Chapter 9
A Viewpoint for Making Decisions via Compact Spaces in Neutrosophic Generalized Topology

A. Yuvarani
https://orcid.org/0000-0002-5755-3429
The American College, India

S. Vijaya
https://orcid.org/0000-0002-4173-0451
Thiagarajar College, Madurai Kamaraj University, India

P. Santhi
The Standard Fireworks Rajaratnam College for Women, India

ABSTRACT

The ramifications of making decisions are more noteworthy due to the abundance and intricacy of data in everyday challenges. Hence, it is imperative to make sound and effective decision by developing innovative mathematical approaches to resolve these tasks. In this chapter, a problem is identified in the current scenario and a novel technique is proposed to make efficacious decision through the utilization of compactness in neutrosophic generalized topology. For that, initially, μN-compact space is introduced, and its characteristics are analyzed. Subsequently, μN-feebly compact space is presented along with its properties and examined its relationships with some existing notions.

DOI: 10.4018/979-8-3693-2085-3.ch009

INTRODUCTION

To pact with indeterminate and inconsistent data, Neutrosophic concept delivers a more realistic mathematical framework. Smarandache (Al-Omeri & Smarandache, 2016; Smarandache, 1999; Smarandache, 2002; Smarandache, 2010) devoted his exertions to delve into the scope of indeterminacy, leading to the development of Neutrosophic Sets (NS). Further, Salama and Albowi (Salama, 2012) paved the way to Neutrosophic Topological Spaces.

Császár (1997, 2002, 2005) originated and studied the characteristics of Generalized Topological Spaces. Drawing inspiration from these works, in 2020, Raksha Ben & Hari Siva Annam (2021) instigated Neutrosophic Generalized Topological Spaces and analyzed its properties.

The conception of compactness in Generalized Topological Spaces is formerly presented and investigated by Jyothis Thomas and Sunil Jacob John in 2012 (Thomas & John, 2012). Later on, K. Bageerathi and P. Jeya Puvaneswari, hosted the idea of compactness in neutrosophic topological spaces in 2019 (Bageerathi & Jeya Puvaneswari, 2019).

Compact sets perform a decisive role in numerous decision-making scenarios, abetting in the depiction of uncertainty, feasible regions, and constraints athwart a wide gamut of applications. Decision-makers can employ them mathematically and logically, to formulate and make decisions thoroughly.

An innovative strategy is proposed in our chapter, by making use of the statistical tools such as logistic regression analysis and Python programming code (Bewick et al., 2003; Embarak, 2018; Nongthombam & Sharma, 2021; Peng et al., 2002), to make effectual decision for a current scenario issue via compactness in Neutrosophic Generalized Topology. For that, μ^N-compact space and μ^N-feebly compact space are introduced along with its properties and its characteristics are analyzed.

PREREQUISITES

2.1 Definition (Al-Omeri & Smarandache, 2016)

Consider **B** as a set $\neq 0_N$. A μ^N-set D in **B**, labelled as $D = \{< \beta, (\mathbf{Y}_D(\beta), \mathbf{U}_D(\beta), \mathbf{N}_D(\beta)) >: \beta \in \mathbf{B}, \mathbf{Y}_D, \mathbf{U}_D, \mathbf{N}_D \in]^-0, 1^+[\}$ where $\mathbf{Y}_D$, $\mathbf{U}_D$ and $\mathbf{N}_D$ are real standard rudiments of [0, 1], represented as degree of membership, neutrality and non-membership respectively. Also, $0 \leq \mathbf{Y}_D(\beta) + \mathbf{U}_D(\beta) + \mathbf{N}_D(\beta) \leq 3$.