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NEUTROSOPHIC BIMINIMAL STRUCTURE SPACES

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Abstract. In this article, we introduce the concept of neutrosophic biminimal structure spaces and study some fundamental properties of $N^1_{mX}N^2_{mX}$-closed sets and $N^1_{mX}N^2_{mX}$-open sets in neutrosophic biminimal structure spaces and also applications of neutrosophic biminimal structure spaces.

Keywords: neutrosophic minimal structure spaces, neutrosophic biminimal structure spaces, $N^1_{mX}N^2_{mX}$-closed, $N^1_{mX}N^2_{mX}$-open.

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1. INTRODUCTION

L. A. Zadeh [20] Fuzzy set laid the foundation of many theories such as intuitionistic fuzzy set and neutrosophic set, rough sets etc. Later, researchers developed K. T. Atanassov's [4] intuitionistic fuzzy set theory in many fields such as differential equations, topology, computer science and so on. F. Smarandache [18, 19] found that some objects have indeterminacy or neutral other than membership and non-membership. So he coined the notion of neutrosophy. R. Dhavaseelan et al [3, 5, 6, 7, 8, 9, 10, 14] studied in various concept covered in neutrosophy. The concept of minimal structure (in short, m-structure) was introduced by V. Popa and T. Noiri [15] in 2000. Also they introduced the notion of m_x-open set and m_x-closed set and characterize those sets using m_x-closure and m_x-interior operators respectively. Further they introduced $\mathcal{M}$-continuous functions and studied some of its basic properties. J. C. Kelly [13] introduce the notion of bitopological spaces. Such spaces are equipped with two arbitrary topologies. Furthermore, Kelly extended some of the standard results of separation axioms in a topological space to a bitopological space. M. Karthika et al [12] introduced and studied neutrosophic minimal structure spaces. In this article, we introduce the concept of neutrosophic biminimal structure space and study $N^1_{mX}N^2_{mX}$-closed sets and $N^1_{mX}N^2_{mX}$-open sets in neutrosophic biminimal structure spaces and also applications of neutrosophic biminimal structure spaces.

2. PRELIMINARIES

Definition 2.1. [15] *A subfamily m_x of the power set $\wp(X)$ of a nonempty set X is called a minimal structure (in short, m-structure) on X if $\emptyset \in m_x$ and $X \in m_x$. By (X, m_x), we denote a nonempty set X with a minimal structure m_x on X and call it an m-space. Each member of m_x is said to be m_x-open (or in short, m-open) and the complement of an m_x-open set is said to be m_x-closed (or in short, m-closed).*

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Definition 2.2. [18, 19] *A neutrosophic set (in short ns) K on a set $X \neq \emptyset$ is defined by $K = \{\prec a, P_K(a), Q_K(a), R_K(a) \succ : a \in X\}$ where $P_K : X \to [0,1]$, $Q_K : X \to [0,1]$ and $R_K : X \to [0,1]$ denotes the membership of an object, indeterminacy and non-membership of an object, for each a X to K, respectively and $0 \leq P_K(a) + Q_K(a) + R_K(a) \leq 3$ for each $a \in X$.*

Definition 2.3. [16] *Let $K = \{\prec a, P_K(a), Q_K(a), R_K(a) \succ : a \in X\}$ be a ns.*

(1) A ns K is an empty set i.e., $K = 0_\sim$ if 0 is membership of an object and 0 is an indeterminacy and 1 is an non-membership of an object respectively. i.e., $0_\sim = \{x, (0, 0, 1) : x \in X\}$
(2) A ns K is a universal set i.e., $K = 1_\sim$ if 1 is membership of an object and 1 is an indeterminacy and 0 is an non-membership of an object respectively. $1_\sim = \{x, (1, 1, 0) : x \in X\}$
(3) $K_1 \cup K_2 = \{a, max\{P_{K_1}(a), P_{K_2}(a)\}, max\{Q_{K_1}(a), Q_{K_2}(a)\}, min\{R_{K_1}(a), R_{K_2}(a)\} : a \in X\}$
(4) $K_1 \cap K_2 = \{a, min\{P_{K_1}(a), P_{K_2}(a)\}, min\{Q_{K_1}(a), Q_{K_2}(a)\}, max\{R_{K_1}(a), R_{K_2}(a)\} : a \in X\}$
(5) $K^C = \{\prec a, R_K(a), 1 - Q_K(a), P_K(a) \succ : a \in X\}$

Definition 2.4. [16] *A neutrosophic topology (nt) in Salama's sense on a nonempty set X is a family τ of ns in X satisfying three axioms:*

(1) Empty set ($0_\sim$) and universal set ($1_\sim$) are members of τ.
(2) $K_1 \cap K_2 \in \tau$ where $K_1, K_2 \in \tau$.
(3) $\cup K_\delta \in \tau$ for every $\{K_\delta : \delta \in \Delta\} \leq \tau$.

Each ns in nt are called neutrosophic open sets. It is complements are called neutrosophic closed sets.

Definition 2.5. [12] *Family N_m of ns of a universal set X is said to be neutrosophic minimal structure space (in short, nms) over X if it satisfying following the axiom: $0_\sim, 1_\sim \in N_m$. A family of neutrosophic minimal structure space is denoted by (X, N_{mX}).*
Note that neutrosophic empty set and neutrosophic universal set can form a topology and it is known as neutrosophic minimal structure space.

Remark 2.6. [12] *Each ns in nms is neutrosophic minimal open set.*
The complement of neutrosophic minimal open set is neutrosophic minimal closed set.

Proposition 2.7. [12] *Let R and S are any ns of nms N_m over X. Then*

(1) $N_m^C = \{0, 1, R_i^C\}$ where R_i^c is a complement of ns R_i.
(2) $X - N_m int(S) = N_m cl(X - S)$.
(3) $X - N_m cl(S) = N_m int(X - S)$.
(4) $N_m cl(R^C) = (N_m cl(R))^C = N_m int(R)$.
(5) N_m closure of an empty set is an empty set and N_m closure of a universal set is a universal set. Similarly, N_m interior of an empty set and universal set respectively an empty and a universal set.
(6) If S is a subset of R then $N_m cl(S) \leq N_m cl(R)$ and $N_m int(S) \leq N_m int(R)$.
(7) $N_m cl(N_m cl(R)) = N_m cl(R)$ and $N_m int(N_m int(R)) = N_m int(R)$.
(8) $N_m cl(R \vee S) = N_m cl(R) \vee N_m cl(S)$.
(9) $N_m cl(R \wedge S) = N_m cl(R) \wedge N_m cl(S)$.

Definition 2.8. [12] *Let N_m be any nms and A be any neutrosophic set. Then*

(1) Every $A \in N_m$ is open and its complement is closed.
(2) N_m-closure of A = min $\{F : F$ is a neutrosophic minimal closed set and $F \geq A\}$ and it is denoted by $N_m cl(A)$.
(3) N_m-interior of A = max $\{F : F$ is a neutrosophic minimal open set and $F \leq A\}$ and it is denoted by $N_m int(A)$.

In general $N_m int(A)$ is subset of A and A is a subset of $N_m cl(A)$.

Definition 2.9. [12] *Let (X, N_{mX}) be nms.*

(1) Arbitrary union of neutrosophic minimal open sets in (X, N_{mX}) is neutrosophic minimal open. (Union Property).
(2) Finite intersection of neutrosophic minimal open sets in (X, N_{mX}) is neutrosophic minimal open. (intersection Property).

3. NEUTROSOPHIC BIMINIMAL STRUCTURE SPACES

Definition 3.1. *Let X be a nonempty set and N^1_{mX}, N^2_{mX} be nms on X. A triple (X, N^1_{mX}, N^2_{mX}) is called a neutrosophic biminimal structure space (in short, nbims)*

Definition 3.2. *Let (X, N^1_{mX}, N^2_{mX}) be a nbims and S be any neutrosophic set. Then*

(1) Every $S \in N^j_{mX}$ is open and its complement is closed, respectively, for j = 1, 2.
(2) $N_m cl_j(S)$ = min $\{L : L$ is N^j_{mX}-closed set and $L \geq S\}$, respectively, for j = 1, 2.
(3) $N_m int_j(S)$ = max $\{T : T$ is N^j_{mX}-open set and $T \leq S\}$, respectively, for j = 1, 2.

Definition 3.3. *A subset A of a nbims (X, N^1_{mX}, N^2_{mX}) is called $N^1_{mX}N^2_{mX}$-closed if $N_m cl_1(N_m cl_2(A))$ = A. The complement of $N^1_{mX}N^2_{mX}$-closed set is called $N^1_{mX}N^2_{mX}$-open.*

Example 3.4. *Let $X = \{a\}$ with $N^1_{mX} = \{0_\sim, A, 1_\sim\}$; $(N^1_{mX})^C = \{1_\sim, B, 0_\sim\}$ and $N^2_{mX} = \{0_\sim, P, 1_\sim\}$; $(N^2_{mX})^C = \{1_\sim, Q, 0_\sim\}$ where*
$A = \prec (0.5, 0.4, 0.2) \succ$; $B = \prec (0.2, 0.6, 0.5) \succ$
$P = \prec (0.5, 0.4, 0.2) \succ$; $Q = \prec (0.2, 0.6, 0.5) \succ$
We know that $0_\sim = \{\prec x, 0, 0, 1 \succ : x \in X\}$, $1_\sim = \{\prec x, 1, 1, 0 \succ : x \in X\}$ and $0^C_\sim = \{\prec x, 1, 1, 0 \succ : x \in X\}$, $1^C_\sim = \{\prec x, 0, 0, 1 \succ : x \in X\}$.
Then $\prec (0.2, 0.6, 0.5) \succ$ is $N^1_{mX}N^2_{mX}$-closed. Since $N_m cl_1(N_m cl_2(\prec (0.2, 0.6, 0.5) \succ)) = \prec (0.2, 0.6, 0.5) \succ$.

Definition 3.5. *Let (X, N^1_{mX}, N^2_{mX}) be a nbims and A be a subset of X. Then A is $N^1_{mX}N^2_{mX}$-closed if and only if $N_m cl_1(A) = A$ and $N_m cl_2(A) = A$.*

Proposition 3.6. *Let N^1_{mX} and N^2_{mX} be nms on X satisfying (Union Property). Then A is a $N^1_{mX}N^2_{mX}$-closed subset of a nbims (X, N^1_{mX}, N^2_{mX}) if and only if A is both N^1_{mX}-closed and N^2_{mX}-closed.*

Proposition 3.7. *Let (X, N^1_{mX}, N^2_{mX}) be a nbims. If A and B are $N^1_{mX}N^2_{mX}$-closed subsets of (X, N^1_{mX}, N^2_{mX}), then $A \wedge B$ is $N^1_{mX}N^2_{mX}$-closed.*

Proof. Let A and B be $N^1_{mX}N^2_{mX}$-closed. Then $N_m cl_1(N_m cl_2(A)) = A$ and $N_m cl_1(N_m cl_2(B)) = B$. Since $A \wedge B \leq A$ and $A \wedge B \leq B$, $N_m cl_1(N_m cl_2(A \wedge B)) \leq N_m cl_1(N_m cl_2(A))$ and $N_m cl_1(N_m cl_2(A \wedge B)) \leq N_m cl_1(N_m cl_2(B))$. Therefore, $N_m cl_1(N_m cl_2(A \wedge B)) \leq N_m cl_1(N_m cl_2(A)) \wedge N_m cl_1(N_m cl_2(B)) = A \wedge B$. But $A \wedge B \leq N_m cl_1(N_m cl_2(A \wedge B))$. Consequently, $N_m cl_1(N_m cl_2(A \wedge B)) = A \wedge B$. Hence, $A \wedge B$ is $N^1_{mX}N^2_{mX}$-closed. □

Remark 3.8. *The union of two $N^1_{mX}N^2_{mX}$-closed set is not a $N^1_{mX}N^2_{mX}$-closed set in general as can be seen from the following example.*

Example 3.9. *Let $X = \{a\}$ with $N^1_{mX} = \{0_\sim, A, B, 1_\sim\}$; $(N^1_{mX})^C = \{1_\sim, P, Q, 0_\sim\}$ and $N^2_{mX} = \{0_\sim, E, F, G, H, 1_\sim\}$; $(N^2_{mX})^C = \{1_\sim, R, S, U, V, 0_\sim\}$ where*
$A = \prec (0.2, 0.4, 0.5) \succ$; $B = \prec (0.1, 0.5, 0.6) \succ$
$P = \prec (0.5, 0.6, 0.2) \succ$; $Q = \prec (0.6, 0.5, 0.1) \succ$
$E = \prec (0.2, 0.4, 0.5) \succ$; $F = \prec (0.1, 0.5, 0.6) \succ$
$G = \prec (0.1, 0.6, 0.4) \succ$; $H = \prec (0.3, 0.5, 0.4) \succ$
$R = \prec (0.5, 0.6, 0.2) \succ$; $S = \prec (0.6, 0.5, 0.1) \succ$
$U = \prec (0.4, 0.4, 0.1) \succ$; $V = \prec (0.4, 0.5, 0.3) \succ$
We know that $0_\sim = \{\prec x, 0, 0, 1 \succ : x \in X\}$, $1_\sim = \{\prec x, 1, 1, 0 \succ : x \in X\}$ and $0^C_\sim = \{\prec x, 1, 1, 0 \succ : x \in X\}$, $1^C_\sim = \{\prec x, 0, 0, 1 \succ : x \in X\}$.
Then $S_1 = \prec (0.5, 0.6, 0.2) \succ$ and $S_2 = \prec (0.6, 0.5, 0.1) \succ$ are $N^1_{mX}N^2_{mX}$-closed but $S_1 \vee S_2 = \prec (0.6, 0.6, 0.1) \succ$ is not $N^1_{mX}N^2_{mX}$-closed. Since $N_m cl_1(N_m cl_2(\prec (0.6, 0.6, 0.1) \succ)) \neq \prec (1, 1, 0) \succ$.

Proposition 3.10. *Let (X, N^1_{mX}, N^2_{mX}) be a nbims. Then A is a $N^1_{mX}N^2_{mX}$-open subset of (X, N^1_{mX}, N^2_{mX}) if and only if $A = N_m int_1(N_m int_2(A))$.*

Proof. Let A be a $N^1_{mX}N^2_{mX}$-open subset of (X, N^1_{mX}, N^2_{mX}). Then $X - A$ is $N^1_{mX}N^2_{mX}$-closed. Therefore, $N_m cl_1(N_m cl_2(X - A)) = X - A$. By Proposition 2.7 (2), $X - N_m int_1(N_m int_2(A)) = X - A$. Consequently, $A = N_m int_1(N_m int_2(A))$.
Conversely, let $A = N_m int_1(N_m int_2(A))$. Therefore, $X - A = X - N_m int_1(N_m int_2(A))$.By Proposition 2.7(2), $X - A = N_m cl_1(N_m cl_2(X - A))$. Hence, $X - A$ is $N^1_{mX}N^2_{mX}$-closed. Consequently, A is $N^1_{mX}N^2_{mX}$-open. □

Proposition 3.11. *Let (X, N^1_{mX}, N^2_{mX}) be a nbims. If A and B are $N^1_{mX}N^2_{mX}$-open subsets of (X, N^1_{mX}, N^2_{mX}), then $A \vee B$ is $N^1_{mX}N^2_{mX}$-open.*

Proof. Let A and B be $N^1_{mX}N^2_{mX}$-open. Then $N_m int_1(N_m int_2(A)) = A$ and $N_m int_1(N_m int_2(B)) = B$. Since $A \leq A \vee B$ and $B \leq A \vee B$, $N_m int_1(N_m int_2(A)) \leq N_m int_1(N_m int_2(A \vee B))$ and $N_m int_1(N_m int_2(B)) \leq N_m int_1(N_m int_2(A \vee B))$. Therefore, $A \vee B = N_m int_1(N_m int_2(A)) \vee N_m int_1(N_m int_2(B)) \leq N_m int_1(N_m int_2(A \vee B))$. But $N_m int_1(N_m int_2(A \vee B)) \leq A \vee B$. Consequently, $N_m int_1(N_m int_2(A \vee B)) = A \vee B$. Hence, $A \vee B$ is $N^1_{mX}N^2_{mX}$-open. □

Remark 3.12. *The intersection of two $N^1_{mX}N^2_{mX}$-open set is not a $N^1_{mX}N^2_{mX}$-open set in general as can be seen from the following example.*

Example 3.13. *Let $X = \{a\}$ with $N^1_{mX} = \{0_\sim, A, B, D, 1_\sim\}$; $(N^1_{mX})^C = \{1_\sim, P, Q, R, 0_\sim\}$ and $N^2_{mX} = \{0_\sim, U, V, W, 1_\sim\}$; $(N^2_{mX})^C = \{1_\sim, D, E, F, 0_\sim\}$ where*
$A = \prec (0.4, 0.7, 0.5) \succ$; $B = \prec (0.6, 0.5, 0.3) \succ$; $D = \prec (0.6, 0.7, 0.3) \succ$
$P = \prec (0.5, 0.3, 0.4) \succ$; $Q = \prec (0.3, 0.5, 0.6) \succ$; $R = \prec (0.3, 0.3, 0.6) \succ$

$U = \prec (0.4, 0.7, 0.5)\succ$; $V = \prec (0.6, 0.5, 0.3)\succ$; $W = \prec (0.6, 0.7, 0.3)\succ$
$D = \prec (0.5, 0.3, 0.4)\succ$; $E = \prec (0.3, 0.5, 0.6)\succ$; $F = \prec (0.3, 0.3, 0.6)\succ$
We know that $0_\sim = \{\prec x, 0, 0, 1 \succ : x \in X\}$, $1_\sim = \{\prec x, 1, 1, 0 \succ : x \in X\}$ and $0_\sim^C = \{\prec x, 1, 1, 0 \succ : x \in X\}$, $1_\sim^C = \{\prec x, 0, 0, 1 \succ : x \in X\}$.
Then $G_1 = \prec (0.4, 0.7, 0.5)\succ$ and $G_2 = \prec (0.6, 0.5, 0.3)\succ$ are $N^1_{mX}N^2_{mX}$-open but $G_1 \wedge G_2 = \prec (0.4, 0.5, 0.5)\succ$ is not $N^1_{mX}N^2_{mX}$-open. Since $N_m int_1(N_m int_2(\prec (0.4, 0.5, 0.5)\succ)) \neq \prec (0, 0, 1)\succ$.

Definition 3.14. *Let (X, N^1_{mX}, N^2_{mX}) be a nbims and Y be a subset of X. Define nms N^1_{mY} and N^2_{mY} on Y as follows: $N^1_{mY} = \{A \wedge Y \mid A \in N^1_{mX}\}$ and $N^2_{mY} = \{B \wedge Y \mid B \in N^2_{mX}\}$. A triple (Y, N^1_{mY}, N^1_{mY}) is called a neutrosophic biminimal structure subspace (in short, nbim-subspace) of (X, N^1_{mX}, N^2_{mX}).*
(Y, N^1_{mY}, N^1_{mY}) be a nbims of (X, N^1_{mX}, N^2_{mX}) and A be a subset of Y. Then N_{mY}-closure and N_{mY}-interior of A with respect to N^j_{mY} are denote by $N_{mY}cl_j(A)$ and $N_{mY}int_j(A)$, respectively, for $j = 1, 2$. Then $N_{mY}cl_1(A) = Y \wedge N_m cl_1(A)$ and $N_{mY}cl_2(A) = Y \wedge N_m cl_2(A)$.

Proposition 3.15. *Let (Y, N^1_{mY}, N^1_{mY}) be a nbim-subspace of (X, N^1_{mX}, N^2_{mX}) and F be a subset of Y. If F is $N^1_{mX}N^2_{mX}$-closed, then F is $N^1_{mY}N^1_{mY}$-closed.*

Proof. Let F be $N^1_{mX}N^2_{mX}$-closed. Then $N_m cl_1(N_m cl_2(F)) = F$. Therefore, $N_m cl_1(F) = F$ and $N_m cl_2(F) = F$. Hence, $Y \wedge N_m cl_1(F) = F$ and $Y \wedge N_m cl_2(F) = F$. Consequently, $N_{mY}cl_1(N_{mY}cl_2(F)) = F$. Hence, F is $N^1_{mY}N^1_{mY}$-closed. □

4. Applications

The application of neutrosophic biminimal structure space is based on the neutrosophic minimal element and maximal element. In neutrosophic biminimal structure space, $0_\sim$ is the minimal element and $1_\sim$ is the maximal element. The application of neutrosophic biminimal structure space used in index numbers(Statistical theory) to compare the price of a food item at a particular period with the price of the same item at a previous period of time and also the quantity of a food item at a particular period with the quantity of the same item at a previous period of time.
The following stages are proposed to take largest value.

Stage 1 : Input m attributes and 1, 2 are alternatives.

Table I

Commodities	Base year		Current year	
	price (p_0)	quantity (q_0)	price (p_1)	quantity(q_1)
V_1	$p_0$11	$q_0$12	$p_1$11	$q_1$12
V_2	$p_0$21	$q_0$22	$p_1$21	$q_1$22
V_3	$p_0$31	$q_0$32	$p_1$31	$q_1$32
V_4	$p_0$41	$q_0$42	$p_1$41	$q_1$42
.	.	.	.	.
.	.	.	.	.
V_m	p_0m1	q_0m2	p_1m1	q_1m2

Stage 2: Construct the neutrosophic biminimal structure from the data;

$N^j_{mX} = \{0_\sim, V_i, 1_\sim\}$, respectively for j = 1, 2
$V_i = \{p_0$i1, p_1i1$\}$
$V_i = \{q_0$i1, q_1i1$\}$, for i = 1, 2, ...m

Stage 3: The index number formulas are given by [17]

(1) Laspeyre's index number (in short, $\text{LI}_{01}) = \frac{\sum(p_1q_0)}{\sum(p_0q_0)}$.

(2) Paasche's index number (in short, $\text{PI}_{01}) = \frac{\sum(p_1q_1)}{\sum(p_0q_1)}$.

(3) Sidgwig-Drobisch index number (in short, $\text{SDI}_{01}) = \frac{LI_{01}+PI_{01}}{2}$.

(4) Marshall-Edgeworth index number (in short, $\text{MEI}_{01}) = \frac{\sum(p_1q_0)+\sum(p_1q_1)}{\sum(p_0q_0)+\sum(p_0q_1)}$.

(5) Banerjee index number (in short, $\text{BI}_{01}) = \frac{PI_{01}(LI_{01}+1)}{(PI_{01}+1)}$.

(6) Fisher index number (in short, $\text{FI}_{01}) = \sqrt{LI_{01} \times PI_{01}}$.

Stage 4: Arrange the index number formula, we calculated in stage 3 of ascending order which formula has the largest value.
For example, a middle class family food items are much more essential than cosmetic and luxuary items in the budget.
Let X = {a} and parameters P_1 = { w= price of the food items, y = quality of the food items, z = manufacturing date of the food items} and P_2 = { w = quantity of the food items, y = quality of the food items, z = manufacturing date of the food items}.
A consumer will assign minimum value of $0_\sim$ to bad feature, maximum $1_\sim$ to the best features of the food items (commodities).
Membership, indeterminacy and non-membership values taken from consumer's review rating.
N^1_{mX} : Membership refreed to low price, low quality and expiry date of an items. Indeterminacy refreed to correct price, perfect quality of packing food items and exact manufacturing date of an items. Non membership refreed to medium price, medium quality and no manufacturing date of an items.

N^2_{mX} : Membership refreed to low quantity, low quality and expiry date of an items. Indeterminacy refreed to correct quantity, perfect quality of packing food items and exact manufacturing date of an items. Non membership refreed to medium quantity, medium quality and not printed manufacturing date of an items.
Let us assume Table II values are taken consumer review rating for the commodities with parameters w, y, z.

Table II

Commodities	Base year		Current year	
	price (p_0)	quantity (q_0)	price (p_1)	quantity(q_1)
V_1: Rice	$\prec$ (0.2, 0.3, 0.5)$\succ$	$\prec$ (0.3, 0.4, 0.6)$\succ$	$\prec$ (0.3, 0.4, 0.6)$\succ$	$\prec$ (0.4, 0.5, 0.7)$\succ$
V_2: Wheat	$\prec$ (0.1, 0.4, 0.6)$\succ$	$\prec$ (0.3, 0.5, 0.8)$\succ$	$\prec$ (0.2, 0.5, 0.7)$\succ$	$\prec$ (0.4, 0.6, 0.9)$\succ$
V_3: Ragi	$\prec$ (0.3, 0.4, 0.3)$\succ$	$\prec$ (0.5, 0.5, 0.6)$\succ$	$\prec$ (0.4, 0.5, 0.4)$\succ$	$\prec$ (0.6, 0.6, 0.7)$\succ$
V_4: Cholam	$\prec$ (0.4, 0.1, 0.7)$\succ$	$\prec$ (0.5, 0.2, 0.8)$\succ$	$\prec$ (0.5, 0.2, 0.8)$\succ$	$\prec$ (0.6, 0.3, 0.9)$\succ$
V_5: Sugar	$\prec$ (0.7, 0.6, 0.8)$\succ$	$\prec$ (0.8, 0.7, 0.9)$\succ$	$\prec$ (0.6, 0.6, 0.9)$\succ$	$\prec$ (0.6, 0.8, 0.9)$\succ$

Calculated values are given below:
$\sum(p_0q_0) = \prec (0.7, 0.6, 0.6)\succ$; $\sum(p_0q_1) = \prec (0.6, 0.6, 0.7)\succ$
$\sum(p_1q_0) = \prec (0.6, 0.6, 0.6)\succ$; $\sum(p_1q_1) = \prec (0.6, 0.6, 0.7)\succ$

(1) $\mathrm{SDI}_{01} = \prec (0.5, 0.5, 0.5)\succ$
(2) $\mathrm{LI}_{01} = \prec (0.85, 1, 1)\succ$
(3) $\mathrm{MEI}_{01} = \prec (0.85, 1, 1)\succ$
(4) $\mathrm{FI}_{01} = \prec (0.92, 1, 1)\succ$
(5) $\mathrm{BI}_{01} = \prec (1, 1, 0)\succ$
(6) $\mathrm{PI}_{01} = \prec (1, 1, 1)\succ$

Therfore, PI_{01} is largest value in this example.

5. CONCLUSION

We presented several definitions, properties, explanations, examples and application of index number(Statistical theory) inspired from the concept of neutrosophic biminimal structure spaces in real world.

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Dedicated to our colleague the late Professor R. Dhavaseelan who died recently because of Covid-19.

CONFLICT OF INTERESTS

The author(s) declare that there is no conflict of interests.

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