Chapter 5
A Novel on Virtual Social Network Analysis Utilising Interval-Valued Complex Neutrosophic Graph Structures

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ABSTRACT

The interval-valued complex neutrosophic set (IVCNS), an expansion of the interval-valued neutrosophic set (IVNS), provides a more precisecharacterisation of uncertainty than traditional fuzzy sets. Fuzzy control can use it in a variety of ways. In this research study, the authors also introduce the adjacency matrix IVCNGS notion as well as the idea of an isomorphic adjacency matrix. They also introduce interval-valued complex neutrosophic graph structures (IVCNGS). They use an example to investigate a number of IVCNGS adjacency matrix properties. In addition, they introduce the ideas of edge regular and totally edge regular adjacency matrix IVCNGS. The conditions under which edge regular adjacency matrix IVCNGS and totally edge regular adjacency matrix IVCNGS are equal are described. Finally, in order to make the proposed IVCNGS principles more understandable, they give specific

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instances of how virtual social networks impact cross-cultural communication and evaluate the effectiveness and performance of the organisation.

1. INTRODUCTION

In 1965, L.A. Zadeh (1965) developed fuzzy sets to solve the problems associated with handling uncertainty in fuzzy sets. Since then, other scholars have investigated more real-world issues involving ambiguous and uncertain conditions in an effort to solve them using fuzzy sets and fuzzy logic. A fuzzy set development that the author initiated in Turksen (1986) in 1986 is interval-valued fuzzy sets. It also takes into account the values of number intervals to account for uncertainty as a result of using numbers as the membership function. Normally, it is denoted by the symbol $\left[\mu_{AL}^{-}(x), \mu_{AL}^{+}(x)\right]$. To express the degree of membership of the fuzzy set A use the formula $0 \leq \mu_{AL}^{-}(x) + \mu_{AL}^{+}(x) \leq 1$. The list of components that make up fuzzy sets was expanded by T. Atanassov in Atanassove and Gargov (1989) by include a non-membership function, which is represented as intuitionistic fuzzy sets. He also included interval valued intuitionistic fuzzy sets in the definition of intuitionistic fuzzy sets (Atanassove & Gargov, 1989). Interval-valued intuitionistic fuzzy sets, as opposed to classical fuzzy sets, are preferable for representing uncertainty. The phase of the process that requires the greatest processing is defuzzification, a method used in fuzzy control in various ways. For the purpose of interpreting the degree of true and false membership functions, it is defined as a pair of intervals $[\mu^{-}, \mu^{+}], 0 \leq \mu^{-} + \mu^{+} \leq 1$ and $[\lambda^{-}, \lambda^{+}], 0 \leq \lambda^{-} + \lambda^{+} \leq 1$ with $0 \leq \mu^{-} + \lambda^{+} \leq 1$. These theories have the common flaw of not being able to model two-dimensional occurrences, despite being applicable to a wide number of scientific subjects. The fuzzy set (FS) theory is a useful tool for coping with uncertainties that occur in many different spheres of life. However, this theory cannot always reproduce the precise and irregular information of a two-dimensional or periodic nature seen in the real world. To solve this issue, Ramot (Rani & Garg, 2017) proposed the idea of a complex fuzzy set (CFS) in 2012. This idea's membership grade, which has the notation $re^{i\theta}$, where r denotes the amplitude term and θ the phase term, is a helpful generalisation of FS. There is a restriction that values may only come from the unit circle of the complex plane. The phase term of CFS is significant since it is better able to control recurrent problematic phenomena or cyclical problems. Because the phase term is present in CFS, it is guaranteed that there may be situations where the second dimension is necessary. CFS stands out from every other type of currently available information due to this phrase. A CF representation of solar activity is an example of this use that best illustrates the unique idea. time series forecasting and signal processing applications. In 2012, Alkouri and Salleh (2012) first introduced

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