Decision Making Algorithms in Neutrosophic Soft Environments

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Abstract. Many applications of neutrosophic sets were limited due to inadequate parametric tools. However, with the introduction of the concept of soft sets, this limitation was overcome through the hybridization of neutrosophic sets and soft sets. Neutrosophic soft sets [5] represent a powerful tool for data modeling, and their application has been the subject of extensive research in both practical and theoretical fields. The greatest practical application of this approach is related to decision making algorithms.

Recently, one of the most popular concepts in graph theory is determining the energy value of a **graph**. Using the idea of graph energy, a new concept of fuzzy soft set energy [3] has been introduced, and its application has been successfully used to create a decision making algorithm. Therefore, the consideration of applying this concept inspired us to define a numerical characteristic of neutrosophic soft sets in a specific way and to successfully apply it in creating an algorithm.

In this regard, the main focus of this paper will be on presenting the technique for determining the energy of neutrosophic soft sets, as well as the new decision making algorithm. Additionally, the significance of the algorithm will be highlighted in terms of its efficiency, which surpasses that of existing methods. Through comparative analysis with our algorithm, various decision making algorithms, such as those from Dalkılıç [1], Deli and Broumi [2], and Peng and Liu [4], have been examined, emphasizing the advantages of the proposed energy-based algorithm and its potential application due to the optimization of algorithms for large-scale systems with high-dimensional data.

Keywords: Neutrosophic soft set, Decision making, Singular value, Neutrosophic soft function

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