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EDITORIAL

Special issue on "Applications of neutrosophic theory in decision making-recent advances and future trends"

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Multicriteria decision-making (MCDM) is a modeling and methodological tool for dealing with complex engineering problems. In these problems, sometimes, it is challenging for decision-makers to find solutions because the information they get may be incomplete and vague.

The management of uncertainty within decision-making problems is still a very challenging research issue despite the different proposals developed across the time. One of the most interesting research topics in recent years is the use of neutrosophic sets in decision-making processes. Neutrosophic sets and logic are generalizations of fuzzy and intuitionistic fuzzy sets and logic.

Neutrosophic logic and set are gaining significant attention in solving many real-life problems that involve uncertainty, impreciseness, vagueness, incompleteness, inconsistent, and indeterminacy. A number of new neutrosophic theories have been proposed and have been applied in computational intelligence, multiple-attribute decision-making, image processing, medical diagnosis, fault diagnosis, optimization design, and so on.

This special issue includes seven papers on decision-making theory and applications using neutrosophic theory. They have been selected after a peer-review process with at least three reviewers per papers.

The first paper titled *A New Attribute Sampling Plan Using Neutrosophic Statistical Interval Method*, by Muhammad Aslam, proposed a new attribute sampling plan using the neutrosophic interval method. The lot acceptance, rejection, and indeterminate probabilities are computed using the neutrosophic binomial distribution at various specified parameters such as sample size and acceptance number. The efficiency of the proposed sampling plan is also discussed. A real example is also added to explain the proposed sampling plan.

The second paper titled *Shortest Path Problem in Fuzzy, Intuitionistic Fuzzy and Neutrosophic Environment: An Overview*, by Said et al., introduced a survey on a shortest path problem with various existing algorithms in fuzzy, intuitionistic fuzzy and neutrosophic environment. This paper will be very helpful to the new researchers to propose novel concepts to solve the shortest path problem. In the future, based on this paper, new algorithms and frameworks will be designed to find the shortest path for a given network under various types of set environments.

The third paper titled *TODIM Strategy for Multi Attribute Group Decision Making in Trapezoidal Neutrosophic Number Environment*, by Surapati Pramanik and Rama Mallick, proposed a trapezoidal neutrosophic multiple-attribute group decision-making strategy, namely TODIM strategy in which the evaluation values of alternatives over the attributes assume the form of trapezoidal neutrosophic numbers. The advantage of the proposed strategy is that it is more suitable for solving multiple-attribute group decision-making problems with trapezoidal neutrosophic information because trapezoidal neutrosophic number can handle indeterminate and inconsistent information and are the extension of trapezoidal intuitionistic fuzzy numbers. A comparison analysis is also provided.

The fourth paper titled *The Shortest Path Problem In Interval Valued Trapezoidal and Triangular Neutrosophic*

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Environment, by Broumi et al., proposed a new score function for interval-valued neutrosophic numbers and shortest path problem is solved using interval-valued neutrosophic numbers. Also, novel algorithms are proposed to find the neutrosophic shortest path by considering interval valued neutrosophic number, trapezoidal and triangular interval-valued neutrosophic numbers for the length of the path in a network with illustrative example. A comparative analysis has been done for the proposed algorithm with the existing method with the shortcoming and advantage of the proposed method and it shows the effectiveness of the proposed algorithm.

The fifth paper titled *Neutrosophic Analysis of Variance: Application to University Students*, by Muhammad Aslam, introduced a new concept called, neutrosophic analysis of variance (NANONA). The proposed NANOVA is the generalization of the existing ANOVA under classical statistics. The proposed method has the ability to be applied effectively than the existing under uncertainty. A NANOVA table from a real example shows that sum squares were in indeterminacy interval.

The sixth paper titled *Shortest Path Problem using Bellman Algorithm under Neutrosophic Environment*, by Broumi et al., proposed a novel algorithm to obtain the neutrosophic shortest path between each pair of nodes. Length of all the edges is accredited an interval-valued neutrosophic set. For the validation of the proposed algorithm, a numerical example has been offered. A comparative analysis has been done with the existing methods which exhibit the advantages of the new algorithm.

The seventh paper titled *A New Approach on Differential Equations Via Trapezoidal Neutrosophic Number*, by I. R. Sumathi and C. Antony Crispin, derived the solution of the second-order differential equation in neutrosophic environment. An example is given to demonstrate the strong solution of the same.

We hope this issue will provide a useful resource of ideas, techniques, and methods for the research on the theory and applications of neutrosophic theory and the decision-making problems. We thank all the authors whose contributions and efforts made the publication of this issue possible. We are also grateful to the referees for their valuable and highly appreciated works contributed to select the high quality of papers published in this issue. Finally, our sincere thanks go to Prof. Yaochu Jin, Editor-in-Chief, for his support throughout the process of editing this issue.