Chapter 8
A Proposed Neutrosophic Probability Model for Normalized DifferenceVegetation Index Using Remote Sensing:
Model Building on Climate

Shan-E-Fatima
Government College University, Lahore, Pakistan

Hina Khan
Government College University, Lahore, Pakistan

Kanwal Javid
https://orcid.org/0000-0003-3143-8868
Government College University, Lahore, Pakistan

ABSTRACT

In this research work, a new neutrosophic probability model named a neutrosophic Topp-Leone exponentiated generalized exponential distribution is proposed to model the normalized difference vegetation index (NDVI) of Pakistan in the year 2022. The MODIS was used in this research, which gave spatial and spectral information on NDVI in the Earth. NDVI maps were produced from the acquired data, and NDVI sensors computed the normalized difference vegetation index. Mathematical char-

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acteristics of the proposed model of NDVI are derived, including central tendency measures, dispersion estimators, inferential statistics, moment generating function, order statistics, reliability measures, quantile-based statistical measures, and renyi entropy and graphical representations of the density function are also presented. The maximum likelihood technique is used to estimate the parameters for the proposed probability model.

1. INTRODUCTION

A mathematical method known as fuzzy logic enables the representation and processing of hazy or inaccurate data. It is based on the idea of fuzzy sets, which generalize crisp sets in the sense that they permit items to have degrees of membership ranging from 0 to 1. The degree to which an element belongs to a fuzzy set is represented by membership functions, which are given to variables and propositions in fuzzy logic. Depending on the nature of the problem, the membership functions can be defined using a variety of shapes, including triangular, trapezoidal, or Gaussian curves. Fuzzy logic is enhanced by the concept of neutrality or indeterminacy in the neutrosophic sense. Neutrosophic logic includes indeterminate truth values in addition to true and false values to deal with circumstances in which the truth or falsity of a statement cannot be decided or is only partially known. A new division of philosophy is introduced as neutrosophic statistics, which is executed as a generalization of fuzzy logic(Smarandache, 2000) (Rivieccio, 2008). This type of statistics is used for uncertain environments(Kashihara, 1996). It gained significance in utilizing the ambivalent phenomenon and estimating values in intervals instead of single values(Wang, Smarandache, Sunderraman, & Zhang, 2005) (Smarandache & Pramanik, 2016). The set of neutrosophic variables is defined in three components indeterminate (I), valid (T), and false (F) (Smarandache, 2003), (Salama, 2018) uses these three components to improve grayscale images(Salama, Smarandache, & Eisa, 2014) also (Salama, Smarandache, & Kromov, 2022)has developed "Neutrosophic Closed Set and Neutrosophic Continuous Functions" in application to GIS and topology(Vasantha Kandasamy, 2006),(Salama, Smarandache, & Kroumov, 2014), (Salama & Alblowi, 2012),(Smarandache, 2014).A new set theory based on the neutrosophic random variable is derived and named it neutrosophic set theory(Salama & Alblowi, 2012). "Neutrosophic crisp neighbourhoods system for the neutrosophic crisp points" has been established for local neutrosophic functions (Salama, Smarandache, & Alblowi), (Smarandache, 1999). Programming in the most potent, easily assessable software, EXCEL, has been developed to analyze neutrosophic data sets (Salama, El-Ghareeb, Manie, & Smarandache). The effect of neutrosophic random variables in decision trees is a significant area in classical

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