Chapter 8
Correlation Coefficients of Pentapartitioned Neutrosophic Sets in Selection of Academic Courses

R. Radha
Karpagam College of Engineering, Coimbatore, India

R. Prema
KPR College of Arts, Science, and Research, Coimbatore, India

A. Stanis Arul Mary
Nirmala College for Women, Coimbatore, India

Said Broumi
https://orcid.org/0000-0002-1334-5759
Laboratory of Information Processing, Faculty of Science Ben M'Sik, University of Hassan II, Casablanca, Morocco & Regional Center for the Professions of Education and Training (CRMEF), Morocco

ABSTRACT

Correlation is a statistical measure that expresses the extent to which two variables are linearly related. It's a common tool for describing simple relationships without making a statement about cause and effects. Correlations are useful for describing relationships among data. In this chapter, the authors are applying the correlation coefficient to pentapartitioned neutrosophic sets[PNS]. Also, the authors have introduced the new concept of interval valued pentapartitioned neutrosophic set [IVPNS] and some basic operations are also investigated. Also, the correlation measure of IVPNS is proposed and discussed some of its properties. The concept of this correlation measures of PNS is the extension of correlation measures of fuzzy set and pentapartitioned neutrosophic set. Then, using correlation of PN and IVPN set measure, the application of selection of academic courses is given.

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INTRODUCTION

In daily life, everyone deals with uncertainty. If anyone toss a coin one will get either a head or tail but are not sure about outcomes so to tackle with issues like uncertainty and to make decisions in practical applications many theories have been proposed and some of them are as follows. In different fields such as educational problem , image processing, medical diagnosis, social problems, conflict resolution etc have been applied and studied in NSs and its numerous extensions. In all scientific fields, the concept of similarity is very important.

In this universe, there are many notions that are uncertain, and these concepts cannot be handled by the classical set theory. In this sense, Zadeh (1965) created the idea of fuzzy set theory to analyse uncertain mathematical data that is classified by the degree to which an element belongs to a real number in the range [0, 1]. This theory is highly used in a variety of domains, including robotics, operations research, artificial intelligence, control systems, decision analysis, and medical diagnostics.

An intuitionistic fuzzy set is a generalized version of the fuzzy set that was developed by Atanassov (1986) in order to more accurately represent uncertainty. This is done by simultaneously taking into account membership and non-membership degrees in the range [0, 1], with the objective that their sum should be less than 1. With the help of both membership degrees, Atanassov's intuitionistic fuzzy set theory diverged into several application domains in the context of uncertainty.

As an extension of both fuzzy sets and intuitionistic fuzzy sets, Smarandache (1998) introduced the idea of neutrosophic set theory as a mathematical tool to cope with situations comprising inconsistent, ambiguous, and incomplete information in the real world (Smarandache 2005). The truth-membership, indeterminacy-membership, and falsity membership properties of neutrosophic sets are each independently defined philosophically as falling inside the real standard or non-standard unit interval $^{-}]0,1[^{+}$. In practical applications, it might be challenging to utilise the stated neutrosophic set operators on a neutrosophic set whose values come from a genuine standard or non-standard interval $^{-}]0,1[^{+}$. Single-valued neutrosophic sets (also known as SVNSs), whose components are single-valued numbers and whose value is drawn from the unit interval [0, 1], were established by Wang et al. (2010) to make the neutrosophic set easier to implement in practical settings. A single-valued neutrosophic set is a particular instance of the neutrosophic set as a result. Numerous areas have used and investigated the numerous features of neutrosophic sets and single-valued neutrosophic sets.

The characteristics of distance and similarity measurements on single-valued neutrosophic sets were defined by Broumi and Smarandache in 2013. The hamming and Euclidean distance measurements on single-valued neutrosophic sets were established by Majumdar and Samanta (2014).Cosine similarity was studied in relation to multi-attribute decision-making problems by Biswas et al. (2015). With its use, Mondal and Pramanik (2015) developed the tangent similarity measure. For single-valued neutrosophic sets, Biswas et al. (2016) established a number of distance measures once again and contrasted their approach with other ones already in use to address multi-attribute decision-making challenges.

A single-valued neutrosophic set application in medical diagnostics was established by Shahzadi et al. (2017). In multi-criteria decision-making situations, Ye and Zhang (2014) used single-valued neutrosophic cross-entropy and single-valued neutrosophic similarity metrics. For single-valued neutrosophic sets, Chai et al. (2021) have proposed novel distance and similarity metrics with applications in pattern recognition and medical diagnosis issues.

A multi-criteria group decision-making technique was created by Karaaslan and Khizar (2018) and is based on various operations on neutrosophic matrices. In addition, Karaaslan (2018a) created a