ORIGINAL ARTICLE

Dissimilarity Fuzzy Soft Points and Their Applications

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Abstract   In this work, we first introduce the concept of dissimilarity fuzzy soft point and study some of their properties. Some applications of dissimilarity fuzzy soft points are illustrated in decision making problems and medical diagnosis problems. Moreover, we introduce fuzzy soft limit points, fuzzy soft index and the notion of similarity measure with some of their properties studied. Some applications of similarity measure are shown in decision making problems in the ministry of planning and sustainable development as well.

1. Introduction

Soft set theory was first introduced by Molodtsov [9] in 1999 as a general mathematical tool for dealing with uncertain fuzzy, not clearly defined objects. He has established the fundamental results of this new theory and successfully applied soft set theory into several directions, such as smoothness of functions, operations research, Riemann integration, game theory, theory of probability and so on. Soft set theory has a wider application with its very rapid progress in different fields. Maji

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et al. [4-6] have further studied the theory of soft sets and used this theory to solve some decision making problems. They have also introduced the concept of fuzzy soft set, a more generalized concept, which is a combination of fuzzy set and soft set and studied its properties. After then many useful results of soft sets and fuzzy soft sets are introduced see [11, 12]. Recently Kong et al. [13, 14] have applied a soft set theoretic approach in decision making problems. Majumdar and Samanta [7, 8] have studied the problem of similarity measurement between soft sets and fuzzy soft sets. Some set operations based on distance and similarity measures for soft sets are introduced by Kharal [3]. The same problem appears in the distance measures and similarity measures presented in [2, 10]. In order to cope with different practical problems, it is necessary to find more new similarity measures and entropies and give a deep comparison with the proposals mentioned before. The aim of this paper is to propose a new category of similarity measures for fuzzy soft sets based on fuzzy soft limit points which are defined in this work.

In this paper, we define dissimilarity fuzzy soft points and study some of their properties. Also, in this work we introduce fuzzy soft limit points and fuzzy soft index. Further, some concepts on fuzzy soft sets, which are introduced by Maji et al. [4] using dissimilarity fuzzy soft points, are studied in this paper. Moreover, we study the problem of similarity measurement between two dissimilarity fuzzy soft points. Some applications of dissimilarity fuzzy soft points are illustrated in decision making problems and medical diagnosis problems. Further, some applications of similarity measure are shown in decision making problems in the ministry of planning and sustainable development.

For more details in our work, the dissimilarity fuzzy soft point of each pair of fuzzy soft sets is denoted by. In other words, indicates the degree of the convergence between and. This definition is more realistic as it involves uncertainty in the selection of a fuzzy set corresponding to each value of the parameter.

The organization of this paper is as follows: In Section 2, some preliminary definitions and results are given which will be used in the rest of the paper. In Section 3, a definition of dissimilarity fuzzy soft point is given with some of its properties studied. In Section 4, similarity between two dissimilarity fuzzy soft points has been discussed. In Section 5, fuzzy soft limit points are defined and a decision making problem has been discussed. An application of this fuzzy soft limit point in medical diagnosis has been shown in Section 6. An application of this similarity measure in the ministry of planning and sustainable development diagnosis has been shown in Section 7. Section 8 concludes the paper.

2. Preliminaries

In this section, we give some definitions and properties regarding fuzzy soft sets.

Definition 2.1 [4] *Let U be an initial universe set and let E be a set of parameters. Let I^U denote the collection of all fuzzy soft subsets of U and $A \subseteq E$. Then the mapping $F_A : A \rightarrow I^U$ defined by $F_A(e) = \mu^e_{F_A}$ (a fuzzy soft subset of U), is called a fuzzy soft set over (U, E), where $\mu^e_{F_A} = \bar{0}$ if $e \in E - A$ and $\mu^e_{F_A} \neq \bar{0}$ if $e \in A$. The set of all fuzzy soft sets over (U, E) is denoted by $FS(U, E)$.*