



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Neuro Neutrosophic Systems

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Abstract: The Neuro Neutrosophic System is an intelligence system that is used to render systems intelligent. The Neutrosophic System is an artificial intelligence technique focused on Neutrosophic logic and often used together generally with neural networks. The combination of neutrosophic logic and neural networks is modified and referred as the neuro neutrosophic systems. The neuro neutrosophic system is a system to execute the various domains such as finance, healthcare, robotics and engineering. The neuro neutrosophic system has different applications and uses to investigate optimization techniques within the context of neuro neutrosophic systems to enhance learning efficiency and system performance.

Keywords:

Neutrosophic logic, Neutrosophic set, neural networks and artificial intelligence.

INTRODUCTION:

Neuro neutrosophic systems combine elements from neural networks and neutrosophic set theory to address complex problems involving indeterminacy, uncertainty and learning. A system with some input of modified variable into the system begins the operation according to the requirement and thus gets the output in neutrosophic principles.

The impact of precise scientific techniques and smart technology is profound and widespread, influencing fields such as healthcare, data science, Internet of things, automation and Artificial intelligence. Advancement of these areas in engineering sector develops more efficient intelligent and personalized solutions across different domains.

The neuro neutrosophic approach aims to address problems that involve uncertainty, vagueness and incomplete or contradictory information. It can be applied in decision- making, pattern recognition, image processing and various other areas where dealing with uncertainty is crucial.

When discussing the neutrosophic logic and reasoning, there does not need to be a certain value for any condition. Such as we define the three ways like Digital way, imprecision way and Neutrosophic way.

Digital way:

This way allows for a more delicate representation of uncertainty, vagueness and ambiguity.

Imprecision way:

Imprecision can arise due to vagueness, ambiguity or uncertainty in various situations.

Neutrosophic way:

This way combines the digital and imprecision aspects by allowing truth, indeterminacy and falsehood to coexist in a single framework.

Neutrosophic set:

Let X be a non-empty set. Let a neutrosophic set A be defined as

$$A = \{x, M(x), I(x), N(x) : x \in X\}$$

where $M(x)$ represents the degree of membership function, $I(x)$ represents the degree on indeterminacy and $N(x)$ represents the degree of non-membership function respectively of each element $x \in X$ to the set A .

Membership function:

A membership function the extent of membership of an element in a set, taking values in the interval $[0, 1]$.

Indeterminacy:

The indeterminacy function measures the degree to which the element or subset belongs to the set, the degree to which it does not belong to the set and the degree to which it is indeterminate or uncertain.

Non-membership function:

The non-membership function also takes values in the interval $[0, 1]$ but reflects the opposite perspective. It indicates the degree to which an element is definitely not a part of the set.

Neuro-neutrosophic systems combine concepts from neurocomputing and neutrosophic logic. Neutrosophic logic extends classical and fuzzy logics to handle indeterminacy, inconsistency and incomplete information. Neurocomputing employs computational models patterned after the structure and function of the human brain. Combining these two fields creates a framework that can deal with uncertain and imprecise information in a way that mimics human cognitive processes.

Neutrosophic system:

The neutrosophic logic integrate with human systems lead flexible and decision making processes across a wide range of domain. Also neutrosophic approaches can help human systems better cope with the complexities of the real world.

Operations of Neutrosophic set:

Let the operations of neutrosophic sets be defined in terms of membership, indeterminacy and non-membership functions.

The basic operations are:

1. Union (maximum)
2. Intersection (minimum)
3. Complement
4. Difference

Neural Network:

The types of neural networks are:

- Artificial Neural Networks
- Biological Neutral Networks

Artificial networks, which are computer models inspired by the form and operation of biological brain networks, are developed using neural networks as inspiration.

Neutrosophic logic:

Law of Excluded middle-

This law states that for any proposition, A or (not A) or indeterminacy is true.

Law of Non Contradiction-

This law states that for any proposition A , it cannot be true and false at the same time, but it can be partially true, partially false, or partially indeterminate.

Law of identity-

This law states that a proposition is partially true, partially false, or partially indeterminate. This reflects the facts that identity is not always absolute and can be influenced by different perspective or interpretations.

Implication-

This is an extension of classical implication, where the truth value of the implication depends on the truth values of the antecedent and consequent in a neutrosophic way.

Contraposition-

This is an extension of classical contraposition, which states that if a statement A implies statement B, then the negation of B implies the negation of A in a neutrosophic sense.

Neutrosophic control:

Neutrosophic control is a specialized branch of control theory that deals with systems that exhibit indeterminacy, uncertainty and impression.

Traditional control techniques may not be sufficient due to the presence of ambiguous or incomplete information.

Neutrosophic logic control is an extension of traditional control theory that incorporates the principles of neutrosophic logic to handle systems with indeterminacy, uncertainty and imprecision.

The neutrosophic control could be conceptualized within the context of the human brain's neural network:

- Conflict information
- Modulate information
- Course of action
- Emotional responses
- Adaptation to environment
- Cognitive enhancement

The need for neutrosophic control arises in situations where traditional control methods are inadequate to handle the complexities and uncertainties present in real- world systems.

CONCLUSION:

Neuro neutrosophic systems, in conjunction with techniques necessary to simulate the human brain, represent a promising approach for bridging the gap between computational models and the complexities of human cognition. By leveraging insights from neuroscience and computational intelligence, these systems pave the way for a deeper understanding of brain function and the development of innovative technologies with diverse applications across multiple domains. As research in this field progresses, it holds the potential to revolutionize our understanding of the brain and inspire ground breaking advancements in artificial intelligence and cognitive computing.

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