Chapter 9

Minimal Spanning Tree in Cylindrical Single-Valued Neutrosophic Arena

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ABSTRACT

In this chapter, the concept of cylindrical single-valued neutrosophic number whenever two of the membership functions, which serve a crucial role for uncertainty conventional problem, are dependent to each other is developed. It also introduces a new score and accuracy function for this special cylindrical single-valued neutrosophic number, which are useful for crispification. Further, a minimal spanning tree execution technique is proposed when the numbers are in cylindrical single-valued neutrosophic nature. This noble idea will help researchers to solve daily problems in the vagueness arena.

1. INTRODUCTION

The idea of vagueness theory was first invented by (Zadeh, 1965) in his paper. After that, the paper of (Atanassov, 1986) presents the remarkable concept of an intuitionistic fuzzy set in the field of uncertainty theory in which the perception of membership function and non-membership function both are considered. Day by day, as development goes on, researchers invented triangular (Chen S., 1994) and (K.K.Yen, S.Ghoshray, & G.Roig, 1999), trapezoidal (Chen & Chen, 2007) and (S.Abbasbandy & T.Hajjari, 2009), pentagonal (R.Helen & G.Uma, 2015) and (Chakraborty A., et al., 2018) and Later (Maity, Chakraborty, Dey, Mondal, & Alam, 2020) and (Maity, Chakraborty, Dey, Mondal, & Alam, 2021). DOI: 10.4018/978-1-7998-1313-2.ch009
2018) invented heptagonal fuzzy number which are useful and plays a key role in mathematical modeling and statistical computational problem. Further, (F & XH, 2007), developed the concept of triangular intuitionistic fuzzy set and (Li & Chen, 2015) introduced the idea of trapezoidal intuitionistic fuzzy set. Later, (Smarandache, 1998) invented the concept of neutrosophic set where there are three disjunctive components are considered namely i) truth, ii) indeterminacy, iii) falsity. Neutrosophic concept is a very effective & an useful idea in real life problems. Later, (Chakraborty A., Mondal, Ahmadian, Senu, Alam, & Salahshour, 2018) developed different form of triangular neutrosophic number and its application. Recently, (Chakraborty A., et al., 2019) introduced the concept of triangular bipolar neutrosophic number and its application in multi criteria decision making problem. It was defined that in case of neutrosophic set, the sum of the truth function, falsity function and hesitation function is less than or equal to 2, whenever any two of them are dependent, while the third one is independent from them. Now, the conception of cylindrical neutrosophic single-valued number has been imported which is fur more advanced than accustomed conception of dependence neutrosophic number.

All those neutrosophic numbers whose addition of the squares of two dependent membership functions are less than or equals to $1^2$ and independent membership function less or equals to 1 in the 1st quadrant of three dimensional co-ordinate axes are considered as cylindrical single-valued neutrosophic number. Graphically it signifies the $\frac{1}{4}$ th part of a total unit radius cylinder. Thus, the idea of cylindrical single-valued neutrosophic number or cylindrical dependence fuzzy set in neutrosophic domain is being established.

Obviously it will contain all general neutrosophic number which will satisfy cylindrical single-valued neutrosophic number. In this article, classification and operation on cylindrical single-valued neutrosophic fuzzy number and a new important score and accuracy function is being developed which plays useful roles in vagueness theory. Later, it can be applied in various fields of science and engineering problems.

Minimal spanning tree is a very crucial topic in graph theory domain. (Ye, 2014) introduced Single valued neutrosophic minimum spanning tree and its clustering method. (Mandal & Basu, 2016) proposed an approach based on similarity measure for searching the optimum spanning tree problems in a neutrosophic environment considering the inconsistency, incompleteness and indeterminacy of the information. (Mullai, Broumi, & Stephen, 2017) discussed about the minimum spanning tree problem in bipolar neutrosophic environment. Later, (Broumi, Talea, Smarandache, & Bakali, 2016) (Broumi S., Bakali, Talea, Smarandache, & Kishore Kumar, 2017) discussed on Shortest path problem on single valued neutrosophic graphs. Also, (Broumi, Smarandache, Talea, & Bakali, 2016) developed Decision-making method based on the interval valued neutrosophic graph and after that (Kandasamy, 2016)
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