

ABSTRACT

Most of the problems in economics, environment, science and engineering are deals with uncertainty and decision making. The uncertainty arises in the form of ambiguity and lack of information about the data. Decision making is the problem of choosing the optimal choice which suits the physical nature of the problem. In these situations a tool such as soft set, which deals with uncertainty and rich in handling the parameters will analyze the problem effectively and gives a much better solutions.

The objective of this research is to study the generalization of soft sets like, intuitionistic fuzzy soft sets, generalized fuzzy soft rough sets, fuzzy parameterized soft fuzzy sets, and ordered intuitionistic fuzzy soft sets, and applied them in multi-criteria decision making problems. Further, investigate the properties of these sets and developing some useful algorithms which can be applied in a decision making problems. In addition, the effectiveness of the proposed techniques is established with a numerical illustration.

A new similarity measure and a weighted similarity measure on Intuitionistic Fuzzy Soft Sets (IFSSs) are proposed and some of their basic properties are discussed. Further, the optimality criteria for the decision making problem using the proposed method are stated and performance analysis of the method is discussed through a measure of performance and measure of error. The effectiveness of the proposed method is demonstrated with UCI Machine Learning Repository datasets to the diagnostic problem and their interested parameters are presented.

The concept of Mean Potentiality Approach (MPA) has been defined and the corresponding balanced algorithm, to obtain a balanced solution of an IFSS based decision making problem has been developed. Further, a parameter reduction algorithm has been proposed to reduce the choice parameter set with

the help of the balanced algorithm. Finally, the effectiveness of the proposed method has been demonstrated through medical diagnosis problem.

The Generalized Fuzzy Soft Rough (GFSR) matrices and their operations are introduced. Using the notions of GFSR matrices, a novel method for choosing an optimum choice in a multi criteria decision making problem is developed. The proposed method is compared with the well known existing methods of fuzzy soft matrices, and the effectiveness of the proposed method has been demonstrated through numerical examples.

Fuzzy Parameterized Soft Fuzzy (FPSF) sets are introduced and some of their basic properties are studied. Further, the notion of FPSF matrix is introduced by using FPSF set and its cardinal set is defined. Finally, a FPSF decision making algorithm is developed by introducing aggregation operator and implemented in a numerical example with hypothetical case study.

Some new basic operations and results of Ordered Intuitionistic Fuzzy Soft (OIFS) sets along with several examples are investigated. Using the notions of OIFS sets, an algorithm is developed and implemented in a numerical example.