ABSTRACT

Recent technology is featured with complex processes and phenomena for which complete information is not always available. For such cases, mathematical models are developed to handle various types of systems containing elements of imprecision. Among the several methods available, intuitionistic fuzzy set and neutrosophic set are the most adopted sets to handle the imprecision.

In decision making with imprecise environment, the study of similarity between objects/sets is very essential. Measuring similarity between intuitionistic fuzzy sets and neutrosophic sets has been intensively explored for decades. In the research topics of pattern recognition, image processing, decision making, etc., the study of their similarity measures becomes very essential.

Decision making problems involve two sets of relations which can be effectively modelled using the applications of intuitionistic fuzzy set and neutrosophic set. Intuitionistic Fuzzy Set (IFS) is to deal with the hesitancy in order to describe better the real status of the information. Neutrosophic Set (NS) deals with imprecise, indeterminate and inconsistent data. The main objective of the research work is to propose similarity measure of fuzzy, intuitionistic fuzzy and neutrosophic sets to obtain a decision which gives accurate solutions of the problems in fields like pattern recognition, medical diagnosis etc.

In this work an Intuitionistic Fuzzy Similarity Measure (IFSM) is defined to calculate the degree of similarity of generalized fuzzy numbers. The IFSM is developed by integrating the concept of Centre Of Gravity

(COG) points and intuitionistic fuzzy difference of distance of points of fuzzy numbers. Relevant properties of IFSM are verified. A comparative study is made for a few pattern sets available in literature and it is observed that the IFSM provides a very intuitive quantification. Further, the similarity measure IFSM is applied for an object recognition and fingerprint matching problems.

Similarity measure between intuitionistic fuzzy sets is proposed based on the mid points of transformed triangular fuzzy numbers. Also, some relevant properties of the proposed similarity measure between intuitionistic fuzzy sets are verified. Illustrative examples are taken to discuss that the proposed similarity measure between intuitionistic fuzzy sets can overcome the drawbacks of the existing similarity measures. In order to provide the supportive evidence, the proposed similarity measure is applied to pattern recognition problems and medical diagnosis problems in intuitionistic fuzzy environment. It is observed that the proposed similarity measure between intuitionistic fuzzy sets is more accurate in handling imprecision and uncertainty.

An effective method for evaluating similarity measure between interval-valued intuitionistic fuzzy sets based on the mid points of transformed triangular fuzzy numbers is proposed. Some relevant properties of the proposed similarity measures are discussed and the related similarity measures are also compared with the proposed measure. Several illustrative examples are given to demonstrate the practicality and effectiveness of the proposed similarity measure. Further, in order to provide the supportive evidence of effectiveness of the proposed similarity measure, it is applied to medical diagnosis problems and pattern recognition problems.

Similarity measure between intuitionistic fuzzy multisets based on their cardinality is proposed. Some of the basic properties to be satisfied for a

similarity measure are also verified for the proposed similarity measure. The main feature of the proposed measure is that it can be applied for both intuitionistic fuzzy set and as well for intuitionistic fuzzy multiset. Illustrative examples are used to establish that the proposed similarity measure can overcome the drawback of the existing similarity measures. Further, the measure is also applied to pattern recognition and medical diagnosis problems.

Single Valued Neutrosophic Exponential Similarity Measure (SVNESM) and weighted SVNESM are introduced to overcome the drawbacks of the existing similarity measures. By numerical examples, the proposed SVNESM is compared with the existing similarity measures of neutrosophic set to provide their effectiveness and rationality for overcoming some shortcomings of the existing similarity measures. Further, the similarity measure is applied for the medical diagnosis problems and Multi Attribute Decision Making (MADM) problems.