

Chapter 7

Application of the Neutrosophic Spherical Sets in Education

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ABSTRACT

Neutrosophic logic is the science of artificial intelligence that enables information systems to simulate human understanding. Neutrosophic logic enables computers to understand complex concepts with indeterministic constraints. It incorporates human intellect into machines and tries to exhibit human decision-making skills. Hence, neutrosophic logic makes predictions and inferences based on its knowledge, turning it into a tool for users to explore ideas and conclude on perfect solutions for real-time problems that involve indeterminacy. Neutrosophic logic finds varied applications in the field of education that are beneficial for progress in learning as well as decision making and evaluation. This chapter proposes the application of neutrosophic sets in education and school determination systems by using neutrosophic spherical distance measures.

INTRODUCTION

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 considering 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

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diverged into several application domains in the context of uncertainty. In a recent study, Dutta and Goala (2018) developed the intuitionistic fuzzy distance measure and discussed its use in diagnosing illnesses.

The choice of a student's subject is important to their social and professional growth as well as their future job. When it comes to planning or picking a job, students are losing hope and getting confused as they consider: What is my dream? What type of nature do I have, and what sort of employment best suits me? What are the many career options that are offered on the employment market? How does the employment market offer each career? I will be content and fully appreciate any subject I select, etc. Students in these circumstances require appropriate recommendations, encouragement, support, advice, and counseling in order to make the best career choice possible.

By including normalised Euclidean distance measurements in Atanassov's intuitionistic fuzzy sets, Ejegwa et al. (2014) provided a novel way for determining a career. Using normalised Euclidean distance measurements, Tugrul et al. (2017) suggested an application of school career selection in intuitionistic fuzzy sets. Calculating the least distance between each student and each school gives the answer in this case. In Turkey's city school in Kahramanmara, Citil (2019) explained the connection between the student's pilot tests and the official test. He arrived at the conclusion by using a distance measuring device to determine the shortest distance between each student and each school.

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 SVNSSs), 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 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. Neutrosophic supra topology was introduced by Jayapartha sarathy et al. (2019) with a focus on data mining. 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. The characteristics of distance and similarity measurements on single-valued neutrosophic sets were defined by Broumi and Smarandache in 2013.

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 decision-making method for medical diagnoses by defining Gaussian numbers and the α -cut in single-valued

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