Demonstrating Complete Connections in Every Embedded Regions and Sub-Regions in the Terms of Cancer's Recognition and (Neutrosophic) SuperHyperGraphs With (Neutrosophic) SuperHyper...

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1 author:

Henry Garrett

Demonstrating Complete Connections in Every Embedded Regions and Sub-Regions in the Terms of Cancer's Recognition and (Neutrosophic) SuperHyperGraphs With (Neutrosophic) SuperHyperClique

Henry Garrett

DrHenryGarrett@gmail.com

Twitter's ID: @DrHenryGarrett | ©DrHenryGarrett.wordpress.com

in this research, new setting is introduced for new SuperHyperNotions, namely, a SuperHyperClique and Neutrosophic SuperHyperClique . Two different types of SuperHyperDefinitions are debut for them but the research goes further and the SuperHyperNotion, SuperHyperUniform, and SuperHyperClass based on that are well-defined and well-reviewed. The literature review is implemented in the whole of this research. For shining the elegancy and the significancy of this research, the comparison between this SuperHyperNotion with other SuperHyperNotions and fundamental SuperHyperNumbers are featured. The definitions are followed by the examples and the instances thus the clarifications are driven with different tools. The applications are figured out to make sense about the theoretical aspect of this ongoing research. The "Cancer's Recognition" are the under research to figure out the challenges make sense about ongoing and upcoming research. The special case is up. The cells are viewed in the deemed ways. There are different types of them. Some of them are individuals and some of them are well-modeled by the group of cells. These types are all officially called "SuperHyperVertex" but the relations amid them all officially called "SuperHyperEdge". The frameworks "SuperHyperGraph" and "neutrosophic SuperHyperGraph" are chosen and elected to research about "Cancer's Recognition". Thus these complex and dense SuperHyperModels open up some avenues to research on theoretical segments and "Cancer's Recognition". Some avenues are posed to pursue this research. It's also officially collected in the form of some questions and some problems. Assume a SuperHyperGraph. Then a "SuperHyperClique" $\mathcal{C}(NSHG)$ for a neutrosophic SuperHyperGraph $NSHG:(V,E)$ is the maximum cardinality of a SuperHyperSet S of SuperHyperVertices such that there's a SuperHyperVertex to have a SuperHyperEdge in common. Assume a SuperHyperGraph. Then an "$\delta-$SuperHyperClique" is a <u>maximal</u> SuperHyperClique of SuperHyperVertices with <u>maximum</u> cardinality such that either of the following expressions hold for the (neutrosophic) cardinalities of SuperHyperNeighbors of $s \in S$: $|S \cap N(s)| > |S \cap (V \setminus N(s))| + \delta,\ |S \cap N(s)| < |S \cap (V \setminus N(s))| + \delta.$ The first Expression, holds if S is an "$\delta-$SuperHyperOffensive". And the second Expression, holds if S is an "$\delta-$SuperHyperDefensive"; a"neutrosophic $\delta-$SuperHyperClique" is a <u>maximal</u> neutrosophic SuperHyperClique of SuperHyperVertices with <u>maximum</u> neutrosophic cardinality such that either of the following expressions hold for the neutrosophic cardinalities of SuperHyperNeighbors of $s \in S$: $|S \cap N(s)|_{neutrosophic} > |S \cap (V \setminus N(s))|_{neutrosophic} + \delta,\ |S \cap N(s)|_{neutrosophic} < |S \cap (V \setminus N(s))|_{neutrosophic} + \delta.$ The first Expression, holds if S is a "neutrosophic $\delta-$SuperHyperOffensive". And the second Expression, holds if S is a "neutrosophic $\delta-$SuperHyperDefensive". It's useful to define a "neutrosophic" version of a SuperHyperClique . Since there's more ways to get

type-results to make a SuperHyperClique more understandable. For the sake of having neutrosophic SuperHyperClique, there's a need to "redefine" the notion of a "SuperHyperClique ". The SuperHyperVertices and the SuperHyperEdges are assigned by the labels from the letters of the alphabets. In this procedure, there's the usage of the position of labels to assign to the values. Assume a SuperHyperClique . It's redefined a neutrosophic SuperHyperClique if the mentioned Table holds, concerning, "The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The Neutrosophic SuperHyperGraph" with the key points, "The Values of The Vertices & The Number of Position in Alphabet", "The Values of The SuperVertices&The maximum Values of Its Vertices", "The Values of The Edges&The maximum Values of Its Vertices", "The Values of The HyperEdges&The maximum Values of Its Vertices", "The Values of The SuperHyperEdges&The maximum Values of Its Endpoints". To get structural examples and instances, I'm going to introduce the next SuperHyperClass of SuperHyperGraph based on a SuperHyperClique . It's the main. It'll be disciplinary to have the foundation of previous definition in the kind of SuperHyperClass. If there's a need to have all SuperHyperConnectivities until the SuperHyperClique, then it's officially called a "SuperHyperClique" but otherwise, it isn't a SuperHyperClique . There are some instances about the clarifications for the main definition titled a "SuperHyperClique ". These two examples get more scrutiny and discernment since there are characterized in the disciplinary ways of the SuperHyperClass based on a SuperHyperClique . For the sake of having a neutrosophic SuperHyperClique, there's a need to "redefine" the notion of a "neutrosophic SuperHyperClique" and a "neutrosophic SuperHyperClique ". The SuperHyperVertices and the SuperHyperEdges are assigned by the labels from the letters of the alphabets. In this procedure, there's the usage of the position of labels to assign to the values. Assume a neutrosophic SuperHyperGraph. It's redefined "neutrosophic SuperHyperGraph" if the intended Table holds. And a SuperHyperClique are redefined to a "neutrosophic SuperHyperClique" if the intended Table holds. It's useful to define "neutrosophic" version of SuperHyperClasses. Since there's more ways to get neutrosophic type-results to make a neutrosophic SuperHyperClique more understandable. Assume a neutrosophic SuperHyperGraph. There are some neutrosophic SuperHyperClasses if the intended Table holds. Thus SuperHyperPath, SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultiPartite, and SuperHyperWheel, are "neutrosophic SuperHyperPath", "neutrosophic SuperHyperCycle", "neutrosophic SuperHyperStar", "neutrosophic SuperHyperBipartite", "neutrosophic SuperHyperMultiPartite", and "neutrosophic SuperHyperWheel" if the intended Table holds. A SuperHyperGraph has a "neutrosophic SuperHyperClique" where it's the strongest [the maximum neutrosophic value from all the SuperHyperClique amid the maximum value amid all SuperHyperVertices from a SuperHyperClique .] SuperHyperClique . A graph is a SuperHyperUniform if it's a SuperHyperGraph and the number of elements of SuperHyperEdges are the same. Assume a neutrosophic SuperHyperGraph. There are some SuperHyperClasses as follows. It's SuperHyperPath if it's only one SuperVertex as intersection amid two given SuperHyperEdges with two exceptions; it's SuperHyperCycle if it's only one SuperVertex as intersection amid two given SuperHyperEdges; it's SuperHyperStar it's only one SuperVertex as intersection amid all SuperHyperEdges; it's SuperHyperBipartite it's only one SuperVertex as intersection amid two given SuperHyperEdges and these SuperVertices, forming two separate sets, has no SuperHyperEdge in common; it's SuperHyperMultiPartite it's only one SuperVertex as intersection amid two given SuperHyperEdges and these SuperVertices, forming multi separate sets, has no SuperHyperEdge in common; it's a SuperHyperWheel if it's only one SuperVertex as intersection amid two given SuperHyperEdges and one SuperVertex has one SuperHyperEdge with any common SuperVertex. The SuperHyperModel proposes the specific designs and the specific architectures. The SuperHyperModel is officially called "SuperHyperGraph" and "Neutrosophic SuperHyperGraph". In this SuperHyperModel, The "specific" cells and "specific group" of cells are SuperHyperModeled as "SuperHyperVertices" and the common and intended properties between "specific" cells and "specific group" of cells are SuperHyperModeled as "SuperHyperEdges". Sometimes, it's useful to have some degrees of determinacy, indeterminacy, and neutrality to have more precise SuperHyperModel which in this case the SuperHyperModel is called "neutrosophic". In the future research, the foundation will be based on the "Cancer's Recognition" and the results and the definitions will be introduced in redeemed ways. The recognition of the cancer in the long-term function. The specific region has been assigned by the model [it's called SuperHyperGraph] and the long cycle of the move from the cancer is identified by this research. Sometimes the move of the cancer hasn't be easily identified since there are some determinacy, indeterminacy and neutrality about the moves and the effects of the cancer on that region; this event leads us to choose another model [it's said to be neutrosophic SuperHyperGraph] to have convenient perception on what's happened and what's done. There are some specific models, which are well-known and they've got the names, and some SuperHyperGeneral SuperHyperModels. The moves and the traces of the cancer on the complex tracks and between complicated groups of cells could be fantasized by a neutrosophic SuperHyperPath(-/SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultipartite, SuperHyperWheel). The aim is to find either the longest SuperHyperClique or the strongest SuperHyperClique in those neutrosophic SuperHyperModels. For the longest SuperHyperClique, called SuperHyperClique, and the strongest SuperHyperClique, called neutrosophic SuperHyperClique, some general results are introduced. Beyond that in SuperHyperStar, all possible SuperHyperPaths have only two SuperHyperEdges but it's not enough since it's essential to have at least three SuperHyperEdges to form any style of a SuperHyperCycle. There isn't any formation of any SuperHyperCycle but literarily, it's the deformation of any SuperHyperCycle. It, literarily, deforms and it doesn't form. A basic familiarity with SuperHyperGraph theory and neutrosophic SuperHyperGraph theory are proposed.

Keywords: SuperHyperGraph, (Neutrosophic) SuperHyperClique, Cancer's Recognition

AMS Subject Classification: 05C17, 05C22, 05E45

1 Background

There are some researches covering the topic of this research. In what follows, there are some discussion and literature reviews about them.

First article is titled "properties of SuperHyperGraph and neutrosophic SuperHyperGraph" in **Ref.** [1] by Henry Garrett (2022). It's first step toward the research on neutrosophic SuperHyperGraphs. This research article is published on the journal "Neutrosophic Sets and Systems" in issue 49 and the pages 531-561. In this research article, different types of notions like dominating, resolving, coloring, Eulerian(Hamiltonian) neutrosophic path, n-Eulerian(Hamiltonian) neutrosophic path, zero forcing number, zero forcing neutrosophic- number, independent number, independent neutrosophic-number, clique number, clique neutrosophic-number, matching number, matching neutrosophic-number, girth, neutrosophic girth, 1-zero-forcing number, 1-zero- forcing neutrosophic-number, failed 1-zero-forcing number, failed 1-zero-forcing neutrosophic-number, global- offensive alliance, t-offensive alliance, t-defensive alliance, t-powerful alliance, and global-powerful alliance are defined in SuperHyperGraph and neutrosophic SuperHyperGraph. Some Classes of

SuperHyperGraph and Neutrosophic SuperHyperGraph are cases of research. Some results are applied in family of SuperHyperGraph and neutrosophic SuperHyperGraph. Thus this research article has concentrated on the vast notions and introducing the majority of notions.

The seminal paper and groundbreaking article is titled "neutrosophic co-degree and neutrosophic degree alongside chromatic numbers in the setting of some classes related to neutrosophic hypergraphs" in **Ref.** [2] by Henry Garrett (2022). In this research article, a novel approach is implemented on SuperHyperGraph and neutrosophic SuperHyperGraph based on general forms without using neutrosophic classes of neutrosophic SuperHyperGraph. It's published in prestigious and fancy journal is entitled "Journal of Current Trends in Computer Science Research (JCTCSR)" with abbreviation "J Curr Trends Comp Sci Res" in volume 1 and issue 1 with pages 06-14. The research article studies deeply with choosing neutrosophic hypergraphs instead of neutrosophic SuperHyperGraph. It's the breakthrough toward independent results based on initial background.

The seminal paper and groundbreaking article is titled "Super Hyper Dominating and Super Hyper Resolving on Neutrosophic Super Hyper Graphs and Their Directions in Game Theory and Neutrosophic Super Hyper Classes" in **Ref.** [3] by Henry Garrett (2022). In this research article, a novel approach is implemented on SuperHyperGraph and neutrosophic SuperHyperGraph based on fundamental SuperHyperNumber and using neutrosophic SuperHyperClasses of neutrosophic SuperHyperGraph. It's published in prestigious and fancy journal is entitled "Journal of Mathematical Techniques and Computational Mathematics(JMTCM)" with abbreviation "J Math Techniques Comput Math" in volume 1 and issue 3 with pages 242-263. The research article studies deeply with choosing directly neutrosophic SuperHyperGraph and SuperHyperGraph. It's the breakthrough toward independent results based on initial background and fundamental SuperHyperNumbers.

In some articles are titled "0039 — Closing Numbers and Super-Closing Numbers as (Dual)Resolving and (Dual)Coloring alongside (Dual)Dominating in (Neutrosophic)n-SuperHyperGraph" in **Ref.** [4] by Henry Garrett (2022), "0049 — (Failed)1-Zero-Forcing Number in Neutrosophic Graphs" in **Ref.** [5] by Henry Garrett (2022), "(Neutrosophic) 1-Failed SuperHyperForcing in Cancer's Recognitions And (Neutrosophic) SuperHyperGraphs" in **Ref.** [6] by Henry Garrett (2022), "Neutrosophic Messy-Style SuperHyperGraphs To Form Neutrosophic SuperHyperStable To Act on Cancer's Neutrosophic Recognitions In Special ViewPoints" in **Ref.** [7] by Henry Garrett (2022), "Neutrosophic 1-Failed SuperHyperForcing in the SuperHyperFunction To Use Neutrosophic SuperHyperGraphs on Cancer's Neutrosophic Recognition And Beyond" in **Ref.** [8] by Henry Garrett (2022), "(Neutrosophic) SuperHyperStable on Cancer's Recognition by Well- SuperHyperModelled (Neutrosophic) SuperHyperGraphs " in **Ref.** [9] by Henry Garrett (2022), "Neutrosophic Messy-Style SuperHyperGraphs To Form Neutrosophic SuperHyperStable To Act on Cancer's Neutrosophic Recognitions In Special ViewPoints" in **Ref.** [10] by Henry Garrett (2022), "Basic Notions on (Neutrosophic) SuperHyperForcing And (Neutrosophic) SuperHyperModeling in Cancer's Recognitions And (Neutrosophic) SuperHyperGraphs" in **Ref.** [11] by Henry Garrett (2022), "(Neutrosophic) SuperHyperModeling of Cancer's Recognitions Featuring (Neutrosophic) SuperHyperDefensive SuperHyperAlliances" in **Ref.** [12] by Henry Garrett (2022), "(Neutrosophic) SuperHyperAlliances With SuperHyperDefensive and SuperHyperOffensive Type-SuperHyperSet On (Neutrosophic) SuperHyperGraph With (Neutrosophic) SuperHyperModeling of Cancer's Recognitions And Related (Neutrosophic) SuperHyperClasses" in **Ref.** [13] by Henry Garrett (2022), "SuperHyperGirth on SuperHyperGraph and Neutrosophic SuperHyperGraph With SuperHyperModeling of Cancer's Recognitions" in **Ref.** [14] by Henry Garrett (2022), "Some SuperHyperDegrees and Co-SuperHyperDegrees on

Neutrosophic SuperHyperGraphs and SuperHyperGraphs Alongside Applications in Cancer's Treatments" in **Ref.** [15] by Henry Garrett (2022), "SuperHyperDominating and SuperHyperResolving on Neutrosophic SuperHyperGraphs And Their Directions in Game Theory and Neutrosophic SuperHyperClasses" in **Ref.** [16] by Henry Garrett (2022), "Different Neutrosophic Types of Neutrosophic Regions titled neutrosophic Failed SuperHyperStable in Cancer's Neutrosophic Recognition modeled in the Form of Neutrosophic SuperHyperGraphs" in **Ref.** [17] by Henry Garrett (2023), "Using the Tool As (Neutrosophic) Failed SuperHyperStable To SuperHyperModel Cancer's Recognition Titled (Neutrosophic) SuperHyperGraphs" in **Ref.** [18] by Henry Garrett (2023), "Neutrosophic Messy-Style SuperHyperGraphs To Form Neutrosophic SuperHyperStable To Act on Cancer's Neutrosophic Recognitions In Special ViewPoints" in **Ref.** [19] by Henry Garrett (2023), "(Neutrosophic) SuperHyperStable on Cancer's Recognition by Well-SuperHyperModelled (Neutrosophic) SuperHyperGraphs" in **Ref.** [20] by Henry Garrett (2023), "Neutrosophic 1-Failed SuperHyperForcing in the SuperHyperFunction To Use Neutrosophic SuperHyperGraphs on Cancer's Neutrosophic Recognition And Beyond" in **Ref.** [21] by Henry Garrett (2022), "(Neutrosophic) 1-Failed SuperHyperForcing in Cancer's Recognitions And (Neutrosophic) SuperHyperGraphs" in **Ref.** [22] by Henry Garrett (2022), "Basic Notions on (Neutrosophic) SuperHyperForcing And (Neutrosophic) SuperHyperModeling in Cancer's Recognitions And (Neutrosophic) SuperHyperGraphs" in **Ref.** [23] by Henry Garrett (2022), "Basic Neutrosophic Notions Concerning SuperHyperDominating and Neutrosophic SuperHyperResolving in SuperHyperGraph" in **Ref.** [24] by Henry Garrett (2022), "Initial Material of Neutrosophic Preliminaries to Study Some Neutrosophic Notions Based on Neutrosophic SuperHyperEdge (NSHE) in Neutrosophic SuperHyperGraph (NSHG)" in **Ref.** [25] by Henry Garrett (2022), there are some endeavors to formalize the basic SuperHyperNotions about neutrosophic SuperHyperGraph and SuperHyperGraph.

Some studies and researches about neutrosophic graphs, are proposed as book in **Ref.** [26] by Henry Garrett (2022) which is indexed by Google Scholar and has more than 2347 readers in Scribd. It's titled "Beyond Neutrosophic Graphs" and published by Ohio: E-publishing: Educational Publisher 1091 West 1st Ave Grandview Heights, Ohio 43212 United State. This research book covers different types of notions and settings in neutrosophic graph theory and neutrosophic SuperHyperGraph theory.

Also, some studies and researches about neutrosophic graphs, are proposed as book in **Ref.** [27] by Henry Garrett (2022) which is indexed by Google Scholar and has more than 3048 readers in Scribd. It's titled "Neutrosophic Duality" and published by Florida: GLOBAL KNOWLEDGE - Publishing House 848 Brickell Ave Ste 950 Miami, Florida 33131 United States. This research book presents different types of notions SuperHyperResolving and SuperHyperDominating in the setting of duality in neutrosophic graph theory and neutrosophic SuperHyperGraph theory. This research book has scrutiny on the complement of the intended set and the intended set, simultaneously. It's smart to consider a set but acting on its complement that what's done in this research book which is popular in the terms of high readers in Scribd.

2 Motivation and Contributions

In this research, there are some ideas in the featured frameworks of motivations. I try to bring the motivations in the narrative ways. Some cells have been faced with some attacks from the situation which is caused by the cancer's attacks. In this case, there are some embedded analysis on the ongoing situations which in that, the cells could be labelled as some groups and some groups or individuals have excessive labels which all are raised from the behaviors to overcome the cancer's attacks. In the embedded situations, the individuals of cells and the groups of cells could be considered as "new groups". Thus it motivates us to find the proper SuperHyperModels for getting more proper analysis on this messy story. I've found the SuperHyperModels which are officially called "SuperHyperGraphs" and "Neutrosophic SuperHyperGraphs". In this SuperHyperModel, the cells and the groups of cells are defined as "SuperHyperVertices" and the relations between the individuals of cells and the groups of cells are defined as "SuperHyperEdges". Thus it's another motivation for us to do research on this SuperHyperModel based on the "Cancer's Recognition". Sometimes, the situations get worst. The situation is passed from the certainty and precise style. Thus it's the beyond them. There are three descriptions, namely, the degrees of determinacy, indeterminacy and neutrality, for any object based on vague forms, namely, incomplete data, imprecise data, and uncertain analysis. The latter model could be considered on the previous SuperHyperModel. It's SuperHyperModel. It's SuperHyperGraph but it's officially called "Neutrosophic SuperHyperGraphs". The cancer is the disease but the model is going to figure out what's going on this phenomenon. The special case of this disease is considered and as the consequences of the model, some parameters are used. The cells are under attack of this disease but the moves of the cancer in the special region are the matter of mind. The recognition of the cancer could help to find some treatments for this disease. The SuperHyperGraph and neutrosophic SuperHyperGraph are the SuperHyperModels on the "Cancer's Recognition" and both bases are the background of this research. Sometimes the cancer has been happened on the region, full of cells, groups of cells and embedded styles. In this segment, the SuperHyperModel proposes some SuperHyperNotions based on the connectivities of the moves of the cancer in the forms of alliances' styles with the formation of the design and the architecture are formally called " SuperHyperClique" in the themes of jargons and buzzwords. The prefix "SuperHyper" refers to the theme of the embedded styles to figure out the background for the SuperHyperNotions. The recognition of the cancer in the long-term function. The specific region has been assigned by the model [it's called SuperHyperGraph] and the long cycle of the move from the cancer is identified by this research. Sometimes the move of the cancer hasn't be easily identified since there are some determinacy, indeterminacy and neutrality about the moves and the effects of the cancer on that region; this event leads us to choose another model [it's said to be neutrosophic SuperHyperGraph] to have convenient perception on what's happened and what's done. There are some specific models, which are well-known and they've got the names, and some general models. The moves and the traces of the cancer on the complex tracks and between complicated groups of cells could be fantasized by a neutrosophic neutrosophic SuperHyperPath (-/SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultipartite, SuperHyperWheel). The aim is to find either the optimal SuperHyperClique or the neutrosophic SuperHyperClique in those neutrosophic SuperHyperModels. Some general results are introduced. Beyond that in SuperHyperStar, all possible neutrosophic SuperHyperPath s have only two SuperHyperEdges but it's not enough since it's essential to have at least three SuperHyperEdges to form any style of a SuperHyperCycle. There isn't any formation of any SuperHyperCycle but literarily, it's the deformation of any SuperHyperCycle. It, literarily, deforms and it doesn't form.

Question 2.1. *How to define the SuperHyperNotions and to do research on them to find the " amount of SuperHyperClique" of either individual of cells or the groups of cells based on the fixed cell or the fixed group of cells, extensively, the "amount of SuperHyperClique" based on the fixed groups of cells or the fixed groups of group of cells?*

Question 2.2. *What are the best descriptions for the "Cancer's Recognition" in terms of these messy and dense SuperHyperModels where embedded notions are illustrated?*

It's motivation to find notions to use in this dense model is titled

"SuperHyperGraphs". Thus it motivates us to define different types of " SuperHyperClique" and "neutrosophic SuperHyperClique" on "SuperHyperGraph" and "Neutrosophic SuperHyperGraph". Then the research has taken more motivations to define SuperHyperClasses and to find some connections amid this SuperHyperNotion with other SuperHyperNotions. It motivates us to get some instances and examples to make clarifications about the framework of this research. The general results and some results about some connections are some avenues to make key point of this research, "Cancer's Recognition", more understandable and more clear.

The framework of this research is as follows. In the beginning, I introduce basic definitions to clarify about preliminaries. In the subsection "Preliminaries", initial definitions about SuperHyperGraphs and neutrosophic SuperHyperGraph are deeply-introduced and in-depth-discussed. The elementary concepts are clarified and illustrated completely and sometimes review literature are applied to make sense about what's going to figure out about the upcoming sections. The main definitions and their clarifications alongside some results about new notions, SuperHyperClique and neutrosophic SuperHyperClique, are figured out in sections " SuperHyperClique" and "Neutrosophic SuperHyperClique". In the sense of tackling on getting results and in order to make sense about continuing the research, the ideas of SuperHyperUniform and Neutrosophic SuperHyperUniform are introduced and as their consequences, corresponded SuperHyperClasses are figured out to debut what's done in this section, titled "Results on SuperHyperClasses" and "Results on Neutrosophic SuperHyperClasses". As going back to origin of the notions, there are some smart steps toward the common notions to extend the new notions in new frameworks, SuperHyperGraph and Neutrosophic SuperHyperGraph, in the sections "Results on SuperHyperClasses" and "Results on Neutrosophic SuperHyperClasses". The starter research about the general SuperHyperRelations and as concluding and closing section of theoretical research are contained in the section "General Results". Some general SuperHyperRelations are fundamental and they are well-known as fundamental SuperHyperNotions as elicited and discussed in the sections, "General Results", " SuperHyperClique", "Neutrosophic SuperHyperClique", "Results on SuperHyperClasses" and "Results on Neutrosophic SuperHyperClasses". There are curious questions about what's done about the SuperHyperNotions to make sense about excellency of this research and going to figure out the word "best" as the description and adjective for this research as presented in section, " SuperHyperClique". The keyword of this research debut in the section "Applications in Cancer's Recognition" with two cases and subsections "Case 1: The Initial Steps Toward SuperHyperBipartite as SuperHyperModel" and "Case 2: The Increasing Steps Toward SuperHyperMultipartite as SuperHyperModel". In the section, "Open Problems", there are some scrutiny and discernment on what's done and what's happened in this research in the terms of "questions" and "problems" to make sense to figure out this research in featured style. The advantages and the limitations of this research alongside about what's done in this research to make sense and to get sense about what's figured out are included in the section, "Conclusion and Closing Remarks".

3 Preliminaries

In this subsection, the basic material which is used in this research, is presented. Also, the new ideas and their clarifications are elicited.

Definition 3.1 (Neutrosophic Set)**.** (**Ref.** [29],Definition 2.1,p.87).

Let X be a space of points (objects) with generic elements in X denoted by x; then the **neutrosophic set** A (NS A) is an object having the form

$$A = \{< x : T_A(x), I_A(x), F_A(x) >, x \in X\}$$

where the functions $T, I, F : X \to]^-0, 1^+[$ define respectively the a **truth-membership function**, an **indeterminacy-membership function**, and a **falsity-membership function** of the element $x \in X$ to the set A with the condition

$$^-0 \leq T_A(x) + I_A(x) + F_A(x) \leq 3^+.$$

The functions $T_A(x), I_A(x)$ and $F_A(x)$ are real standard or nonstandard subsets of $]^-0, 1^+[$.

Definition 3.2 (Single Valued Neutrosophic Set)**.** (**Ref.** [32],Definition 6,p.2).
Let X be a space of points (objects) with generic elements in X denoted by x. A **single valued neutrosophic set** A (SVNS A) is characterized by truth-membership function $T_A(x)$, an indeterminacy-membership function $I_A(x)$, and a falsity-membership function $F_A(x)$. For each point x in X, $T_A(x), I_A(x), F_A(x) \in [0, 1]$. A SVNS A can be written as

$$A = \{< x : T_A(x), I_A(x), F_A(x) >, x \in X\}.$$

Definition 3.3. The **degree of truth-membership**, **indeterminacy-membership** and **falsity-membership of the subset** $X \subset A$ of the single valued neutrosophic set $A = \{< x : T_A(x), I_A(x), F_A(x) >, x \in X\}$:

$$T_A(X) = \min[T_A(v_i), T_A(v_j)]_{v_i, v_j \in X},$$

$$I_A(X) = \min[I_A(v_i), I_A(v_j)]_{v_i, v_j \in X},$$

$$\text{and } F_A(X) = \min[F_A(v_i), F_A(v_j)]_{v_i, v_j \in X}.$$

Definition 3.4. The **support** of $X \subset A$ of the single valued neutrosophic set $A = \{< x : T_A(x), I_A(x), F_A(x) >, x \in X\}$:

$$supp(X) = \{x \in X : \ T_A(x), I_A(x), F_A(x) > 0\}.$$

Definition 3.5 (Neutrosophic SuperHyperGraph (NSHG))**.** (**Ref.** [31],Definition 3,p.291).
Assume V' is a given set. A **neutrosophic SuperHyperGraph** (NSHG) S is an ordered pair $S = (V, E)$, where

(i) $V = \{V_1, V_2, \ldots, V_n\}$ a finite set of finite single valued neutrosophic subsets of V';

(ii) $V = \{(V_i, T_{V'}(V_i), I_{V'}(V_i), F_{V'}(V_i)) : \ T_{V'}(V_i), I_{V'}(V_i), F_{V'}(V_i) \geq 0\}, \ (i = 1, 2, \ldots, n)$;

(iii) $E = \{E_1, E_2, \ldots, E_{n'}\}$ a finite set of finite single valued neutrosophic subsets of V;

(iv) $E = \{(E_{i'}, T'_V(E_{i'}), I'_V(E_{i'}), F'_V(E_{i'})) : \ T'_V(E_{i'}), I'_V(E_{i'}), F'_V(E_{i'}) \geq 0\}, \ (i' = 1, 2, \ldots, n')$;

(v) $V_i \neq \emptyset, \ (i = 1, 2, \ldots, n)$;

(vi) $E_{i'} \neq \emptyset, \ (i' = 1, 2, \ldots, n')$;

(vii) $\sum_i supp(V_i) = V, \ (i = 1, 2, \ldots, n)$;

$(viii)$ $\sum_{i'} supp(E_{i'}) = V, \ (i' = 1, 2, \ldots, n')$;

(ix) and the following conditions hold:

$$T'_V(E_{i'}) \leq \min[T_{V'}(V_i), T_{V'}(V_j)]_{V_i,V_j \in E_{i'}},$$

$$I'_V(E_{i'}) \leq \min[I_{V'}(V_i), I_{V'}(V_j)]_{V_i,V_j \in E_{i'}},$$

$$\text{and } F'_V(E_{i'}) \leq \min[F_{V'}(V_i), F_{V'}(V_j)]_{V_i,V_j \in E_{i'}}$$

where $i' = 1, 2, \ldots, n'$.

Here the neutrosophic SuperHyperEdges (NSHE) $E_{j'}$ and the neutrosophic SuperHyperVertices (NSHV) V_j are single valued neutrosophic sets. $T_{V'}(V_i), I_{V'}(V_i)$, and $F_{V'}(V_i)$ denote the degree of truth-membership, the degree of indeterminacy-membership and the degree of falsity-membership the neutrosophic SuperHyperVertex (NSHV) V_i to the neutrosophic SuperHyperVertex (NSHV) V. $T'_V(E_{i'}), T'_V(E_{i'})$, and $T'_V(E_{i'})$ denote the degree of truth-membership, the degree of indeterminacy-membership and the degree of falsity-membership of the neutrosophic SuperHyperEdge (NSHE) $E_{i'}$ to the neutrosophic SuperHyperEdge (NSHE) E. Thus, the ii'th element of the **incidence matrix** of neutrosophic SuperHyperGraph (NSHG) are of the form $(V_i, T'_V(E_{i'}), I'_V(E_{i'}), F'_V(E_{i'}))$, the sets V and E are crisp sets.

Definition 3.6 (Characterization of the Neutrosophic SuperHyperGraph (NSHG))**.** (**Ref.** [31],Section 4,pp.291-292).

Assume a neutrosophic SuperHyperGraph (NSHG) S is an ordered pair $S = (V, E)$. The neutrosophic SuperHyperEdges (NSHE) $E_{i'}$ and the neutrosophic SuperHyperVertices (NSHV) V_i of neutrosophic SuperHyperGraph (NSHG) $S = (V, E)$ could be characterized as follow-up items.

(i) If $|V_i| = 1$, then V_i is called **vertex**;

(ii) if $|V_i| \geq 1$, then V_i is called **SuperVertex**;

(iii) if for all V_is are incident in $E_{i'}$, $|V_i| = 1$, and $|E_{i'}| = 2$, then $E_{i'}$ is called **edge**;

(iv) if for all V_is are incident in $E_{i'}$, $|V_i| = 1$, and $|E_{i'}| \geq 2$, then $E_{i'}$ is called **HyperEdge**;

(v) if there's a V_i is incident in $E_{i'}$ such that $|V_i| \geq 1$, and $|E_{i'}| = 2$, then $E_{i'}$ is called **SuperEdge**;

(vi) if there's a V_i is incident in $E_{i'}$ such that $|V_i| \geq 1$, and $|E_{i'}| \geq 2$, then $E_{i'}$ is called **SuperHyperEdge**.

If we choose different types of binary operations, then we could get hugely diverse types of general forms of neutrosophic SuperHyperGraph (NSHG).

Definition 3.7 (t-norm)**.** (**Ref.** [30], Definition 5.1.1, pp.82-83).

A binary operation $\otimes : [0, 1] \times [0, 1] \to [0, 1]$ is a ***t*-norm** if it satisfies the following for $x, y, z, w \in [0, 1]$:

(i) $1 \otimes x = x$;

(ii) $x \otimes y = y \otimes x$;

(iii) $x \otimes (y \otimes z) = (x \otimes y) \otimes z$;

(iv) If $w \leq x$ and $y \leq z$ then $w \otimes y \leq x \otimes z$.

Definition 3.8. The **degree of truth-membership**, **indeterminacy-membership** and **falsity-membership of the subset** $X \subset A$ of the single valued neutrosophic set $A = \{< x : T_A(x), I_A(x), F_A(x) >, x \in X\}$ (with respect to t-norm T_{norm}):

$$T_A(X) = T_{norm}[T_A(v_i), T_A(v_j)]_{v_i, v_j \in X},$$

$$I_A(X) = T_{norm}[I_A(v_i), I_A(v_j)]_{v_i, v_j \in X},$$

$$\text{and } F_A(X) = T_{norm}[F_A(v_i), F_A(v_j)]_{v_i, v_j \in X}.$$

Definition 3.9. The **support** of $X \subset A$ of the single valued neutrosophic set $A = \{< x : T_A(x), I_A(x), F_A(x) >, x \in X\}$:

$$supp(X) = \{x \in X : \ T_A(x), I_A(x), F_A(x) > 0\}.$$

Definition 3.10. (General Forms of Neutrosophic SuperHyperGraph (NSHG)).

Assume V' is a given set. A **neutrosophic SuperHyperGraph** (NSHG) S is an ordered pair $S = (V, E)$, where

(i) $V = \{V_1, V_2, \ldots, V_n\}$ a finite set of finite single valued neutrosophic subsets of V';

(ii) $V = \{(V_i, T_{V'}(V_i), I_{V'}(V_i), F_{V'}(V_i)) : \ T_{V'}(V_i), I_{V'}(V_i), F_{V'}(V_i) \geq 0\}, \ (i = 1, 2, \ldots, n)$;

(iii) $E = \{E_1, E_2, \ldots, E_{n'}\}$ a finite set of finite single valued neutrosophic subsets of V;

(iv) $E = \{(E_{i'}, T'_V(E_{i'}), I'_V(E_{i'}), F'_V(E_{i'})) : \ T'_V(E_{i'}), I'_V(E_{i'}), F'_V(E_{i'}) \geq 0\}, \ (i' = 1, 2, \ldots, n')$;

(v) $V_i \neq \emptyset, \ (i = 1, 2, \ldots, n)$;

(vi) $E_{i'} \neq \emptyset, \ (i' = 1, 2, \ldots, n')$;

(vii) $\sum_i supp(V_i) = V, \ (i = 1, 2, \ldots, n)$;

$(viii)$ $\sum_{i'} supp(E_{i'}) = V, \ (i' = 1, 2, \ldots, n')$.

Here the neutrosophic SuperHyperEdges (NSHE) $E_{j'}$ and the neutrosophic SuperHyperVertices (NSHV) V_j are single valued neutrosophic sets. $T_{V'}(V_i), I_{V'}(V_i)$, and $F_{V'}(V_i)$ denote the degree of truth-membership, the degree of indeterminacy-membership and the degree of falsity-membership the neutrosophic SuperHyperVertex (NSHV) V_i to the neutrosophic SuperHyperVertex (NSHV) V. $T'_V(E_{i'}), T'_V(E_{i'})$, and $T'_V(E_{i'})$ denote the degree of truth-membership, the degree of indeterminacy-membership and the degree of falsity-membership of the neutrosophic SuperHyperEdge (NSHE) $E_{i'}$ to the neutrosophic SuperHyperEdge (NSHE) E. Thus, the ii'th element of the **incidence matrix** of neutrosophic SuperHyperGraph (NSHG) are of the form $(V_i, T'_V(E_{i'}), I'_V(E_{i'}), F'_V(E_{i'}))$, the sets V and E are crisp sets.

Definition 3.11 (Characterization of the Neutrosophic SuperHyperGraph (NSHG))**.** (**Ref.** [31],Section 4,pp.291-292).

Assume a neutrosophic SuperHyperGraph (NSHG) S is an ordered pair $S = (V, E)$. The neutrosophic SuperHyperEdges (NSHE) $E_{i'}$ and the neutrosophic SuperHyperVertices (NSHV) V_i of neutrosophic SuperHyperGraph (NSHG) $S = (V, E)$ could be characterized as follow-up items.

(i) If $|V_i| = 1$, then V_i is called **vertex**;

(ii) if $|V_i| \geq 1$, then V_i is called **SuperVertex**;

(iii) if for all V_is are incident in $E_{i'}$, $|V_i| = 1$, and $|E_{i'}| = 2$, then $E_{i'}$ is called **edge**;

(iv) if for all V_is are incident in $E_{i'}$, $|V_i| = 1$, and $|E_{i'}| \geq 2$, then $E_{i'}$ is called **HyperEdge**;

(v) if there's a V_i is incident in $E_{i'}$ such that $|V_i| \geq 1$, and $|E_{i'}| = 2$, then $E_{i'}$ is called **SuperEdge**;

(vi) if there's a V_i is incident in $E_{i'}$ such that $|V_i| \geq 1$, and $|E_{i'}| \geq 2$, then $E_{i'}$ is called **SuperHyperEdge**.

This SuperHyperModel is too messy and too dense. Thus there's a need to have some restrictions and conditions on SuperHyperGraph. The special case of this SuperHyperGraph makes the patterns and regularities.

Definition 3.12. A graph is **SuperHyperUniform** if it's SuperHyperGraph and the number of elements of SuperHyperEdges are the same.

To get more visions on , the some SuperHyperClasses are introduced. It makes to have more understandable.

Definition 3.13. Assume a neutrosophic SuperHyperGraph. There are some SuperHyperClasses as follows.

(i). It's **neutrosophic SuperHyperPath** if it's only one SuperVertex as intersection amid two given SuperHyperEdges with two exceptions;

(ii). it's **SuperHyperCycle** if it's only one SuperVertex as intersection amid two given SuperHyperEdges;

(iii). it's **SuperHyperStar** it's only one SuperVertex as intersection amid all SuperHyperEdges;

(iv). it's **SuperHyperBipartite** it's only one SuperVertex as intersection amid two given SuperHyperEdges and these SuperVertices, forming two separate sets, has no SuperHyperEdge in common;

(v). it's **SuperHyperMultiPartite** it's only one SuperVertex as intersection amid two given SuperHyperEdges and these SuperVertices, forming multi separate sets, has no SuperHyperEdge in common;

(vi). it's **SuperHyperWheel** if it's only one SuperVertex as intersection amid two given SuperHyperEdges and one SuperVertex has one SuperHyperEdge with any common SuperVertex.

Definition 3.14. Let an ordered pair $S = (V, E)$ be a neutrosophic SuperHyperGraph (NSHG) S. Then a sequence of neutrosophic SuperHyperVertices (NSHV) and neutrosophic SuperHyperEdges (NSHE)

$$V_1, E_1, V_2, E_2, V_3, \ldots, V_{s-1}, E_{s-1}, V_s$$

is called a **neutrosophic neutrosophic SuperHyperPath** (NSHP) from neutrosophic SuperHyperVertex (NSHV) V_1 to neutrosophic SuperHyperVertex (NSHV) V_s if either of following conditions hold:

(i) $V_i, V_{i+1} \in E_{i'}$;

(ii) there's a vertex $v_i \in V_i$ such that $v_i, V_{i+1} \in E_{i'}$;

(iii) there's a SuperVertex $V'_i \in V_i$ such that $V'_i, V_{i+1} \in E_{i'}$;

(iv) there's a vertex $v_{i+1} \in V_{i+1}$ such that $V_i, v_{i+1} \in E_{i'}$;

(v) there's a SuperVertex $V'_{i+1} \in V_{i+1}$ such that $V_i, V'_{i+1} \in E_{i'}$;

(vi) there are a vertex $v_i \in V_i$ and a vertex $v_{i+1} \in V_{i+1}$ such that $v_i, v_{i+1} \in E_{i'}$;

(vii) there are a vertex $v_i \in V_i$ and a SuperVertex $V'_{i+1} \in V_{i+1}$ such that $v_i, V'_{i+1} \in E_{i'}$;

(viii) there are a SuperVertex $V'_i \in V_i$ and a vertex $v_{i+1} \in V_{i+1}$ such that $V'_i, v_{i+1} \in E_{i'}$;

(ix) there are a SuperVertex $V'_i \in V_i$ and a SuperVertex $V'_{i+1} \in V_{i+1}$ such that $V'_i, V'_{i+1} \in E_{i'}$.

Definition 3.15. (Characterization of the Neutrosophic neutrosophic SuperHyperPath s).

Assume a neutrosophic SuperHyperGraph (NSHG) S is an ordered pair $S = (V, E)$. A neutrosophic neutrosophic SuperHyperPath (NSHP) from neutrosophic SuperHyperVertex (NSHV) V_1 to neutrosophic SuperHyperVertex (NSHV) V_s is sequence of neutrosophic SuperHyperVertices (NSHV) and neutrosophic SuperHyperEdges (NSHE)

$$V_1, E_1, V_2, E_2, V_3, \ldots, V_{s-1}, E_{s-1}, V_s,$$

could be characterized as follow-up items.

(i) If for all $V_i, E_{j'}$, $|V_i| = 1,\ |E_{j'}| = 2$, then NSHP is called **path**;

(ii) if for all $E_{j'}$, $|E_{j'}| = 2$, and there's V_i, $|V_i| \geq 1$, then NSHP is called **SuperPath**;

(iii) if for all $V_i, E_{j'}$, $|V_i| = 1,\ |E_{j'}| \geq 2$, then NSHP is called **HyperPath**;

(iv) if there are $V_i, E_{j'}$, $|V_i| \geq 1, |E_{j'}| \geq 2$, then NSHP is called **neutrosophic SuperHyperPath** .

Definition 3.16. ((neutrosophic) SuperHyperClique).

Assume a SuperHyperGraph. Then

(i) an **extreme SuperHyperClique** $\mathcal{C}(NSHG)$ for an extreme SuperHyperGraph $NSHG : (V, E)$ is an extreme type-SuperHyperSet of the extreme SuperHyperVertices with **the maximum extreme cardinality** of an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an amount of extreme SuperHyperEdges amid an amount of extreme SuperHyperVertices given by that extreme SuperHyperSet of the extreme SuperHyperVertices; it's also called an extreme $(z, -)-$SuperHyperClique **extreme SuperHyperClique** $\mathcal{C}(NSHG)$ for an extreme SuperHyperGraph $NSHG : (V, E)$ if it's an extreme type-SuperHyperSet of the extreme SuperHyperVertices with **the maximum extreme cardinality** of an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's z extreme SuperHyperEdge amid an amount of extreme SuperHyperVertices given by that extreme SuperHyperSet of the extreme SuperHyperVertices; it's also called an extreme $(-, x)-$SuperHyperClique **extreme SuperHyperClique** $\mathcal{C}(NSHG)$ for an extreme SuperHyperGraph $NSHG : (V, E)$ if it's an extreme type-SuperHyperSet of the extreme SuperHyperVertices with **the maximum extreme cardinality** of an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an amount of extreme SuperHyperEdges amid x extreme SuperHyperVertices given by that extreme SuperHyperSet of the extreme

SuperHyperVertices; it's also called an extreme $(z, x)-$SuperHyperClique **extreme SuperHyperClique** $\mathcal{C}(NSHG)$ for an extreme SuperHyperGraph $NSHG : (V, E)$ if it's an extreme type-SuperHyperSet of the extreme SuperHyperVertices with **the maximum extreme cardinality** of an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's z extreme SuperHyperEdges amid x extreme SuperHyperVertices given by that extreme SuperHyperSet of the extreme SuperHyperVertices; it's also the extreme extension of the extreme notion of the extreme clique in the extreme graphs to the extreme SuperHyperNotion of the extreme SuperHyperClique in the extreme SuperHyperGraphs where in the extreme setting of the graphs, there's an extreme $(1, 2)-$SuperHyperClique since an extreme graph is an extreme SuperHyperGraph;

(ii) an **neutrosophic SuperHyperClique** $\mathcal{C}(NSHG)$ for an neutrosophic SuperHyperGraph $NSHG : (V, E)$ is an neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperVertices with **the maximum neutrosophic cardinality** of an neutrosophic SuperHyperSet S of the neutrosophic SuperHyperVertices such that there's an amount of neutrosophic SuperHyperEdges amid an amount of neutrosophic SuperHyperVertices given by that neutrosophic SuperHyperSet of the neutrosophic SuperHyperVertices; it's also called an neutrosophic $(z, -)-$SuperHyperClique **neutrosophic SuperHyperClique** $\mathcal{C}(NSHG)$ for an neutrosophic SuperHyperGraph $NSHG : (V, E)$ if it's an neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperVertices with **the maximum neutrosophic cardinality** of an neutrosophic SuperHyperSet S of the neutrosophic SuperHyperVertices such that there's z neutrosophic SuperHyperEdge amid an amount of neutrosophic SuperHyperVertices given by that neutrosophic SuperHyperSet of the neutrosophic SuperHyperVertices; it's also called an neutrosophic $(-, x)-$SuperHyperClique **neutrosophic SuperHyperClique** $\mathcal{C}(NSHG)$ for an neutrosophic SuperHyperGraph $NSHG : (V, E)$ if it's an neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperVertices with **the maximum neutrosophic cardinality** of an neutrosophic SuperHyperSet S of the neutrosophic SuperHyperVertices such that there's an amount of neutrosophic SuperHyperEdges amid x neutrosophic SuperHyperVertices given by that neutrosophic SuperHyperSet of the neutrosophic SuperHyperVertices; it's also called an neutrosophic $(z, x)-$SuperHyperClique **neutrosophic SuperHyperClique** $\mathcal{C}(NSHG)$ for an neutrosophic SuperHyperGraph $NSHG : (V, E)$ if it's an neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperVertices with **the maximum neutrosophic cardinality** of an neutrosophic SuperHyperSet S of the neutrosophic SuperHyperVertices such that there's z neutrosophic SuperHyperEdges amid x neutrosophic SuperHyperVertices given by that neutrosophic SuperHyperSet of the neutrosophic SuperHyperVertices; it's also the neutrosophic extension of the neutrosophic notion of the neutrosophic clique in the neutrosophic graphs to the neutrosophic SuperHyperNotion of the neutrosophic SuperHyperClique in the neutrosophic SuperHyperGraphs where in the neutrosophic setting of the graphs, there's an neutrosophic $(1, 2)-$SuperHyperClique since an neutrosophic graph is an extreme SuperHyperGraph;

Proposition 3.17. *An extreme clique in an extreme graph is an extreme $(1, 2)-$SuperHyperClique in that extreme SuperHyperGraph. And reverse of that statement doesn't hold.*

Proposition 3.18. *A neutrosophic clique in a neutrosophic graph is a neutrosophic*

Table 1. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Definition (3.24)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The maximum Values of Its Vertices
The Values of The Edges	The maximum Values of Its Vertices
The Values of The HyperEdges	The maximum Values of Its Vertices
The Values of The SuperHyperEdges	The maximum Values of Its Endpoints

$(1,2)-$*SuperHyperClique in that neutrosophic SuperHyperGraph. And reverse of that statement doesn't hold.*

Proposition 3.19. *Assume an extreme* $(x,z)-$*SuperHyperClique in an extreme SuperHyperGraph. For all* $z_i \leq z, x_i \leq x$*, it's an extreme* $(x_i, z_i)-$*SuperHyperClique in that extreme SuperHyperGraph.*

Proposition 3.20. *Assume a neutrosophic* $(x,z)-$*SuperHyperClique in a neutrosophic SuperHyperGraph. For all* $z_i \leq z, x_i \leq x$*, it's a neutrosophic* $(x_i, z_i)-$*SuperHyperClique in that neutrosophic SuperHyperGraph.*

Definition 3.21. ((neutrosophic)$\delta-$SuperHyperClique).
Assume a SuperHyperGraph. Then

(i) an $\delta-$**SuperHyperClique** is a maximal of SuperHyperVertices with a maximum cardinality such that either of the following expressions hold for the (neutrosophic) cardinalities of SuperHyperNeighbors of $s \in S$:

$$|S \cap N(s)| > |S \cap (V \setminus N(s))| + \delta; \quad (3.1)$$
$$|S \cap N(s)| < |S \cap (V \setminus N(s))| + \delta. \quad (3.2)$$

The Expression (3.1), holds if S is an $\delta-$**SuperHyperOffensive**. And the Expression (3.2), holds if S is an $\delta-$**SuperHyperDefensive**;

(ii) a **neutrosophic** $\delta-$**SuperHyperClique** is a maximal neutrosophic of SuperHyperVertices with maximum neutrosophic cardinality such that either of the following expressions hold for the neutrosophic cardinalities of SuperHyperNeighbors of $s \in S$:

$$|S \cap N(s)|_{neutrosophic} > |S \cap (V \setminus N(s))|_{neutrosophic} + \delta; \quad (3.3)$$
$$|S \cap N(s)|_{neutrosophic} < |S \cap (V \setminus N(s))|_{neutrosophic} + \delta. \quad (3.4)$$

The Expression (3.3), holds if S is a **neutrosophic** $\delta-$**SuperHyperOffensive**. And the Expression (3.4), holds if S is a **neutrosophic** $\delta-$**SuperHyperDefensive**.

For the sake of having a neutrosophic SuperHyperClique, there's a need to "**redefine**" the notion of "neutrosophic SuperHyperGraph". The SuperHyperVertices and the SuperHyperEdges are assigned by the labels from the letters of the alphabets. In this procedure, there's the usage of the position of labels to assign to the values.

Definition 3.22. Assume a neutrosophic SuperHyperGraph. It's redefined **neutrosophic SuperHyperGraph** if the Table (1) holds.

It's useful to define a "neutrosophic" version of SuperHyperClasses. Since there's more ways to get neutrosophic type-results to make a neutrosophic more understandable.

Table 2. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The Neutrosophic SuperHyperGraph, Mentioned in the Definition (3.23)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The maximum Values of Its Vertices
The Values of The Edges	The maximum Values of Its Vertices
The Values of The HyperEdges	The maximum Values of Its Vertices
The Values of The SuperHyperEdges	The maximum Values of Its Endpoints

Table 3. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Definition (3.24)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The maximum Values of Its Vertices
The Values of The Edges	The maximum Values of Its Vertices
The Values of The HyperEdges	The maximum Values of Its Vertices
The Values of The SuperHyperEdges	The maximum Values of Its Endpoints

Definition 3.23. Assume a neutrosophic SuperHyperGraph. There are some **neutrosophic SuperHyperClasses** if the Table (2) holds. Thus neutrosophic SuperHyperPath , SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultiPartite, and SuperHyperWheel, are **neutrosophic neutrosophic SuperHyperPath** , **neutrosophic SuperHyperCycle**, **neutrosophic SuperHyperStar**, **neutrosophic SuperHyperBipartite**, **neutrosophic SuperHyperMultiPartite**, and **neutrosophic SuperHyperWheel** if the Table (2) holds.

It's useful to define a "neutrosophic" version of a SuperHyperClique. Since there's more ways to get type-results to make a SuperHyperClique more understandable.

For the sake of having a neutrosophic SuperHyperClique, there's a need to "**redefine**" the notion of " ". The SuperHyperVertices and the SuperHyperEdges are assigned by the labels from the letters of the alphabets. In this procedure, there's the usage of the position of labels to assign to the values.

Definition 3.24. Assume a SuperHyperClique. It's redefined a **neutrosophic SuperHyperClique** if the Table (3) holds.

4 Extreme SuperHyperClique

Example 4.1. Assume the SuperHyperGraphs in the Figures (1), (2), (3), (4), (5), (6), (7), (8), (9), (10), (11), (12), (13), (14), (15), (16), (17), (18), (19), and (20).

- On the Figure (1), the extreme SuperHyperNotion, namely, extreme SuperHyperClique, is up. E_1 and E_3 are some empty extreme SuperHyperEdges but E_2 is a loop extreme SuperHyperEdge and E_4 is an extreme SuperHyperEdge. Thus in the terms of extreme SuperHyperNeighbor, there's only one extreme SuperHyperEdge, namely, E_4. The extreme SuperHyperVertex, V_3 is extreme isolated means that there's no extreme SuperHyperEdge has it as an extreme endpoint. Thus the extreme SuperHyperVertex, V_3, **<u>isn't</u>** contained in every given extreme SuperHyperClique. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_4\}$. The extreme SuperHyperSet of extreme

SuperHyperVertices, $\{V_1, V_2, V_4\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_4\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_4\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_4\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_4\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_1, V_2, V_4\}$.

- On the Figure (2), the SuperHyperNotion, namely, SuperHyperClique, is up. E_1 and E_3 SuperHyperClique are some empty SuperHyperEdges but E_2 is a loop SuperHyperEdge and E_4 is a SuperHyperEdge. Thus in the terms of SuperHyperNeighbor, there's only one SuperHyperEdge, namely, E_4. The SuperHyperVertex, V_3 is isolated means that there's no SuperHyperEdge has it as an endpoint. Thus SuperHyperVertex, V_3, is contained in every given SuperHyperClique. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_4\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme

SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_4\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_4\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_4\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_4\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_1, V_2, V_4\}$.

- On the Figure (3), the SuperHyperNotion, namely, SuperHyperClique, is up. E_1, E_2 and E_3 are some empty SuperHyperEdges but E_4 is a SuperHyperEdge. Thus in the terms of SuperHyperNeighbor, there's only one SuperHyperEdge, namely, E_4. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_4\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_4\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_4\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_4\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_4\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_4\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_1, V_2, V_4\}$.

- On the Figure (4), the SuperHyperNotion, namely, a SuperHyperClique, is up. There's no empty SuperHyperEdge but E_3 are a loop SuperHyperEdge on $\{F\}$, and there are some SuperHyperEdges, namely, E_1 on $\{H, V_1, V_3\}$, alongside E_2 on $\{O, H, V_4, V_3\}$ and E_4, E_5 on $\{N, V_1, V_2, V_3, F\}$. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_3, N, F\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, N, F\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, N, F\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, N, F\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, N, F\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, N, F\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, N, F\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet.

There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_3, N, F\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_3, N, F\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_3, N, F\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_3, N, F\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. $\{V_1, V_2, V_3, N, F\}$ is an extreme$(2, 5)-$SuperHyperClique. $\{V_4, H\}$ is an extreme$(2, -)-$SuperHyperClique. $\{V_1, V_2, V_3, N, F\}$ is an extreme$(-, 5)-$SuperHyperClique. As the maximum extreme cardinality of the extreme SuperHyperSet of the extreme SuperHyperVertices is the matter, $\{V_1, V_2, V_3, N, F\}$ is an extreme SuperHyperClique; since it has five extreme SuperHyperVertices with satisfying on the at least extreme conditions over both of the extremeSuperHyperVertices and the extreme SuperHyperEdges.

- On the Figure (5), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_3, V_4, V_5\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_4, V_5\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_4, V_5\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_4, V_5\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_4, V_5\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_4, V_5\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_4, V_5\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s** **the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_3, V_4, V_5\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_3, V_4, V_5\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_3, V_4, V_5\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_3, V_4, V_5\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_1, V_2, V_3, V_4, V_5\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ is mentioned as the SuperHyperModel $ESHG : (V, E)$ in the Figure (5).

- On the Figure (6), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_5, V_6\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_5, V_6\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_5, V_6\}$, is an extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_5, V_6\}$. There're only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique isn't up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_5, V_6\}$, does has less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **isn't** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_5, V_6\}$, **isn't** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. But the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_5, V_6\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There is only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_5, V_6\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_5, V_6\}$, isn't up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_5, V_6\}$, is the extreme SuperHyperSet, $\{V_5, V_6\}$, does includes only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSets of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are only $\{V_5, V_6\}, \{V_6, V_7\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ with a illustrated SuperHyperModeling of the Figure (6). It's also, an extreme free-triangle SuperHyperModel. But all only obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are

$$\{V_5, V_{15}\}, \{V_8, V_9\}, \{V_7, V_8\}, \{V_5, V_6\}, \{V_6, V_7\}\}.$$

- On the Figure (7), the SuperHyperNotion, namely, extreme SuperHyperClique $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$ is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme

SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is the extreme SuperHyperSet, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ of depicted SuperHyperModel as the Figure (7). But

$$\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$$
$$\{V_4, V_{,}V_6, V_7, V_{13}\}$$

are the only obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperVertices.

- On the Figure (8), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. The extreme SuperHyperSet of extreme SuperHyperVertices,

$\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is the extreme SuperHyperSet, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ of depicted SuperHyperModel as the Figure (7). But

$$\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$$
$$\{V_4, V, V_6, V_7, V_{13}\}$$

are the only obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperVertices in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ of dense SuperHyperModel as the Figure (8).

- On the Figure (9), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_5, V_6\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_5, V_6\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_5, V_6\}$, is an extreme

SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_5, V_6\}$. There're only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique isn't up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_5, V_6\}$, does has less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **isn't** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_5, V_6\}$, **isn't** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. But the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_5, V_6\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There is only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_5, V_6\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_5, V_6\}$, isn't up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_5, V_6\}$, is the extreme SuperHyperSet, $\{V_5, V_6\}$, does includes only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSets of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are only $\{V_5, V_6\}, \{V_6, V_7\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ with a illustrated SuperHyperModeling of the Figure (6). It's also, an extreme free-triangle SuperHyperModel. But all only obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are

$$\{V_5, V_{15}\}, \{V_8, V_9\}, \{V_7, V_8\}, \{V_5, V_6\}, \{V_6, V_7\}\}$$

in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ with a messy SuperHyperModeling of the Figure (9).

- On the Figure (10), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme

SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s** **the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, is the extreme SuperHyperSet, $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ of depicted SuperHyperModel as the Figure (7). But

$$\{V_8, V_9, V_{10}, V_{11}, V_{14}\}$$
$$\{V_4, V, V_6, V_7, V_{13}\}$$

are the only obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperVertices in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ of highly-embedding-connected SuperHyperModel as the Figure (10).

- On the Figure (11), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_3\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$.

There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_3\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_3\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_3\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_3\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are only $\{V_1, V_2, V_3\}$ and $\{V_4, V_5, V_6\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$. But also, the only obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are only $\{V_1, V_2, V_3\}$ and $\{V_4, V_5, V_6\}$ in a connected extreme SuperHyperGraph $ESHG : (V, E)$.

- On the Figure (12), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_3, V_7, V_8\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_7, V_8\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_7, V_8\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_7, V_8\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_7, V_8\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme

SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_7, V_8\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3, V_7, V_8\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_3, V_7, V_8\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_3, V_7, V_8\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_3, V_7, V_8\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_3, V_7, V_8\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_1, V_2, V_3, V_7, V_8\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ in highly-multiple-connected-style SuperHyperModel On the Figure (12) and it's also, the only obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_1, V_2, V_3, V_7, V_8\}$ in a connected extreme SuperHyperGraph $ESHG : (V, E)$

- On the Figure (13), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2, V_3\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$. There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2, V_3\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2, V_3\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2, V_3\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2, V_3\}$, is the extreme SuperHyperSet, $\{V_1, V_2, V_3\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are only $\{V_1, V_2, V_3\}$ and $\{V_4, V_5, V_6\}$ in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$. But also, the only obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are only $\{V_1, V_2, V_3\}$ and $\{V_4, V_5, V_6\}$ in a connected extreme SuperHyperGraph $ESHG : (V, E)$.

- On the Figure (14), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2\}$, is an extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2\}$. There're only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2\}$, does has less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **isn't** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2\}$, **isn't** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2\}$, is the extreme

SuperHyperSet, $\{V_1, V_2\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, are only $\{V_1, V_2\}$ and $\{V_1, V_3\}$. But the only obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperVertices, are only $\{V_1, V_2\}$ and $\{V_1, V_3\}$. It's noted that this extreme SuperHyperGraph $ESHG : (V, E)$ is a extreme graph $G : (V, E)$ thus the notions in both settings are coincided.

- On the Figure (15), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. $\{V_1, V_2\}$. The extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2\}$, is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2\}$, is an extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2\}$. There're only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2\}$, does has less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **isn't** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, $\{V_1, V_2\}$, **isn't** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, $\{V_1, V_2\}$, is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, $\{V_1, V_2\}$. Thus the non-obvious extreme SuperHyperClique, $\{V_1, V_2\}$, is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, $\{V_1, V_2\}$, is the extreme SuperHyperSet, $\{V_1, V_2\}$, doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only $\{V_1, V_5\}$. But the only obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperVertices, are only

$$\{V_1, V_2\},$$
$$\{V_2, V_3\},$$
$$\{V_3, V_4\},$$
$$\{V_4, V_6\},$$
$$\{V_5, V_1\}.$$

It's noted that this extreme SuperHyperGraph $ESHG : (V, E)$ is a extreme graph $G : (V, E)$ thus the notions in both settings are coincided. In a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$ as Linearly-Connected SuperHyperModel On the Figure (15).

- On the Figure (16), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. corresponded to the SuperHyperEdge E_4 The extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, corresponded to the SuperHyperEdge E_4 Thus the non-obvious extreme SuperHyperClique, corresponded to the SuperHyperEdge E_4 is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, corresponded to the SuperHyperEdge E_4 is the extreme SuperHyperSet, corresponded to the SuperHyperEdge E_4 doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph

$ESHG:(V,E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only corresponded to the neutrosophic SuperHyperEdge E_4 in a connected neutrosophic SuperHyperGraph $ESHG:(V,E)$. But the only obvious simple extreme type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets, is only corresponded to the extreme SuperHyperEdge E_4 in a connected extreme SuperHyperGraph $ESHG:(V,E)$.

- On the Figure (17), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. corresponded to the SuperHyperEdge E_4 The extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG:(V,E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG:(V,E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, corresponded to the SuperHyperEdge E_4 Thus the non-obvious extreme SuperHyperClique, corresponded to the SuperHyperEdge E_4 is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, corresponded to the SuperHyperEdge E_4 is the extreme SuperHyperSet, corresponded to the SuperHyperEdge E_4 doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG:(V,E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme

SuperHyperClique, is only corresponded to the neutrosophic SuperHyperEdge E_4 in a connected neutrosophic SuperHyperGraph $ESHG:(V,E)$. But the only obvious simple extreme type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets, is only corresponded to the extreme SuperHyperEdge E_4 in a connected extreme SuperHyperGraph $ESHG:(V,E)$. In a connected neutrosophic SuperHyperGraph $ESHG:(V,E)$ as Linearly-over-packed SuperHyperModel is featured On the Figure (17).

- On the Figure (18), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. corresponded to the SuperHyperEdge E_4 The extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG:(V,E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_4 is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG:(V,E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, corresponded to the SuperHyperEdge E_4 Thus the non-obvious extreme SuperHyperClique, corresponded to the SuperHyperEdge E_4 is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, corresponded to the SuperHyperEdge E_4 is the extreme SuperHyperSet, corresponded to the SuperHyperEdge E_4 doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG:(V,E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only corresponded to the neutrosophic SuperHyperEdge E_4

in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$. But the only obvious simple extreme type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets, is only corresponded to the extreme SuperHyperEdge E_4 in a connected extreme SuperHyperGraph $ESHG : (V, E)$. In a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$.

- On the Figure (19), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. corresponded to the SuperHyperEdge E_9 The extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_9 is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_9 is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_9 There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_9 doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_9 **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_9 is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG : (V, E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s** **the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, corresponded to the SuperHyperEdge E_9 Thus the non-obvious extreme SuperHyperClique, corresponded to the SuperHyperEdge E_9 is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, corresponded to the SuperHyperEdge E_9 is the extreme SuperHyperSet, corresponded to the SuperHyperEdge E_9 doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG : (V, E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only corresponded to the neutrosophic SuperHyperEdge E_9 in a connected neutrosophic SuperHyperGraph $ESHG : (V, E)$. But the only obvious simple extreme type-SuperHyperSet of the neutrosophic

SuperHyperClique amid those obvious simple extreme type-SuperHyperSets, is only corresponded to the extreme SuperHyperEdge E_9 in a connected extreme SuperHyperGraph $ESHG:(V,E)$.

- On the Figure (20), the SuperHyperNotion, namely, SuperHyperClique, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following extreme SuperHyperSet of extreme SuperHyperVertices is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. corresponded to the SuperHyperEdge E_6 The extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_6 is the simple extreme type-SuperHyperSet of the extreme SuperHyperClique. The extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_6 is an extreme 3-SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG:(V,E)$ is an extreme type-SuperHyperSet with **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge amid any 3 extreme SuperHyperVertices given by the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_6 There're not only **two** extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious extreme SuperHyperClique is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique is a extreme SuperHyperSet **includes** only **two** extreme SuperHyperVertices. But the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_6 doesn't have less than three SuperHyperVertices **inside** the intended extreme SuperHyperSet. Thus the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique **is** up. To sum them up, the extreme SuperHyperSet of extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_6 **is** the non-obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique. Since the extreme SuperHyperSet of the extreme SuperHyperVertices, corresponded to the SuperHyperEdge E_6 is a extreme SuperHyperClique $\mathcal{C}(ESHG)$ for a extreme SuperHyperGraph $ESHG:(V,E)$ is the extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any z SuperHyperVertices given by that extreme type-SuperHyperSet **and** it's an extreme **SuperHyperClique**. Since it**'s the maximum extreme cardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge for any two extreme SuperHyperVertices given by that extreme type-SuperHyperSet. There isn't only less than three extreme SuperHyperVertices **inside** the intended extreme SuperHyperSet, corresponded to the SuperHyperEdge E_6 Thus the non-obvious extreme SuperHyperClique, corresponded to the SuperHyperEdge E_6 is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, corresponded to the SuperHyperEdge E_6 is the extreme SuperHyperSet, corresponded to the SuperHyperEdge E_6 doesn't include only less than three SuperHyperVertices in a connected extreme SuperHyperGraph $ESHG:(V,E)$. It's interesting to mention that the only obvious simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets of the extreme SuperHyperClique, is only corresponded to the neutrosophic SuperHyperEdge E_6 in a connected neutrosophic SuperHyperGraph $ESHG:(V,E)$. But the only obvious simple extreme type-SuperHyperSet of the neutrosophic SuperHyperClique amid those obvious simple extreme type-SuperHyperSets, is only corresponded to the extreme SuperHyperEdge E_6 in a connected extreme SuperHyperGraph $ESHG:(V,E)$.

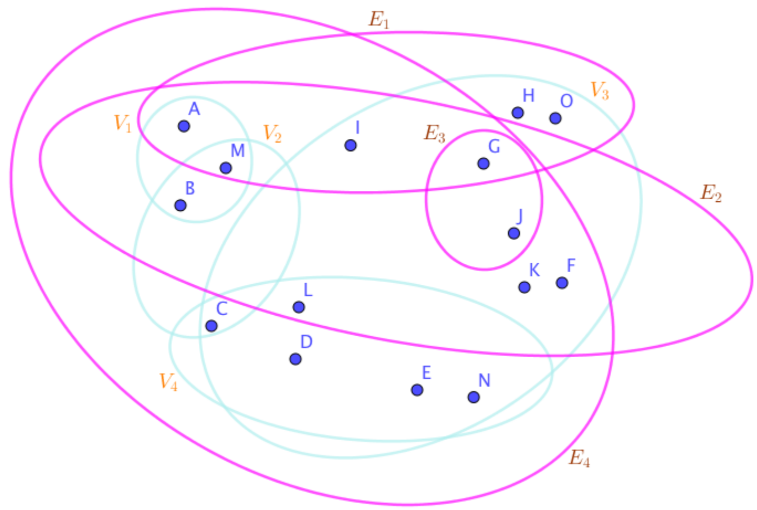

Figure 1. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

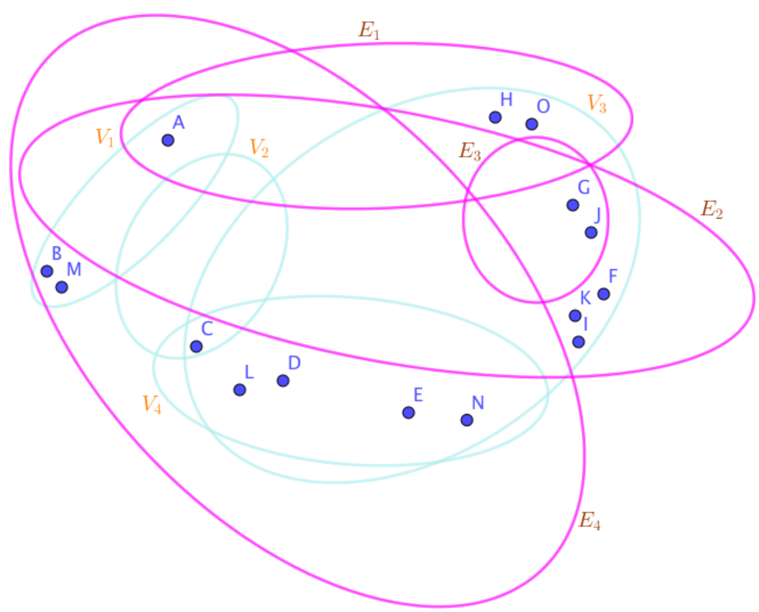

Figure 2. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

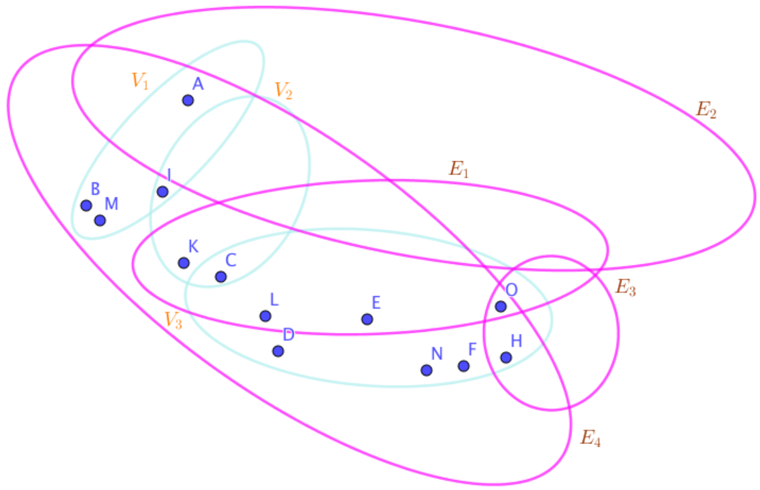

Figure 3. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

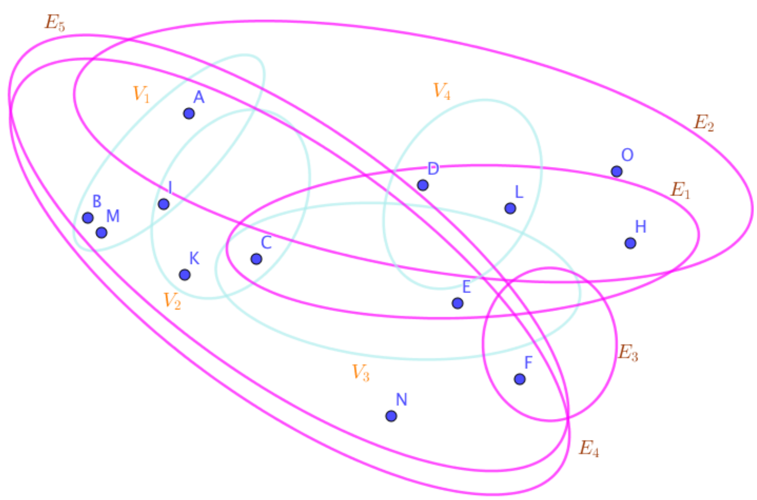

Figure 4. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

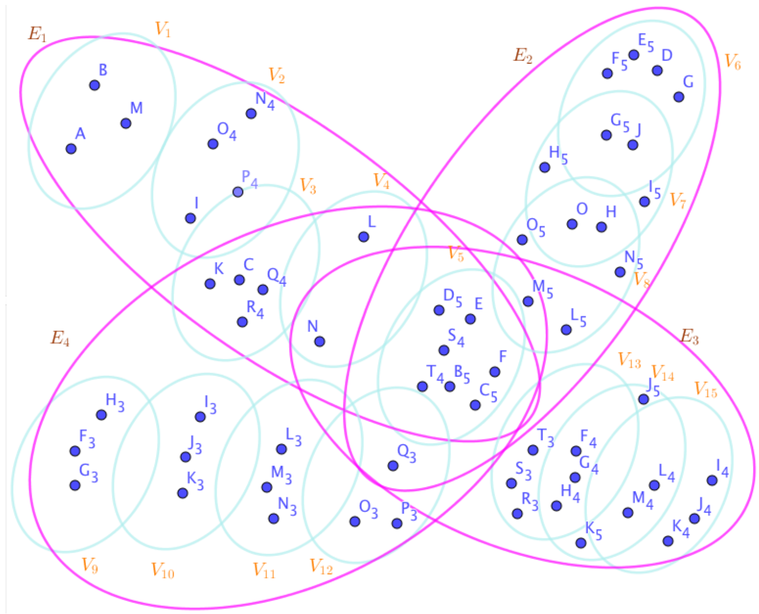

Figure 5. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

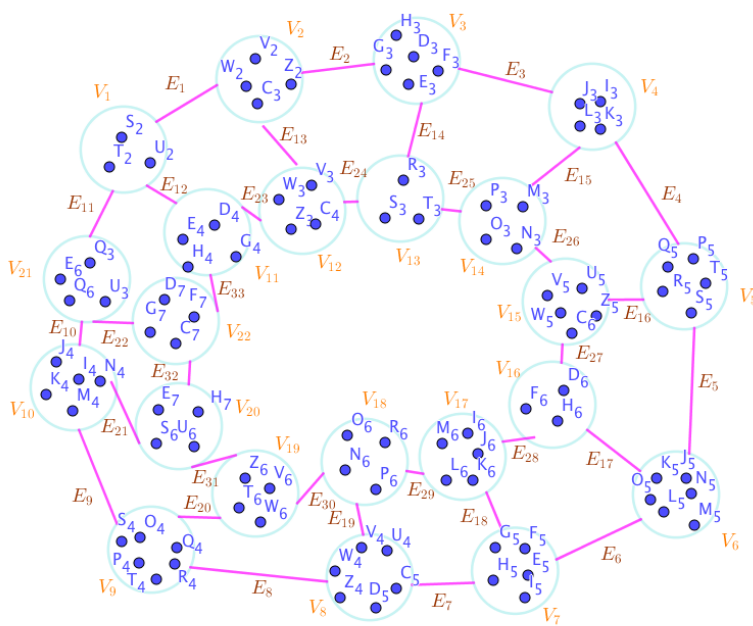

Figure 6. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

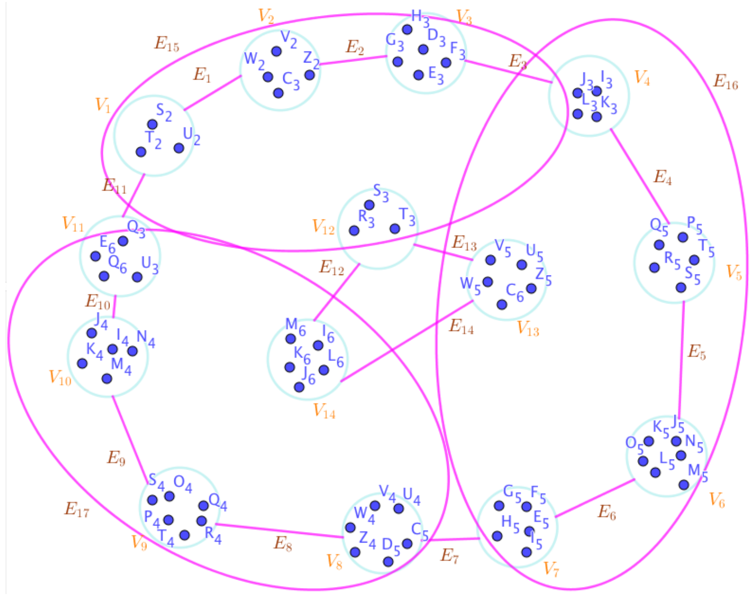

Figure 7. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

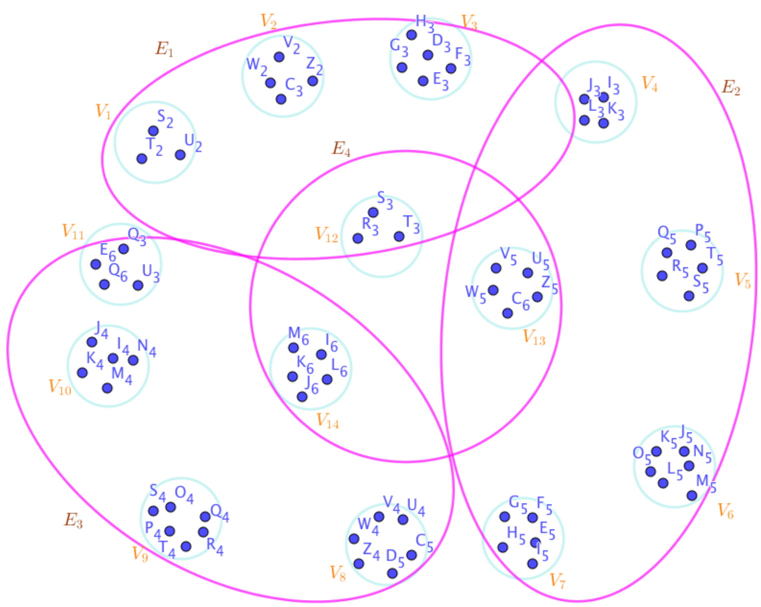

Figure 8. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

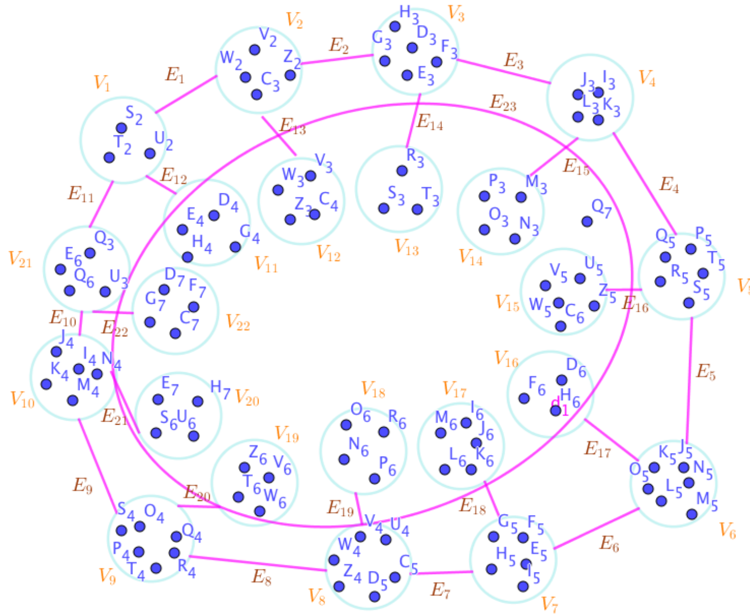

Figure 9. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

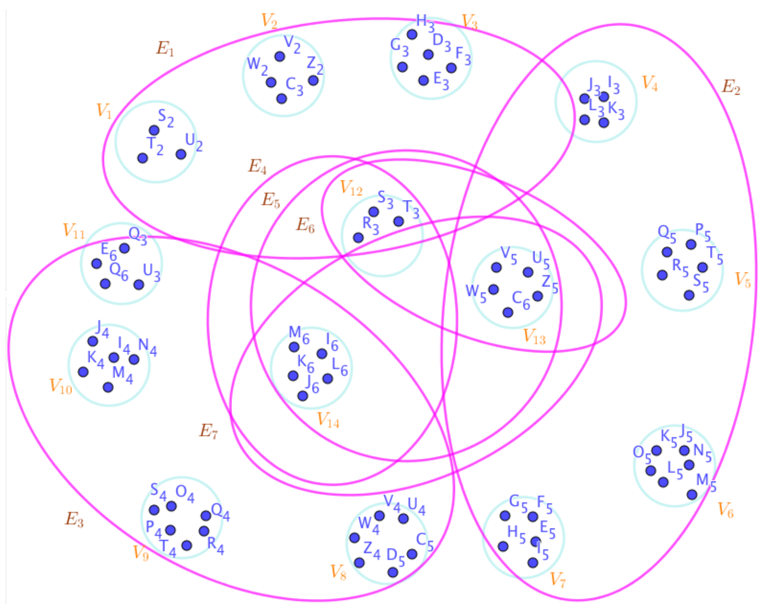

Figure 10. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

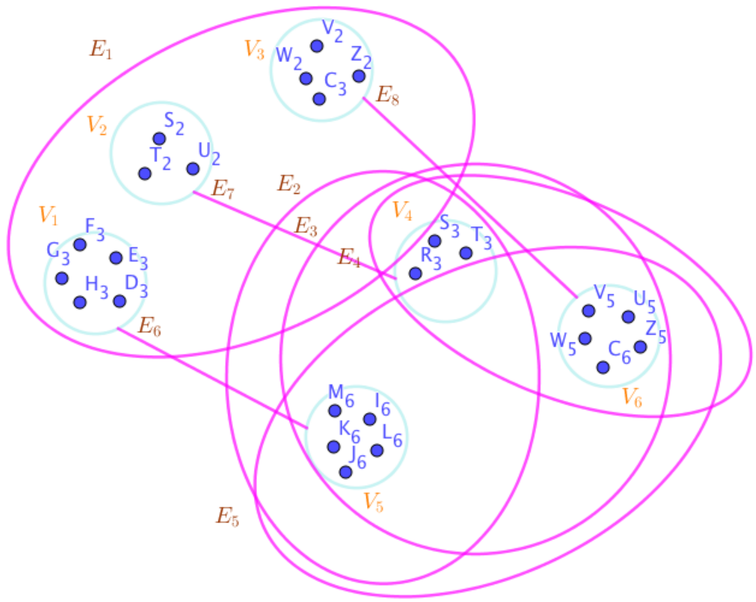

Figure 11. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

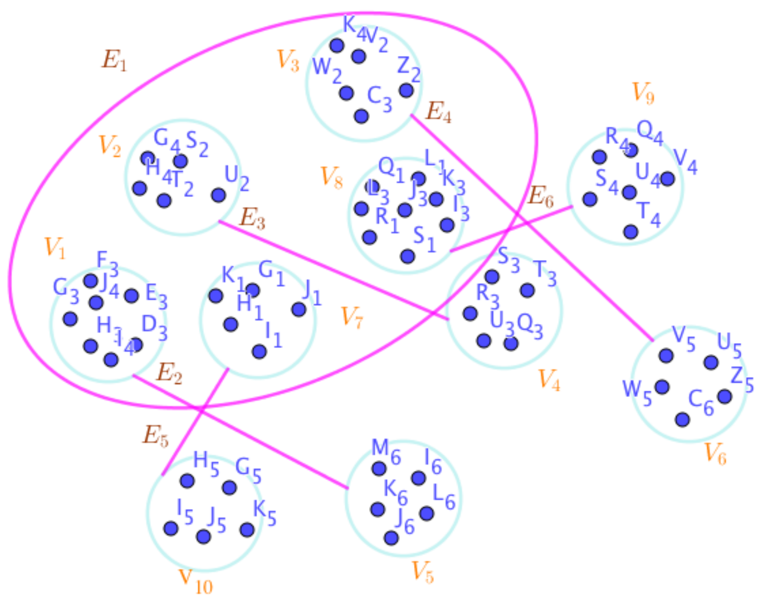

Figure 12. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

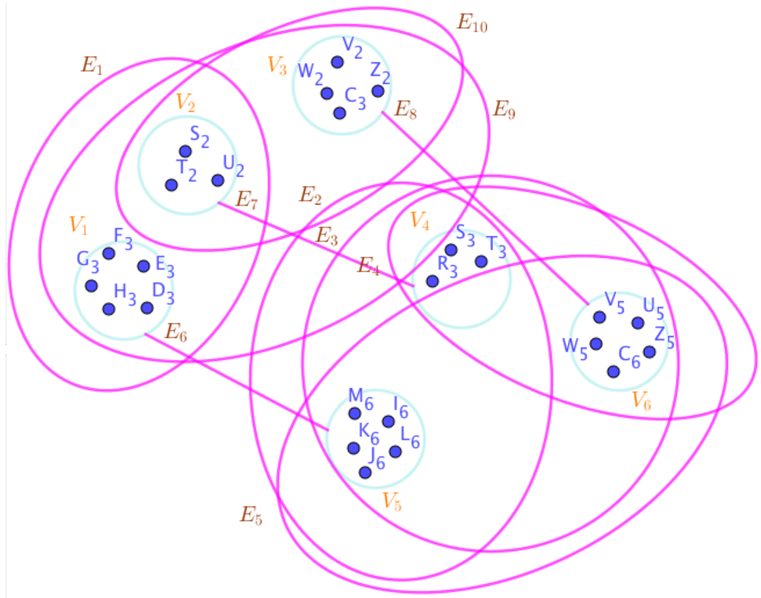

Figure 13. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

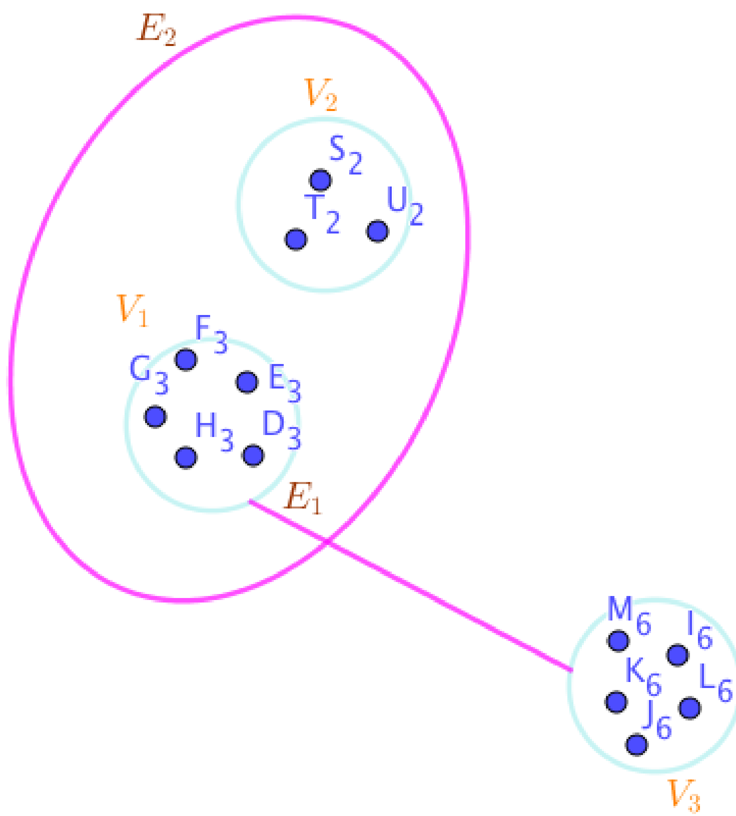

Figure 14. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

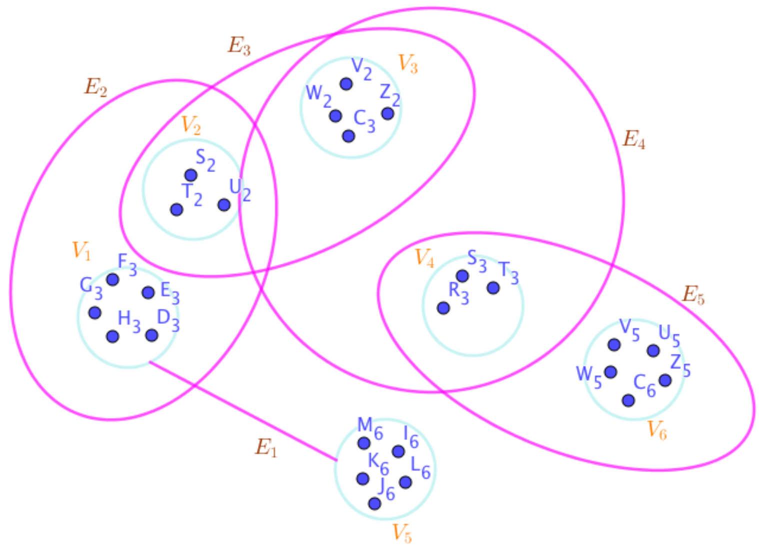

Figure 15. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

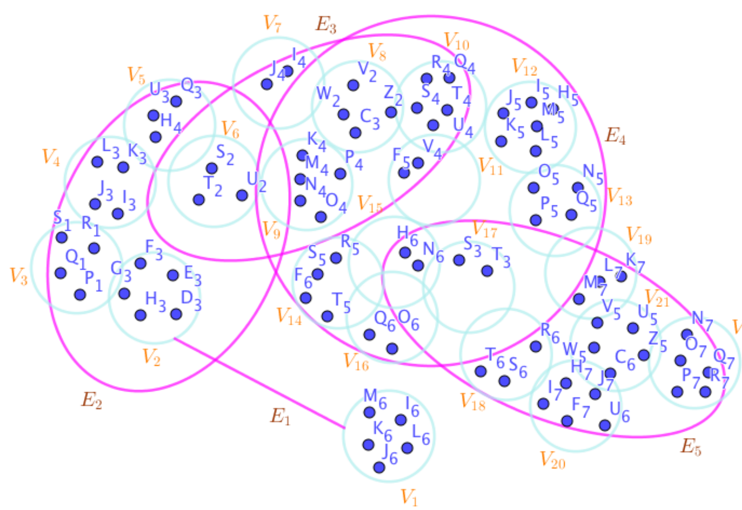

Figure 16. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

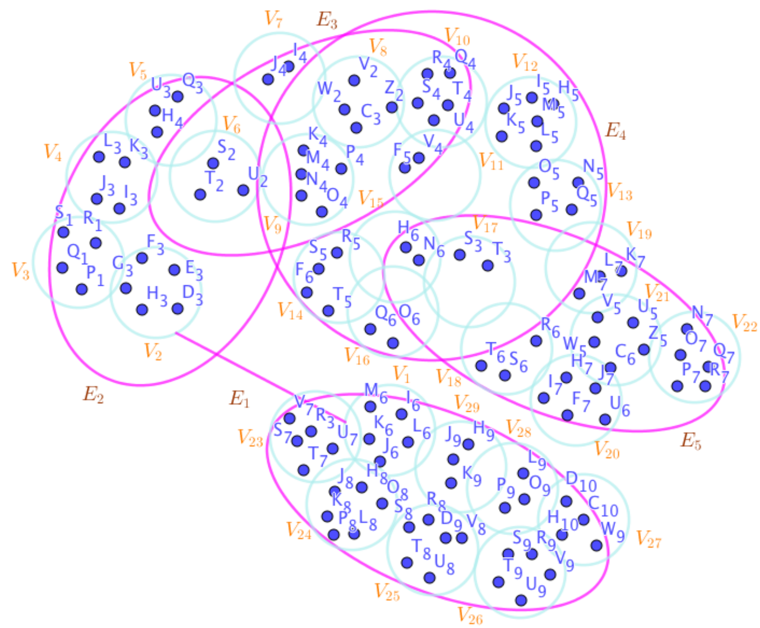

Figure 17. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

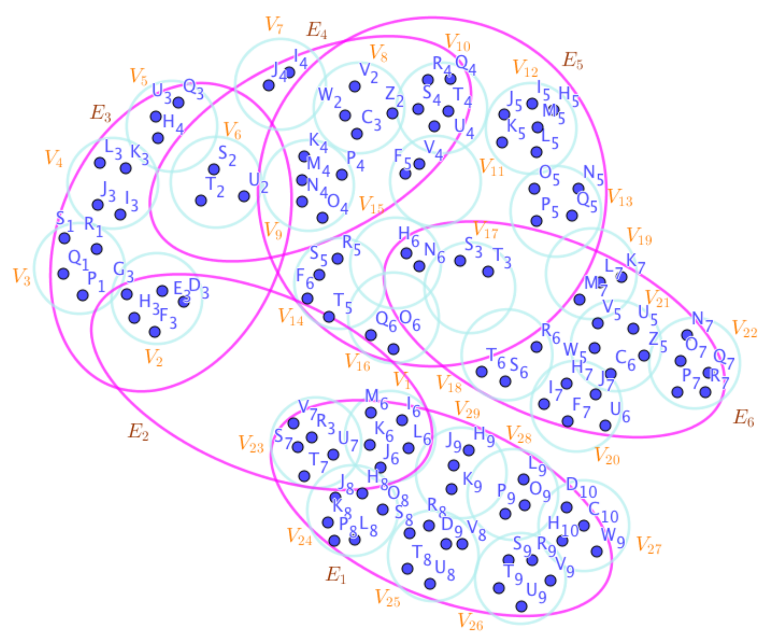

Figure 18. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

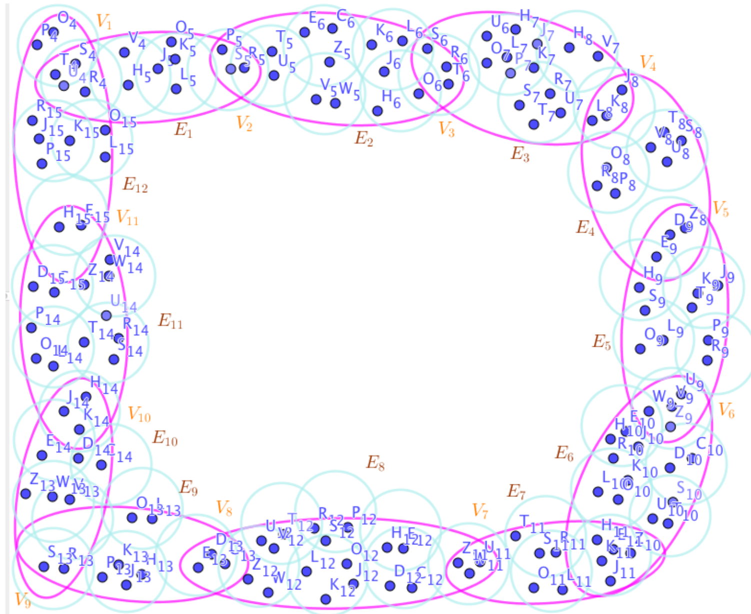

Figure 19. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

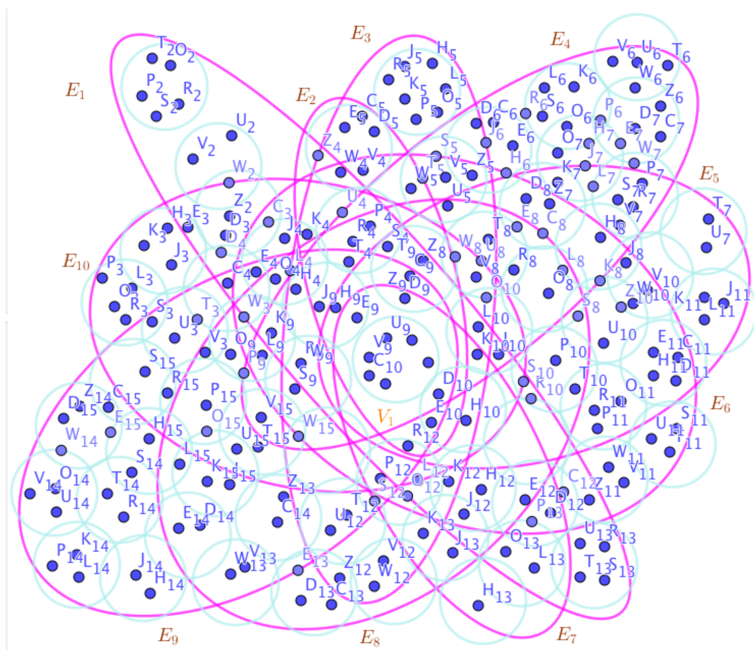

Figure 20. The SuperHyperGraphs Associated to the Notions of SuperHyperClique in the Example (4.1)

Proposition 4.2. *Assume a connected loopless neutrosophic SuperHyperGraph $ESHG:(V,E)$. Then in the worst case, literally, $V \setminus V \setminus \{x,z\}$, is a SuperHyperClique. In other words, the least cardinality, the lower sharp bound for the cardinality, of a SuperHyperClique is the cardinality of $V \setminus V \setminus \{x,z\}$.*

Proof. Assume a connected loopless neutrosophic SuperHyperGraph $ESHG:(V,E)$. The SuperHyperSet of the SuperHyperVertices $V \setminus V \setminus \{z\}$ isn't a SuperHyperClique since neither amount of extreme SuperHyperEdges nor amount of SuperHyperVertices where amount refers to the extreme number of SuperHyperVertices(-/SuperHyperEdges) more than one. Let us consider the extreme SuperHyperSet $V \setminus V \setminus \{x,y,z\}$. This extreme SuperHyperSet of the extreme SuperHyperVertices has the eligibilities to propose some amount of extreme SuperHyperEdges for some amount of the extreme SuperHyperVertices taken from the mentioned extreme SuperHyperSet and it has the maximum extreme cardinality amid those extreme type-SuperHyperSets but the minimum case of the maximum extreme cardinality indicates that these extreme type-SuperHyperSets couldn't give us the extreme lower bound in the term of extreme sharpness. In other words, the extreme SuperHyperSet $V \setminus V \setminus \{x,y,z\}$ of the extreme SuperHyperVertices implies at least on-triangle style is up but sometimes the extreme SuperHyperSet $V \setminus V \setminus \{x,y,z\}$ of the extreme SuperHyperVertices is free-triangle and it doesn't make a contradiction to the supposition on the connected loopless neutrosophic SuperHyperGraph $ESHG:(V,E)$. Thus the minimum case never happens in the generality of the connected loopless neutrosophic SuperHyperGraphs. Thus if we assume in the worst case, literally, $V \setminus V \setminus \{x,y,z\}$, is a SuperHyperClique. In other words, the least cardinality, the lower sharp bound for the cardinality, of a SuperHyperClique is the cardinality of $V \setminus V \setminus \{x,y,z\}$. Then we've lost some connected loopless neutrosophic SuperHyperClasses of the connected loopless neutrosophic SuperHyperGraphs titled free-triangle. It's the contradiction to that fact on the generality. There are some counterexamples to deny this statement. One of them comes from the setting of the graph titled path and cycle are well-known classes in that setting and they could be considered as the examples for the tight bound of $V \setminus V \setminus \{x,z\}$. Let $V \setminus V \setminus \{z\}$ in mind. There's no necessity on the SuperHyperEdge since we need at least two SuperHyperVertices to form a SuperHyperEdge. It doesn't withdraw the principles of the main definition since there's no condition to be satisfied but the condition is on the existence of the SuperHyperEdge instead of acting on the SuperHyperVertices. In other words, if there's a SuperHyperEdge, then the extreme SuperHyperSet has the necessary condition for the intended definition to be applied. Thus the $V \setminus V \setminus \{z\}$ is withdrawn not by the conditions of the main definition but by the necessity of the pre-condition on the usage of the main definition. □

Proposition 4.3. *Assume a simple neutrosophic SuperHyperGraph $ESHG:(V,E)$. Then the extreme number of SuperHyperClique has, the least cardinality, the lower sharp bound for cardinality, is the extreme cardinality of $V \setminus V \setminus \{x,z\}$ if there's a SuperHyperClique with the least cardinality, the lower sharp bound for cardinality.*

Proof. The extreme structure of the extreme SuperHyperClique decorates the extreme SuperHyperVertices have received complete extreme connections so as this extreme style implies different versions of extreme SuperHyperEdges with the maximum extreme cardinality in the terms of extreme SuperHyperVertices are spotlight. The lower extreme bound is to have the minimum extreme groups of extreme SuperHyperVertices have perfect extreme connections inside and the outside of this extreme SuperHyperSet doesn't matter but regarding the connectedness of the used extreme SuperHyperGraph arising from its extreme properties taken from the fact that it's simple. If there's no extreme SuperHyperVertex in the targeted extreme SuperHyperSet, then there's no extreme connection. Furthermore, the extreme existence of one extreme

SuperHyperVertex has no extreme effect to talk about the extreme SuperHyperClique. Since at least two extreme SuperHyperVertices involve to make a title in the extreme background of the extreme SuperHyperGraph. The extreme SuperHyperGraph is obvious if it has no extreme SuperHyperEdge but at least two extreme SuperHyperVertices make the extreme version of extreme SuperHyperEdge. Thus in the extreme setting of non-obvious extreme SuperHyperGraph, there are at least one extreme SuperHyperEdge. It's necessary to mention that the word "Simple" is used as extreme adjective for the initial extreme SuperHyperGraph, induces there's no extreme appearance of the loop extreme version of the extreme SuperHyperEdge and this extreme SuperHyperGraph is said to be loopless. The extreme adjective "loop" on the basic extreme framework engages one extreme SuperHyperVertex but it never happens in this extreme setting. With these extreme bases, on a extreme SuperHyperGraph, there's at least one extreme SuperHyperEdge thus there's at least a extreme SuperHyperClique has the extreme cardinality two. Thus, a extreme SuperHyperClique has the extreme cardinality at least two. Assume a extreme SuperHyperSet $V \setminus V \setminus \{z\}$. This extreme SuperHyperSet isn't a extreme SuperHyperClique since either the extreme SuperHyperGraph is an obvious extreme SuperHyperModel thus it never happens since there's no extreme usage of this extreme framework and even more there's no extreme connection inside or the extreme SuperHyperGraph isn't obvious and as its consequences, there's an extreme contradiction with the term "extreme SuperHyperClique" since the maximum extreme cardinality never happens for this extreme style of the extreme SuperHyperSet and beyond that there's no extreme connection inside as mentioned in first extreme case in the forms of drawback for this selected extreme SuperHyperSet. Let $V \setminus V \setminus \{x, y, z\}$ comes up. This extreme case implies having the extreme style of on-triangle extreme style on the every extreme elements of this extreme SuperHyperSet. Precisely, the extreme SuperHyperClique is the extreme SuperHyperSet of the extreme SuperHyperVertices such that any extreme amount of the extreme SuperHyperVertices are on-triangle extreme style. The extreme cardinality of the v SuperHypeSet $V \setminus V \setminus \{x, y, z\}$ is the maximum in comparison to the extreme SuperHyperSet $V \setminus V \setminus \{z, x\}$ but the lower extreme bound is up. Thus the minimum extreme cardinality of the maximum extreme cardinality ends up the extreme discussion. The first extreme term refers to the extreme setting of the extreme SuperHyperGraph but this key point is enough since there's a extreme SuperHyperClass of a extreme SuperHyperGraph has no on-triangle extreme style amid any amount of its extreme SuperHyperVertices. This extreme setting of the extreme SuperHyperModel proposes an extreme SuperHyperSet has only two extreme SuperHyperVertices such that there's extreme amount of extreme SuperHyperEdges involving these two extreme SuperHyperVertices. The extreme cardinality of this extreme SuperHyperSet is the maximum and the extreme case is occurred in the minimum extreme situation. To sum them up, the extreme SuperHyperSet $V \setminus V \setminus \{z, x\}$ has the maximum extreme cardinality such that $V \setminus V \setminus \{z, x\}$ contains some extreme SuperHyperVertices such that there's amount extreme SuperHyperEdges for amount of extreme SuperHyperVertices taken from the extreme SuperHyperSet $V \setminus V \setminus \{z, x\}$. It means that the extreme SuperHyperSet of the extreme SuperHyperVertices $V \setminus V \setminus \{z, x\}$. is an extreme SuperHyperClique for the extreme SuperHyperGraph as used extreme background in the extreme terms of worst extreme case and the lower extreme bound occurred in the specific extreme SuperHyperClasses of the extreme SuperHyperGraphs which are extreme free-triangle. □

Proposition 4.4. *Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme* *number of extreme SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique.*

Proof. Assume an extreme SuperHyperEdge has z extreme number of the extreme SuperHyperVertices. Then every extreme SuperHyperVertex has at least one extreme SuperHyperEdge with others in common. Thus those extreme SuperHyperVertices have the eligibles to be contained in an extreme SuperHyperClique. Those extreme SuperHyperVertices are potentially included in an extreme style-SuperHyperClique. Formally, consider

$$\{Z_1, Z_2, \ldots, Z_z\}$$

are the extreme SuperHyperVertices of an extreme SuperHyperEdge. Thus

$$Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z.$$

where the $\sim$ isn't an equivalence relation but only the symmetric relation on the extreme SuperHyperVertices of the extreme SuperHyperGraph. The formal definition is as follows.

$$Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z$$

if and only if Z_i and Z_j are the extreme SuperHyperVertices and there's an extreme SuperHyperEdge between the extreme SuperHyperVertices Z_i and Z_j. The other definition for the extreme SuperHyperEdge in the terms of extreme SuperHyperClique is

$$\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z\}.$$

This definition coincides with the definition of the extreme SuperHyperClique but with slightly differences in the maximum extreme cardinality amid those extreme type-SuperHyperSets of the extreme SuperHyperVertices. Thus the extreme SuperHyperSet of the extreme SuperHyperVertices,

$$\max_z |\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z\}|_{\text{extreme cardinality}},$$

is formalized with mathematical literatures on the extreme SuperHyperClique. Let $Z_i \overset{E}{\sim} Z_j$, be defined as Z_i and Z_j are the extreme SuperHyperVertices belong to the extreme SuperHyperEdge E. Thus,

$$E = \{Z_1, Z_2, \ldots, Z_z \mid Z_i \overset{E}{\sim} Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z\}.$$

But with the slightly differences,

$$\text{extreme SuperHyperClique} =$$
$$\{Z_1, Z_2, \ldots, Z_z \mid \forall i \neq j, \ i, j = 1, 2, \ldots, z, \ \exists E_x, \ Z_i \overset{E_x}{\sim} Z_j, \}.$$

Thus E is an extreme quasi-SuperHyperClique where E is fixed that means $E_x = E$. for all extreme intended SuperHyperVertices but in an extreme SuperHyperClique, E_x could be different and it's not unique. To sum them up, in a connected extreme SuperHyperGraph $ESHG : (V, E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme number of extreme

SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique. □

Proposition 4.5. *Assume a connected non-obvious extreme SuperHyperGraph* $ESHG : (V, E)$*. There's only one extreme SuperHyperEdge has only less than three distinct interior extreme SuperHyperVertices inside of any given extreme quasi-SuperHyperClique. In other words, there's only an unique extreme SuperHyperEdge has only two distinct extreme SuperHyperVertices in an extreme quasi-SuperHyperClique.*

Proof. The obvious SuperHyperGraph has no SuperHyperEdges. But the non-obvious extreme SuperHyperModel is up. The quasi-SuperHyperModel addresses some issues about the extreme optimal SuperHyperObject. It specially delivers some remarks on the extreme SuperHyperSet of the extreme SuperHyperVertices such that there's amount of extreme SuperHyperEdges for amount of extreme SuperHyperVertices taken from that extreme SuperHyperSet of the extreme SuperHyperVertices but this extreme SuperHyperSet of the extreme SuperHyperVertices is either has the maximum extreme SuperHyperCardinality or it doesn't have maximum extreme SuperHyperCardinality. In a non-obvious SuperHyperModel, there's at least one extreme SuperHyperEdge containing at least two extreme SuperHyperVertices. Thus it forms an extreme quasi-SuperHyperClique where the extreme completion of the extreme incidence is up in that. Thus it's, literarily, an extreme embedded SuperHyperClique. The SuperHyperNotions of embedded SuperHyperSet and quasi-SuperHyperSet coincide. In the original setting, these types of SuperHyperSets only don't satisfy on the maximum SuperHyperCardinality. Thus the embedded setting is elected such that those SuperHyperSets have the maximum extreme SuperHyperCardinality and they're extreme SuperHyperOptimal. The less than three extreme SuperHyperVertices are included in the minimum extreme style of the embedded extreme SuperHyperClique. The interior types of the extreme SuperHyperVertices are deciders. Since the extreme number of SuperHyperNeighbors are only affected by the interior extreme SuperHyperVertices. The common connections, more precise and more formal, the perfect connections inside the extreme SuperHyperSet pose the extreme SuperHyperClique. Thus extreme exterior SuperHyperVertices could be used only in one extreme SuperHyperEdge and in extreme SuperHyperRelation with the interior extreme SuperHyperVertices in that extreme SuperHyperEdge. In the embedded extreme SuperHyperClique, there's the usage of exterior extreme SuperHyperVertices since they've more connections inside more than outside. Thus the title "exterior" is more relevant than the title "interior". One extreme SuperHyperVertex has no connection, inside. Thus, the extreme SuperHyperSet of the extreme SuperHyperVertices with one SuperHyperElement has been ignored in the exploring to lead on the optimal case implying the extreme SuperHyperClique. The extreme SuperHyperClique with the exclusion of the exclusion of two extreme SuperHyperVertices and with other terms, the extreme SuperHyperClique with the inclusion of two extreme SuperHyperVertices is a extreme quasi-SuperHyperClique. To sum them up, in a connected non-obvious extreme SuperHyperGraph $ESHG : (V, E)$, there's only one extreme SuperHyperEdge has only less than three distinct interior extreme SuperHyperVertices inside of any given extreme quasi-SuperHyperClique. In other words, there's only an unique extreme SuperHyperEdge has only two distinct extreme SuperHyperVertices in an extreme quasi-SuperHyperClique. □

Proposition 4.6. *Assume a connected extreme SuperHyperGraph* $ESHG : (V, E)$*. The* *all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all.*

Proof. The main definition of the extreme SuperHyperClique has two titles. An extreme quasi-SuperHyperClique and its corresponded quasi-maximum extreme SuperHyperCardinality are two titles in the terms of quasi-styles. For any extreme number, there's an extreme quasi-SuperHyperClique with that quasi-maximum extreme SuperHyperCardinality in the terms of the embedded extreme SuperHyperGraph. If there's an embedded extreme SuperHyperGraph, then the extreme quasi-SuperHyperNotions lead us to take the collection of all the extreme quasi-SuperHyperCliques for all extreme numbers less than its extreme corresponded maximum number. The essence of the extreme SuperHyperClique ends up but this essence starts up in the terms of the extreme quasi-SuperHyperClique, again and more in the operations of collecting all the extreme quasi-SuperHyperCliques acted on the all possible used formations of the extreme SuperHyperGraph to achieve one extreme number. This extreme number is considered as the equivalence class for all corresponded quasi-SuperHyperCliques. Let $z_{\text{Extreme Number}}$, $S_{\text{Extreme SuperHyperSet}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperSet and an extreme SuperHyperClique. Then

$$
\begin{aligned}
&[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}
$$

As its consequences, the formal definition of the extreme SuperHyperClique is re-formalized and redefined as follows.

$$
\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}
$$

To get more precise perceptions, the follow-up expressions propose another formal technical definition for the extreme SuperHyperClique.

$$
\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}
$$

In more concise and more convenient ways, the modified definition for the extreme

SuperHyperClique poses the upcoming expressions.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.\end{aligned}$$

To translate the statement to this mathematical literature, the formulae will be revised.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.\end{aligned}$$

And then,

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.\end{aligned}$$

To get more visions in the closer look-up, there's an overall overlook.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid\\&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}},\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid\\&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}},\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= z_{\text{Extreme Number}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.\end{aligned}$$

Now, the extension of these types of approaches is up. Since the new term, “extreme SuperHyperNeighborhood”, could be redefined as the collection of the extreme SuperHyperVertices such that any amount of its extreme SuperHyperVertices are incident to an extreme SuperHyperEdge. It’s, literarily, another name for “extreme Quasi-SuperHyperClique” but, precisely, it’s the generalization of “extreme Quasi-SuperHyperClique” since “extreme Quasi-SuperHyperClique” happens “extreme SuperHyperClique” in an extreme SuperHyperGraph as initial framework and background but “extreme SuperHyperNeighborhood” may not happens “extreme SuperHyperClique” in an extreme SuperHyperGraph as initial framework and preliminarily background since there are some ambiguities about the extreme SuperHyperCardinality arise from it. To get orderly keywords, the terms, “extreme SuperHyperNeighborhood”, “extreme Quasi-SuperHyperClique”, and “extreme SuperHyperClique” are up.

Thus, let $z_{\text{Extreme Number}}, N_{\text{Extreme SuperHyperNeighborhood}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperNeighborhood and an extreme SuperHyperClique and the new terms are up.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid \\
&|N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

And with go back to initial structure,

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= 2\}.
\end{aligned}$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Thus, in a connected extreme SuperHyperGraph $ESHG : (V, E)$, the all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all. □

Proposition 4.7. *Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out.*

Proof. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Let an extreme SuperHyperEdge $ESHE$ has some extreme SuperHyperVertices r. Consider all extreme numbers of those extreme SuperHyperVertices from that extreme SuperHyperEdge excluding excluding more than r distinct extreme SuperHyperVertices, exclude to any given extreme SuperHyperSet of the extreme SuperHyperVertices. Consider there's an extreme SuperHyperClique with the least cardinality, the lower sharp extreme bound for extreme cardinality. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \setminus \{z\}$ is an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common but it isn't an extreme SuperHyperClique. Since it doesn't have **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have a some SuperHyperVertices in common. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \cup \{z\}$ is the maximum extreme cardinality of an extreme SuperHyperSet S of extreme SuperHyperVertices but it isn't an extreme SuperHyperClique. Since it **doesn't do** the extreme procedure such that such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common [there are at least one extreme SuperHyperVertex outside implying there's, sometimes in the connected extreme SuperHyperGraph $ESHG : (V, E)$, an extreme SuperHyperVertex, titled its extreme SuperHyperNeighbor, to that extreme SuperHyperVertex in the extreme SuperHyperSet S so as S doesn't do "the extreme procedure".]. There's only **one** extreme SuperHyperVertex **outside** the intended extreme SuperHyperSet, $V_{ESHE} \cup \{z\}$, in the terms of extreme SuperHyperNeighborhood. Thus the obvious extreme SuperHyperClique, V_{ESHE} is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, V_{ESHE}, **is** a extreme SuperHyperSet, V_{ESHE}, **includes** only **all** extreme SuperHyperVertices does forms any kind of extreme pairs are titled extreme SuperHyperNeighbors in a connected extreme SuperHyperGraph $ESHG : (V, E)$. Since the extreme SuperHyperSet of the extreme SuperHyperVertices V_{ESHE}, is the **maximum extreme SuperHyperCardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices **such that** there's an extreme SuperHyperEdge to have an extreme SuperHyperVertex in common. Thus, a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out. □

Remark 4.8. The words " extreme SuperHyperClique" and "extreme SuperHyperDominating" both refer to the maximum extreme type-style. In other words, they either refer to the maximum extreme SuperHyperNumber or to the minimum extreme SuperHyperNumber and the extreme SuperHyperSet either with the maximum extreme SuperHyperCardinality or with the minimum extreme SuperHyperCardinality.

Proposition 4.9. *Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Consider an extreme SuperHyperDominating. Then an extreme SuperHyperClique has only one extreme representative in.*

Proof. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Consider an extreme SuperHyperDominating. By applying the Proposition (4.7), the extreme results are up. Thus on a connected extreme SuperHyperGraph $ESHG : (V, E)$, and in an extreme SuperHyperDominating, an extreme SuperHyperClique has only one extreme representative in. □

5 Results on Extreme SuperHyperClasses

The previous extreme approaches apply on the upcoming extreme results on extreme SuperHyperClasses.

Proposition 5.1. *Assume a connected extreme SuperHyperPath $ESHP : (V, E)$. Then an extreme SuperHyperClique-style with the maximum extreme SuperHyperCardinality is an extreme SuperHyperSet of the interior extreme SuperHyperVertices.*

Proposition 5.2. *Assume a connected extreme SuperHyperPath $ESHP : (V, E)$. Then an extreme SuperHyperClique is an extreme SuperHyperSet of the interior extreme SuperHyperVertices with only no extreme exceptions in the form of interior extreme SuperHyperVertices from the unique extreme SuperHyperEdges not excluding only any interior extreme SuperHyperVertices from the extreme unique SuperHyperEdges. An extreme SuperHyperClique has the extreme number of all the interior extreme SuperHyperVertices without any minus on SuperHyperNeighborhoods.*

Proof. Assume a connected SuperHyperPath $ESHP : (V, E)$. Assume an extreme SuperHyperEdge has z extreme number of the extreme SuperHyperVertices. Then every extreme SuperHyperVertex has at least one extreme SuperHyperEdge with others in common. Thus those extreme SuperHyperVertices have the eligibles to be contained in an extreme SuperHyperClique. Those extreme SuperHyperVertices are potentially included in an extreme style-SuperHyperClique. Formally, consider

$$\{Z_1, Z_2, \ldots, Z_z\}$$

are the extreme SuperHyperVertices of an extreme SuperHyperEdge. Thus

$$Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z.$$

where the $\sim$ isn't an equivalence relation but only the symmetric relation on the extreme SuperHyperVertices of the extreme SuperHyperGraph. The formal definition is as follows.

$$Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z$$

if and only if Z_i and Z_j are the extreme SuperHyperVertices and there's an extreme SuperHyperEdge between the extreme SuperHyperVertices Z_i and Z_j. The other definition for the extreme SuperHyperEdge in the terms of extreme SuperHyperClique is

$$\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z\}.$$

This definition coincides with the definition of the extreme SuperHyperClique but with slightly differences in the maximum extreme cardinality amid those extreme type-SuperHyperSets of the extreme SuperHyperVertices. Thus the extreme SuperHyperSet of the extreme SuperHyperVertices,

$$\max_z |\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z\}|_{\text{extreme cardinality}},$$

is formalized with mathematical literatures on the extreme SuperHyperClique. Let $Z_i \overset{E}{\sim} Z_j$, be defined as Z_i and Z_j are the extreme SuperHyperVertices belong to the extreme SuperHyperEdge E. Thus,

$$E = \{Z_1, Z_2, \ldots, Z_z \mid Z_i \overset{E}{\sim} Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z\}.$$

But with the slightly differences,

$$\text{extreme SuperHyperClique} =$$
$$\{Z_1, Z_2, \ldots, Z_z \mid \forall i \neq j, \ i, j = 1, 2, \ldots, z, \ \exists E_x, \ Z_i \overset{E_x}{\sim} Z_j, \}.$$

Thus E is an extreme quasi-SuperHyperClique where E is fixed that means $E_x = E$. for all extreme intended SuperHyperVertices but in an extreme SuperHyperClique, E_x could be different and it's not unique. To sum them up, in a connected extreme SuperHyperGraph $ESHG : (V, E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme number of extreme SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique. The main definition of the extreme SuperHyperClique has two titles. An extreme quasi-SuperHyperClique and its corresponded quasi-maximum extreme SuperHyperCardinality are two titles in the terms of quasi-styles. For any extreme number, there's an extreme quasi-SuperHyperClique with that quasi-maximum extreme SuperHyperCardinality in the terms of the embedded extreme SuperHyperGraph. If there's an embedded extreme SuperHyperGraph, then the extreme quasi-SuperHyperNotions lead us to take the collection of all the extreme quasi-SuperHyperCliques for all extreme numbers less than its extreme corresponded maximum number. The essence of the extreme SuperHyperClique ends up but this essence starts up in the terms of the extreme quasi-SuperHyperClique, again and more in the operations of collecting all the extreme quasi-SuperHyperCliques acted on the all possible used formations of the extreme SuperHyperGraph to achieve one extreme number. This extreme number is considered as the equivalence class for all corresponded quasi-SuperHyperCliques. Let $z_{\text{Extreme Number}}$, $S_{\text{Extreme SuperHyperSet}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperSet and an extreme SuperHyperClique. Then

$$
\begin{aligned}
&[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}
$$

As its consequences, the formal definition of the extreme SuperHyperClique is re-formalized and redefined as follows.

$$
\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}
$$

To get more precise perceptions, the follow-up expressions propose another formal technical definition for the extreme SuperHyperClique.

$$
\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}
$$

In more concise and more convenient ways, the modified definition for the extreme SuperHyperClique poses the upcoming expressions.

$$
\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}
$$

To translate the statement to this mathematical literature, the formulae will be revised.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.\end{aligned}$$

And then,

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.\end{aligned}$$

To get more visions in the closer look-up, there's an overall overlook.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid\\&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}},\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid\\&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}},\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= z_{\text{Extreme Number}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.\end{aligned}$$

Now, the extension of these types of approaches is up. Since the new term, "extreme SuperHyperNeighborhood", could be redefined as the collection of the extreme SuperHyperVertices such that any amount of its extreme SuperHyperVertices are incident to an extreme SuperHyperEdge. It's, literarily, another name for "extreme Quasi-SuperHyperClique" but, precisely, it's the generalization of "extreme Quasi-SuperHyperClique" since "extreme Quasi-SuperHyperClique" happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and background but “extreme SuperHyperNeighborhood” may not happens “extreme SuperHyperClique” in an extreme SuperHyperGraph as initial framework and preliminarily background since there are some ambiguities about the extreme SuperHyperCardinality arise from it. To get orderly keywords, the terms, “extreme SuperHyperNeighborhood”, “extreme Quasi-SuperHyperClique”, and “extreme SuperHyperClique” are up.

Thus, let $z_{\text{Extreme Number}}, N_{\text{Extreme SuperHyperNeighborhood}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperNeighborhood and an extreme SuperHyperClique and the new terms are up.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

And with go back to initial structure,

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Thus, in a connected extreme SuperHyperGraph $ESHG : (V, E)$, the all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Let an extreme SuperHyperEdge $ESHE$ has some extreme SuperHyperVertices r. Consider all extreme numbers of those extreme SuperHyperVertices from that extreme SuperHyperEdge excluding excluding more than r distinct extreme SuperHyperVertices, exclude to any given extreme SuperHyperSet of the extreme SuperHyperVertices. Consider there's an extreme SuperHyperClique with the least cardinality, the lower sharp extreme bound for extreme cardinality. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \setminus \{z\}$ is an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common but it isn't an extreme SuperHyperClique. Since it doesn't have **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have a some SuperHyperVertices in common. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \cup \{z\}$ is the maximum extreme cardinality of an extreme SuperHyperSet S of extreme SuperHyperVertices but it isn't an extreme SuperHyperClique. Since it **doesn't do** the extreme procedure such that such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common [there are at least one extreme SuperHyperVertex outside implying there's, sometimes in the connected extreme SuperHyperGraph $ESHG : (V, E)$, an extreme SuperHyperVertex, titled its extreme SuperHyperNeighbor, to that extreme SuperHyperVertex in the extreme SuperHyperSet S so as S doesn't do "the extreme procedure".]. There's only **one** extreme SuperHyperVertex **outside** the intended extreme SuperHyperSet, $V_{ESHE} \cup \{z\}$, in the terms of extreme SuperHyperNeighborhood. Thus the obvious extreme SuperHyperClique, V_{ESHE} is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, V_{ESHE}, **is** a extreme SuperHyperSet, V_{ESHE}, **includes** only **all** extreme SuperHyperVertices does forms any kind of extreme pairs are titled extreme SuperHyperNeighbors in a connected extreme SuperHyperGraph $ESHG : (V, E)$. Since the extreme SuperHyperSet of the extreme SuperHyperVertices V_{ESHE}, is the **maximum extreme SuperHyperCardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices **such that** there's an extreme SuperHyperEdge to have an extreme SuperHyperVertex in common. Thus, a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of

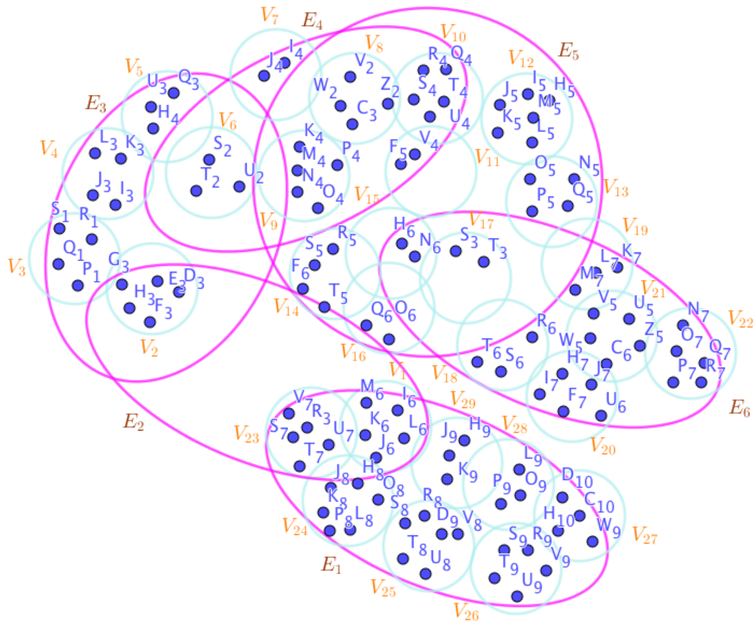

Figure 21. An extreme SuperHyperPath Associated to the Notions of extreme SuperHyperClique in the Example (5.3)

them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out. □

Example 5.3. In the Figure (21), the connected extreme SuperHyperPath $ESHP : (V, E)$, is highlighted and featured. The extreme SuperHyperSet, corresponded to E_5, V_{E_5}, of the extreme SuperHyperVertices of the connected extreme SuperHyperPath $ESHP : (V, E)$, in the extreme SuperHyperModel (21), is the SuperHyperClique.

Proposition 5.4. *Assume a connected extreme SuperHyperCycle $ESHC : (V, E)$. Then an extreme SuperHyperClique is a extreme SuperHyperSet of the interior extreme SuperHyperVertices with only no extreme exceptions on the form of interior extreme SuperHyperVertices from the same extreme SuperHyperNeighborhoods not excluding any extreme SuperHyperVertex. An extreme SuperHyperClique has the extreme number of all the extreme SuperHyperEdges in the terms of the maximum extreme cardinality.*

Proof. Assume a connected SuperHyperCycle $ESHC : (V, E)$. Assume an extreme SuperHyperEdge has z extreme number of the extreme SuperHyperVertices. Then every extreme SuperHyperVertex has at least one extreme SuperHyperEdge with others in common. Thus those extreme SuperHyperVertices have the eligibles to be contained in an extreme SuperHyperClique. Those extreme SuperHyperVertices are potentially included in an extreme style-SuperHyperClique. Formally, consider

$$\{Z_1, Z_2, \ldots, Z_z\}$$

are the extreme SuperHyperVertices of an extreme SuperHyperEdge. Thus

$$Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z.$$

where the $\sim$ isn't an equivalence relation but only the symmetric relation on the extreme SuperHyperVertices of the extreme SuperHyperGraph. The formal definition is as follows.

$$Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z$$

if and only if Z_i and Z_j are the extreme SuperHyperVertices and there's an extreme SuperHyperEdge between the extreme SuperHyperVertices Z_i and Z_j. The other definition for the extreme SuperHyperEdge in the terms of extreme SuperHyperClique is

$$\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}.$$

This definition coincides with the definition of the extreme SuperHyperClique but with slightly differences in the maximum extreme cardinality amid those extreme type-SuperHyperSets of the extreme SuperHyperVertices. Thus the extreme SuperHyperSet of the extreme SuperHyperVertices,

$$\max_z |\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}|_{\text{extreme cardinality}},$$

is formalized with mathematical literatures on the extreme SuperHyperClique. Let $Z_i \overset{E}{\sim} Z_j$, be defined as Z_i and Z_j are the extreme SuperHyperVertices belong to the extreme SuperHyperEdge E. Thus,

$$E = \{Z_1, Z_2, \ldots, Z_z \mid Z_i \overset{E}{\sim} Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}.$$

But with the slightly differences,

$$\text{extreme SuperHyperClique} =$$
$$\{Z_1, Z_2, \ldots, Z_z \mid \forall i \neq j,\ i,j = 1,2,\ldots,z,\ \exists E_x,\ Z_i \overset{E_x}{\sim} Z_j,\}.$$

Thus E is an extreme quasi-SuperHyperClique where E is fixed that means $E_x = E$. for all extreme intended SuperHyperVertices but in an extreme SuperHyperClique, E_x could be different and it's not unique. To sum them up, in a connected extreme SuperHyperGraph $ESHG : (V, E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme number of extreme SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique. The main definition of the extreme SuperHyperClique has two titles. An extreme quasi-SuperHyperClique and its corresponded quasi-maximum extreme SuperHyperCardinality are two titles in the terms of quasi-styles. For any extreme number, there's an extreme quasi-SuperHyperClique with that quasi-maximum extreme SuperHyperCardinality in the terms of the embedded extreme SuperHyperGraph. If there's an embedded extreme SuperHyperGraph, then the extreme quasi-SuperHyperNotions lead us to take the collection of all the extreme quasi-SuperHyperCliques for all extreme numbers less than its extreme corresponded maximum number. The essence of the extreme SuperHyperClique ends up but this essence starts up in the terms of the extreme quasi-SuperHyperClique, again and more in the operations of collecting all the extreme quasi-SuperHyperCliques acted on the all possible used formations of the extreme SuperHyperGraph to achieve one extreme number. This extreme number is considered as the equivalence class for all corresponded quasi-SuperHyperCliques. Let $z_{\text{Extreme Number}}, S_{\text{Extreme SuperHyperSet}}$ and

$G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperSet and an extreme SuperHyperClique. Then

$$[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}}\}.$$

As its consequences, the formal definition of the extreme SuperHyperClique is re-formalized and redefined as follows.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}}\}.$$

To get more precise perceptions, the follow-up expressions propose another formal technical definition for the extreme SuperHyperClique.

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

In more concise and more convenient ways, the modified definition for the extreme SuperHyperClique poses the upcoming expressions.

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

To translate the statement to this mathematical literature, the formulae will be revised.

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

And then,

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

To get more visions in the closer look-up, there's an overall overlook.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Now, the extension of these types of approaches is up. Since the new term, "extreme SuperHyperNeighborhood", could be redefined as the collection of the extreme SuperHyperVertices such that any amount of its extreme SuperHyperVertices are incident to an extreme SuperHyperEdge. It's, literarily, another name for "extreme Quasi-SuperHyperClique" but, precisely, it's the generalization of "extreme Quasi-SuperHyperClique" since "extreme Quasi-SuperHyperClique" happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and background but "extreme SuperHyperNeighborhood" may not happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and preliminarily background since there are some ambiguities about the extreme SuperHyperCardinality arise from it. To get orderly keywords, the terms, "extreme SuperHyperNeighborhood", "extreme Quasi-SuperHyperClique", and "extreme SuperHyperClique" are up.

Thus, let $z_{\text{Extreme Number}}, N_{\text{Extreme SuperHyperNeighborhood}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperNeighborhood and an extreme SuperHyperClique and the new terms are up.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

1919

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

1920

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

1921

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

And with go back to initial structure, 1922

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

1923

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

1924

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

1925

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Thus, in a connected extreme SuperHyperGraph $ESHG : (V, E)$, the all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Let an extreme SuperHyperEdge $ESHE$ has some extreme SuperHyperVertices r. Consider all extreme numbers of those extreme SuperHyperVertices from that extreme SuperHyperEdge excluding excluding more than r distinct extreme SuperHyperVertices, exclude to any given extreme SuperHyperSet of the extreme SuperHyperVertices. Consider there's an extreme SuperHyperClique with the least cardinality, the lower sharp extreme bound for extreme cardinality. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \setminus \{z\}$ is an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common but it isn't an extreme SuperHyperClique. Since it doesn't have **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have a some SuperHyperVertices in common. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \cup \{z\}$ is the maximum extreme cardinality of an extreme SuperHyperSet S of extreme SuperHyperVertices but it isn't an extreme SuperHyperClique. Since it **doesn't do** the extreme procedure such that such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common [there are at least one extreme SuperHyperVertex outside implying there's, sometimes in the connected extreme SuperHyperGraph $ESHG : (V, E)$, an extreme SuperHyperVertex, titled its extreme SuperHyperNeighbor, to that extreme SuperHyperVertex in the extreme SuperHyperSet S so as S doesn't do "the extreme procedure".]. There's only **one** extreme SuperHyperVertex **outside** the intended extreme SuperHyperSet, $V_{ESHE} \cup \{z\}$, in the terms of extreme SuperHyperNeighborhood. Thus the obvious extreme SuperHyperClique, V_{ESHE} is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, V_{ESHE}, **is** a extreme SuperHyperSet, V_{ESHE}, **includes** only **all** extreme SuperHyperVertices does forms any kind of extreme pairs are titled extreme SuperHyperNeighbors in a connected extreme SuperHyperGraph $ESHG : (V, E)$. Since the extreme SuperHyperSet of the extreme SuperHyperVertices V_{ESHE}, is the **maximum extreme SuperHyperCardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices **such that** there's an extreme SuperHyperEdge to have an extreme SuperHyperVertex in common. Thus, a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out. □

Example 5.5. In the Figure (22), the connected extreme SuperHyperCycle $NSHC : (V, E)$, is highlighted and featured. The obtained extreme SuperHyperSet, , corresponded to E_8, V_{E_8}, by the Algorithm in previous result, of the extreme SuperHyperVertices of the connected extreme SuperHyperCycle $NSHC : (V, E)$, in the extreme SuperHyperModel (22), corresponded to E_5, V_{E_8}, is the extreme SuperHyperClique.

Proposition 5.6. *Assume a connected extreme SuperHyperStar $ESHS : (V, E)$. Then an extreme SuperHyperClique is an extreme SuperHyperSet of the interior extreme SuperHyperVertices, not extreme excluding the extreme SuperHyperCenter, with only all*

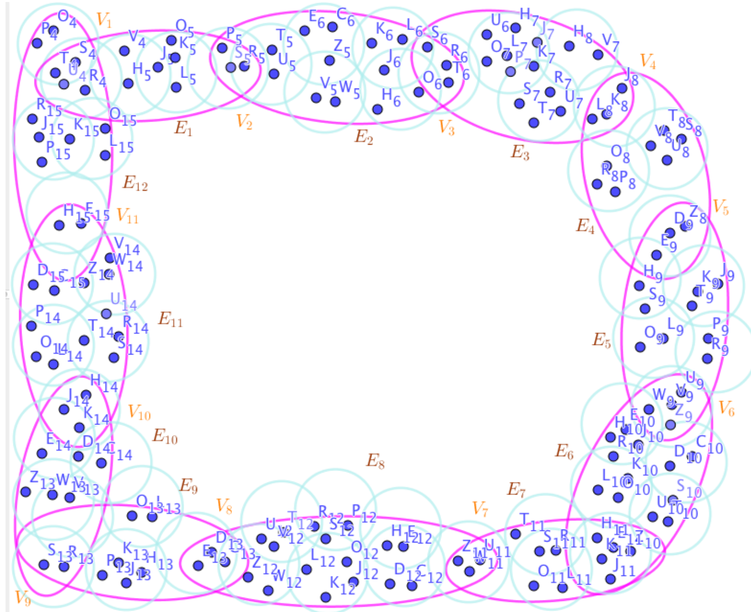

Figure 22. An extreme SuperHyperCycle Associated to the extreme Notions of extreme SuperHyperClique in the extreme Example (5.5)

extreme exceptions in the extreme form of interior extreme SuperHyperVertices from common extreme SuperHyperEdge, extreme including only one extreme SuperHyperEdge. An extreme SuperHyperClique has the extreme number of the extreme cardinality of the one extreme SuperHyperEdge.

Proof. Assume a connected SuperHyperStar $ESHS : (V, E)$. Assume an extreme SuperHyperEdge has z extreme number of the extreme SuperHyperVertices. Then every extreme SuperHyperVertex has at least one extreme SuperHyperEdge with others in common. Thus those extreme SuperHyperVertices have the eligibles to be contained in an extreme SuperHyperClique. Those extreme SuperHyperVertices are potentially included in an extreme style-SuperHyperClique. Formally, consider

$$\{Z_1, Z_2, \ldots, Z_z\}$$

are the extreme SuperHyperVertices of an extreme SuperHyperEdge. Thus

$$Z_i \sim Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z.$$

where the $\sim$ isn't an equivalence relation but only the symmetric relation on the extreme SuperHyperVertices of the extreme SuperHyperGraph. The formal definition is as follows.

$$Z_i \sim Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z$$

if and only if Z_i and Z_j are the extreme SuperHyperVertices and there's an extreme SuperHyperEdge between the extreme SuperHyperVertices Z_i and Z_j. The other definition for the extreme SuperHyperEdge in the terms of extreme SuperHyperClique is

$$\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z\}.$$

This definition coincides with the definition of the extreme SuperHyperClique but with slightly differences in the maximum extreme cardinality amid those extreme type-SuperHyperSets of the extreme SuperHyperVertices. Thus the extreme SuperHyperSet of the extreme SuperHyperVertices,

$$\max_z |\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}|_{\text{extreme cardinality}},$$

is formalized with mathematical literatures on the extreme SuperHyperClique. Let $Z_i \overset{E}{\sim} Z_j$, be defined as Z_i and Z_j are the extreme SuperHyperVertices belong to the extreme SuperHyperEdge E. Thus,

$$E = \{Z_1, Z_2, \ldots, Z_z \mid Z_i \overset{E}{\sim} Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}.$$

But with the slightly differences,

$$\text{extreme SuperHyperClique} =$$
$$\{Z_1, Z_2, \ldots, Z_z \mid \forall i \neq j,\ i,j = 1,2,\ldots,z,\ \exists E_x,\ Z_i \overset{E_x}{\sim} Z_j,\}.$$

Thus E is an extreme quasi-SuperHyperClique where E is fixed that means $E_x = E$. for all extreme intended SuperHyperVertices but in an extreme SuperHyperClique, E_x could be different and it's not unique. To sum them up, in a connected extreme SuperHyperGraph $ESHG : (V, E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme number of extreme SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique. The main definition of the extreme SuperHyperClique has two titles. An extreme quasi-SuperHyperClique and its corresponded quasi-maximum extreme SuperHyperCardinality are two titles in the terms of quasi-styles. For any extreme number, there's an extreme quasi-SuperHyperClique with that quasi-maximum extreme SuperHyperCardinality in the terms of the embedded extreme SuperHyperGraph. If there's an embedded extreme SuperHyperGraph, then the extreme quasi-SuperHyperNotions lead us to take the collection of all the extreme quasi-SuperHyperCliques for all extreme numbers less than its extreme corresponded maximum number. The essence of the extreme SuperHyperClique ends up but this essence starts up in the terms of the extreme quasi-SuperHyperClique, again and more in the operations of collecting all the extreme quasi-SuperHyperCliques acted on the all possible used formations of the extreme SuperHyperGraph to achieve one extreme number. This extreme number is considered as the equivalence class for all corresponded quasi-SuperHyperCliques. Let $z_{\text{Extreme Number}}$, $S_{\text{Extreme SuperHyperSet}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperSet and an extreme SuperHyperClique. Then

$$[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \{S_{\text{Extreme SuperHyperSet}} \mid$$
$$S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}},$$
$$|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}$$
$$= z_{\text{Extreme Number}}\}.$$

As its consequences, the formal definition of the extreme SuperHyperClique is re-formalized and redefined as follows.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\ \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid \\ S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\ = z_{\text{Extreme Number}}\}.$$

To get more precise perceptions, the follow-up expressions propose another formal technical definition for the extreme SuperHyperClique.

$$G_{\text{Extreme SuperHyperClique}} = \\ \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\ \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid \\ S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\ = z_{\text{Extreme Number}} \mid \\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\ = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

In more concise and more convenient ways, the modified definition for the extreme SuperHyperClique poses the upcoming expressions.

$$G_{\text{Extreme SuperHyperClique}} = \\ \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\ = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

To translate the statement to this mathematical literature, the formulae will be revised.

$$G_{\text{Extreme SuperHyperClique}} = \\ \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\ = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

And then,

$$G_{\text{Extreme SuperHyperClique}} = \\ \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

To get more visions in the closer look-up, there's an overall overlook.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\ \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid \\ S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\ = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Now, the extension of these types of approaches is up. Since the new term, “extreme SuperHyperNeighborhood”, could be redefined as the collection of the extreme SuperHyperVertices such that any amount of its extreme SuperHyperVertices are incident to an extreme SuperHyperEdge. It’s, literarily, another name for “extreme Quasi-SuperHyperClique” but, precisely, it’s the generalization of “extreme Quasi-SuperHyperClique” since “extreme Quasi-SuperHyperClique” happens “extreme SuperHyperClique” in an extreme SuperHyperGraph as initial framework and background but “extreme SuperHyperNeighborhood” may not happens “extreme SuperHyperClique” in an extreme SuperHyperGraph as initial framework and preliminarily background since there are some ambiguities about the extreme SuperHyperCardinality arise from it. To get orderly keywords, the terms, “extreme SuperHyperNeighborhood”, “extreme Quasi-SuperHyperClique”, and “extreme SuperHyperClique” are up.

Thus, let $z_{\text{Extreme Number}}, N_{\text{Extreme SuperHyperNeighborhood}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperNeighborhood and an extreme SuperHyperClique and the new terms are up.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

And with go back to initial structure,

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Thus, in a connected extreme SuperHyperGraph $ESHG : (V, E)$, the all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Let an extreme SuperHyperEdge $ESHE$ has some extreme SuperHyperVertices r. Consider all extreme numbers of those extreme SuperHyperVertices from that extreme SuperHyperEdge excluding excluding more than r distinct extreme SuperHyperVertices, exclude to any given extreme SuperHyperSet of the extreme SuperHyperVertices. Consider there's an extreme SuperHyperClique with the least cardinality, the lower sharp extreme bound for extreme cardinality. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \setminus \{z\}$ is an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common but it isn't an extreme SuperHyperClique. Since it doesn't have **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have a some SuperHyperVertices in common. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \cup \{z\}$ is the maximum extreme cardinality of an extreme SuperHyperSet S of extreme SuperHyperVertices but it isn't an extreme SuperHyperClique. Since it **doesn't do** the extreme procedure such that such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common [there are at least one extreme SuperHyperVertex outside implying there's, sometimes in the connected extreme SuperHyperGraph $ESHG : (V, E)$, an extreme SuperHyperVertex, titled its extreme SuperHyperNeighbor, to that extreme SuperHyperVertex in the extreme SuperHyperSet S so as S doesn't do "the extreme procedure".]. There's only **one** extreme SuperHyperVertex **outside** the intended extreme SuperHyperSet, $V_{ESHE} \cup \{z\}$, in the terms of extreme SuperHyperNeighborhood. Thus the obvious extreme SuperHyperClique, V_{ESHE} is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, V_{ESHE}, **is** a extreme SuperHyperSet, V_{ESHE}, **includes** only **all** extreme SuperHyperVertices does forms any kind of extreme pairs are titled extreme SuperHyperNeighbors in a connected extreme SuperHyperGraph $ESHG : (V, E)$. Since the extreme SuperHyperSet of the extreme SuperHyperVertices V_{ESHE}, is the **maximum extreme SuperHyperCardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices **such that** there's an extreme SuperHyperEdge to have an extreme SuperHyperVertex in common. Thus, a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out. □

Example 5.7. In the Figure (23), the connected extreme SuperHyperStar $ESHS : (V, E)$, is highlighted and featured. The obtained extreme SuperHyperSet, by the Algorithm in previous extreme result, of the extreme SuperHyperVertices of the connected extreme SuperHyperStar $ESHS : (V, E)$, in the extreme SuperHyperModel (23), , corresponded to E_5, V_{E_5}, is the extreme SuperHyperClique.

Proposition 5.8. *Assume a connected extreme SuperHyperBipartite $ESHB : (V, E)$. Then an extreme SuperHyperClique is an extreme SuperHyperSet of the interior extreme SuperHyperVertices with no any extreme exceptions in the form of interior extreme SuperHyperVertices titled extreme SuperHyperNeighbors with only no exception. An extreme SuperHyperClique has the extreme maximum number of on extreme cardinality of the first SuperHyperPart plus extreme SuperHyperNeighbors.*

Proof. Assume a connected extreme SuperHyperBipartite $ESHB : (V, E)$. Assume an extreme SuperHyperEdge has z extreme number of the extreme SuperHyperVertices. Then every extreme SuperHyperVertex has at least one extreme SuperHyperEdge with others in common. Thus those extreme SuperHyperVertices have the eligibles to be contained in an extreme SuperHyperClique. Those extreme SuperHyperVertices are potentially included in an extreme style-SuperHyperClique. Formally, consider

$$\{Z_1, Z_2, \ldots, Z_z\}$$

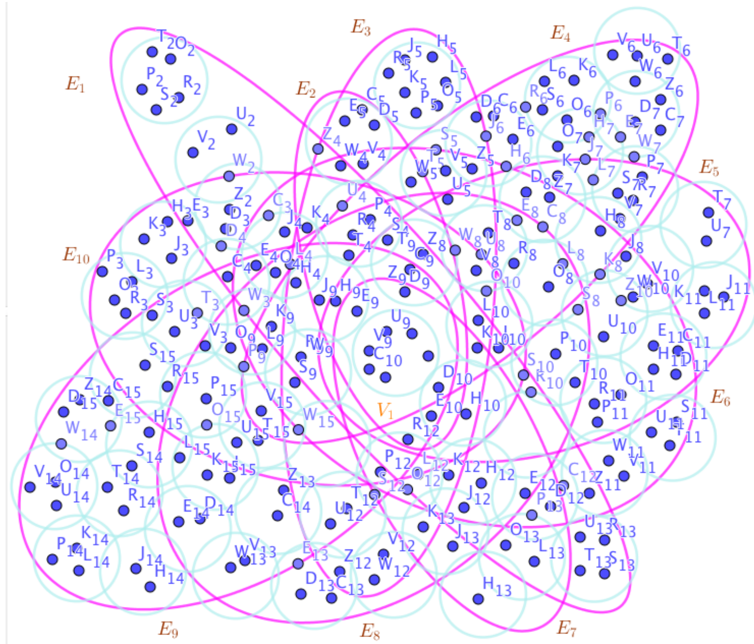

Figure 23. An extreme SuperHyperStar Associated to the extreme Notions of extreme SuperHyperClique in the extreme Example (5.7)

are the extreme SuperHyperVertices of an extreme SuperHyperEdge. Thus

$$Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z.$$

where the $\sim$ isn't an equivalence relation but only the symmetric relation on the extreme SuperHyperVertices of the extreme SuperHyperGraph. The formal definition is as follows.

$$Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z$$

if and only if Z_i and Z_j are the extreme SuperHyperVertices and there's an extreme SuperHyperEdge between the extreme SuperHyperVertices Z_i and Z_j. The other definition for the extreme SuperHyperEdge in the terms of extreme SuperHyperClique is

$$\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}.$$

This definition coincides with the definition of the extreme SuperHyperClique but with slightly differences in the maximum extreme cardinality amid those extreme type-SuperHyperSets of the extreme SuperHyperVertices. Thus the extreme SuperHyperSet of the extreme SuperHyperVertices,

$$\max_z |\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}|_{\text{extreme cardinality}},$$

is formalized with mathematical literatures on the extreme SuperHyperClique. Let $Z_i \overset{E}{\sim} Z_j$, be defined as Z_i and Z_j are the extreme SuperHyperVertices belong to the extreme SuperHyperEdge E. Thus,

$$E = \{Z_1, Z_2, \ldots, Z_z \mid Z_i \overset{E}{\sim} Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}.$$

But with the slightly differences,

$$\text{extreme SuperHyperClique} =$$
$$\{Z_1, Z_2, \ldots, Z_z \mid \forall i \neq j,\ i,j = 1,2,\ldots,z,\ \exists E_x,\ Z_i \overset{E_x}{\sim} Z_j, \}.$$

Thus E is an extreme quasi-SuperHyperClique where E is fixed that means $E_x = E$. for all extreme intended SuperHyperVertices but in an extreme SuperHyperClique, E_x could be different and it's not unique. To sum them up, in a connected extreme SuperHyperGraph $ESHG : (V, E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme number of extreme SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique. The main definition of the extreme SuperHyperClique has two titles. An extreme quasi-SuperHyperClique and its corresponded quasi-maximum extreme SuperHyperCardinality are two titles in the terms of quasi-styles. For any extreme number, there's an extreme quasi-SuperHyperClique with that quasi-maximum extreme SuperHyperCardinality in the terms of the embedded extreme SuperHyperGraph. If there's an embedded extreme SuperHyperGraph, then the extreme quasi-SuperHyperNotions lead us to take the collection of all the extreme quasi-SuperHyperCliques for all extreme numbers less than its extreme corresponded maximum number. The essence of the extreme SuperHyperClique ends up but this essence starts up in the terms of the extreme quasi-SuperHyperClique, again and more in the operations of collecting all the extreme quasi-SuperHyperCliques acted on the all possible used formations of the extreme SuperHyperGraph to achieve one extreme number. This extreme number is considered as the equivalence class for all corresponded quasi-SuperHyperCliques. Let $z_{\text{Extreme Number}}, S_{\text{Extreme SuperHyperSet}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperSet and an extreme SuperHyperClique. Then

$$[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}}\}.$$

As its consequences, the formal definition of the extreme SuperHyperClique is re-formalized and redefined as follows.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}}\}.$$

To get more precise perceptions, the follow-up expressions propose another formal technical definition for the extreme SuperHyperClique.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

In more concise and more convenient ways, the modified definition for the extreme SuperHyperClique poses the upcoming expressions.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

To translate the statement to this mathematical literature, the formulae will be revised.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.
\end{aligned}$$

And then,

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.
\end{aligned}$$

To get more visions in the closer look-up, there's an overall overlook.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= 2\}.
\end{aligned}$$

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= 2\}.
\end{aligned}$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Now, the extension of these types of approaches is up. Since the new term, "extreme SuperHyperNeighborhood", could be redefined as the collection of the extreme SuperHyperVertices such that any amount of its extreme SuperHyperVertices are incident to an extreme SuperHyperEdge. It's, literarily, another name for "extreme Quasi-SuperHyperClique" but, precisely, it's the generalization of "extreme Quasi-SuperHyperClique" since "extreme Quasi-SuperHyperClique" happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and background but "extreme SuperHyperNeighborhood" may not happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and preliminarily background since there are some ambiguities about the extreme SuperHyperCardinality arise from it. To get orderly keywords, the terms, "extreme SuperHyperNeighborhood", "extreme Quasi-SuperHyperClique", and "extreme SuperHyperClique" are up.

Thus, let $z_{\text{Extreme Number}}, N_{\text{Extreme SuperHyperNeighborhood}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperNeighborhood and an extreme SuperHyperClique and the new terms are up.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.$$

And with go back to initial structure,

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Thus, in a connected extreme SuperHyperGraph $ESHG : (V, E)$, the all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Let an extreme SuperHyperEdge $ESHE$ has some extreme SuperHyperVertices r. Consider all extreme numbers of those extreme SuperHyperVertices from that extreme SuperHyperEdge excluding excluding more than r distinct extreme SuperHyperVertices, exclude to any given extreme SuperHyperSet of the extreme SuperHyperVertices. Consider there's an extreme SuperHyperClique with the least cardinality, the lower sharp extreme bound for extreme cardinality. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \setminus \{z\}$ is an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common but it isn't an extreme SuperHyperClique. Since it doesn't have **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme

SuperHyperEdge to have a some SuperHyperVertices in common. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \cup \{z\}$ is the maximum extreme cardinality of an extreme SuperHyperSet S of extreme SuperHyperVertices but it isn't an extreme SuperHyperClique. Since it **doesn't do** the extreme procedure such that such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common [there are at least one extreme SuperHyperVertex outside implying there's, sometimes in the connected extreme SuperHyperGraph $ESHG : (V, E)$, an extreme SuperHyperVertex, titled its extreme SuperHyperNeighbor, to that extreme SuperHyperVertex in the extreme SuperHyperSet S so as S doesn't do "the extreme procedure".]. There's only **one** extreme SuperHyperVertex **outside** the intended extreme SuperHyperSet, $V_{ESHE} \cup \{z\}$, in the terms of extreme SuperHyperNeighborhood. Thus the obvious extreme SuperHyperClique, V_{ESHE} is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, V_{ESHE}, **is** a extreme SuperHyperSet, V_{ESHE}, **includes** only **all** extreme SuperHyperVertices does forms any kind of extreme pairs are titled extreme SuperHyperNeighbors in a connected extreme SuperHyperGraph $ESHG : (V, E)$. Since the extreme SuperHyperSet of the extreme SuperHyperVertices V_{ESHE}, is the **maximum extreme SuperHyperCardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices **such that** there's an extreme SuperHyperEdge to have an extreme SuperHyperVertex in common. Thus, a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out. □

Example 5.9. In the extreme Figure (24), the connected extreme SuperHyperBipartite $ESHB : (V, E)$, is extreme highlighted and extreme featured. The obtained extreme SuperHyperSet, by the extreme Algorithm in previous extreme result, of the extreme SuperHyperVertices of the connected extreme SuperHyperBipartite $ESHB : (V, E)$, in the extreme SuperHyperModel (24), , corresponded to E_6, V_{E_6}, is the extreme SuperHyperClique.

Proposition 5.10. *Assume a connected extreme SuperHyperMultipartite $ESHM : (V, E)$. Then an extreme SuperHyperClique is an extreme SuperHyperSet of the interior extreme SuperHyperVertices with only no extreme exception in the extreme form of interior extreme SuperHyperVertices from an extreme SuperHyperPart and only no exception in the form of interior SuperHyperVertices from another SuperHyperPart titled "SuperHyperNeighbors" with neglecting and ignoring more than one of them. An extreme SuperHyperClique has the extreme maximum number on all the extreme summation on the extreme cardinality of the all extreme SuperHyperParts form one SuperHyperEdges not plus any.*

Proof. Assume a connected extreme SuperHyperMultipartite $NSHM : (V, E)$. Assume an extreme SuperHyperEdge has z extreme number of the extreme SuperHyperVertices. Then every extreme SuperHyperVertex has at least one extreme SuperHyperEdge with others in common. Thus those extreme SuperHyperVertices have the eligibles to be contained in an extreme SuperHyperClique. Those extreme SuperHyperVertices are potentially included in an extreme style-SuperHyperClique. Formally, consider

$$\{Z_1, Z_2, \ldots, Z_z\}$$

are the extreme SuperHyperVertices of an extreme SuperHyperEdge. Thus

$$Z_i \sim Z_j, \ i \neq j, \ i, j = 1, 2, \ldots, z.$$

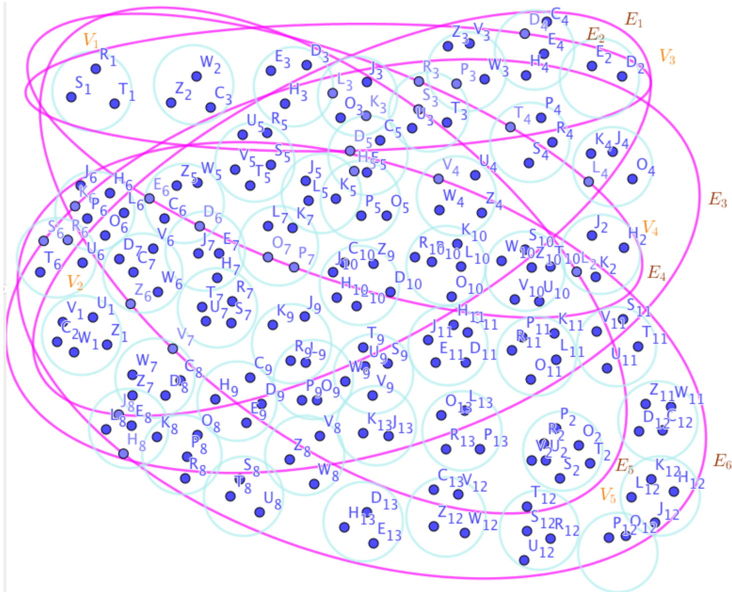

Figure 24. An extreme SuperHyperBipartite extreme Associated to the extreme Notions of extreme SuperHyperClique in the Example (5.9)

where the $\sim$ isn't an equivalence relation but only the symmetric relation on the extreme SuperHyperVertices of the extreme SuperHyperGraph. The formal definition is as follows.

$$Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z$$

if and only if Z_i and Z_j are the extreme SuperHyperVertices and there's an extreme SuperHyperEdge between the extreme SuperHyperVertices Z_i and Z_j. The other definition for the extreme SuperHyperEdge in the terms of extreme SuperHyperClique is

$$\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}.$$

This definition coincides with the definition of the extreme SuperHyperClique but with slightly differences in the maximum extreme cardinality amid those extreme type-SuperHyperSets of the extreme SuperHyperVertices. Thus the extreme SuperHyperSet of the extreme SuperHyperVertices,

$$\max_{z} |\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}|_{\text{extreme cardinality}},$$

is formalized with mathematical literatures on the extreme SuperHyperClique. Let $Z_i \overset{E}{\sim} Z_j$, be defined as Z_i and Z_j are the extreme SuperHyperVertices belong to the extreme SuperHyperEdge E. Thus,

$$E = \{Z_1, Z_2, \ldots, Z_z \mid Z_i \overset{E}{\sim} Z_j,\ i \neq j,\ i,j = 1,2,\ldots,z\}.$$

But with the slightly differences,

$$\text{extreme SuperHyperClique} =$$
$$\{Z_1, Z_2, \ldots, Z_z \mid \forall i \neq j,\ i,j = 1,2,\ldots,z,\ \exists E_x,\ Z_i \overset{E_x}{\sim} Z_j,\}.$$

Thus E is an extreme quasi-SuperHyperClique where E is fixed that means $E_x = E$. for all extreme intended SuperHyperVertices but in an extreme SuperHyperClique, E_x could be different and it's not unique. To sum them up, in a connected extreme

SuperHyperGraph $ESHG:(V,E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme number of extreme SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique. The main definition of the extreme SuperHyperClique has two titles. An extreme quasi-SuperHyperClique and its corresponded quasi-maximum extreme SuperHyperCardinality are two titles in the terms of quasi-styles. For any extreme number, there's an extreme quasi-SuperHyperClique with that quasi-maximum extreme SuperHyperCardinality in the terms of the embedded extreme SuperHyperGraph. If there's an embedded extreme SuperHyperGraph, then the extreme quasi-SuperHyperNotions lead us to take the collection of all the extreme quasi-SuperHyperCliques for all extreme numbers less than its extreme corresponded maximum number. The essence of the extreme SuperHyperClique ends up but this essence starts up in the terms of the extreme quasi-SuperHyperClique, again and more in the operations of collecting all the extreme quasi-SuperHyperCliques acted on the all possible used formations of the extreme SuperHyperGraph to achieve one extreme number. This extreme number is considered as the equivalence class for all corresponded quasi-SuperHyperCliques. Let $z_{\text{Extreme Number}}, S_{\text{Extreme SuperHyperSet}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperSet and an extreme SuperHyperClique. Then

$$
\begin{aligned}
&[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}
$$

As its consequences, the formal definition of the extreme SuperHyperClique is re-formalized and redefined as follows.

$$
\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}
$$

To get more precise perceptions, the follow-up expressions propose another formal technical definition for the extreme SuperHyperClique.

$$
\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}
$$

In more concise and more convenient ways, the modified definition for the extreme SuperHyperClique poses the upcoming expressions.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.\end{aligned}$$

To translate the statement to this mathematical literature, the formulae will be revised.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.\end{aligned}$$

And then,

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.\end{aligned}$$

To get more visions in the closer look-up, there's an overall overlook.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid\\&\ S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}},\\&\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\&\cup_{z_{\text{Extreme Number}}}\{S_{\text{Extreme SuperHyperSet}} \mid\\&\ S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}},\\&\ |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= z_{\text{Extreme Number}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\&\{S \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.\end{aligned}$$

Now, the extension of these types of approaches is up. Since the new term, "extreme SuperHyperNeighborhood", could be redefined as the collection of the extreme SuperHyperVertices such that any amount of its extreme SuperHyperVertices are incident to an extreme SuperHyperEdge. It's, literarily, another name for "extreme Quasi-SuperHyperClique" but, precisely, it's the generalization of "extreme Quasi-SuperHyperClique" since "extreme Quasi-SuperHyperClique" happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and background but "extreme SuperHyperNeighborhood" may not happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and preliminarily background since there are some ambiguities about the extreme SuperHyperCardinality arise from it. To get orderly keywords, the terms, "extreme SuperHyperNeighborhood", "extreme Quasi-SuperHyperClique", and "extreme SuperHyperClique" are up.

Thus, let $z_{\text{Extreme Number}}, N_{\text{Extreme SuperHyperNeighborhood}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperNeighborhood and an extreme SuperHyperClique and the new terms are up.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid \\
&|N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

And with go back to initial structure,

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid \\
&|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} \\
&= 2\}.
\end{aligned}$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{N_{\text{Extreme SuperHyperNeighborhood}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Thus, in a connected extreme SuperHyperGraph $ESHG : (V, E)$, the all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Let an extreme SuperHyperEdge $ESHE$ has some extreme SuperHyperVertices r. Consider all extreme numbers of those extreme SuperHyperVertices from that extreme SuperHyperEdge excluding excluding more than r distinct extreme SuperHyperVertices, exclude to any given extreme SuperHyperSet of the extreme SuperHyperVertices. Consider there's an extreme SuperHyperClique with the least cardinality, the lower sharp extreme bound for extreme cardinality. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \setminus \{z\}$ is an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common but it isn't an extreme SuperHyperClique. Since it doesn't have **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have a some SuperHyperVertices in common. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \cup \{z\}$ is the maximum extreme cardinality of an extreme SuperHyperSet S of extreme SuperHyperVertices but it isn't an extreme SuperHyperClique. Since it **doesn't do** the extreme procedure such that such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common [there are at least one extreme SuperHyperVertex outside implying there's, sometimes in the connected extreme SuperHyperGraph $ESHG : (V, E)$, an extreme SuperHyperVertex, titled its extreme SuperHyperNeighbor, to that extreme SuperHyperVertex in the extreme SuperHyperSet S so as S doesn't do "the extreme procedure".]. There's only **one** extreme SuperHyperVertex **outside** the intended extreme SuperHyperSet, $V_{ESHE} \cup \{z\}$, in the terms of extreme SuperHyperNeighborhood. Thus the obvious extreme SuperHyperClique, V_{ESHE} is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique,

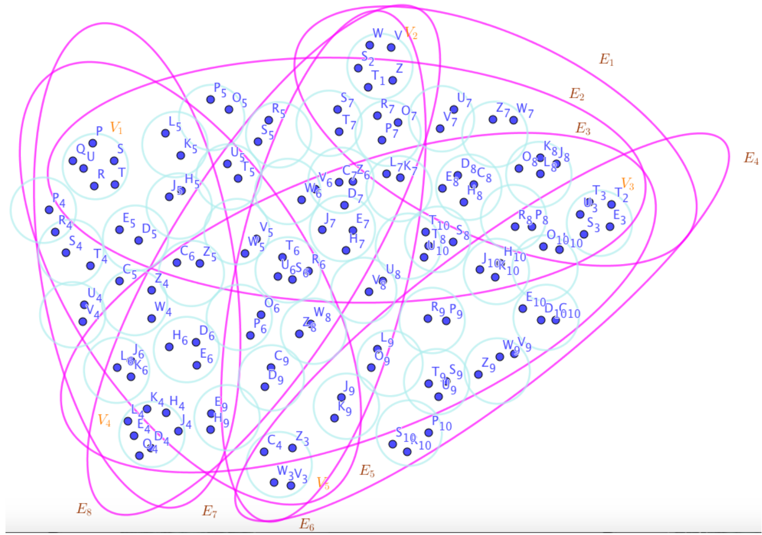

Figure 25. An extreme SuperHyperMultipartite Associated to the Notions of extreme SuperHyperClique in the Example (5.11)

V_{ESHE}, **is** a extreme SuperHyperSet, V_{ESHE}, **includes** only **all** extreme SuperHyperVertices does forms any kind of extreme pairs are titled extreme SuperHyperNeighbors in a connected extreme SuperHyperGraph $ESHG : (V, E)$. Since the extreme SuperHyperSet of the extreme SuperHyperVertices V_{ESHE}, is the **maximum extreme SuperHyperCardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices **such that** there's an extreme SuperHyperEdge to have an extreme SuperHyperVertex in common. Thus, a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out. □

Example 5.11. In the Figure (25), the connected extreme SuperHyperMultipartite $ESHM : (V, E)$, is highlighted and extreme featured. The obtained extreme SuperHyperSet, by the Algorithm in previous extreme result, of the extreme SuperHyperVertices of the connected extreme SuperHyperMultipartite $ESHM : (V, E)$, , corresponded to E_3, V_{E_3}, in the extreme SuperHyperModel (25), is the extreme SuperHyperClique.

Proposition 5.12. *Assume a connected extreme SuperHyperWheel $ESHW : (V, E)$. Then an extreme SuperHyperClique is an extreme SuperHyperSet of the interior extreme SuperHyperVertices, not excluding the extreme SuperHyperCenter, with only no exception in the form of interior extreme SuperHyperVertices from same extreme SuperHyperEdge with not the exclusion. An extreme SuperHyperClique has the extreme maximum number on all the extreme number of all the extreme SuperHyperEdges have common extreme SuperHyperNeighbors inside for an extreme SuperHyperVertex with the not exclusion.*

Proof. Assume a connected extreme SuperHyperWheel $ESHW : (V, E)$. Assume an extreme SuperHyperEdge has z extreme number of the extreme SuperHyperVertices. Then every extreme SuperHyperVertex has at least one extreme SuperHyperEdge with others in common. Thus those extreme SuperHyperVertices have the eligibles to be contained in an extreme SuperHyperClique. Those extreme SuperHyperVertices are potentially included in an extreme style-SuperHyperClique. Formally, consider

$$\{Z_1, Z_2, \ldots, Z_z\}$$

are the extreme SuperHyperVertices of an extreme SuperHyperEdge. Thus

$$Z_i \sim Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z.$$

where the $\sim$ isn't an equivalence relation but only the symmetric relation on the extreme SuperHyperVertices of the extreme SuperHyperGraph. The formal definition is as follows.

$$Z_i \sim Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z$$

if and only if Z_i and Z_j are the extreme SuperHyperVertices and there's an extreme SuperHyperEdge between the extreme SuperHyperVertices Z_i and Z_j. The other definition for the extreme SuperHyperEdge in the terms of extreme SuperHyperClique is

$$\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z\}.$$

This definition coincides with the definition of the extreme SuperHyperClique but with slightly differences in the maximum extreme cardinality amid those extreme type-SuperHyperSets of the extreme SuperHyperVertices. Thus the extreme SuperHyperSet of the extreme SuperHyperVertices,

$$\max_z |\{Z_1, Z_2, \ldots, Z_z \mid Z_i \sim Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z\}|_{\text{extreme cardinality}},$$

is formalized with mathematical literatures on the extreme SuperHyperClique. Let $Z_i \overset{E}{\sim} Z_j$, be defined as Z_i and Z_j are the extreme SuperHyperVertices belong to the extreme SuperHyperEdge E. Thus,

$$E = \{Z_1, Z_2, \ldots, Z_z \mid Z_i \overset{E}{\sim} Z_j,\ i \neq j,\ i, j = 1, 2, \ldots, z\}.$$

But with the slightly differences,

$$\text{extreme SuperHyperClique} =$$
$$\{Z_1, Z_2, \ldots, Z_z \mid \forall i \neq j,\ i, j = 1, 2, \ldots, z,\ \exists E_x,\ Z_i \overset{E_x}{\sim} Z_j, \}.$$

Thus E is an extreme quasi-SuperHyperClique where E is fixed that means $E_x = E$. for all extreme intended SuperHyperVertices but in an extreme SuperHyperClique, E_x could be different and it's not unique. To sum them up, in a connected extreme SuperHyperGraph $ESHG : (V, E)$. If an extreme SuperHyperEdge has z extreme SuperHyperVertices, then the extreme cardinality of the extreme SuperHyperClique is at least z. It's straightforward that the extreme cardinality of the extreme SuperHyperClique is at least the maximum extreme number of extreme SuperHyperVertices of the extreme SuperHyperEdges. In other words, the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices are renamed to extreme SuperHyperClique in some cases but the extreme SuperHyperEdge with the maximum extreme number of extreme SuperHyperVertices, has the extreme SuperHyperVertices are contained in an extreme SuperHyperClique. The main definition of the extreme SuperHyperClique has two titles. An extreme quasi-SuperHyperClique and its corresponded quasi-maximum extreme SuperHyperCardinality are two titles in the terms of quasi-styles. For any extreme number, there's an extreme quasi-SuperHyperClique with that quasi-maximum extreme SuperHyperCardinality in the terms of the embedded extreme SuperHyperGraph. If there's an embedded extreme SuperHyperGraph, then the extreme quasi-SuperHyperNotions lead us to take the collection of all the extreme quasi-SuperHyperCliques for all extreme numbers less than its extreme corresponded maximum number. The essence of the extreme SuperHyperClique ends up but this essence starts up in the terms of the extreme quasi-SuperHyperClique, again and more in the operations of collecting all the extreme quasi-SuperHyperCliques acted on the all possible used formations of the extreme SuperHyperGraph to achieve one extreme number. This extreme number is considered as the equivalence class for all corresponded quasi-SuperHyperCliques. Let $z_{\text{Extreme Number}}$, $S_{\text{Extreme SuperHyperSet}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperSet and an extreme SuperHyperClique. Then

$$\begin{aligned}
&[z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}$$

As its consequences, the formal definition of the extreme SuperHyperClique is re-formalized and redefined as follows.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}}\}.
\end{aligned}$$

To get more precise perceptions, the follow-up expressions propose another formal technical definition for the extreme SuperHyperClique.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \\
&\cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid \\
&S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= z_{\text{Extreme Number}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

In more concise and more convenient ways, the modified definition for the extreme SuperHyperClique poses the upcoming expressions.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.
\end{aligned}$$

To translate the statement to this mathematical literature, the formulae will be revised.

$$\begin{aligned}
&G_{\text{Extreme SuperHyperClique}} = \\
&\{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid \\
&|S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} \\
&= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.
\end{aligned}$$

And then,

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

To get more visions in the closer look-up, there's an overall overlook.

$$G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} = \cup_{z_{\text{Extreme Number}}} \{S_{\text{Extreme SuperHyperSet}} \mid S_{\text{Extreme SuperHyperSet}} = G_{\text{Extreme SuperHyperClique}}, |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = z_{\text{Extreme Number}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.$$

$$G_{\text{Extreme SuperHyperClique}} = \{S \in \cup_{z_{\text{Extreme Number}}} [z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |S_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Now, the extension of these types of approaches is up. Since the new term, "extreme SuperHyperNeighborhood", could be redefined as the collection of the extreme SuperHyperVertices such that any amount of its extreme SuperHyperVertices are incident to an extreme SuperHyperEdge. It's, literarily, another name for "extreme Quasi-SuperHyperClique" but, precisely, it's the generalization of "extreme Quasi-SuperHyperClique" since "extreme Quasi-SuperHyperClique" happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and background but "extreme SuperHyperNeighborhood" may not happens "extreme SuperHyperClique" in an extreme SuperHyperGraph as initial framework and preliminarily background since there are some ambiguities about the extreme SuperHyperCardinality arise from it. To get orderly keywords, the terms, "extreme SuperHyperNeighborhood", "extreme Quasi-SuperHyperClique", and "extreme SuperHyperClique" are up.

Thus, let $z_{\text{Extreme Number}}, N_{\text{Extreme SuperHyperNeighborhood}}$ and $G_{\text{Extreme SuperHyperClique}}$ be an extreme number, an extreme SuperHyperNeighborhood and an extreme SuperHyperClique and the new terms are up.

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\ &\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid\\ &\ |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}}\\ &= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\ &\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\ &\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid\\ &\ |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\ &= z_{\text{Extreme Number}} \mid\\ &|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}}\\ &= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\ &\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\ &|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}}\\ &= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\ &\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\ &|N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}}\}.\end{aligned}$$

And with go back to initial structure,

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\ &\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid\\ &\ |N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}}\\ &= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\ &\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} =\\ &\cup_{z_{\text{Extreme Number}}}\{N_{\text{Extreme SuperHyperNeighborhood}} \mid\\ &\ |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}}\\ &= z_{\text{Extreme Number}} \mid\\ &|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}}\\ &= 2\}.\end{aligned}$$

$$\begin{aligned}&G_{\text{Extreme SuperHyperClique}} =\\ &\{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid\\ &|N_{\text{Extreme SuperHyperNeighborhood}}|_{\text{Extreme Cardinality}}\\ &= \max_{[z_{\text{Extreme Number}}]_{\text{Extreme Class}}} z_{\text{Extreme Number}} = 2\}.\end{aligned}$$

$$G_{\text{Extreme SuperHyperClique}} = \{N_{\text{Extreme SuperHyperNeighborhood}} \in \cup_{z_{\text{Extreme Number}}}[z_{\text{Extreme Number}}]_{\text{Extreme Class}} \mid |N_{\text{Extreme SuperHyperSet}}|_{\text{Extreme Cardinality}} = 2\}.$$

Thus, in a connected extreme SuperHyperGraph $ESHG : (V, E)$, the all interior extreme SuperHyperVertices belong to any extreme quasi-SuperHyperClique if for any of them, and any of other corresponded extreme SuperHyperVertex, the two interior extreme SuperHyperVertices are mutually extreme SuperHyperNeighbors with no extreme exception at all. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. Let an extreme SuperHyperEdge $ESHE$ has some extreme SuperHyperVertices r. Consider all extreme numbers of those extreme SuperHyperVertices from that extreme SuperHyperEdge excluding excluding more than r distinct extreme SuperHyperVertices, exclude to any given extreme SuperHyperSet of the extreme SuperHyperVertices. Consider there's an extreme SuperHyperClique with the least cardinality, the lower sharp extreme bound for extreme cardinality. Assume a connected extreme SuperHyperGraph $ESHG : (V, E)$. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \setminus \{z\}$ is an extreme SuperHyperSet S of the extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common but it isn't an extreme SuperHyperClique. Since it doesn't have **the maximum extreme cardinality** of an extreme SuperHyperSet S of extreme SuperHyperVertices such that there's an extreme SuperHyperEdge to have a some SuperHyperVertices in common. The extreme SuperHyperSet of the extreme SuperHyperVertices $V_{ESHE} \cup \{z\}$ is the maximum extreme cardinality of an extreme SuperHyperSet S of extreme SuperHyperVertices but it isn't an extreme SuperHyperClique. Since it **doesn't do** the extreme procedure such that such that there's an extreme SuperHyperEdge to have some extreme SuperHyperVertices in common [there are at least one extreme SuperHyperVertex outside implying there's, sometimes in the connected extreme SuperHyperGraph $ESHG : (V, E)$, an extreme SuperHyperVertex, titled its extreme SuperHyperNeighbor, to that extreme SuperHyperVertex in the extreme SuperHyperSet S so as S doesn't do "the extreme procedure".]. There's only **one** extreme SuperHyperVertex **outside** the intended extreme SuperHyperSet, $V_{ESHE} \cup \{z\}$, in the terms of extreme SuperHyperNeighborhood. Thus the obvious extreme SuperHyperClique, V_{ESHE} is up. The obvious simple extreme type-SuperHyperSet of the extreme SuperHyperClique, V_{ESHE}, **is** a extreme SuperHyperSet, V_{ESHE}, **includes** only **all** extreme SuperHyperVertices does forms any kind of extreme pairs are titled extreme SuperHyperNeighbors in a connected extreme SuperHyperGraph $ESHG : (V, E)$. Since the extreme SuperHyperSet of the extreme SuperHyperVertices V_{ESHE}, is the **maximum extreme SuperHyperCardinality** of a extreme SuperHyperSet S of extreme SuperHyperVertices **such that** there's an extreme SuperHyperEdge to have an extreme SuperHyperVertex in common. Thus, a connected extreme SuperHyperGraph $ESHG : (V, E)$. The any extreme SuperHyperClique only contains all interior extreme SuperHyperVertices and all exterior extreme SuperHyperVertices from the unique extreme SuperHyperEdge where there's any of them has all possible extreme SuperHyperNeighbors in and there's all extreme SuperHyperNeighborhoods in with no exception but everything is possible about extreme SuperHyperNeighborhoods and extreme SuperHyperNeighbors out. □

Example 5.13. In the extreme Figure (**??**), the connected extreme SuperHyperWheel $NSHW : (V, E)$, is extreme highlighted and featured. The obtained extreme SuperHyperSet, by the Algorithm in previous result, of the extreme SuperHyperVertices

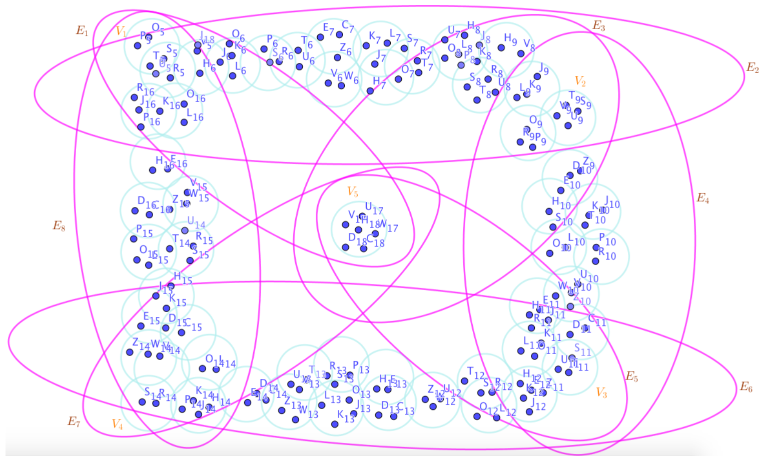

Figure 26. An extreme SuperHyperWheel extreme Associated to the extreme Notions of extreme SuperHyperClique in the extreme Example (5.13)

of the connected extreme SuperHyperWheel $ESHW : (V, E)$, , corresponded to E_5, V_{E_6}, in the extreme SuperHyperModel (**??**), is the extreme SuperHyperClique.

6 General Extreme Results

For the SuperHyperClique, extreme SuperHyperClique, and the neutrosophic SuperHyperClique, some general results are introduced.

Remark 6.1. Let remind that the neutrosophic SuperHyperClique is "redefined" on the positions of the alphabets.

Corollary 6.2. *Assume extreme SuperHyperClique. Then*

$$Neutrosophic\ SuperHyperClique =$$
$$\{theSuperHyperCliqueoftheSuperHyperVertices \mid$$
$$\max|SuperHyperOffensiveSuperHyper$$
$$Clique|_{neutrosophiccardinalityamidthoseSuperHyperClique.}\}$$

Where σ_i is the unary operation on the SuperHyperVertices of the SuperHyperGraph to assign the determinacy, the indeterminacy and the neutrality, for $i = 1, 2, 3$, respectively.

Corollary 6.3. *Assume a neutrosophic SuperHyperGraph on the same identical letter of the alphabet. Then the notion of neutrosophic SuperHyperClique and SuperHyperClique coincide.*

Corollary 6.4. *Assume a neutrosophic SuperHyperGraph on the same identical letter of the alphabet. Then a consecutive sequence of the SuperHyperVertices is a neutrosophic SuperHyperClique if and only if it's a SuperHyperClique.*

Corollary 6.5. *Assume a neutrosophic SuperHyperGraph on the same identical letter of the alphabet. Then a consecutive sequence of the SuperHyperVertices is a strongest SuperHyperCycle if and only if it's a longest SuperHyperCycle.*

Corollary 6.6. *Assume SuperHyperClasses of a neutrosophic SuperHyperGraph on the same identical letter of the alphabet. Then its neutrosophic SuperHyperClique is its SuperHyperClique and reversely.*

Corollary 6.7. *Assume a neutrosophic SuperHyperPath(-/SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultipartite, SuperHyperWheel) on the same identical letter of the alphabet. Then its neutrosophic SuperHyperClique is its SuperHyperClique and reversely.*

Corollary 6.8. *Assume a neutrosophic SuperHyperGraph. Then its neutrosophic SuperHyperClique isn't well-defined if and only if its SuperHyperClique isn't well-defined.*

Corollary 6.9. *Assume SuperHyperClasses of a neutrosophic SuperHyperGraph. Then its neutrosophic SuperHyperClique isn't well-defined if and only if its SuperHyperClique isn't well-defined.*

Corollary 6.10. *Assume a neutrosophic SuperHyperPath(-/SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultipartite, SuperHyperWheel). Then its neutrosophic SuperHyperClique isn't well-defined if and only if its SuperHyperClique isn't well-defined.*

Corollary 6.11. *Assume a neutrosophic SuperHyperGraph. Then its neutrosophic SuperHyperClique is well-defined if and only if its SuperHyperClique is well-defined.*

Corollary 6.12. *Assume SuperHyperClasses of a neutrosophic SuperHyperGraph. Then its neutrosophic SuperHyperClique is well-defined if and only if its SuperHyperClique is well-defined.*

Corollary 6.13. *Assume a neutrosophic SuperHyperPath(-/SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultipartite, SuperHyperWheel). Then its neutrosophic SuperHyperClique is well-defined if and only if its SuperHyperClique is well-defined.*

Proposition 6.14. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph. Then V is*

(i) : *the dual SuperHyperDefensive SuperHyperClique;*

(ii) : *the strong dual SuperHyperDefensive SuperHyperClique;*

(iii) : *the connected dual SuperHyperDefensive SuperHyperClique;*

(iv) : *the δ-dual SuperHyperDefensive SuperHyperClique;*

(v) : *the strong δ-dual SuperHyperDefensive SuperHyperClique;*

(vi) : *the connected δ-dual SuperHyperDefensive SuperHyperClique.*

Proof. Suppose $ESHG : (V, E)$ is a neutrosophic SuperHyperGraph. Consider V. All SuperHyperMembers of V have at least one SuperHyperNeighbor inside the SuperHyperSet more than SuperHyperNeighbor out of SuperHyperSet. Thus,

(i). V is the dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in V,\ |N(a) \cap V| > |N(a) \cap (V \setminus V)| \equiv \\
&\forall a \in V,\ |N(a) \cap V| > |N(a) \cap \emptyset| \equiv \\
&\forall a \in V,\ |N(a) \cap V| > |\emptyset| \equiv \\
&\forall a \in V,\ |N(a) \cap V| > 0 \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(ii). V is the strong dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_s(a) \cap S| > |N_s(a) \cap (V \setminus S)| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > |N_s(a) \cap (V \setminus V)| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > |N_s(a) \cap \emptyset| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > |\emptyset| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > 0 \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(iii). V is the connected dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_c(a) \cap S| > |N_c(a) \cap (V \setminus S)| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > |N_c(a) \cap (V \setminus V)| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > |N_c(a) \cap \emptyset| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > |\emptyset| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > 0 \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(iv). V is the δ-dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N(a) \cap S) - (N(a) \cap (V \setminus S))| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V) - (N(a) \cap (V \setminus V))| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V) - (N(a) \cap (\emptyset))| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V) - (\emptyset)| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V)| > \delta.
\end{aligned}$$

(v). V is the strong δ-dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_s(a) \cap S) - (N_s(a) \cap (V \setminus S))| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V) - (N_s(a) \cap (V \setminus V))| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V) - (N_s(a) \cap (\emptyset))| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V) - (\emptyset)| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V)| > \delta.
\end{aligned}$$

(vi). V is connected δ-dual SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_c(a) \cap S) - (N_c(a) \cap (V \setminus S))| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V) - (N_c(a) \cap (V \setminus V))| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V) - (N_c(a) \cap (\emptyset))| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V) - (\emptyset)| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V)| > \delta.
\end{aligned}$$

□

Proposition 6.15. *Let $NTG : (V, E, \sigma, \mu)$ be a neutrosophic SuperHyperGraph. Then $\emptyset$ is*

(i) : *the SuperHyperDefensive SuperHyperClique;*

(ii) : *the strong SuperHyperDefensive SuperHyperClique;*

(iii) : *the connected defensive SuperHyperDefensive SuperHyperClique;*

(iv) : *the δ-SuperHyperDefensive SuperHyperClique;*

(v) : *the strong δ-SuperHyperDefensive SuperHyperClique;*

(vi) : *the connected δ-SuperHyperDefensive SuperHyperClique.*

Proof. Suppose $ESHG : (V, E)$ is a neutrosophic SuperHyperGraph. Consider $\emptyset$. All SuperHyperMembers of $\emptyset$ have no SuperHyperNeighbor inside the SuperHyperSet less than SuperHyperNeighbor out of SuperHyperSet. Thus,

(i). $\emptyset$ is the SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in \emptyset,\ |N(a) \cap \emptyset| < |N(a) \cap (V \setminus \emptyset)| \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < |N(a) \cap (V \setminus \emptyset)| \equiv \\
&\forall a \in \emptyset,\ 0 < |N(a) \cap V| \equiv \\
&\forall a \in \emptyset,\ 0 < |N(a) \cap V| \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(ii). $\emptyset$ is the strong SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_s(a) \cap S| < |N_s(a) \cap (V \setminus S)| \equiv \\
&\forall a \in \emptyset,\ |N_s(a) \cap \emptyset| < |N_s(a) \cap (V \setminus \emptyset)| \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < |N_s(a) \cap (V \setminus \emptyset)| \equiv \\
&\forall a \in \emptyset,\ 0 < |N_s(a) \cap V| \equiv \\
&\forall a \in \emptyset,\ 0 < |N_s(a) \cap V| \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(iii). $\emptyset$ is the connected SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_c(a) \cap S| < |N_c(a) \cap (V \setminus S)| \equiv \\
&\forall a \in \emptyset,\ |N_c(a) \cap \emptyset| < |N_c(a) \cap (V \setminus \emptyset)| \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < |N_c(a) \cap (V \setminus \emptyset)| \equiv \\
&\forall a \in \emptyset,\ 0 < |N_c(a) \cap V| \equiv \\
&\forall a \in \emptyset,\ 0 < |N_c(a) \cap V| \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(iv). $\emptyset$ is the δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N(a) \cap S) - (N(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N(a) \cap \emptyset) - (N(a) \cap (V \setminus \emptyset))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N(a) \cap \emptyset) - (N(a) \cap (V))| < \delta \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

(v). $\emptyset$ is the strong δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_s(a) \cap S) - (N_s(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_s(a) \cap \emptyset) - (N_s(a) \cap (V \setminus \emptyset))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_s(a) \cap \emptyset) - (N_s(a) \cap (V))| < \delta \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

(vi). $\emptyset$ is the connected δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_c(a) \cap S) - (N_c(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_c(a) \cap \emptyset) - (N_c(a) \cap (V \setminus \emptyset))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_c(a) \cap \emptyset) - (N_c(a) \cap (V))| < \delta \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

□

Proposition 6.16. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph. Then an independent SuperHyperSet is*

(i) : *the SuperHyperDefensive SuperHyperClique;*

(ii) : *the strong SuperHyperDefensive SuperHyperClique;*

(iii) : *the connected SuperHyperDefensive SuperHyperClique;*

(iv) : *the δ-SuperHyperDefensive SuperHyperClique;*

(v) : *the strong δ-SuperHyperDefensive SuperHyperClique;*

(vi) : *the connected δ-SuperHyperDefensive SuperHyperClique.*

Proof. Suppose $ESHG : (V, E)$ is a neutrosophic SuperHyperGraph. Consider S. All SuperHyperMembers of S have no SuperHyperNeighbor inside the SuperHyperSet less than SuperHyperNeighbor out of SuperHyperSet. Thus,

(i). An independent SuperHyperSet is the SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |\emptyset| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ 0 < |N(a) \cap V| \equiv \\
&\forall a \in S,\ 0 < |N(a)| \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(ii). An independent SuperHyperSet is the strong SuperHyperDefensive

SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_s(a) \cap S| < |N_s(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N_s(a) \cap S| < |N_s(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |\emptyset| < |N_s(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ 0 < |N_s(a) \cap V| \equiv \\
&\forall a \in S,\ 0 < |N_s(a)| \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(iii). An independent SuperHyperSet is the connected SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_c(a) \cap S| < |N_c(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N_c(a) \cap S| < |N_c(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |\emptyset| < |N_c(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ 0 < |N_c(a) \cap V| \equiv \\
&\forall a \in S,\ 0 < |N_c(a)| \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

(iv). An independent SuperHyperSet is the δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N(a) \cap S) - (N(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in S,\ |(N(a) \cap S) - (N(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in S,\ |(N(a) \cap S) - (N(a) \cap (V))| < \delta \equiv \\
&\forall a \in S,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

(v). An independent SuperHyperSet is the strong δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_s(a) \cap S) - (N_s(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in S,\ |(N_s(a) \cap S) - (N_s(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in S,\ |(N_s(a) \cap S) - (N_s(a) \cap (V))| < \delta \equiv \\
&\forall a \in S,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

(vi). An independent SuperHyperSet is the connected δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_c(a) \cap S) - (N_c(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in S,\ |(N_c(a) \cap S) - (N_c(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in S,\ |(N_c(a) \cap S) - (N_c(a) \cap (V))| < \delta \equiv \\
&\forall a \in S,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

□

Proposition 6.17. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperCycle/SuperHyperPath. Then V is a maximal*

$(i):$ *SuperHyperDefensive SuperHyperClique;*

$(ii):$ *strong SuperHyperDefensive SuperHyperClique;*

$(iii):$ *connected SuperHyperDefensive SuperHyperClique;*

$(iv):$ *$\mathcal{O}(ESHG)$-SuperHyperDefensive SuperHyperClique;*

$(v):$ *strong $\mathcal{O}(ESHG)$-SuperHyperDefensive SuperHyperClique;*

$(vi):$ *connected $\mathcal{O}(ESHG)$-SuperHyperDefensive SuperHyperClique;*

Where the exterior SuperHyperVertices and the interior SuperHyperVertices coincide.

Proof. Suppose $ESHG:(V,E)$ is a neutrosophic SuperHyperGraph which is a SuperHyperUniform SuperHyperCycle/SuperHyperPath.

(i). Consider one segment is out of S which is SuperHyperDefensive SuperHyperClique. This segment has $2t$ SuperHyperNeighbors in S, i.e, Suppose $x_{i_{i=1,2,\ldots,t}} \in V \setminus S$ such that $y_{i_{i=1,2,\ldots,t}}, z_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})$. By it's the exterior SuperHyperVertices and the interior SuperHyperVertices coincide and it's SuperHyperUniform SuperHyperCycle, $|N(x_{i_{i=1,2,\ldots,t}})| = |N(y_{i_{i=1,2,\ldots,t}})| = |N(z_{i_{i=1,2,\ldots,t}})| = 2t$. Thus

$$
\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap (V \setminus (V \setminus \{x_{i_{i=1,2,\ldots,t}}\}))| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap \{x_{i_{i=1,2,\ldots,t}}\})| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |\{z_1, z_2, \ldots, z_{t-1}\}| < \\
&|\{x_1, x_2, \ldots, x_{t-1}\})| \equiv \\
&\exists y \in S,\ t-1 < t-1.
\end{aligned}
$$

Thus it's contradiction. It implies every $V \setminus \{x_{i_{i=1,2,\ldots,t}}\}$ isn't SuperHyperDefensive SuperHyperClique in a given SuperHyperUniform SuperHyperCycle.

Consider one segment, with two segments related to the SuperHyperLeaves as exceptions, is out of S which is SuperHyperDefensive SuperHyperClique. This segment has $2t$ SuperHyperNeighbors in S, i.e, Suppose $x_{i_{i=1,2,\ldots,t}} \in V \setminus S$ such that $y_{i_{i=1,2,\ldots,t}}, z_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})$. By it's the exterior SuperHyperVertices and the interior SuperHyperVertices coincide and it's SuperHyperUniform SuperHyperPath, $|N(x_{i_{i=1,2,\ldots,t}})| = |N(y_{i_{i=1,2,\ldots,t}})| = |N(z_{i_{i=1,2,\ldots,t}})| = 2t$. Thus

$$
\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap (V \setminus (V \setminus \{x_{i_{i=1,2,\ldots,t}}\}))| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap \{x_{i_{i=1,2,\ldots,t}}\})| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |\{z_1, z_2, \ldots, z_{t-1}\}| < \\
&|\{x_1, x_2, \ldots, x_{t-1}\})| \equiv \\
&\exists y \in S,\ t-1 < t-1.
\end{aligned}
$$

Thus it's contradiction. It implies every $V \setminus \{x_{i_{i=1,2,\ldots,t}}\}$ isn't SuperHyperDefensive SuperHyperClique in a given SuperHyperUniform SuperHyperPath.

(ii), (iii) are obvious by (i).

(iv). By (i), $|V|$ is maximal and it's a SuperHyperDefensive SuperHyperClique. Thus it's $|V|$-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.18. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph which is a SuperHyperUniform SuperHyperWheel. Then V is a maximal*

(i) : *dual SuperHyperDefensive SuperHyperClique;*

(ii) : *strong dual SuperHyperDefensive SuperHyperClique;*

(iii) : *connected dual SuperHyperDefensive SuperHyperClique;*

(iv) : *$\mathcal{O}(ESHG)$-dual SuperHyperDefensive SuperHyperClique;*

(v) : *strong $\mathcal{O}(ESHG)$-dual SuperHyperDefensive SuperHyperClique;*

(vi) : *connected $\mathcal{O}(ESHG)$-dual SuperHyperDefensive SuperHyperClique;*

Where the exterior SuperHyperVertices and the interior SuperHyperVertices coincide.

Proof. Suppose $ESHG : (V, E)$ is a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperWheel.

(i). Consider one segment is out of S which is SuperHyperDefensive SuperHyperClique. This segment has $3t$ SuperHyperNeighbors in S, i.e, Suppose $x_{i_{i=1,2,\ldots,t}} \in V \setminus S$ such that $y_{i_{i=1,2,\ldots,t}}, z_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})$. By it's the exterior SuperHyperVertices and the interior SuperHyperVertices coincide and it's SuperHyperUniform SuperHyperWheel, $|N(x_{i_{i=1,2,\ldots,t}})| = |N(y_{i_{i=1,2,\ldots,t}})| = |N(z_{i_{i=1,2,\ldots,t}})| = 3t$. Thus

$$
\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}}) \in V \setminus \{x_i\}_{i=1}^{t}, \\
&\ |N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap (V \setminus (V \setminus \{x_{i_{i=1,2,\ldots,t}}\}))| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}}) \in V \setminus \{x_i\}_{i=1}^{t}, \\
&\ |N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap \{x_{i_{i=1,2,\ldots,t}}\})| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}}) \in V \setminus \{x_i\}_{i=1}^{t}, \\
&\ |\{z_1, z_2, \ldots, z_{t-1}, z'_1, z'_2, \ldots, z'_t\}| < |\{x_1, x_2, \ldots, x_{t-1}\})| \equiv \\
&\exists y \in S,\ 2t - 1 < t - 1.
\end{aligned}
$$

Thus it's contradiction. It implies every $V \setminus \{x_{i_{i=1,2,\ldots,t}}\}$ is SuperHyperDefensive SuperHyperClique in a given SuperHyperUniform SuperHyperWheel.

(ii), (iii) are obvious by (i).

(iv). By (i), $|V|$ is maximal and it is a dual SuperHyperDefensive SuperHyperClique. Thus it's a dual $|V|$-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.19. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperCycle/SuperHyperPath. Then the number of*

$(i):$ *the SuperHyperClique;*

$(ii):$ *the SuperHyperClique;*

$(iii):$ *the connected SuperHyperClique;*

$(iv):$ *the $\mathcal{O}(ESHG)$-SuperHyperClique;*

$(v):$ *the strong $\mathcal{O}(ESHG)$-SuperHyperClique;*

$(vi):$ *the connected $\mathcal{O}(ESHG)$-SuperHyperClique.*

is one and it's only V. Where the exterior SuperHyperVertices and the interior SuperHyperVertices coincide.

Proof. Suppose $ESHG:(V,E)$ is a neutrosophic SuperHyperGraph which is a SuperHyperUniform SuperHyperCycle/SuperHyperPath.

(i). Consider one segment is out of S which is SuperHyperDefensive SuperHyperClique. This segment has $2t$ SuperHyperNeighbors in S, i.e, Suppose $x_{i_{i=1,2,\ldots,t}} \in V \setminus S$ such that $y_{i_{i=1,2,\ldots,t}}, z_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})$. By it's the exterior SuperHyperVertices and the interior SuperHyperVertices coincide and it's SuperHyperUniform SuperHyperCycle, $|N(x_{i_{i=1,2,\ldots,t}})| = |N(y_{i_{i=1,2,\ldots,t}})| = |N(z_{i_{i=1,2,\ldots,t}})| = 2t$. Thus

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap (V \setminus (V \setminus \{x_{i_{i=1,2,\ldots,t}}\}))| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap \{x_{i_{i=1,2,\ldots,t}}\})| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |\{z_1, z_2, \ldots, z_{t-1}\}| < |\{x_1, x_2, \ldots, x_{t-1}\})| \equiv \\
&\exists y \in S,\ t-1 < t-1.
\end{aligned}$$

Thus it's contradiction. It implies every $V \setminus \{x_{i_{i=1,2,\ldots,t}}\}$ isn't SuperHyperDefensive SuperHyperClique in a given SuperHyperUniform SuperHyperCycle.

Consider one segment, with two segments related to the SuperHyperLeaves as exceptions, is out of S which is SuperHyperDefensive SuperHyperClique. This segment has $2t$ SuperHyperNeighbors in S, i.e, Suppose $x_{i_{i=1,2,\ldots,t}} \in V \setminus S$ such that $y_{i_{i=1,2,\ldots,t}}, z_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})$. By it's the exterior SuperHyperVertices and the interior SuperHyperVertices coincide and it's SuperHyperUniform SuperHyperPath, $|N(x_{i_{i=1,2,\ldots,t}})| = |N(y_{i_{i=1,2,\ldots,t}})| = |N(z_{i_{i=1,2,\ldots,t}})| = 2t$. Thus

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap (V \setminus (V \setminus \{x_{i_{i=1,2,\ldots,t}}\}))| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |N(y_{i_{i=1,2,\ldots,t}}) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}) \cap \{x_{i_{i=1,2,\ldots,t}}\})| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}} \in V \setminus \{x_i\}_{i=1}^{t},\ |\{z_1, z_2, \ldots, z_{t-1}\}| < \\
&|\{x_1, x_2, \ldots, x_{t-1}\})| \equiv \\
&\exists y \in S,\ t-1 < t-1.
\end{aligned}$$

Thus it's contradiction. It implies every $V \setminus \{x_{i_{i=1,2,\ldots,t}}\}$ isn't SuperHyperDefensive SuperHyperClique in a given SuperHyperUniform SuperHyperPath.

(ii), (iii) are obvious by (i).

(iv). By (i), $|V|$ is maximal and it's a SuperHyperDefensive SuperHyperClique. Thus it's $|V|$-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.20. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperWheel. Then the number of*

(i) : *the dual SuperHyperClique;*

(ii) : *the dual SuperHyperClique;*

(iii) : *the dual connected SuperHyperClique;*

(iv) : *the dual $\mathcal{O}(ESHG)$-SuperHyperClique;*

(v) : *the strong dual $\mathcal{O}(ESHG)$-SuperHyperClique;*

(vi) : *the connected dual $\mathcal{O}(ESHG)$-SuperHyperClique.*

is one and it's only V. Where the exterior SuperHyperVertices and the interior SuperHyperVertices coincide.

Proof. Suppose $ESHG : (V, E)$ is a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperWheel.

(i). Consider one segment is out of S which is SuperHyperDefensive SuperHyperClique. This segment has $3t$ SuperHyperNeighbors in S, i.e, Suppose $x_{i_{i=1,2,\ldots,t}} \in V \setminus S$ such that $y_{i_{i=1,2,\ldots,t}}, z_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})$. By it's the exterior SuperHyperVertices and the interior SuperHyperVertices coincide and it's SuperHyperUniform SuperHyperWheel,
$|N(x_{i_{i=1,2,\ldots,t}})| = |N(y_{i_{i=1,2,\ldots,t}})| = |N(z_{i_{i=1,2,\ldots,t}})| = 3t$. Thus

$$
\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}}) \in V \setminus \{x_i\}_{i=1}^t, \\
&\ |N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap (V \setminus (V \setminus \{x_{i_{i=1,2,\ldots,t}}\}))| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}}) \in V \setminus \{x_i\}_{i=1}^t \\
&,\ |N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap S| < \\
&|N(y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}})) \cap \{x_{i_{i=1,2,\ldots,t}}\})| \equiv \\
&\exists y_{i_{i=1,2,\ldots,t}}, s_{i_{i=1,2,\ldots,t}} \in N(x_{i_{i=1,2,\ldots,t}}) \in V \setminus \{x_i\}_{i=1}^t, \\
&\ |\{z_1, z_2, \ldots, z_{t-1}, z'_1, z'_2, \ldots, z'_t\}| < |\{x_1, x_2, \ldots, x_{t-1}\})| \equiv \\
&\exists y \in S,\ 2t - 1 < t - 1.
\end{aligned}
$$

Thus it's contradiction. It implies every $V \setminus \{x_{i_{i=1,2,\ldots,t}}\}$ isn't a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperUniform SuperHyperWheel.

(ii), (iii) are obvious by (i).

(iv). By (i), $|V|$ is maximal and it's a dual SuperHyperDefensive SuperHyperClique. Thus it isn't an $|V|$-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.21. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperStar/SuperHyperComplete SuperHyperBipartite/SuperHyperComplete SuperHyperMultipartite. Then a SuperHyperSet contains [the SuperHyperCenter and] the half of multiplying r with the number of all the SuperHyperEdges plus one of all the SuperHyperVertices is a*

(i) : *dual SuperHyperDefensive SuperHyperClique;*

(ii) : *strong dual SuperHyperDefensive SuperHyperClique;*

(iii) : *connected dual SuperHyperDefensive SuperHyperClique;*

(iv) : $\frac{\mathcal{O}(ESHG)}{2} + 1$*-dual SuperHyperDefensive SuperHyperClique;*

(v) : *strong* $\frac{\mathcal{O}(ESHG)}{2} + 1$*-dual SuperHyperDefensive SuperHyperClique;*

(vi) : *connected* $\frac{\mathcal{O}(ESHG)}{2} + 1$*-dual SuperHyperDefensive SuperHyperClique.*

Proof. (i). Consider n half $+1$ SuperHyperVertices are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has either $\frac{n}{2}$ or one SuperHyperNeighbors in S. If the SuperHyperVertex is non-SuperHyperCenter, then

$$\forall a \in S,\ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S,\ 1 > 0.$$

If the SuperHyperVertex is SuperHyperCenter, then

$$\forall a \in S,\ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S,\ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperStar.

Consider n half $+1$ SuperHyperVertices are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has at most $\frac{n}{2}$ SuperHyperNeighbors in S.

$$\forall a \in S,\ \frac{n}{2} > |N(a) \cap S| > \frac{n}{2} - 1 > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S,\ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperBipartite which isn't a SuperHyperStar.

Consider n half $+1$ SuperHyperVertices are in S which is SuperHyperDefensive SuperHyperClique and they're chosen from different SuperHyperParts, equally or almost equally as possible. A SuperHyperVertex has at most $\frac{n}{2}$ SuperHyperNeighbors in S.

$$\forall a \in S,\ \frac{n}{2} > |N(a) \cap S| > \frac{n}{2} - 1 > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S,\ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperMultipartite which is neither a SuperHyperStar nor SuperHyperComplete SuperHyperBipartite.

(ii), (iii) are obvious by (i).

(iv). By (i), $\{x_i\}_{i=1}^{\frac{\mathcal{O}(ESHG)}{2}+1}$ is a dual SuperHyperDefensive SuperHyperClique. Thus it's $\frac{\mathcal{O}(ESHG)}{2} + 1$-dual SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.22. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperStar/SuperHyperComplete SuperHyperBipartite/SuperHyperComplete SuperHyperMultipartite. Then a SuperHyperSet contains the half of multiplying r with the number of all the SuperHyperEdges plus one of all the SuperHyperVertices in the biggest SuperHyperPart is a*

(i) : *SuperHyperDefensive SuperHyperClique;*

(ii) : *strong SuperHyperDefensive SuperHyperClique;*

(iii) : *connected SuperHyperDefensive SuperHyperClique;*

(iv) : *δ-SuperHyperDefensive SuperHyperClique;*

(v) : *strong δ-SuperHyperDefensive SuperHyperClique;*

(vi) : *connected δ-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Consider the half of multiplying r with the number of all the SuperHyperEdges plus one of all the SuperHyperVertices in the biggest SuperHyperPart are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has either $n-1, 1$ or zero SuperHyperNeighbors in S. If the SuperHyperVertex is in S, then

$$\forall a \in S, \ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S, \ 0 < 1.$$

Thus it's proved. It implies every S is a SuperHyperDefensive SuperHyperClique in a given SuperHyperStar.

Consider the half of multiplying r with the number of all the SuperHyperEdges plus one of all the SuperHyperVertices in the biggest SuperHyperPart are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has no SuperHyperNeighbor in S.

$$\forall a \in S, \ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S, \ 0 < \delta.$$

Thus it's proved. It implies every S is a SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperBipartite which isn't a SuperHyperStar.

Consider the half of multiplying r with the number of all the SuperHyperEdges plus one of all the SuperHyperVertices in the biggest SuperHyperPart are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has no SuperHyperNeighbor in S.

$$\forall a \in S, \ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S, \ 0 < \delta.$$

Thus it's proved. It implies every S is a SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperMultipartite which is neither a SuperHyperStar nor SuperHyperComplete SuperHyperBipartite.

(ii), (iii) are obvious by (i).

(iv). By (i), S is a SuperHyperDefensive SuperHyperClique. Thus it's an δ-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.23. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperStar/SuperHyperComplete SuperHyperBipartite/SuperHyperComplete SuperHyperMultipartite. Then Then the number of*

(i) : *dual SuperHyperDefensive SuperHyperClique;*

(ii) : *strong dual SuperHyperDefensive SuperHyperClique;*

(iii) : *connected dual SuperHyperDefensive SuperHyperClique;*

(iv) : $\frac{\mathcal{O}(ESHG)}{2} + 1$*-dual SuperHyperDefensive SuperHyperClique;*

(v) : *strong* $\frac{\mathcal{O}(ESHG)}{2} + 1$*-dual SuperHyperDefensive SuperHyperClique;*

(vi) : *connected* $\frac{\mathcal{O}(ESHG)}{2} + 1$*-dual SuperHyperDefensive SuperHyperClique.*

is one and it's only S, a SuperHyperSet contains [the SuperHyperCenter and] the half of multiplying r with the number of all the SuperHyperEdges plus one of all the SuperHyperVertices. Where the exterior SuperHyperVertices and the interior SuperHyperVertices coincide.

Proof. (i). Consider n half $+1$ SuperHyperVertices are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has either $\frac{n}{2}$ or one SuperHyperNeighbors in S. If the SuperHyperVertex is non-SuperHyperCenter, then

$$\forall a \in S, \ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S, \ 1 > 0.$$

If the SuperHyperVertex is SuperHyperCenter, then

$$\forall a \in S, \ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S, \ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperStar.

Consider n half $+1$ SuperHyperVertices are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has at most $\frac{n}{2}$ SuperHyperNeighbors in S.

$$\forall a \in S, \ \frac{n}{2} > |N(a) \cap S| > \frac{n}{2} - 1 > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S, \ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperBipartite which isn't a SuperHyperStar.

Consider n half $+1$ SuperHyperVertices are in S which is SuperHyperDefensive SuperHyperClique and they're chosen from different SuperHyperParts, equally or almost equally as possible. A SuperHyperVertex has at most $\frac{n}{2}$ SuperHyperNeighbors in S.

$$\forall a \in S, \ \frac{n}{2} > |N(a) \cap S| > \frac{n}{2} - 1 > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S, \ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperMultipartite which is neither a SuperHyperStar nor SuperHyperComplete SuperHyperBipartite.

(ii), (iii) are obvious by (i).

(iv). By (i), $\{x_i\}_{i=1}^{\frac{\mathcal{O}(ESHG)}{2}+1}$ is a dual SuperHyperDefensive SuperHyperClique. Thus it's $\frac{\mathcal{O}(ESHG)}{2}+1$-dual SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.24. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph. The number of connected component is $|V - S|$ if there's a SuperHyperSet which is a dual*

(i) : *SuperHyperDefensive SuperHyperClique;*

(ii) : *strong SuperHyperDefensive SuperHyperClique;*

(iii) : *connected SuperHyperDefensive SuperHyperClique;*

(iv) : *SuperHyperClique;*

(v) : *strong 1-SuperHyperDefensive SuperHyperClique;*

(vi) : *connected 1-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Consider some SuperHyperVertices are out of S which is a dual SuperHyperDefensive SuperHyperClique. These SuperHyperVertex-type have some SuperHyperNeighbors in S but no SuperHyperNeighbor out of S. Thus

$$\forall a \in S,\ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in S,\ 1 > 0.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique and number of connected component is $|V - S|$.

(ii), (iii) are obvious by (i).

(iv). By (i), S is a dual SuperHyperDefensive SuperHyperClique. Thus it's a dual 1-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv). □

Proposition 6.25. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph. Then the number is at most $\mathcal{O}(ESHG)$ and the neutrosophic number is at most $\mathcal{O}_n(ESHG)$.*

Proof. Suppose $ESHG : (V, E)$ is a neutrosophic SuperHyperGraph. Consider V. All SuperHyperMembers of V have at least one SuperHyperNeighbor inside the SuperHyperSet more than SuperHyperNeighbor out of SuperHyperSet. Thus,

V is a dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\forall a \in S,\ |N(a) \cap S| > |N(a) \cap (V \setminus S)| \equiv$$
$$\forall a \in V,\ |N(a) \cap V| > |N(a) \cap (V \setminus V)| \equiv$$
$$\forall a \in V,\ |N(a) \cap V| > |N(a) \cap \emptyset| \equiv$$
$$\forall a \in V,\ |N(a) \cap V| > |\emptyset| \equiv$$
$$\forall a \in V,\ |N(a) \cap V| > 0 \equiv$$
$$\forall a \in V,\ \delta > 0.$$

V is a dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_s(a) \cap S| > |N_s(a) \cap (V \setminus S)| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > |N_s(a) \cap (V \setminus V)| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > |N_s(a) \cap \emptyset| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > |\emptyset| \equiv \\
&\forall a \in V,\ |N_s(a) \cap V| > 0 \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

V is connected a dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_c(a) \cap S| > |N_c(a) \cap (V \setminus S)| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > |N_c(a) \cap (V \setminus V)| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > |N_c(a) \cap \emptyset| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > |\emptyset| \equiv \\
&\forall a \in V,\ |N_c(a) \cap V| > 0 \equiv \\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

V is a dual δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N(a) \cap S) - (N(a) \cap (V \setminus S))| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V) - (N(a) \cap (V \setminus V))| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V) - (N(a) \cap (\emptyset))| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V) - (\emptyset)| > \delta \equiv \\
&\forall a \in V,\ |(N(a) \cap V)| > \delta.
\end{aligned}$$

V is a dual strong δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_s(a) \cap S) - (N_s(a) \cap (V \setminus S))| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V) - (N_s(a) \cap (V \setminus V))| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V) - (N_s(a) \cap (\emptyset))| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V) - (\emptyset)| > \delta \equiv \\
&\forall a \in V,\ |(N_s(a) \cap V)| > \delta.
\end{aligned}$$

V is a dual connected δ-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_c(a) \cap S) - (N_c(a) \cap (V \setminus S))| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V) - (N_c(a) \cap (V \setminus V))| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V) - (N_c(a) \cap (\emptyset))| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V) - (\emptyset)| > \delta \equiv \\
&\forall a \in V,\ |(N_c(a) \cap V)| > \delta.
\end{aligned}$$

Thus V is a dual SuperHyperDefensive SuperHyperClique and V is the biggest SuperHyperSet in $ESHG : (V, E)$. Then the number is at most $\mathcal{O}(ESHG : (V, E))$ and the neutrosophic number is at most $\mathcal{O}_n(ESHG : (V, E))$. □

Proposition 6.26. *Let $ESHG:(V,E)$ be a neutrosophic SuperHyperGraph which is SuperHyperComplete. The number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of dual*

(i) : *SuperHyperDefensive SuperHyperClique;*

(ii) : *strong SuperHyperDefensive SuperHyperClique;*

(iii) : *connected SuperHyperDefensive SuperHyperClique;*

(iv) : *$(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique;*

(v) : *strong $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique;*

(vi) : *connected $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Consider n half -1 SuperHyperVertices are out of S which is a dual SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has n half SuperHyperNeighbors in S.

$$\forall a\in S,\ |N(a)\cap S|>|N(a)\cap(V\setminus S)|\equiv$$
$$\forall a\in S,\ \frac{n}{2}>\frac{n}{2}-1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperGraph. Thus the number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of a dual SuperHyperDefensive SuperHyperClique.

(ii). Consider n half -1 SuperHyperVertices are out of S which is a dual SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has n half SuperHyperNeighbors in S.

$$\forall a\in S,\ |N(a)\cap S|>|N(a)\cap(V\setminus S)|\equiv$$
$$\forall a\in S,\ \frac{n}{2}>\frac{n}{2}-1.$$

Thus it's proved. It implies every S is a dual strong SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperGraph. Thus the number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of a dual strong SuperHyperDefensive SuperHyperClique.

(iii). Consider n half -1 SuperHyperVertices are out of S which is a dual SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has n half SuperHyperNeighbors in S.

$$\forall a\in S,\ |N(a)\cap S|>|N(a)\cap(V\setminus S)|\equiv$$
$$\forall a\in S,\ \frac{n}{2}>\frac{n}{2}-1.$$

Thus it's proved. It implies every S is a dual connected SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperGraph. Thus the number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of a dual connected SuperHyperDefensive SuperHyperClique.

(iv). Consider n half -1 SuperHyperVertices are out of S which is a dual SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has n half SuperHyperNeighbors in S.

$$\forall a \in S,\ |N(a)\cap S| > |N(a)\cap (V\setminus S)| \equiv$$
$$\forall a \in S,\ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperGraph. Thus the number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of a dual $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique.

(v). Consider n half -1 SuperHyperVertices are out of S which is a dual SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has n half SuperHyperNeighbors in S.

$$\forall a \in S,\ |N(a)\cap S| > |N(a)\cap (V\setminus S)| \equiv$$
$$\forall a \in S,\ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual strong $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperGraph. Thus the number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of a dual strong $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique.

(vi). Consider n half -1 SuperHyperVertices are out of S which is a dual SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has n half SuperHyperNeighbors in S.

$$\forall a \in S,\ |N(a)\cap S| > |N(a)\cap (V\setminus S)| \equiv$$
$$\forall a \in S,\ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual connected $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique in a given SuperHyperComplete SuperHyperGraph. Thus the number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of a dual connected $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperClique. □

Proposition 6.27. *Let $ESHG:(V,E)$ be a neutrosophic SuperHyperGraph which is $\emptyset$. The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of dual*

(i) : *SuperHyperDefensive SuperHyperClique;*

(ii) : *strong SuperHyperDefensive SuperHyperClique;*

(iii) : *connected SuperHyperDefensive SuperHyperClique;*

(iv) : 0-*SuperHyperDefensive SuperHyperClique;*

(v) : *strong* 0-*SuperHyperDefensive SuperHyperClique;*

(vi) : *connected* 0-*SuperHyperDefensive SuperHyperClique.*

Proof. Suppose $ESHG:(V,E)$ is a neutrosophic SuperHyperGraph. Consider $\emptyset$. All SuperHyperMembers of $\emptyset$ have no SuperHyperNeighbor inside the SuperHyperSet less than SuperHyperNeighbor out of SuperHyperSet. Thus,

(i). $\emptyset$ is a dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N(a)\cap S| < |N(a)\cap (V\setminus S)| \equiv\\
&\forall a \in \emptyset,\ |N(a)\cap \emptyset| < |N(a)\cap (V\setminus \emptyset)| \equiv\\
&\forall a \in \emptyset,\ |\emptyset| < |N(a)\cap (V\setminus \emptyset)| \equiv\\
&\forall a \in \emptyset,\ 0 < |N(a)\cap V| \equiv\\
&\forall a \in \emptyset,\ 0 < |N(a)\cap V| \equiv\\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of a dual SuperHyperDefensive SuperHyperClique.

(ii). $\emptyset$ is a dual strong SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_s(a)\cap S| < |N_s(a)\cap (V\setminus S)| \equiv\\
&\forall a \in \emptyset,\ |N_s(a)\cap \emptyset| < |N_s(a)\cap (V\setminus \emptyset)| \equiv\\
&\forall a \in \emptyset,\ |\emptyset| < |N_s(a)\cap (V\setminus \emptyset)| \equiv\\
&\forall a \in \emptyset,\ 0 < |N_s(a)\cap V| \equiv\\
&\forall a \in \emptyset,\ 0 < |N_s(a)\cap V| \equiv\\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of a dual strong SuperHyperDefensive SuperHyperClique.

(iii). $\emptyset$ is a dual connected SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |N_c(a)\cap S| < |N_c(a)\cap (V\setminus S)| \equiv\\
&\forall a \in \emptyset,\ |N_c(a)\cap \emptyset| < |N_c(a)\cap (V\setminus \emptyset)| \equiv\\
&\forall a \in \emptyset,\ |\emptyset| < |N_c(a)\cap (V\setminus \emptyset)| \equiv\\
&\forall a \in \emptyset,\ 0 < |N_c(a)\cap V| \equiv\\
&\forall a \in \emptyset,\ 0 < |N_c(a)\cap V| \equiv\\
&\forall a \in V,\ \delta > 0.
\end{aligned}$$

The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of a dual connected SuperHyperDefensive SuperHyperClique.

(iv). $\emptyset$ is a dual SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N(a)\cap S) - (N(a)\cap (V\setminus S))| < \delta \equiv\\
&\forall a \in \emptyset,\ |(N(a)\cap \emptyset) - (N(a)\cap (V\setminus \emptyset))| < \delta \equiv\\
&\forall a \in \emptyset,\ |(N(a)\cap \emptyset) - (N(a)\cap (V))| < \delta \equiv\\
&\forall a \in \emptyset,\ |\emptyset| < \delta \equiv\\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of a dual 0-SuperHyperDefensive SuperHyperClique.

(v). $\emptyset$ is a dual strong 0-SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_s(a) \cap S) - (N_s(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_s(a) \cap \emptyset) - (N_s(a) \cap (V \setminus \emptyset))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_s(a) \cap \emptyset) - (N_s(a) \cap (V))| < \delta \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of a dual strong 0-SuperHyperDefensive SuperHyperClique.

(vi). $\emptyset$ is a dual connected SuperHyperDefensive SuperHyperClique since the following statements are equivalent.

$$\begin{aligned}
&\forall a \in S,\ |(N_c(a) \cap S) - (N_c(a) \cap (V \setminus S))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_c(a) \cap \emptyset) - (N_c(a) \cap (V \setminus \emptyset))| < \delta \equiv \\
&\forall a \in \emptyset,\ |(N_c(a) \cap \emptyset) - (N_c(a) \cap (V))| < \delta \equiv \\
&\forall a \in \emptyset,\ |\emptyset| < \delta \equiv \\
&\forall a \in V,\ 0 < \delta.
\end{aligned}$$

The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of a dual connected 0-offensive SuperHyperDefensive SuperHyperClique. □

Proposition 6.28. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph which is SuperHyperComplete. Then there's no independent SuperHyperSet.*

Proposition 6.29. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph which is SuperHyperCycle/SuperHyperPath/SuperHyperWheel. The number is $\mathcal{O}(ESHG : (V, E))$ and the neutrosophic number is $\mathcal{O}_n(ESHG : (V, E))$, in the setting of a dual*

(i) : *SuperHyperDefensive SuperHyperClique;*

(ii) : *strong SuperHyperDefensive SuperHyperClique;*

(iii) : *connected SuperHyperDefensive SuperHyperClique;*

(iv) : *$\mathcal{O}(ESHG : (V, E))$-SuperHyperDefensive SuperHyperClique;*

(v) : *strong $\mathcal{O}(ESHG : (V, E))$-SuperHyperDefensive SuperHyperClique;*

(vi) : *connected $\mathcal{O}(ESHG : (V, E))$-SuperHyperDefensive SuperHyperClique.*

Proof. Suppose $ESHG : (V, E)$ is a neutrosophic SuperHyperGraph which is SuperHyperCycle/SuperHyperPath/SuperHyperWheel.

(i). Consider one SuperHyperVertex is out of S which is a dual SuperHyperDefensive SuperHyperClique. This SuperHyperVertex has one SuperHyperNeighbor in S, i.e, suppose $x \in V \setminus S$ such that $y, z \in N(x)$. By it's SuperHyperCycle, $|N(x)| = |N(y)| = |N(z)| = 2$. Thus

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y \in V \setminus \{x\},\ |N(y) \cap S| < |N(y) \cap (V \setminus (V \setminus \{x\}))| \equiv \\
&\exists y \in V \setminus \{x\},\ |N(y) \cap S| < |N(y) \cap \{x\})| \equiv \\
&\exists y \in V \setminus \{x\},\ |\{z\}| < |\{x\})| \equiv \\
&\exists y \in S,\ 1 < 1.
\end{aligned}$$

Thus it's contradiction. It implies every $V \setminus \{x\}$ isn't a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperCycle.

Consider one SuperHyperVertex is out of S which is a dual SuperHyperDefensive SuperHyperClique. This SuperHyperVertex has one SuperHyperNeighbor in S, i.e, Suppose $x \in V \setminus S$ such that $y, z \in N(x)$. By it's SuperHyperPath, $|N(x)| = |N(y)| = |N(z)| = 2$. Thus

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y \in V \setminus \{x\},\ |N(y) \cap S| < |N(y) \cap (V \setminus (V \setminus \{x\}))| \equiv \\
&\exists y \in V \setminus \{x\},\ |N(y) \cap S| < |N(y) \cap \{x\})| \equiv \\
&\exists y \in V \setminus \{x\},\ |\{z\}| < |\{x\})| \equiv \\
&\exists y \in S,\ 1 < 1.
\end{aligned}$$

Thus it's contradiction. It implies every $V \setminus \{x\}$ isn't a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperPath.

Consider one SuperHyperVertex is out of S which is a dual SuperHyperDefensive SuperHyperClique. This SuperHyperVertex has one SuperHyperNeighbor in S, i.e, Suppose $x \in V \setminus S$ such that $y, z \in N(x)$. By it's SuperHyperWheel, $|N(x)| = |N(y)| = |N(z)| = 2$. Thus

$$\begin{aligned}
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\forall a \in S,\ |N(a) \cap S| < |N(a) \cap (V \setminus S)| \equiv \\
&\exists y \in V \setminus \{x\},\ |N(y) \cap S| < |N(y) \cap (V \setminus (V \setminus \{x\}))| \equiv \\
&\exists y \in V \setminus \{x\},\ |N(y) \cap S| < |N(y) \cap \{x\})| \equiv \\
&\exists y \in V \setminus \{x\},\ |\{z\}| < |\{x\})| \equiv \\
&\exists y \in S,\ 1 < 1.
\end{aligned}$$

Thus it's contradiction. It implies every $V \setminus \{x\}$ isn't a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperWheel.

(ii), (iii) are obvious by (i).

(iv). By (i), V is maximal and it's a dual SuperHyperDefensive SuperHyperClique. Thus it's a dual $\mathcal{O}(ESHG : (V, E))$-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv).

Thus the number is $\mathcal{O}(ESHG : (V, E))$ and the neutrosophic number is $\mathcal{O}_n(ESHG : (V, E))$, in the setting of all types of a dual SuperHyperDefensive SuperHyperClique. □

Proposition 6.30. *Let $ESHG : (V, E)$ be a neutrosophic SuperHyperGraph which is SuperHyperStar/complete SuperHyperBipartite/complete SuperHyperMultiPartite. The number is $\frac{\mathcal{O}(ESHG:(V,E))}{2} + 1$ and the neutrosophic number is $\min \Sigma_{v \in \{v_1, v_2, \cdots, v_t\}_{t > \frac{\mathcal{O}(ESHG:(V,E))}{2}} \subseteq V} \sigma(v)$, in the setting of a dual*

(i) : *SuperHyperDefensive SuperHyperClique;*

(ii) : *strong SuperHyperDefensive SuperHyperClique;*

(iii) : *connected SuperHyperDefensive SuperHyperClique;*

(iv) : *$(\frac{\mathcal{O}(ESHG:(V,E))}{2} + 1)$-SuperHyperDefensive SuperHyperClique;*

(v) : *strong $(\frac{\mathcal{O}(ESHG:(V,E))}{2} + 1)$-SuperHyperDefensive SuperHyperClique;*

(vi) : *connected* $(\frac{\mathcal{O}(ESHG:(V,E))}{2}+1)$*-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Consider n half $+1$ SuperHyperVertices are in S which is SuperHyperDefensive SuperHyperClique. A SuperHyperVertex has at most n half SuperHyperNeighbors in S. If the SuperHyperVertex is the non-SuperHyperCenter, then

$$\forall a \in S,\ |N(a)\cap S| > |N(a)\cap (V\setminus S)| \equiv$$
$$\forall a \in S,\ 1 > 0.$$

If the SuperHyperVertex is the SuperHyperCenter, then

$$\forall a \in S,\ |N(a)\cap S| > |N(a)\cap (V\setminus S)| \equiv$$
$$\forall a \in S,\ \frac{n}{2} > \frac{n}{2} - 1.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given SuperHyperStar.

Consider n half $+1$ SuperHyperVertices are in S which is a dual SuperHyperDefensive SuperHyperClique.

$$\forall a \in S,\ |N(a)\cap S| > |N(a)\cap (V\setminus S)| \equiv$$
$$\forall a \in S,\ \frac{\delta}{2} > n - \frac{\delta}{2}.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given complete SuperHyperBipartite which isn't a SuperHyperStar.

Consider n half $+1$ SuperHyperVertices are in S which is a dual SuperHyperDefensive SuperHyperClique and they are chosen from different SuperHyperParts, equally or almost equally as possible. A SuperHyperVertex in S has δ half SuperHyperNeighbors in S.

$$\forall a \in S,\ |N(a)\cap S| > |N(a)\cap (V\setminus S)| \equiv$$
$$\forall a \in S,\ \frac{\delta}{2} > n - \frac{\delta}{2}.$$

Thus it's proved. It implies every S is a dual SuperHyperDefensive SuperHyperClique in a given complete SuperHyperMultipartite which is neither a SuperHyperStar nor complete SuperHyperBipartite.

$(ii), (iii)$ are obvious by (i).

(iv). By (i), $\{x_i\}_{i=1}^{\frac{\mathcal{O}(ESHG:(V,E))}{2}+1}$ is maximal and it's a dual SuperHyperDefensive SuperHyperClique. Thus it's a dual $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$-SuperHyperDefensive SuperHyperClique.

$(v), (vi)$ are obvious by (iv).

Thus the number is $\frac{\mathcal{O}(ESHG:(V,E))}{2}+1$ and the neutrosophic number is $\min \Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{\mathcal{O}(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of all dual SuperHyperClique. □

Proposition 6.31. *Let $\mathcal{NSHF}:(V,E)$ be a SuperHyperFamily of the $ESHGs:(V,E)$ neutrosophic SuperHyperGraphs which are from one-type SuperHyperClass which the result is obtained for the individuals. Then the results also hold for the SuperHyperFamily $\mathcal{NSHF}:(V,E)$ of these specific SuperHyperClasses of the neutrosophic SuperHyperGraphs.*

Proof. There are neither SuperHyperConditions nor SuperHyperRestrictions on the SuperHyperVertices. Thus the SuperHyperResults on individuals, $ESHGs:(V,E)$, are extended to the SuperHyperResults on SuperHyperFamily, $\mathcal{NSHF}:(V,E)$. □

Proposition 6.32. *Let $ESHG : (V, E)$ be a strong neutrosophic SuperHyperGraph. If S is a dual SuperHyperDefensive SuperHyperClique, then $\forall v \in V \setminus S,\ \exists x \in S$ such that*

(i) $v \in N_s(x)$;

(ii) $vx \in E$.

Proof. (i). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Consider $v \in V \setminus S$. Since S is a dual SuperHyperDefensive SuperHyperClique,

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)| \\
&v \in V \setminus S,\ |N_s(v) \cap S| > |N_s(v) \cap (V \setminus S)| \\
&v \in V \setminus S, \exists x \in S,\ v \in N_s(x).
\end{aligned}$$

(ii). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Consider $v \in V \setminus S$. Since S is a dual SuperHyperDefensive SuperHyperClique,

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)| \\
&v \in V \setminus S,\ |N_s(v) \cap S| > |N_s(v) \cap (V \setminus S)| \\
&v \in V \setminus S, \exists x \in S :\ v \in N_s(x) \\
&v \in V \setminus S, \exists x \in S : vx \in E,\ \mu(vx) = \sigma(v) \wedge \sigma(x). \\
&v \in V \setminus S, \exists x \in S : vx \in E.
\end{aligned}$$

□

Proposition 6.33. *Let $ESHG : (V, E)$ be a strong neutrosophic SuperHyperGraph. If S is a dual SuperHyperDefensive SuperHyperClique, then*

(i) *S is SuperHyperDominating set;*

(ii) *there's $S \subseteq S'$ such that $|S'|$ is SuperHyperChromatic number.*

Proof. (i). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Consider $v \in V \setminus S$. Since S is a dual SuperHyperDefensive SuperHyperClique, either

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)| \\
&v \in V \setminus S,\ |N_s(v) \cap S| > |N_s(v) \cap (V \setminus S)| \\
&v \in V \setminus S, \exists x \in S,\ v \in N_s(x)
\end{aligned}$$

or

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)| \\
&v \in V \setminus S,\ |N_s(v) \cap S| > |N_s(v) \cap (V \setminus S)| \\
&v \in V \setminus S, \exists x \in S :\ v \in N_s(x) \\
&v \in V \setminus S, \exists x \in S : vx \in E,\ \mu(vx) = \sigma(v) \wedge \sigma(x) \\
&v \in V \setminus S, \exists x \in S : vx \in E.
\end{aligned}$$

It implies S is SuperHyperDominating SuperHyperSet.

(ii). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Consider $v \in V \setminus S$. Since S is a dual SuperHyperDefensive SuperHyperClique, either

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)| \\
&v \in V \setminus S,\ |N_s(v) \cap S| > |N_s(v) \cap (V \setminus S)| \\
&v \in V \setminus S, \exists x \in S,\ v \in N_s(x)
\end{aligned}$$

or

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|\\
&v \in V \setminus S,\ |N_s(v) \cap S| > |N_s(v) \cap (V \setminus S)|\\
&v \in V \setminus S, \exists x \in S:\ v \in N_s(x)\\
&v \in V \setminus S, \exists x \in S: vx \in E,\ \mu(vx) = \sigma(v) \wedge \sigma(x)\\
&v \in V \setminus S, \exists x \in S: vx \in E.
\end{aligned}$$

Thus every SuperHyperVertex $v \in V \setminus S$, has at least one SuperHyperNeighbor in S. The only case is about the relation amid SuperHyperVertices in S in the terms of SuperHyperNeighbors. It implies there's $S \subseteq S'$ such that $|S'|$ is SuperHyperChromatic number. □

Proposition 6.34. *Let $ESHG : (V, E)$ be a strong neutrosophic SuperHyperGraph. Then*

(*i*) $\Gamma \leq \mathcal{O}$;

(*ii*) $\Gamma_s \leq \mathcal{O}_n$.

Proof. (i). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Let $S = V$.

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|\\
&v \in V \setminus V,\ |N_s(v) \cap V| > |N_s(v) \cap (V \setminus V)|\\
&v \in \emptyset,\ |N_s(v) \cap V| > |N_s(v) \cap \emptyset|\\
&v \in \emptyset,\ |N_s(v) \cap V| > |\emptyset|\\
&v \in \emptyset,\ |N_s(v) \cap V| > 0
\end{aligned}$$

It implies V is a dual SuperHyperDefensive SuperHyperClique. For all SuperHyperSets of SuperHyperVertices $S,\ S \subseteq V$. Thus for all SuperHyperSets of SuperHyperVertices $S,\ |S| \leq |V|$. It implies for all SuperHyperSets of SuperHyperVertices $S,\ |S| \leq \mathcal{O}$. So for all SuperHyperSets of SuperHyperVertices $S,\ \Gamma \leq \mathcal{O}$.

(ii). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Let $S = V$.

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|\\
&v \in V \setminus V,\ |N_s(v) \cap V| > |N_s(v) \cap (V \setminus V)|\\
&v \in \emptyset,\ |N_s(v) \cap V| > |N_s(v) \cap \emptyset|\\
&v \in \emptyset,\ |N_s(v) \cap V| > |\emptyset|\\
&v \in \emptyset,\ |N_s(v) \cap V| > 0
\end{aligned}$$

It implies V is a dual SuperHyperDefensive SuperHyperClique. For all SuperHyperSets of neutrosophic SuperHyperVertices $S,\ S \subseteq V$. Thus for all SuperHyperSets of neutrosophic SuperHyperVertices $S,\ \Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s) \leq \Sigma_{v \in V} \Sigma_{i=1}^{3} \sigma_i(v)$. It implies for all SuperHyperSets of neutrosophic SuperHyperVertices $S,\ \Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s) \leq \mathcal{O}_n$. So for all SuperHyperSets of neutrosophic SuperHyperVertices $S,\ \Gamma_s \leq \mathcal{O}_n$. □

Proposition 6.35. *Let $ESHG : (V, E)$ be a strong neutrosophic SuperHyperGraph which is connected. Then*

(*i*) $\Gamma \leq \mathcal{O} - 1$;

(*ii*) $\Gamma_s \leq \mathcal{O}_n - \Sigma_{i=1}^{3} \sigma_i(x)$.

Proof. (i). Suppose $ESHG:(V,E)$ is a strong neutrosophic SuperHyperGraph. Let $S=V-\{x\}$ where x is arbitrary and $x\in V$.

$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus V-\{x\},\ |N_s(v)\cap(V-\{x\})|>|N_s(v)\cap(V\setminus(V-\{x\}))|$$
$$|N_s(x)\cap(V-\{x\})|>|N_s(x)\cap\{x\}|$$
$$|N_s(x)\cap(V-\{x\})|>|\emptyset|$$
$$|N_s(x)\cap(V-\{x\})|>0$$

It implies $V-\{x\}$ is a dual SuperHyperDefensive SuperHyperClique. For all SuperHyperSets of SuperHyperVertices $S\neq V,\ S\subseteq V-\{x\}$. Thus for all SuperHyperSets of SuperHyperVertices $S\neq V,\ |S|\leq|V-\{x\}|$. It implies for all SuperHyperSets of SuperHyperVertices $S\neq V,\ |S|\leq\mathcal{O}-1$. So for all SuperHyperSets of SuperHyperVertices $S,\ \Gamma\leq\mathcal{O}-1$.

(ii). Suppose $ESHG:(V,E)$ is a strong neutrosophic SuperHyperGraph. Let $S=V-\{x\}$ where x is arbitrary and $x\in V$.

$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus V-\{x\},\ |N_s(v)\cap(V-\{x\})|>|N_s(v)\cap(V\setminus(V-\{x\}))|$$
$$|N_s(x)\cap(V-\{x\})|>|N_s(x)\cap\{x\}|$$
$$|N_s(x)\cap(V-\{x\})|>|\emptyset|$$
$$|N_s(x)\cap(V-\{x\})|>0$$

It implies $V-\{x\}$ is a dual SuperHyperDefensive SuperHyperClique. For all SuperHyperSets of neutrosophic SuperHyperVertices $S\neq V,\ S\subseteq V-\{x\}$. Thus for all SuperHyperSets of neutrosophic SuperHyperVertices $S\neq V,\ \Sigma_{s\in S}\Sigma_{i=1}^{3}\sigma_i(s)\leq\Sigma_{v\in V-\{x\}}\Sigma_{i=1}^{3}\sigma_i(v)$. It implies for all SuperHyperSets of neutrosophic SuperHyperVertices $S\neq V,\ \Sigma_{s\in S}\Sigma_{i=1}^{3}\sigma_i(s)\leq\mathcal{O}_n-\Sigma_{i=1}^{3}\sigma_i(x)$. So for all SuperHyperSets of neutrosophic SuperHyperVertices $S,\ \Gamma_s\leq\mathcal{O}_n-\Sigma_{i=1}^{3}\sigma_i(x)$. □

Proposition 6.36. *Let $ESHG:(V,E)$ be an odd SuperHyperPath. Then*

(i) *the SuperHyperSet $S=\{v_2,v_4,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique;*

(ii) $\Gamma=\lfloor\frac{n}{2}\rfloor+1$ *and corresponded SuperHyperSet is $S=\{v_2,v_4,\cdots,v_{n-1}\}$;*

(iii) $\Gamma_s=\min\{\Sigma_{s\in S=\{v_2,v_4,\cdots,v_{n-1}\}}\Sigma_{i=1}^{3}\sigma_i(s),\Sigma_{s\in S=\{v_1,v_3,\cdots,v_{n-1}\}}\Sigma_{i=1}^{3}\sigma_i(s)\}$;

(iv) *the SuperHyperSets $S_1=\{v_2,v_4,\cdots,v_{n-1}\}$ and $S_2=\{v_1,v_3,\cdots,v_{n-1}\}$ are only a dual SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is an odd SuperHyperPath. Let $S=\{v_2,v_4,\cdots,v_{n-1}\}$ where for all $v_i,v_j\in\{v_2,v_4,\cdots,v_{n-1}\},\ v_iv_j\notin E$ and $v_i,v_j\in V$.

$$v\in\{v_1,v_3,\cdots,v_n\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_{n-1}\}|=2>$$
$$0=|N_s(v)\cap\{v_1,v_3,\cdots,v_n\}|\forall z\in V\setminus S,\ |N_s(z)\cap S|=2>$$
$$0=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus\{v_2,v_4,\cdots,v_{n-1}\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_{n-1}\}|>$$
$$|N_s(v)\cap(V\setminus\{v_2,v_4,\cdots.v_{n-1}\})|$$

It implies $S=\{v_2,v_4,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S=\{v_2,v_4,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_2,v_4,\cdots,v_{n-1}\}$, then

$$\begin{aligned}&\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1=1=|N_s(z)\cap(V\setminus S)|\\&\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1\not>1=|N_s(z)\cap(V\setminus S)|\\&\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.\end{aligned}$$

So $\{v_2,v_4,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_2,v_4,\cdots,v_{n-1}\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S=\{v_2,v_4,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique.

(ii) and (iii) are trivial.

(iv). By (i), $S_1=\{v_2,v_4,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. Thus it's enough to show that $S_2=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. Suppose $ESHG:(V,E)$ is an odd SuperHyperPath. Let $S=\{v_1,v_3,\cdots,v_{n-1}\}$ where for all $v_i,v_j\in\{v_1,v_3,\cdots,v_{n-1}\},\ v_iv_j\not\in E$ and $v_i,v_j\in V$.

$$\begin{aligned}&v\in\{v_2,v_4,\cdots,v_n\},\ |N_s(v)\cap\{v_1,v_3,\cdots.v_{n-1}\}|=2>\\&0=|N_s(v)\cap\{v_2,v_4,\cdots,v_n\}|\forall z\in V\setminus S,\ |N_s(z)\cap S|=2>0=|N_s(z)\cap(V\setminus S)|\\&\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|\\&v\in V\setminus\{v_1,v_3,\cdots,v_{n-1}\},\ |N_s(v)\cap\{v_1,v_3,\cdots.v_{n-1}\}|>\\&|N_s(v)\cap(V\setminus\{v_1,v_3,\cdots.v_{n-1}\})|\end{aligned}$$

It implies $S=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S=\{v_1,v_3,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_1,v_3,\cdots,v_{n-1}\}$, then

$$\begin{aligned}&\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1=1=|N_s(z)\cap(V\setminus S)|\\&\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1\not>1=|N_s(z)\cap(V\setminus S)|\\&\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.\end{aligned}$$

So $\{v_1,v_3,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_1,v_3,\cdots,v_{n-1}\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. □

Proposition 6.37. *Let $ESHG:(V,E)$ be an even SuperHyperPath. Then*

- (i) *the set $S=\{v_2,v_4,\cdots.v_n\}$ is a dual SuperHyperDefensive SuperHyperClique;*
- (ii) *$\Gamma=\lfloor\frac{n}{2}\rfloor$ and corresponded SuperHyperSets are $\{v_2,v_4,\cdots.v_n\}$ and $\{v_1,v_3,\cdots.v_{n-1}\}$;*
- (iii) $\Gamma_s=\min\{\Sigma_{s\in S=\{v_2,v_4,\cdots,v_n\}}\Sigma_{i=1}^3\sigma_i(s),\Sigma_{s\in S=\{v_1,v_3,\cdots.v_{n-1}\}}\Sigma_{i=1}^3\sigma_i(s)\}$;
- (iv) *the SuperHyperSets $S_1=\{v_2,v_4,\cdots.v_n\}$ and $S_2=\{v_1,v_3,\cdots.v_{n-1}\}$ are only dual SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is an even SuperHyperPath. Let $S=\{v_2,v_4,\cdots,v_n\}$ where for all $v_i,v_j\in\{v_2,v_4,\cdots,v_n\},\ v_iv_j\not\in E$ and $v_i,v_j\in V$.

$$\begin{aligned}&v\in\{v_1,v_3,\cdots,v_{n-1}\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_n\}|=2>\\&0=|N_s(v)\cap\{v_1,v_3,\cdots,v_{n-1}\}|\forall z\in V\setminus S,\ |N_s(z)\cap S|=2>\\&0=|N_s(z)\cap(V\setminus S)|\\&\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|\\&v\in V\setminus\{v_2,v_4,\cdots,v_n\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_n\}|>|N_s(v)\cap(V\setminus\{v_2,v_4,\cdots.v_n\})|\end{aligned}$$

It implies $S=\{v_2,v_4,\cdots,v_n\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S=\{v_2,v_4,\cdots,v_n\}-\{v_i\}$ where $v_i\in\{v_2,v_4,\cdots,v_n\}$, then

$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1=1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1\not>1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.$$

So $\{v_2,v_4,\cdots,v_n\}-\{v_i\}$ where $v_i\in\{v_2,v_4,\cdots,v_n\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S=\{v_2,v_4,\cdots,v_n\}$ is a dual SuperHyperDefensive SuperHyperClique.

(ii) and (iii) are trivial.

(iv). By (i), $S_1=\{v_2,v_4,\cdots,v_n\}$ is a dual SuperHyperDefensive SuperHyperClique. Thus it's enough to show that $S_2=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. Suppose $ESHG:(V,E)$ is an even SuperHyperPath. Let $S=\{v_1,v_3,\cdots,v_{n-1}\}$ where for all $v_i,v_j\in\{v_1,v_3,\cdots,v_{n-1}\},\ v_iv_j\not\in E$ and $v_i,v_j\in V$.

$$v\in\{v_2,v_4,\cdots,v_n\},\ |N_s(v)\cap\{v_1,v_3,\cdots.v_{n-1}\}|=2>$$
$$0=|N_s(v)\cap\{v_2,v_4,\cdots,v_n\}|\forall z\in V\setminus S,\ |N_s(z)\cap S|=2>0=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus\{v_1,v_3,\cdots,v_{n-1}\},\ |N_s(v)\cap\{v_1,v_3,\cdots.v_{n-1}\}|>$$
$$|N_s(v)\cap(V\setminus\{v_1,v_3,\cdots.v_{n-1}\})|$$

It implies $S=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S=\{v_1,v_3,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_1,v_3,\cdots,v_{n-1}\}$, then

$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1=1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1\not>1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.$$

So $\{v_1,v_3,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_1,v_3,\cdots,v_{n-1}\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. □

Proposition 6.38. *Let $ESHG:(V,E)$ be an even SuperHyperCycle. Then*

- (i) *the SuperHyperSet $S=\{v_2,v_4,\cdots,v_n\}$ is a dual SuperHyperDefensive SuperHyperClique;*
- (ii) $\Gamma=\lfloor\frac{n}{2}\rfloor$ *and corresponded SuperHyperSets are $\{v_2,v_4,\cdots,v_n\}$ and $\{v_1,v_3,\cdots,v_{n-1}\}$;*
- (iii) $\Gamma_s=\min\{\Sigma_{s\in S=\{v_2,v_4,\cdots,v_n\}}\sigma(s),\Sigma_{s\in S=\{v_1,v_3,\cdots,v_{n-1}\}}\sigma(s)\}$;
- (iv) *the SuperHyperSets $S_1=\{v_2,v_4,\cdots,v_n\}$ and $S_2=\{v_1,v_3,\cdots,v_{n-1}\}$ are only dual SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is an even SuperHyperCycle. Let $S=\{v_2,v_4,\cdots,v_n\}$ where for all $v_i,v_j\in\{v_2,v_4,\cdots,v_n\},\ v_iv_j\not\in E$ and $v_i,v_j\in V$.

$$v\in\{v_1,v_3,\cdots,v_{n-1}\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_n\}|=2>$$
$$0=|N_s(v)\cap\{v_1,v_3,\cdots,v_{n-1}\}|\forall z\in V\setminus S,\ |N_s(z)\cap S|=2>$$
$$0=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus\{v_2,v_4,\cdots,v_n\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_n\}|>$$
$$|N_s(v)\cap(V\setminus\{v_2,v_4,\cdots.v_n\})|$$

It implies $S=\{v_2,v_4,\cdots,v_n\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S=\{v_2,v_4,\cdots,v_n\}-\{v_i\}$ where $v_i\in\{v_2,v_4,\cdots,v_n\}$, then

$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1=1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1\not>1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.$$

So $\{v_2,v_4,\cdots,v_n\}-\{v_i\}$ where $v_i\in\{v_2,v_4,\cdots,v_n\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S=\{v_2,v_4,\cdots,v_n\}$ is a dual SuperHyperDefensive SuperHyperClique.

(ii) and (iii) are trivial.

(iv). By (i), $S_1=\{v_2,v_4,\cdots,v_n\}$ is a dual SuperHyperDefensive SuperHyperClique. Thus it's enough to show that $S_2=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. Suppose $ESHG:(V,E)$ is an even SuperHyperCycle. Let $S=\{v_1,v_3,\cdots,v_{n-1}\}$ where for all $v_i,v_j\in\{v_1,v_3,\cdots,v_{n-1}\},\ v_iv_j\not\in E$ and $v_i,v_j\in V$.

$$v\in\{v_2,v_4,\cdots,v_n\},\ |N_s(v)\cap\{v_1,v_3,\cdots.v_{n-1}\}|=2>$$
$$0=|N_s(v)\cap\{v_2,v_4,\cdots,v_n\}|\forall z\in V\setminus S,\ |N_s(z)\cap S|=2>0=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus\{v_1,v_3,\cdots,v_{n-1}\},\ |N_s(v)\cap\{v_1,v_3,\cdots.v_{n-1}\}|>$$
$$|N_s(v)\cap(V\setminus\{v_1,v_3,\cdots.v_{n-1}\})|$$

It implies $S=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S=\{v_1,v_3,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_1,v_3,\cdots,v_{n-1}\}$, then

$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1=1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|=1\not>1=|N_s(z)\cap(V\setminus S)|$$
$$\exists v_{i+1}\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.$$

So $\{v_1,v_3,\cdots,v_{n-1}\}-\{v_i\}$ where $v_i\in\{v_1,v_3,\cdots,v_{n-1}\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S=\{v_1,v_3,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. □

Proposition 6.39. *Let $ESHG:(V,E)$ be an odd SuperHyperCycle. Then*

- (i) *the SuperHyperSet $S=\{v_2,v_4,\cdots,v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique;*
- (ii) $\Gamma=\lfloor\frac{n}{2}\rfloor+1$ *and corresponded SuperHyperSet is $S=\{v_2,v_4,\cdots,v_{n-1}\}$;*
- (iii) $\Gamma_s=\min\{\Sigma_{s\in S=\{v_2,v_4,\cdots.v_{n-1}\}}\Sigma_{i=1}^{3}\sigma_i(s),\Sigma_{s\in S=\{v_1,v_3,\cdots.v_{n-1}\}}\Sigma_{i=1}^{3}\sigma_i(s)\}$;
- (iv) *the SuperHyperSets $S_1=\{v_2,v_4,\cdots.v_{n-1}\}$ and $S_2=\{v_1,v_3,\cdots.v_{n-1}\}$ are only dual SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is an odd SuperHyperCycle. Let $S=\{v_2,v_4,\cdots,v_{n-1}\}$ where for all $v_i,v_j\in\{v_2,v_4,\cdots,v_{n-1}\},\ v_iv_j\not\in E$ and $v_i,v_j\in V$.

$$v\in\{v_1,v_3,\cdots,v_n\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_{n-1}\}|=2>$$
$$0=|N_s(v)\cap\{v_1,v_3,\cdots,v_n\}|\forall z\in V\setminus S,\ |N_s(z)\cap S|=2>0=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus\{v_2,v_4,\cdots,v_{n-1}\},\ |N_s(v)\cap\{v_2,v_4,\cdots.v_{n-1}\}|>$$
$$|N_s(v)\cap(V\setminus\{v_2,v_4,\cdots.v_{n-1}\})|$$

It implies $S = \{v_2, v_4, \cdots, v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S = \{v_2, v_4, \cdots, v_{n-1}\} - \{v_i\}$ where $v_i \in \{v_2, v_4, \cdots, v_{n-1}\}$, then

$$\exists v_{i+1} \in V \setminus S,\ |N_s(z) \cap S| = 1 = 1 = |N_s(z) \cap (V \setminus S)|$$
$$\exists v_{i+1} \in V \setminus S,\ |N_s(z) \cap S| = 1 \ngtr 1 = |N_s(z) \cap (V \setminus S)|$$
$$\exists v_{i+1} \in V \setminus S,\ |N_s(z) \cap S| \ngtr |N_s(z) \cap (V \setminus S)|.$$

So $\{v_2, v_4, \cdots, v_{n-1}\} - \{v_i\}$ where $v_i \in \{v_2, v_4, \cdots, v_{n-1}\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S = \{v_2, v_4, \cdots, v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique.

(ii) and (iii) are trivial.

(iv). By (i), $S_1 = \{v_2, v_4, \cdots, v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. Thus it's enough to show that $S_2 = \{v_1, v_3, \cdots, v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. Suppose $ESHG : (V, E)$ is an odd SuperHyperCycle. Let $S = \{v_1, v_3, \cdots, v_{n-1}\}$ where for all $v_i, v_j \in \{v_1, v_3, \cdots, v_{n-1}\},\ v_iv_j \notin E$ and $v_i, v_j \in V$.

$$v \in \{v_2, v_4, \cdots, v_n\},\ |N_s(v) \cap \{v_1, v_3, \cdots .v_{n-1}\}| = 2 >$$
$$0 = |N_s(v) \cap \{v_2, v_4, \cdots, v_n\}| \forall z \in V \setminus S,\ |N_s(z) \cap S| = 2 > 0 = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|$$
$$v \in V \setminus \{v_1, v_3, \cdots, v_{n-1}\},\ |N_s(v) \cap \{v_1, v_3, \cdots .v_{n-1}\}| >$$
$$|N_s(v) \cap (V \setminus \{v_1, v_3, \cdots .v_{n-1}\})|$$

It implies $S = \{v_1, v_3, \cdots, v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S = \{v_1, v_3, \cdots, v_{n-1}\} - \{v_i\}$ where $v_i \in \{v_1, v_3, \cdots, v_{n-1}\}$, then

$$\exists v_{i+1} \in V \setminus S,\ |N_s(z) \cap S| = 1 = 1 = |N_s(z) \cap (V \setminus S)|$$
$$\exists v_{i+1} \in V \setminus S,\ |N_s(z) \cap S| = 1 \ngtr 1 = |N_s(z) \cap (V \setminus S)|$$
$$\exists v_{i+1} \in V \setminus S,\ |N_s(z) \cap S| \ngtr |N_s(z) \cap (V \setminus S)|.$$

So $\{v_1, v_3, \cdots, v_{n-1}\} - \{v_i\}$ where $v_i \in \{v_1, v_3, \cdots, v_{n-1}\}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S = \{v_1, v_3, \cdots, v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperClique. □

Proposition 6.40. *Let $ESHG : (V, E)$ be SuperHyperStar. Then*

(i) *the SuperHyperSet $S = \{c\}$ is a dual maximal SuperHyperClique;*

(ii) $\Gamma = 1$;

(iii) $\Gamma_s = \Sigma_{i=1}^{3} \sigma_i(c)$;

(iv) *the SuperHyperSets $S = \{c\}$ and $S \subset S'$ are only dual SuperHyperClique.*

Proof. (i). Suppose $ESHG : (V, E)$ is a SuperHyperStar.

$$\forall v \in V \setminus \{c\},\ |N_s(v) \cap \{c\}| = 1 >$$
$$0 = |N_s(v) \cap (V \setminus \{c\})| \forall z \in V \setminus S,\ |N_s(z) \cap S| = 1 >$$
$$0 = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|$$
$$v \in V \setminus \{c\},\ |N_s(v) \cap \{c\}| > |N_s(v) \cap (V \setminus \{c\})|$$

It implies $S = \{c\}$ is a dual SuperHyperDefensive SuperHyperClique. If $S = \{c\} - \{c\} = \emptyset$, then

$$\exists v \in V \setminus S,\ |N_s(z) \cap S| = 0 = 0 = |N_s(z) \cap (V \setminus S)|$$
$$\exists v \in V \setminus S,\ |N_s(z) \cap S| = 0 \not> 0 = |N_s(z) \cap (V \setminus S)|$$
$$\exists v \in V \setminus S,\ |N_s(z) \cap S| \not> |N_s(z) \cap (V \setminus S)|.$$

So $S = \{c\} - \{c\} = \emptyset$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S = \{c\}$ is a dual SuperHyperDefensive SuperHyperClique.

(ii) and (iii) are trivial.

(iv). By (i), $S = \{c\}$ is a dual SuperHyperDefensive SuperHyperClique. Thus it's enough to show that $S \subseteq S'$ is a dual SuperHyperDefensive SuperHyperClique. Suppose $ESHG : (V, E)$ is a SuperHyperStar. Let $S \subseteq S'$.

$$\forall v \in V \setminus \{c\},\ |N_s(v) \cap \{c\}| = 1 >$$
$$0 = |N_s(v) \cap (V \setminus \{c\})| \forall z \in V \setminus S',\ |N_s(z) \cap S'| = 1 >$$
$$0 = |N_s(z) \cap (V \setminus S')|$$
$$\forall z \in V \setminus S',\ |N_s(z) \cap S'| > |N_s(z) \cap (V \setminus S')|$$

It implies $S' \subseteq S$ is a dual SuperHyperDefensive SuperHyperClique. □

Proposition 6.41. *Let $ESHG : (V, E)$ be SuperHyperWheel. Then*

(i) *the SuperHyperSet $S = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n}$ is a dual maximal SuperHyperDefensive SuperHyperClique;*

(ii) $\Gamma = |\{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n}|$;

(iii) $\Gamma_s = \Sigma_{\{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n}} \Sigma_{i=1}^{3} \sigma_i(s)$;

(iv) *the SuperHyperSet $\{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n}$ is only a dual maximal SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG : (V, E)$ is a SuperHyperWheel. Let $S = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n}$. There are either

$$\forall z \in V \setminus S,\ |N_s(z) \cap S| = 2 > 1 = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|$$

or

$$\forall z \in V \setminus S,\ |N_s(z) \cap S| = 3 > 0 = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|$$

It implies $S = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n}$ is a dual SuperHyperDefensive SuperHyperClique. If $S' = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n} - \{z\}$ where $z \in S = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \leq n}$, then There are either

$$\forall z \in V \setminus S',\ |N_s(z) \cap S'| = 1 < 2 = |N_s(z) \cap (V \setminus S')|$$
$$\forall z \in V \setminus S',\ |N_s(z) \cap S'| < |N_s(z) \cap (V \setminus S')|$$
$$\forall z \in V \setminus S',\ |N_s(z) \cap S'| \not> |N_s(z) \cap (V \setminus S')|$$

or

$$\forall z \in V \setminus S',\ |N_s(z) \cap S'| = 1 = 1 = |N_s(z) \cap (V \setminus S')|$$
$$\forall z \in V \setminus S',\ |N_s(z) \cap S'| = |N_s(z) \cap (V \setminus S')|$$
$$\forall z \in V \setminus S',\ |N_s(z) \cap S'| \not> |N_s(z) \cap (V \setminus S')|$$

So $S' = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1)\leq n} - \{z\}$ where $z \in S = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1)\leq n}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1)\leq n}$ is a dual maximal SuperHyperDefensive SuperHyperClique.

(ii), (iii) and (iv) are obvious. □

Proposition 6.42. *Let $ESHG : (V, E)$ be an odd SuperHyperComplete. Then*

(i) *the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual SuperHyperDefensive SuperHyperClique;*

(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor + 1$;

(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S=\{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}}$;

(iv) *the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is only a dual SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG : (V, E)$ is an odd SuperHyperComplete. Let $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$. Thus

$$\forall z \in V \setminus S,\ |N_s(z) \cap S| = \lfloor \frac{n}{2} \rfloor + 1 > \lfloor \frac{n}{2} \rfloor - 1 = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|$$

It implies $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual SuperHyperDefensive SuperHyperClique. If $S' = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1} - \{z\}$ where $z \in S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$, then

$$\forall z \in V \setminus S,\ |N_s(z) \cap S| = \lfloor \frac{n}{2} \rfloor = \lfloor \frac{n}{2} \rfloor = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| \not> |N_s(z) \cap (V \setminus S)|$$

So $S' = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1} - \{z\}$ where $z \in S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual SuperHyperDefensive SuperHyperClique.

(ii), (iii) and (iv) are obvious. □

Proposition 6.43. *Let $ESHG : (V, E)$ be an even SuperHyperComplete. Then*

(i) *the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is a dual SuperHyperDefensive SuperHyperClique;*

(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor$;

(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S=\{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}}$;

(iv) *the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is only a dual maximal SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is an even SuperHyperComplete. Let $S=\{v_i\}_{i=1}^{\lfloor \frac{n}{2}\rfloor}$. Thus

$$\forall z\in V\setminus S,\ |N_s(z)\cap S|=\lfloor\frac{n}{2}\rfloor>\lfloor\frac{n}{2}\rfloor-1=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|.$$

It implies $S=\{v_i\}_{i=1}^{\lfloor \frac{n}{2}\rfloor}$ is a dual SuperHyperDefensive SuperHyperClique. If $S'=\{v_i\}_{i=1}^{\lfloor \frac{n}{2}\rfloor}-\{z\}$ where $z\in S=\{v_i\}_{i=1}^{\lfloor \frac{n}{2}\rfloor}$, then

$$\forall z\in V\setminus S,\ |N_s(z)\cap S|=\lfloor\frac{n}{2}\rfloor-1<\lfloor\frac{n}{2}\rfloor+1=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.$$

So $S'=\{v_i\}_{i=1}^{\lfloor \frac{n}{2}\rfloor}-\{z\}$ where $z\in S=\{v_i\}_{i=1}^{\lfloor \frac{n}{2}\rfloor}$ isn't a dual SuperHyperDefensive SuperHyperClique. It induces $S=\{v_i\}_{i=1}^{\lfloor \frac{n}{2}\rfloor}$ is a dual maximal SuperHyperDefensive SuperHyperClique.

(ii), (iii) and (iv) are obvious. □

Proposition 6.44. *Let $\mathcal{NSHF}:(V,E)$ be a m-SuperHyperFamily of neutrosophic SuperHyperStars with common neutrosophic SuperHyperVertex SuperHyperSet. Then*

(i) *the SuperHyperSet $S=\{c_1,c_2,\cdots,c_m\}$ is a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF}$;*

(ii) $\Gamma=m$ *for* $\mathcal{NSHF}:(V,E)$;

(iii) $\Gamma_s=\Sigma_{i=1}^{m}\Sigma_{j=1}^{3}\sigma_j(c_i)$ *for* $\mathcal{NSHF}:(V,E)$;

(iv) *the SuperHyperSets $S=\{c_1,c_2,\cdots,c_m\}$ and $S\subset S'$ are only dual SuperHyperClique for $\mathcal{NSHF}:(V,E)$.*

Proof. (i). Suppose $ESHG:(V,E)$ is a SuperHyperStar.

$$\forall v\in V\setminus\{c\},\ |N_s(v)\cap\{c\}|=1>$$
$$0=|N_s(v)\cap(V\setminus\{c\})|\forall z\in V\setminus S,\ |N_s(z)\cap S|=1>$$
$$0=|N_s(z)\cap(V\setminus S)|$$
$$\forall z\in V\setminus S,\ |N_s(z)\cap S|>|N_s(z)\cap(V\setminus S)|$$
$$v\in V\setminus\{c\},\ |N_s(v)\cap\{c\}|>|N_s(v)\cap(V\setminus\{c\})|$$

It implies $S=\{c_1,c_2,\cdots,c_m\}$ is a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF}:(V,E)$. If $S=\{c\}-\{c\}=\emptyset$, then

$$\exists v\in V\setminus S,\ |N_s(z)\cap S|=0=0=|N_s(z)\cap(V\setminus S)|$$
$$\exists v\in V\setminus S,\ |N_s(z)\cap S|=0\not>0=|N_s(z)\cap(V\setminus S)|$$
$$\exists v\in V\setminus S,\ |N_s(z)\cap S|\not>|N_s(z)\cap(V\setminus S)|.$$

So $S=\{c\}-\{c\}=\emptyset$ isn't a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF}:(V,E)$. It induces $S=\{c_1,c_2,\cdots,c_m\}$ is a dual maximal SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF}:(V,E)$.

(ii) and (iii) are trivial.

(iv). By (i), $S=\{c_1,c_2,\cdots,c_m\}$ is a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF}:(V,E)$. Thus it's enough to show that $S\subseteq S'$ is a dual

SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$. Suppose $ESHG : (V, E)$ is a SuperHyperStar. Let $S \subseteq S'$.

$$\begin{aligned}
&\forall v \in V \setminus \{c\},\ |N_s(v) \cap \{c\}| = 1 > \\
&0 = |N_s(v) \cap (V \setminus \{c\})| \forall z \in V \setminus S',\ |N_s(z) \cap S'| = 1 > \\
&0 = |N_s(z) \cap (V \setminus S')| \\
&\forall z \in V \setminus S',\ |N_s(z) \cap S'| > |N_s(z) \cap (V \setminus S')|
\end{aligned}$$

It implies $S' \subseteq S$ is a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$. □

Proposition 6.45. *Let $\mathcal{NSHF} : (V, E)$ be an m-SuperHyperFamily of odd SuperHyperComplete SuperHyperGraphs with common neutrosophic SuperHyperVertex SuperHyperSet. Then*

(i) the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual maximal SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF}$;

(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor + 1$ for $\mathcal{NSHF} : (V, E)$;

(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}}$ for $\mathcal{NSHF} : (V, E)$;

(iv) the SuperHyperSets $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ are only a dual maximal SuperHyperClique for $\mathcal{NSHF} : (V, E)$.

Proof. (i). Suppose $ESHG : (V, E)$ is odd SuperHyperComplete. Let $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$. Thus

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| = \lfloor \frac{n}{2} \rfloor + 1 > \lfloor \frac{n}{2} \rfloor - 1 = |N_s(z) \cap (V \setminus S)| \\
&\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|
\end{aligned}$$

It implies $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$. If $S' = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1} - \{z\}$ where $z \in S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$, then

$$\begin{aligned}
&\forall z \in V \setminus S,\ |N_s(z) \cap S| = \lfloor \frac{n}{2} \rfloor = \lfloor \frac{n}{2} \rfloor = |N_s(z) \cap (V \setminus S)| \\
&\forall z \in V \setminus S,\ |N_s(z) \cap S| \ngtr |N_s(z) \cap (V \setminus S)|
\end{aligned}$$

So $S' = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1} - \{z\}$ where $z \in S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ isn't a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$. It induces $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual maximal SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$.

(ii), (iii) and (iv) are obvious. □

Proposition 6.46. *Let $\mathcal{NSHF} : (V, E)$ be a m-SuperHyperFamily of even SuperHyperComplete SuperHyperGraphs with common neutrosophic SuperHyperVertex SuperHyperSet. Then*

(i) the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$;

(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor$ for $\mathcal{NSHF} : (V, E)$;

(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}}$ for $\mathcal{NSHF} : (V, E)$;

(iv) *the SuperHyperSets* $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ *are only dual maximal SuperHyperClique for* $\mathcal{NSHF} : (V, E)$.

Proof. (i). Suppose $ESHG : (V, E)$ is even SuperHyperComplete. Let $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$. Thus

$$\forall z \in V \setminus S,\ |N_s(z) \cap S| = \lfloor \frac{n}{2} \rfloor > \lfloor \frac{n}{2} \rfloor - 1 = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| > |N_s(z) \cap (V \setminus S)|.$$

It implies $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$. If $S' = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor} - \{z\}$ where $z \in S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$, then

$$\forall z \in V \setminus S,\ |N_s(z) \cap S| = \lfloor \frac{n}{2} \rfloor - 1 < \lfloor \frac{n}{2} \rfloor + 1 = |N_s(z) \cap (V \setminus S)|$$
$$\forall z \in V \setminus S,\ |N_s(z) \cap S| \not> |N_s(z) \cap (V \setminus S)|.$$

So $S' = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor} - \{z\}$ where $z \in S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ isn't a dual SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$. It induces $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is a dual maximal SuperHyperDefensive SuperHyperClique for $\mathcal{NSHF} : (V, E)$.

(ii), (iii) and (iv) are obvious. □

Proposition 6.47. *Let* $ESHG : (V, E)$ *be a strong neutrosophic SuperHyperGraph. Then following statements hold;*

(i) *if* $s \geq t$ *and a SuperHyperSet* S *of SuperHyperVertices is an t-SuperHyperDefensive SuperHyperClique, then* S *is an s-SuperHyperDefensive SuperHyperClique;*

(ii) *if* $s \leq t$ *and a SuperHyperSet* S *of SuperHyperVertices is a dual t-SuperHyperDefensive SuperHyperClique, then* S *is a dual s-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Consider a SuperHyperSet S of SuperHyperVertices is an t-SuperHyperDefensive SuperHyperClique. Then

$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < t;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < t \leq s;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < s.$$

Thus S is an s-SuperHyperDefensive SuperHyperClique.

(ii). Suppose $ESHG : (V, E)$ is a strong neutrosophic SuperHyperGraph. Consider a SuperHyperSet S of SuperHyperVertices is a dual t-SuperHyperDefensive SuperHyperClique. Then

$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > t;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > t \geq s;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > s.$$

Thus S is a dual s-SuperHyperDefensive SuperHyperClique. □

Proposition 6.48. *Let* $ESHG : (V, E)$ *be a strong neutrosophic SuperHyperGraph. Then following statements hold;*

(i) *if* $s \geq t+2$ *and a SuperHyperSet* S *of SuperHyperVertices is an t-SuperHyperDefensive SuperHyperClique, then* S *is an s-SuperHyperPowerful SuperHyperClique;*

(ii) *if* $s \leq t$ *and a SuperHyperSet* S *of SuperHyperVertices is a dual t-SuperHyperDefensive SuperHyperClique, then* S *is a dual s-SuperHyperPowerful SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is a strong neutrosophic SuperHyperGraph. Consider a SuperHyperSet S of SuperHyperVertices is an t-SuperHyperDefensive SuperHyperClique. Then

$$\begin{aligned}
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<t;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<t\leq t+2\leq s;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<s.
\end{aligned}$$

Thus S is an $(t+2)-$SuperHyperDefensive SuperHyperClique. By S is an $s-$SuperHyperDefensive SuperHyperClique and S is a dual $(s+2)-$SuperHyperDefensive SuperHyperClique, S is an s-SuperHyperPowerful SuperHyperClique.

(ii). Suppose $ESHG:(V,E)$ is a strong neutrosophic SuperHyperGraph. Consider a SuperHyperSet S of SuperHyperVertices is a dual t-SuperHyperDefensive SuperHyperClique. Then

$$\begin{aligned}
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>t;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>t\geq s>s-2;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>s-2.
\end{aligned}$$

Thus S is an $(s-2)-$SuperHyperDefensive SuperHyperClique. By S is an $(s-2)-$SuperHyperDefensive SuperHyperClique and S is a dual $s-$SuperHyperDefensive SuperHyperClique, S is an $s-$SuperHyperPowerful SuperHyperClique. □

Proposition 6.49. *Let* $ESHG:(V,E)$ *be a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then following statements hold;*

(i) *if* $\forall a\in S,\ |N_s(a)\cap S|<\lfloor\frac{r}{2}\rfloor+1$, *then* $ESHG:(V,E)$ *is an 2-SuperHyperDefensive SuperHyperClique;*

(ii) *if* $\forall a\in V\setminus S,\ |N_s(a)\cap S|>\lfloor\frac{r}{2}\rfloor+1$, *then* $ESHG:(V,E)$ *is a dual 2-SuperHyperDefensive SuperHyperClique;*

(iii) *if* $\forall a\in S,\ |N_s(a)\cap V\setminus S|=0$, *then* $ESHG:(V,E)$ *is an r-SuperHyperDefensive SuperHyperClique;*

(iv) *if* $\forall a\in V\setminus S,\ |N_s(a)\cap V\setminus S|=0$, *then* $ESHG:(V,E)$ *is a dual r-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then

$$\begin{aligned}
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<\lfloor\frac{r}{2}\rfloor+1-(\lfloor\frac{r}{2}\rfloor-1);\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<\lfloor\frac{r}{2}\rfloor+1-(\lfloor\frac{r}{2}\rfloor-1)<2;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<2.
\end{aligned}$$

Thus S is an 2-SuperHyperDefensive SuperHyperClique.

(ii). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then

$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > \lfloor \frac{r}{2} \rfloor + 1 - (\lfloor \frac{r}{2} \rfloor - 1);$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > \lfloor \frac{r}{2} \rfloor + 1 - (\lfloor \frac{r}{2} \rfloor - 1) > 2;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2.$$

Thus S is a dual 2-SuperHyperDefensive SuperHyperClique.

(iii). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then

$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < r - 0;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < r - 0 = r;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < r.$$

Thus S is an r-SuperHyperDefensive SuperHyperClique.

(iv). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then

$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > r - 0;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > r - 0 = r;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > r.$$

Thus S is a dual r-SuperHyperDefensive SuperHyperClique. □

Proposition 6.50. *Let $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then following statements hold;*

(i) $\forall a \in S,\ |N_s(a) \cap S| < \lfloor \frac{r}{2} \rfloor + 1$ *if $ESHG : (V, E)$ is an 2-SuperHyperDefensive SuperHyperClique;*

(ii) $\forall a \in V \setminus S,\ |N_s(a) \cap S| > \lfloor \frac{r}{2} \rfloor + 1$ *if $ESHG : (V, E)$ is a dual 2-SuperHyperDefensive SuperHyperClique;*

(iii) $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0$ *if $ESHG : (V, E)$ is an r-SuperHyperDefensive SuperHyperClique;*

(iv) $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0$ *if $ESHG : (V, E)$ is a dual r-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then

$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2 = \lfloor \frac{r}{2} \rfloor + 1 - (\lfloor \frac{r}{2} \rfloor - 1);$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < \lfloor \frac{r}{2} \rfloor + 1 - (\lfloor \frac{r}{2} \rfloor - 1);$$
$$\forall t \in S,\ |N_s(t) \cap S| = \lfloor \frac{r}{2} \rfloor + 1,\ |N_s(t) \cap (V \setminus S)| = \lfloor \frac{r}{2} \rfloor - 1.$$

(ii). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and a dual 2-SuperHyperDefensive SuperHyperClique. Then

$$\begin{aligned}
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>2;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>2=\lfloor\frac{r}{2}\rfloor+1-(\lfloor\frac{r}{2}\rfloor-1);\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>\lfloor\frac{r}{2}\rfloor+1-(\lfloor\frac{r}{2}\rfloor-1);\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|=\lfloor\frac{r}{2}\rfloor+1,\ |N_s(t)\cap(V\setminus S)=\lfloor\frac{r}{2}\rfloor-1.
\end{aligned}$$

(iii). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and an r-SuperHyperDefensive SuperHyperClique.

$$\begin{aligned}
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<r;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<r=r-0;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<r-0;\\
&\forall t\in S,\ |N_s(t)\cap S|=r,\ |N_s(t)\cap(V\setminus S)|=0.
\end{aligned}$$

(iv). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and a dual r-SuperHyperDefensive SuperHyperClique. Then

$$\begin{aligned}
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>r;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>r=r-0;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>r-0;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|=r,\ |N_s(t)\cap(V\setminus S)|=0.
\end{aligned}$$

□

Proposition 6.51. *Let $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then following statements hold;*

(i) $\forall a\in S,\ |N_s(a)\cap S|<\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1$ *if $ESHG:(V,E)$ is an 2-SuperHyperDefensive SuperHyperClique;*

(ii) $\forall a\in V\setminus S,\ |N_s(a)\cap S|>\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1$ *if $ESHG:(V,E)$ is a dual 2-SuperHyperDefensive SuperHyperClique;*

(iii) $\forall a\in S,\ |N_s(a)\cap V\setminus S|=0$ *if $ESHG:(V,E)$ is an $(\mathcal{O}-1)$-SuperHyperDefensive SuperHyperClique;*

(iv) $\forall a\in V\setminus S,\ |N_s(a)\cap V\setminus S|=0$ *if $ESHG:(V,E)$ is a dual $(\mathcal{O}-1)$-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and an 2- SuperHyperDefensive SuperHyperClique. Then

$$\begin{aligned}
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<2;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<2=\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1);\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1);\\
&\forall t\in S,\ |N_s(t)\cap S|=\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1,\ |N_s(t)\cap(V\setminus S)|=\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1.
\end{aligned}$$

(ii). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and a dual 2-SuperHyperDefensive SuperHyperClique. Then

$$\begin{aligned}
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|>2;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|>2=\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1);\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|>\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1);\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|=\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1,\ |N_s(t)\cap (V\setminus S)=\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1.
\end{aligned}$$

(iii). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and an $(\mathcal{O}-1)$-SuperHyperDefensive SuperHyperClique.

$$\begin{aligned}
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|<\mathcal{O}-1;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|<\mathcal{O}-1=\mathcal{O}-1-0;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|<\mathcal{O}-1-0;\\
&\forall t\in S,\ |N_s(t)\cap S|=\mathcal{O}-1,\ |N_s(t)\cap (V\setminus S)|=0.
\end{aligned}$$

(iv). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and a dual r-SuperHyperDefensive SuperHyperClique. Then

$$\begin{aligned}
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|>\mathcal{O}-1;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|>\mathcal{O}-1=\mathcal{O}-1-0;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|>\mathcal{O}-1-0;\\
&\forall t\in V\setminus S,\ |N_s(t)\cap S|=\mathcal{O}-1,\ |N_s(t)\cap (V\setminus S)|=0.
\end{aligned}$$

□

Proposition 6.52. *Let $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then following statements hold;*

(i) if $\forall a\in S,\ |N_s(a)\cap S|<\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1$, then $ESHG:(V,E)$ is an 2-SuperHyperDefensive SuperHyperClique;

(ii) if $\forall a\in V\setminus S,\ |N_s(a)\cap S|>\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1$, then $ESHG:(V,E)$ is a dual 2-SuperHyperDefensive SuperHyperClique;

(iii) if $\forall a\in S,\ |N_s(a)\cap V\setminus S|=0$, then $ESHG:(V,E)$ is $(\mathcal{O}-1)$-SuperHyperDefensive SuperHyperClique;

(iv) if $\forall a\in V\setminus S,\ |N_s(a)\cap V\setminus S|=0$, then $ESHG:(V,E)$ is a dual $(\mathcal{O}-1)$-SuperHyperDefensive SuperHyperClique.

Proof. (i). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then

$$\begin{aligned}
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|<\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1);\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|<\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1)<2;\\
&\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap (V\setminus S)|<2.
\end{aligned}$$

Thus S is an 2-SuperHyperDefensive SuperHyperClique.

(ii). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then

$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1);$$
$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>\lfloor\frac{\mathcal{O}-1}{2}\rfloor+1-(\lfloor\frac{\mathcal{O}-1}{2}\rfloor-1)>2;$$
$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>2.$$

Thus S is a dual 2-SuperHyperDefensive SuperHyperClique.

(iii). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then

$$\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<\mathcal{O}-1-0;$$
$$\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<\mathcal{O}-1-0=\mathcal{O}-1;$$
$$\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<\mathcal{O}-1.$$

Thus S is an $(\mathcal{O}-1)$-SuperHyperDefensive SuperHyperClique.

(iv). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then

$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>\mathcal{O}-1-0;$$
$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>\mathcal{O}-1-0=\mathcal{O}-1;$$
$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>\mathcal{O}-1.$$

Thus S is a dual $(\mathcal{O}-1)$-SuperHyperDefensive SuperHyperClique. □

Proposition 6.53. *Let $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then following statements hold;*

(i) $\forall a\in S,\ |N_s(a)\cap S|<2$ if $ESHG:(V,E))$ is an 2-SuperHyperDefensive SuperHyperClique;

(ii) $\forall a\in V\setminus S,\ |N_s(a)\cap S|>2$ if $ESHG:(V,E)$ is a dual 2-SuperHyperDefensive SuperHyperClique;

(iii) $\forall a\in S,\ |N_s(a)\cap V\setminus S|=0$ if $ESHG:(V,E)$ is an 2-SuperHyperDefensive SuperHyperClique;

(iv) $\forall a\in V\setminus S,\ |N_s(a)\cap V\setminus S|=0$ if $ESHG:(V,E)$ is a dual 2-SuperHyperDefensive SuperHyperClique.

Proof. (i). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and S is an 2-SuperHyperDefensive SuperHyperClique. Then

$$\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<2;$$
$$\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<2=2-0;$$
$$\forall t\in S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|<2;$$
$$\forall t\in S,\ |N_s(t)\cap S|<2,\ |N_s(t)\cap(V\setminus S)|=0.$$

(ii). Suppose $ESHG:(V,E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and S is a dual 2-SuperHyperDefensive SuperHyperClique. Then

$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>2;$$
$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>2=2-0;$$
$$\forall t\in V\setminus S,\ |N_s(t)\cap S|-|N_s(t)\cap(V\setminus S)|>2;$$
$$\forall t\in V\setminus S,\ |N_s(t)\cap S|>2,\ |N_s(t)\cap(V\setminus S)=0.$$

(iii). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and S is an 2-SuperHyperDefensive SuperHyperClique.

$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2 = 2 - 0;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2 - 0;$$
$$\forall t \in S,\ |N_s(t) \cap S| < 2,\ |N_s(t) \cap (V \setminus S)| = 0.$$

(iv). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph and S is a dual r-SuperHyperDefensive SuperHyperClique. Then

$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2 = 2 - 0;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2 - 0;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| > 2,\ |N_s(t) \cap (V \setminus S)| = 0.$$

□

Proposition 6.54. *Let $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then following statements hold;*

- (i) *if $\forall a \in S,\ |N_s(a) \cap S| < 2$, then $ESHG : (V, E)$ is an 2-SuperHyperDefensive SuperHyperClique;*
- (ii) *if $\forall a \in V \setminus S,\ |N_s(a) \cap S| > 2$, then $ESHG : (V, E)$ is a dual 2-SuperHyperDefensive SuperHyperClique;*
- (iii) *if $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0$, then $ESHG : (V, E)$ is an 2-SuperHyperDefensive SuperHyperClique;*
- (iv) *if $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0$, then $ESHG : (V, E)$ is a dual 2-SuperHyperDefensive SuperHyperClique.*

Proof. (i). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then

$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2 - 0;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2 - 0 = 2;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2.$$

Thus S is an 2-SuperHyperDefensive SuperHyperClique.

(ii). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then

$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2 - 0;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2 - 0 = 2;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2.$$

Thus S is a dual 2-SuperHyperDefensive SuperHyperClique.

(iii). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then

$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2 - 0;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2 - 0 = 2;$$
$$\forall t \in S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| < 2.$$

Thus S is an 2-SuperHyperDefensive SuperHyperClique.

(iv). Suppose $ESHG : (V, E)$ is a[an] [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then

$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2 - 0;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2 - 0 = 2;$$
$$\forall t \in V \setminus S,\ |N_s(t) \cap S| - |N_s(t) \cap (V \setminus S)| > 2.$$

Thus S is a dual 2-SuperHyperDefensive SuperHyperClique. □

7 Extreme Applications in Cancer's Extreme Recognition

The cancer is the extreme disease but the extreme model is going to figure out what's going on this extreme phenomenon. The special extreme case of this extreme disease is considered and as the consequences of the model, some parameters are used. The cells are under attack of this disease but the moves of the cancer in the special region are the matter of mind. The extreme recognition of the cancer could help to find some extreme treatments for this extreme disease.

In the following, some extreme steps are extreme devised on this disease.

Step 1. (Extreme Definition) The extreme recognition of the cancer in the long-term extreme function.

Step 2. (Extreme Issue) The specific region has been assigned by the extreme model [it's called extreme SuperHyperGraph] and the long extreme cycle of the move from the cancer is identified by this research. Sometimes the move of the cancer hasn't be easily identified since there are some determinacy, indeterminacy and neutrality about the moves and the effects of the cancer on that region; this event leads us to choose another model [it's said to be neutrosophic SuperHyperGraph] to have convenient perception on what's happened and what's done.

Step 3. (Extreme Model) There are some specific extreme models, which are well-known and they've got the names, and some general extreme models. The moves and the extreme traces of the cancer on the complex tracks and between complicated groups of cells could be fantasized by an extreme SuperHyperPath(-/SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultipartite, SuperHyperWheel). The aim is to find either the extreme SuperHyperClique or the neutrosophic SuperHyperClique in those neutrosophic extreme SuperHyperModels.

8 Case 1: The Initial extreme Steps Toward extreme SuperHyperBipartite as extreme SuperHyperModel

Step 4. (Extreme Solution) In the extreme Figure (27), the extreme SuperHyperBipartite is extreme highlighted and extreme featured. By using the extreme Figure (27) and the Table (4), the neutrosophic SuperHyperBipartite is obtained.

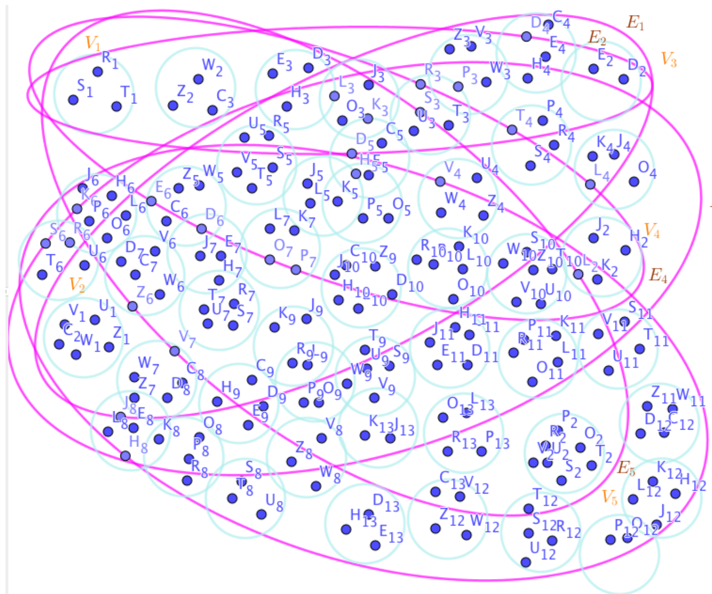

Figure 27. An extreme SuperHyperBipartite Associated to the Notions of extreme SuperHyperClique

Table 4. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The Neutrosophic SuperHyperBipartite

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The maximum Values of Its Vertices
The Values of The Edges	The maximum Values of Its Vertices
The Values of The HyperEdges	The maximum Values of Its Vertices
The Values of The SuperHyperEdges	The maximum Values of Its Endpoints

The obtained extreme SuperHyperSet, by the extreme Algorithm in previous extreme result, of the extreme SuperHyperVertices of the connected extreme SuperHyperBipartite $ESHB : (V, E)$, in the extreme SuperHyperModel (27), , corresponded to E_3, V_{E_3}, is the extreme SuperHyperClique.

9 Case 2: The Increasing extreme Steps Toward extreme SuperHyperMultipartite as extreme SuperHyperModel

Step 4. (Extreme Solution) In the extreme Figure (28), the extreme SuperHyperMultipartite is extreme highlighted and extreme featured.
By using the extreme Figure (28) and the Table (5), the neutrosophic SuperHyperMultipartite is obtained.
The obtained extreme SuperHyperSet, by the extreme Algorithm in previous result, of the extreme SuperHyperVertices of the connected extreme SuperHyperMultipartite $ESHM : (V, E)$, , corresponded to E_6, V_{E_6}, in the extreme SuperHyperModel (28), is the extreme SuperHyperClique.

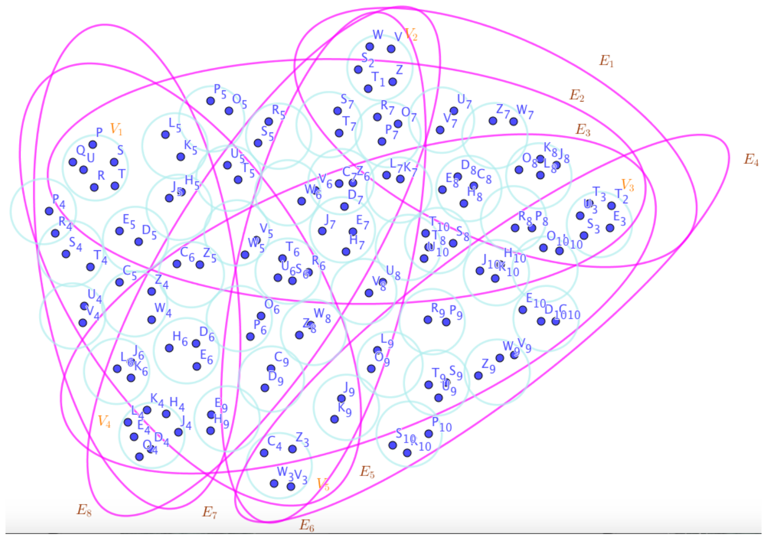

Figure 28. An extreme SuperHyperMultipartite Associated to the Notions of extreme SuperHyperClique

Table 5. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The Neutrosophic SuperHyperMultipartite

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The maximum Values of Its Vertices
The Values of The Edges	The maximum Values of Its Vertices
The Values of The HyperEdges	The maximum Values of Its Vertices
The Values of The SuperHyperEdges	The maximum Values of Its Endpoints

10 Open Problems

In what follows, some "problems" and some "questions" are proposed.

The SuperHyperClique and the neutrosophic SuperHyperClique are defined on a real-world application, titled "Cancer's Recognitions".

Question 10.1. *Which the else SuperHyperModels could be defined based on Cancer's recognitions?*

Question 10.2. *Are there some SuperHyperNotions related to SuperHyperClique and the neutrosophic SuperHyperClique?*

Question 10.3. *Are there some Algorithms to be defined on the SuperHyperModels to compute them?*

Question 10.4. *Which the SuperHyperNotions are related to beyond the SuperHyperClique and the neutrosophic SuperHyperClique?*

Problem 10.5. *The SuperHyperClique and the neutrosophic SuperHyperClique do a SuperHyperModel for the Cancer's recognitions and they're based on SuperHyperClique, are there else?*

Problem 10.6. *Which the fundamental SuperHyperNumbers are related to these SuperHyperNumbers types-results?*

Problem 10.7. *What's the independent research based on Cancer's recognitions concerning the multiple types of SuperHyperNotions?*

11 Conclusion and Closing Remarks

In this section, concluding remarks and closing remarks are represented. The drawbacks of this research are illustrated. Some benefits and some advantages of this research are highlighted.

This research uses some approaches to make neutrosophic SuperHyperGraphs more understandable. In this endeavor, two SuperHyperNotions are defined on the SuperHyperClique. For that sake in the second definition, the main definition of the neutrosophic SuperHyperGraph is redefined on the position of the alphabets. Based on the new definition for the neutrosophic SuperHyperGraph, the new SuperHyperNotion, neutrosophic SuperHyperClique, finds the convenient background to implement some results based on that. Some SuperHyperClasses and some neutrosophic SuperHyperClasses are the cases of this research on the modeling of the regions where are under the attacks of the cancer to recognize this disease as it's mentioned on the title "Cancer's Recognitions". To formalize the instances on the SuperHyperNotion, SuperHyperClique, the new SuperHyperClasses and SuperHyperClasses, are introduced. Some general results are gathered in the section on the SuperHyperClique and the neutrosophic SuperHyperClique. The clarifications, instances and literature reviews have taken the whole way through. In this research, the literature reviews have fulfilled the lines containing the notions and the results. The SuperHyperGraph and neutrosophic SuperHyperGraph are the SuperHyperModels on the "Cancer's Recognitions" and both bases are the background of this research. Sometimes the cancer has been happened on the region, full of cells, groups of cells and embedded styles. In this segment, the SuperHyperModel proposes some SuperHyperNotions based on the connectivities of the moves of the cancer in the longest and strongest styles with the formation of the design and the architecture are formally called " SuperHyperClique" in the themes of jargons and buzzwords. The prefix "SuperHyper" refers to the theme of the embedded styles to figure out the background for the SuperHyperNotions. In the Table (6), some limitations and advantages of this research are pointed out.

Table 6. A Brief Overview about Advantages and Limitations of this Research

Advantages	Limitations
1. Redefining Neutrosophic SuperHyperGraph	1. General Results
2. SuperHyperClique	
3. Neutrosophic SuperHyperClique	2. Other SuperHyperNumbers
4. Modeling of Cancer's Recognitions	
5. SuperHyperClasses	3. SuperHyperFamilies

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