Chapter 2
Plithogenic Fermatean-Based Plithogenic Cognitive Map Decision-Making Model

Nivetha Martin
Arul Anandar College (Autonomous), Karumathur, India

N. Angel
https://orcid.org/0000-0003-1182-3371
Department of Mathematics, Madurai Kamaraj University, India

P. Pandiammal
G.T.N. Arts College (Autonomous), India

Ramila Gandhi
PSNA College of Engineering and Technology, India

Florentin Smarandache
https://orcid.org/0000-0002-5560-5926
University of New Mexico, USA

ABSTRACT

The use of plithogenic cognitive maps is instrumental in tackling intricate decision-making structures. These models, utilizing plithogenic representations, enable the examination of interconnected influences among decision-making factors. This chapter introduces a novel type of plithogenic cognitive maps employing plithogenic Fermatean sets representations. The suggested decision-making model is employed to analyze the effects of digitalized educational system on the learning community.

DOI: 10.4018/979-8-3693-2085-3.ch002

A comparative assessment of the effectiveness and competence of this model against plithogenic cognitive maps with alternative representations is conducted. The outcomes exhibit greater promise for the proposed model. Consequently, this chapter advocates for the adoption of this decision-making approach to address problems involving complex interrelated factors.

1. INTRODUCTION

The well-constructed theory of Plithogeny has intense applications in the broad and comprehensive field of decision making. The efficacy of the decision-making models is measured by the extent of optimal resultants obtained on using suitable methods. Cognitive Maps are one such excellent decision-making tools primarily applied in investigating the causal relationship existing between the factors of the considered decision-making problem. These cognitive maps are basically graphical structures with nodes and edges representing the factors and causal effects respectively. The positive, negative and null associational impacts between the factors are represented by the edge weights belonging to the set {1,0,-1}. The extension of this cognitive maps into fuzzy, intuitionistic and neutrosophic differ by the representations of the edge weights. Nivetha and Smarandache (Martin, Smarandache, 2020) discussed Plithogenic cognitive maps and applied in developing a decision making model. Plithogeny based cognitive maps are widely employed in exploring the causal effect relationship in the context of problems pertinent to disease diagnosis and education. However, Plithogenic cognitive maps has dealt with Plithogenic fuzzy representations. In a Plithogenic cognitive map decision model, the initial constructions of factors and associational impacts are based on the intuition of the experts. The data representations must possess the competency of reflecting the expert's opinion and the Fermatean sets are the best choice of it. Senapati and Yager (Senapati, Yager, 2020) introduced Fermatean sets which are the extended version of Pythagorean sets. These Fermatean sets facilitate experts to express their consent and dissent more effectively and this has made the researchers to develop and extend the theory of Fermatean sets.

Antony and Jansi (Sweety, Jansi, 2021) developed the theory of Fermatean Neutrosophic sets and also discussed the algebraic operations and applications in decision making. However, the Fermatean sets are not discussed under Plithogenic environment. This chapter introduces the concept of Plithogenic Fermatean sets. As Plithogenic cognitive maps are primarily based on expert's opinion, the Plithogenic Fermatean representations will be so beneficial in constructing the initial data sets. The integration of Plithogenic Fermatean representations with Plithogenic cogni-