Correlation Measure for NeutroSophic Filter in Medical Diagnosis

P. Susithabanu[1], V. Nirmala[1,*]

[1]Department of Mathematics, Karpagam Academy of Higher Education, Coimbatore – 641 021, Tamil Nadu, India

[1]Department of Mathematics, Faculty of Engineering, Karpagam Academy of Higher Education, Coimbatore - 641 021, Tamil Nadu, India

Emails: susithabanups7090@gmail.com; nirmalakutty9@gmail.com

Abstract

The aim of this article is proposed the notion of Correlation Measure for Neutrosophic Filter (NF). Additionally using correlation measure for neutrosophic set the application of medical diagnosis were discussed with numerical example.

Keywords: Intuitionistic set; Implicative filter; Neutrosophic set; Neutrosophic Filter; Correlation measure

1. Introduction

Recently, several theories have been proposed to handle imprecision, ambiguity, and vagueness. These include fuzzy sets, intuitionistic fuzzy sets, interval valued intuitionistic fuzzy sets (IFS), multi sets, and intuitionistic fuzzy multi sets, and so on [1]. Smarandache. F developed a new concept is called Neutrosophic set (NS) in 1998, expanded upon the fuzzy set and intuitionistic fuzzy set. Wang Introduced a kind of NS called single-valued neutrosophic sets. The hybrid structures of this theory have proven useful in a number of fields, as an illustration, certain fields. Aggarwal. S, Bswas. R and Ansari. A. Q defined Neutrosophic modeling and control in 2010 [2], Broumi. S, Deli. Smarandache and I. F proposed the N value interval neutrosophic sets and their application in medical diagnosis in 2015, and Juan-Juan Peng and Jian-Qiang Wang defined the Multi-Valued Neutrosophic Sets and its application in Multi-Criteria Decision-Making Problems in 2015. Font. J. M, Antonio. J. R and Torrence. An introduced the notion is called implicative filter, Basheer Ahamad. M and Ibrahim developed the Intuitionistic fuzzy implicative filter and Zhang developed the Neutrosophic Filter (NF). The concept of NF generalized by a fuzzy filter and intuitionistic filter [3-10].

Rajarajeswari and Uma put forward the correlation measure for IFMS. Broumi and Smarandache defined the Hausdorff distance between neutrosophic sets and some similarity measures based on the distance such as; recently set theoretic approach and matching function to calculate the similarity degree between neutrosophic sets. Jun Ye, Jiamin Song and Shigui Du proposed the Correlation Coefficients of Consistency Neutrosophic Sets Regarding Neutrosophic Multivalued Sets and Their Multi-attribute Decision-Making Method, in same year Ji. Bin, Zhou. Chuhao, Chen. Ze and Zheng created by a novel multi-parameter similarity measure of interval neutrosophic sets for medical diagnosis. Shuai Hanafy et al. proposed the correlation coefficients of neutrosophic sets and studied some of their basic properties. Based on centroid method, Hanafy et al. introduced and studied the concepts of correlation and correlation coefficient of neutrosophic sets and studied some of their properties [11-25].

DOI: https://doi.org/10.54216/IJNS.260203

The aim of this article is proposed the notion of correlation measure for Neutrosophic Filter (NF). In Section 2, both the neutrosophic set and Neutrosophic Filter (NF) are defined and discussed. In Section 3, a correlation measure of the neutrosophic filter is investigated. Additionally, Section 4 describes the application of neutrosophic filter as a correlation measure for medical diagnosis with numerical example.

2. Preliminaries

The basic definitions were discussed in this section, which is related to our research.

2.1 Definition

Let the universe be $\mathfrak{U}$. An intuitionistic fuzzy set $\mathfrak{I}$ on $\mathfrak{U}$ is defined as follows.

$$\mathfrak{I} = \{< x, \zeta_{\mathfrak{I}}(x), \chi_{\mathfrak{I}}(x) >: x \in \mathfrak{U}\}$$

in which $\chi_{\mathfrak{I}}(x), \zeta_{\mathfrak{I}}(x): \mathfrak{U} \to [0,1]$ such that $0 \leq \zeta_{\mathfrak{I}}(x) + \chi_{\mathfrak{I}}(x) \leq 1$ for all $x \in \mathfrak{U}$. IFS characterized by a membership $\zeta(x)$ non-membership function $\chi(x)$.

2.2 Definition

Let $\mathfrak{U}$ be a lattice wajsberg algebra. A subset $\mathcal{P}$ of $\mathfrak{U}$ is called an implicative filter of $\mathfrak{U}$, if it satisfies the following axioms for all $x, y \in \mathfrak{U}$,
(i) $1 \in \mathcal{P}$
(ii) $x \in \mathcal{P}$ and $x \to y \in \mathcal{P}$ for all $y \in \mathcal{P}$.

2.3 Definition

Let $\mathfrak{U}$ be a lattice wajsberg algebra. An intuitionistic fuzzy set $\mathfrak{I} = (\zeta_{\mathfrak{I}}, \chi_{\mathfrak{I}})$ of $\mathfrak{U}$ is called an intuitionistic fuzzy implicative filter of $\mathfrak{U}$, if it satisfies the following for all $x, y \in \mathfrak{U}$,
(i) $\zeta_{\mathfrak{I}}(1) \geq \zeta_{\mathfrak{I}}(x)$ and $\chi_{\mathfrak{I}}(1) \leq \chi_{\mathfrak{I}}(x)$
(ii) $\zeta_{\mathfrak{I}}(x) \geq \min\{\zeta_{\mathfrak{I}}(x \to y), \zeta_{\mathfrak{I}}(x)\}$
(iii) $\chi_{\mathfrak{I}}(x) \leq \max\{\chi_{\mathfrak{I}}(x \to y), \chi_{\mathfrak{I}}(x)\}$

2.4 Definition

Let the universe be $\mathfrak{U}$, with generic element in $\mathfrak{U}$ denoted by x. A neutrosophic set $\mathcal{A}$ in $\mathfrak{U}$ is characterized by a truth-membership $(T_{\mathcal{A}})$, an indeterminacymembership $(I_{\mathcal{A}})$ and falsity-membership function $(F_{\mathcal{A}})$. The functions $T_{\mathcal{A}}(x), I_{\mathcal{A}}(x)$, and $F_{\mathcal{A}}(x)$ are real standard or non-standard subset of $]^{-}0, 1^{+}[$.That is,
$T_{\mathcal{A}}(x): \mathfrak{U} \to]^{-}0, 1^{+}[$
$I_{\mathcal{A}}(x): \mathfrak{U} \to]^{-}0, 1^{+}[$
$F_{\mathcal{A}}(x): \mathfrak{U} \to]^{-}0, 1^{+}[$
Then the neutrosophic set $\mathcal{A}$ can be denoted by,

$$\mathcal{A} = \{\langle x, T_{\mathcal{A}}(x), I_{\mathcal{A}}(x), F_{\mathcal{A}}(x)\rangle: x \in \mathfrak{U}, T_{\mathcal{A}}(x), I_{\mathcal{A}}(x), F_{\mathcal{A}}(x) \in [0,1]\}$$

Thus, there is no restriction on the sum of $T_{\mathcal{A}}(x), I_{\mathcal{A}}(x)$ and $F_{\mathcal{A}}(x)$, so $^{-}0 \leq \sup T_{\mathcal{A}}(x) + \sup I_{\mathcal{A}}(x) + \sup F_{\mathcal{A}}(x) \leq 3^{+}$.

2.5 Definition

Let the universe be $\mathfrak{U}$, with generic element x in $\mathfrak{U}$. A single-valued Neutrosophic Set(SVNS)$\mathcal{A}$ in $\mathfrak{U}$ is characterized by a truth-membership $T_{\mathcal{A}}(x)$, indeterminacymembership $I_{\mathcal{A}}(x)$ and falsity-membership function $F_{\mathcal{A}}(x)$. Where $T_{\mathcal{A}}(x), I_{\mathcal{A}}(x), F_{\mathcal{A}}(x) \in [0,1]$ for each point x in $\mathfrak{U}$. Then SVNS $\mathcal{A}$ can be expressed as

$$\mathcal{A} = \{\langle x, T_{\mathcal{A}}(x), I_{\mathcal{A}}(x), F_{\mathcal{A}}(x)\rangle: x \in \mathfrak{U}, T_{\mathcal{A}}(x), I_{\mathcal{A}}(x), F_{\mathcal{A}}(x) \in [0,1]\}$$

Therefore, the sum of $T_{\mathcal{A}}(x), I_{\mathcal{A}}(x)$ and $F_{\mathcal{A}}(x)$ satisfies the condition $0 \leq \sup T_{\mathcal{A}}(x) + \sup I_{\mathcal{A}}(x) + \sup F_{\mathcal{A}}(x) \leq 3$.

2.6 Definition

Let $\mathfrak{U}$ be a lattice wajsberg algebra. A neutrosophic fuzzy set $\mathcal{A} = (T_{\mathcal{A}}, I_{\mathcal{A}}, F_{\mathcal{A}})$ of $\mathfrak{U}$ is called a Neutrosophic Filter (NF) of $\mathfrak{U}$, if it satisfies the following inequalities for all $x, y \in \mathfrak{U}$,

DOI: https://doi.org/10.54216/IJNS.260203

1. $T_{\mathcal{A}}(1) \geq T_{\mathcal{A}}(x)$
$I_{\mathcal{A}}(1) \geq I_{\mathcal{A}}(x)$
$F_{\mathcal{A}}(1) \leq F_{\mathcal{A}}(x)$

2. $T_{\mathcal{A}}(x) \geq \min\{T_{\mathcal{A}}(x \to y), T_{\mathcal{A}}(x)\}$
$I_{\mathcal{A}}(x) \geq \min\{I_{\mathcal{A}}(x \to y), I_{\mathcal{A}}(x)\}$
$F_{\mathcal{A}}(x) \leq \max\{F_{\mathcal{A}}(x \to y), F_{\mathcal{A}}(x)\}$

3. Correlation Measure for Neutrosophic Filter

This section describes the definition of correlation measure for neutrosophic filter.

3.1 Definition

Let the universe be $\mathcal{X} = \{x_1, x_2, x_3, \dots x_n\}$ and $\mathrm{G} = \left\{\left\langle T_{\mathrm{G}}^{j}(x_i), I_{\mathrm{G}}^{j}(x_i), F_{\mathrm{G}}^{j}(x_i)\right\rangle / x_i \in \mathcal{X}\right\}$,

$\mathrm{H} = \left\{\left\langle T_{\mathrm{H}}^{j}(x_i), I_{\mathrm{H}}^{j}(x_i), F_{\mathrm{H}}^{j}(x_i)\right\rangle / x_i \in \mathcal{X}\right\}$ be two neutrosophic filter consisting of the truth-membership, indeterminate and false-membership function. Then the correlation measure coefficient of G and H is defined by,

$$\check{\rho}_{NF}(\mathrm{G},\mathrm{H}) = \frac{\mathrm{C}_{NF}(\mathrm{G},\mathrm{H})}{\sqrt{\mathrm{C}_{NF}(\mathrm{G},\mathrm{G}) * \mathrm{C}_{NF}(\mathrm{H},\mathrm{H})}}$$

Where,

$$\begin{aligned}\mathrm{C}_{NF}(\mathrm{G},\mathrm{H}) = \frac{1}{P}\sum_{j=1}^{P}\sum_{i=1}^{n} &\left\{\min\left(T_{\mathrm{G}}^{j}(x_i \to y_i), T_{\mathrm{G}}^{j}(x_i)\right)\min\left(T_{\mathrm{H}}^{j}(x_i \to y_i), T_{\mathrm{H}}^{j}(x_i)\right)\right.\\ &+\min\left(I_{\mathrm{G}}^{j}(x_i \to y_i), I_{\mathrm{G}}^{j}(x_i)\right)\min\left(I_{\mathrm{H}}^{j}(x_i \to y_i), I_{\mathrm{H}}^{j}(x_i)\right)\\ &\left.+\max\left(F_{\mathrm{G}}^{j}(x_i \to y_i), F_{\mathrm{G}}^{j}(x_i)\right)\max\left(F_{\mathrm{H}}^{j}(x_i \to y_i), F_{\mathrm{H}}^{j}(x_i)\right)\right\}\end{aligned}$$

$$\begin{aligned}\mathrm{C}_{NF}(\mathrm{G},\mathrm{G}) = \frac{1}{P}\sum_{j=1}^{P}\sum_{i=1}^{n} &\left\{\min\left(T_{\mathrm{G}}^{j}(x_i \to y_i), T_{\mathrm{G}}^{j}(x_i)\right)\min\left(T_{\mathrm{G}}^{j}(x_i \to y_i), T_{\mathrm{G}}^{j}(x_i)\right)\right.\\ &+\min\left(I_{\mathrm{G}}^{j}(x_i \to y_i), I_{\mathrm{G}}^{j}(x_i)\right)\min\left(I_{\mathrm{G}}^{j}(x_i \to y_i), I_{\mathrm{G}}^{j}(x_i)\right)\\ &\left.+\max\left(F_{\mathrm{G}}^{j}(x_i \to y_i), F_{\mathrm{G}}^{j}(x_i)\right)\max\left(F_{\mathrm{G}}^{j}(x_i \to y_i), F_{\mathrm{G}}^{j}(x_i)\right)\right\}\end{aligned}$$

$$\begin{aligned}\mathrm{C}_{NF}(\mathrm{H},\mathrm{H}) = \frac{1}{P}\sum_{j=1}^{P}\sum_{i=1}^{n} &\left\{\min\left(T_{\mathrm{H}}^{j}(x_i \to y_i), T_{\mathrm{H}}^{j}(x_i)\right)\min\left(T_{\mathrm{H}}^{j}(x_i \to y_i), T_{\mathrm{H}}^{j}(x_i)\right)\right.\\ &+\min\left(I_{\mathrm{H}}^{j}(x_i \to y_i), I_{\mathrm{H}}^{j}(x_i)\right)\min\left(I_{\mathrm{H}}^{j}(x_i \to y_i), I_{\mathrm{H}}^{j}(x_i)\right)\\ &\left.+\max\left(F_{\mathrm{H}}^{j}(x_i \to y_i), F_{\mathrm{H}}^{j}(x_i)\right)\max\left(F_{\mathrm{H}}^{j}(x_i \to y_i), F_{\mathrm{H}}^{j}(x_i)\right)\right\}\end{aligned}$$

3.2 Preposition

The established correlation measure between NF G and NF H achieves this property
(1) $0 < \check{\rho}_{NF}(\mathrm{G},\mathrm{H}) \leq 1.$
(2) $\check{\rho}_{NF}(\mathrm{G},\mathrm{H}) = \check{\rho}_{NF}(\mathrm{H},\mathrm{G})$

Proof

(1) Since the NF membership, indeterminate, and non-membership functions fall between 0 and 1.

But the filter conditions are $1 \in \mathcal{P}$ (by the definition 2.2). Using correlation measure for NF, then $\check{\rho}_{NF}(\mathrm{G},\mathrm{H}) \leq 1$. so that, $\check{\rho}_{NF}(\mathrm{G},\mathrm{H})$ lies between $0 < \check{\rho}_{NF}(\mathrm{G},\mathrm{H}) \leq 1$

DOI: https://doi.org/10.54216/IJNS.260203

(2) If $\check{\rho}_{NF}(\mathrm{G},\mathrm{H})=\check{\rho}_{NF}(\mathrm{H},\mathrm{G})$,
since,

$$\check{\rho}_{NF}(\mathrm{G},\mathrm{H})=\frac{\mathrm{C}_{NF}(\mathrm{G},\mathrm{H})}{\sqrt{\mathrm{C}_{NF}(\mathrm{G},\mathrm{G})*\mathrm{C}_{NF}(\mathrm{H},\mathrm{H})}} \text{ and}$$
$$\check{\rho}_{NF}(\mathrm{H},\mathrm{G})=\frac{\mathrm{C}_{NF}(\mathrm{H},\mathrm{G})}{\sqrt{\mathrm{C}_{NF}(\mathrm{G},\mathrm{G})*\mathrm{C}_{NF}(\mathrm{H},\mathrm{H})}}$$

By the definition (3.1),

$$\begin{aligned}\mathrm{C}_{NF}(\mathrm{G},\mathrm{H})=&\frac{1}{P}\sum_{j=1}^{P}\sum_{i=1}^{n}\Big\{\min\left(T_{\mathrm{G}}^{j}(x_i\to y_i),T_{\mathrm{G}}^{j}(x_i)\right)\min\left(T_{\mathrm{H}}^{j}(x_i\to y_i),T_{\mathrm{H}}^{j}(x_i)\right)\\&+\min\left(I_{\mathrm{G}}^{j}(x_i\to y_i),I_{\mathrm{G}}^{j}(x_i)\right)\min\left(I_{\mathrm{H}}^{j}(x_i\to y_i),I_{\mathrm{H}}^{j}(x_i)\right)\\&+\max\left(F_{\mathrm{G}}^{j}(x_i\to y_i),F_{\mathrm{G}}^{j}(x_i)\right)\max\left(F_{\mathrm{H}}^{j}(x_i\to y_i),F_{\mathrm{H}}^{j}(x_i)\right)\Big\}\\=&\frac{1}{P}\sum_{j=1}^{P}\sum_{i=1}^{n}\Big\{\min\left(T_{\mathrm{H}}^{j}(x_i\to y_i),T_{\mathrm{H}}^{j}(x_i)\right)\min\left(T_{\mathrm{G}}^{j}(x_i\to y_i),T_{\mathrm{G}}^{j}(x_i)\right)\\&+\min\left(I_{\mathrm{H}}^{j}(x_i\to y_i),I_{\mathrm{H}}^{j}(x_i)\right)\min\left(I_{\mathrm{G}}^{j}(x_i\to y_i),I_{\mathrm{G}}^{j}(x_i)\right)\\&+\max\left(F_{\mathrm{H}}^{j}(x_i\to y_i),F_{\mathrm{H}}^{j}(x_i)\right)\max\left(F_{\mathrm{G}}^{j}(x_i\to y_i),F_{\mathrm{G}}^{j}(x_i)\right)\Big\}\\=&\,\mathrm{C}_{NF}(\mathrm{H},\mathrm{G})\end{aligned}$$

4. Numerical Example

In this section, we discussed Neutrosophic Filter (NF) application in medical diagnosis with numerical example.

4.1 Medical diagnosis based on NF theory

Given the example of medical diagnosis using the definition of correlation measure for neutrosophic filter. Classifying various sets of symptoms under a single disease label becomes challenging as medical diagnosis involves many unknowns and a rise for information that doctors can access from new medical technologies. It is possible for each element to have distinct truth-membership, indeterminate-membership, and false-membership functions in various real-world scenarios. The appropriate medical diagnosis is provided by the suggested correlation measure between the patients' symptoms and illnesses' symptoms. This proposed method's distinctive selling point is that it takes into account multiple truth-membership, indeterminate-membership, and false-membership. A single inspection could result in a diagnosis error. Therefore, the best diagnosis is obtained through multi-time inspection, which involves obtaining samples from the same patient at several times.

4.2 Example

Let us consider the hypothetical medical diagnosis case. In those three patients denoted, $\mathrm{S}=\{\mathrm{S}_1(\text{ sri }),\mathrm{S}_2(\text{ shalini }),\mathrm{S}_3(\text{ Diya })\}$, followed by the collection of samples and vital signs for critical analysis, the following primary symptoms and diseases were $\mathrm{M}=\{$ Thermal reading, Cough, Throat pain, Headache, Join pain $\}$. and $\mathrm{N}=\{$ Malaria, Dengue, TB, Typhoid $\}$. We propose examining the patient three times a day at varied time intervals, which leads to distinct truth-membership, indeterminate and false-membership functions for every patient.

DOI: https://doi.org/10.54216/IJNS.260203

Table 1: The connection among the patients and their symptoms.

M	Thermal reading	Cough	Throat pain	Head ache	Joint pain
Sree	(0.1,0.3,0.4) (0.1,0.4,0.3) (0.2,0.3,0.7)	(0.3,0.2,0.6) (0.1,0.4,0.3) (0.1,0.3,0.2)	(0.3,0.5,0.1) (0.7,0.3,0.1) (0.1,0.6,0.3)	(0.5,0.3,0.3) (0.2,0.4,0.3) (0.3,0.3,0.2)	(0.2,0.3,0.4) (0.3,0.4,0.7) (0.2,0.3,0.5)
Shalini	(0.5,0.3,0.4) (0.3,0.1,0.2) (0.4,0.2,0.4)	(0.2,0.3,0.1) (0.7,0.4,0.5) (0.1,0.3,0.4)	(0.6,0.3,0.3) (0.6,0.2,0.1) (0.7,0.5,0.1)	(0.6,0.3,0.1) (0.5,0.4,0.7) (0.3,0.4,0.2)	(0.3,0.4,0.2) (0.3,0.1,0.2) (0.1,0.5,0.6)
Diya	(0.2,0.3,0.4) (0.1,0.4,0.6) (0.2,0.4,0.7)	(0.4,0.3,0.5) (0.4,0.3,0.4) (0.3,0.4,0.1)	(0.5,0.6,0.6) (0.7,0.6,0.1) (0.8,0.5,0.3)	(0.4,0.2,0.5) (0.6,0.3,0.5) (0.2,0.6,0.2)	(0.6,0.2,0.4) (0.2,0.3,0.5) (0.3,0.4,0.6)

Let the sample be taken at three different timing in a day (9am, 12pm, 1am)

Table 2: The connection among the diseases and their symptoms.

N	Malaria	Dengue	TB
Thermal Reading	(0.3,0.6,0.1)	(0.6,0.5,0.4)	(0.4,0.6,0.3)
cough	(0.2,0.3,0.5)	(0.5,0.6,0.2)	(0.1,0.3,0.4)
Throat Pain	(0.5,0.3,0.2)	(0.4,0.5,0.4)	(0.5,0.3,0.6)
Headache	(0.5,0.2,0.4)	(0.3,0.6,0.4)	(0.2,0.6,0.4)
Joint Pain	(0.5,0.6,0.2)	(0.4,0.6,0.2)	(0.3,0.5,0.3)

DOI: https://doi.org/10.54216/IJNS.260203

Calculate the Neutrosophic Filter (NF) value for M,
Let $\mathcal{M} = \{(0.1,0.3,0.4), (0.1,0.4,0.3), (0.2,0.3,0.7)\}$ be a Neutrosophic sets.
From the definition (2.6) we have
Truth membership $T_{\mathcal{M}}(x) = 0.1$ and $T_{\mathcal{M}}(y) = 0.1$,

$$0.1 \geq \min\{1,0.1\} \geq 0.1$$

Indeterminacy membership $I_{\mathcal{M}}(x) = 0.3$ and $I_{\mathcal{M}}(y) = 0.4$,

$$0.3 \geq \min\{1,0.3\} \geq 0.3$$

false membership $F_{\mathcal{M}}(x) = 0.4$ and $F_{\mathcal{M}}(y) = 0.3$,

$$0.4 \geq \max\{1,0.4\} \geq 1$$

The value of Neutrosophic filter at 9 am to 12pm$(0.1,0.3,1)$

Truth membership $T_{\mathcal{M}}(x) = 0.1$ and $T_{\mathcal{M}}(y) = 0.2$

$$0.1 \geq \min\{1,0.1\} \geq 0.1$$

Indeterminacy membership $I_{\mathcal{M}}(x) = 0.4$ and $I_{\mathcal{M}}(y) = 0.3$,

$$0.4 \geq \min\{1,0.4\} \geq 0.4$$

false membership $F_{\mathcal{M}}(x) = 0.3$ and $F_{\mathcal{M}}(y) = 0.7$,

$$0.3 \geq \max\{1,0.3\} \geq 1$$

The value of Neutrosophic filter at 12 pm to 1am$(0.1,0.4,1)$

Truth membership $T_{\mathcal{M}}(x) = 0.2$ and $T_{\mathcal{M}}(y) = 0.1$

$$0.2 \geq \min\{1,0.2\} \geq 0.2$$

Indeterminacy membership $I_{\mathcal{M}}(x) = 0.3$ and $I_{\mathcal{M}}(y) = 0.3$,

$$0.3 \geq \min\{1,0.3\} \geq 0.3$$

false membership $F_{\mathcal{M}}(x) = 0.7$ and $F_{\mathcal{M}}(y) = 0.4$,

$$0.7 \geq \max\{1,0.7\} \geq 1$$

The value of Neutrosophic filter at 1am to 9am (0.2,0.3,1)
Similarly, we can find the table values

Table 3: Neutrosophic Filter value for M

G	Thermal reading	Cough	Throat pain	head ache	Joint pain
Sri	(0.1,0.3,1) (0.1,0.4,1) (0.2,0.3,1)	(0.3,0.2,1) (0.1,0.4,1) (0.1,0.3,1)	(0.3,0.5,1) (0.7,0.3,1) (0.1,0.6,1)	(0.5,0.3,1) (0.2,0.4,1) (0.3,0.3,1)	(0.2,0.3,1) (0.3,0.4,1) (0.2,0.3,1)
Shalini	(0.5,0.3,1)	(0.2,0.3,1)	(0.6,0.3,1)	(0.6,0.3,1)	(0.3,0.4,1)

DOI: https://doi.org/10.54216/IJNS.260203

	(0.3,0.1,1)	(0.7,0.4,1)	(0.6,0.2,1)	(0.5,0.4,1)	(0.3,0.1,1)
	(0.4,0.2,1)	(0.1,0.3,1)	(0.7,0.5,1)	(0.3,0.4,1)	(0.1,0.5,1)
Diya	(0.2,0.3,1)	(0.4,0.3,1)	(0.5,0.6,1)	(0.4,0.2,1)	(0.6,0.2,1)
	(0.1,0.4,1)	(0.4,0.3,1)	(0.7,0.6,1)	(0.6,0.3,1)	(0.2,0.3,1)
	(0.2,0.4,1)	(0.3,0.4,1)	(0.8,0.5,1)	(0.2,0.6,1)	(0.3,0.4,1)

Table 4: Neutrosophic Filter value for N

H	Malaria	Dengue	TB
Thermal Reading	(0.3,0.6,1)	(0.6,0.5,1)	(0.4,0.6,1)
cough	(0.2,0.3,1)	(0.5,0.6,1)	(0.1,0.3,1)
Throat Pain	(0.5,0.3,1)	(0.4,0.5,1)	(0.5,0.3,1)
Headache	(0.5,0.2,1)	(0.3,0.6,1)	(0.2,0.6,1)
Joint Pain	(0.5,0.6,1)	(0.4,0.6,1)	(0.3,0.5,1)

Table 5: The Correlation Measure NF value between patient and diseases.

C	Malaria	Dengue	TB
Sri	0.9602	0.9628	**0.9738**
Shalini	0.9664	**0.9829**	0.9796
Diya	0.9667	0.9505	**0.9690**

DOI: https://doi.org/10.54216/IJNS.260203

From the above example, we conclude that the most accurate medical diagnosis is provided by the correlation measure for the neutrosophic filter, which has the highest correlation metric. As a result, patient Shalini has dengue, whereas patients Sri and Diya have TB.

5. Conclusion

In this paper, we have defined the correlation measure of neutrosophic filter and proved some of their properties. We have presented an application of correlation measure for neutrosophic filter in medical diagnosis. In the future work, we will extend this correlation measure to the type of neutrosophic filter.

References

[1] J. C. Abbott, "Implication Algebra," *Bulletin Mathematique de la Soc Sci Math de Roumanie Nouvelle Series*, vol. 11, pp. 3-23, 1967.

[2] S. Aggarwal, R. Biswas, and A. Q. Ansari, "Neutrosophic Modeling and Control," in *Proc. Computer and Communication Technology Conf.*, pp. 718-723, 2010.

[3] A. Ahadpanath, L. Torkzadeth, and S. A. Borumand, "Filter Theory of Smarandache Residuated Lattice," *UPB Scientific Bulletin Series*, vol. 76, pp. 87-98, 2024.

[4] K. Atanassov, "Intuitionistic Fuzzy Set," *Fuzzy Sets and Systems*, vol. 20, pp. 87-96, 1986.

[5] K. Atanassov and K. Gargov, "Interval-Solved Intuitionistic Fuzzy Set," *Fuzzy Sets and Systems*, vol. 31, pp. 343-349, 1989.

[6] P. Kumar and M. Singh, "A Novel Approach for Multi-Attribute Decision Making Using Generalized Neutrosophic Sets," *Mathematical Methods in the Applied Sciences*, vol. 46, no. 9, pp. 10512-10529, 2023.

[7] H. R. Hosseini and A. M. Zaker, "Neutrosophic Soft Set-Based Decision-Making Approach for Healthcare Diagnosis," *International Journal of Approximate Reasoning*, vol. 143, pp. 33-48, 2021.

[8] S. Broumi and I. Deli, "Correlation Measure for Neutrosophic Refined Sets and Its Application in Medical Diagnosis," *Journal of Mathematics*, vol. 5, pp. 135-143, 2016.

[9] F. Al-Sharqi, Y. Al-Qudah, and N. Alotaibi, "Decision Making Techniques Based on Similarity Measures in Soft Expert Set," *Applied Intelligence*, vol. 55, no. 3, pp. 357-382, 2023.

[10] I. M. Henafi, A. A. Salama, and K. Mahfouz, "Correlation of Neutrosophic Data," *International Refereed Journal of Engineering and Science*, vol. 1, pp. 39-43, 2012.

[11] A. Ibrahim and V. Nirmala, "Fuzzy Implicative Filters of Residuated Lattice Wajsberg Algebras," *Journal of Computer and Mathematical Science*, vol. 9, pp. 1201-1209, 2018.

[12] A. Ibrahim and V. Nirmala, "Implicative Filters of Residuated Lattice Wajsberg Algebras," *Global Journal of Pure and Applied Mathematics*, vol. 14, pp. 625-634, 2018.

[13] M. H. Bilal, N. A. Shah, and F. Smarandache, "A Novel Hybrid Neutrosophic Soft Set for Multi-Criteria Decision Making," *Complex & Intelligent Systems*, vol. 9, pp. 3467-3482, 2023.

[14] J. Ye, J. Song, and S. Du, "Correlation Coefficients of Consistency Neutrosophic Sets Regarding Neutrosophic Multi-Valued Sets and Their Multi-Attribute Decision-Making Method," *International Journal of Fuzzy Systems*, vol. 24, pp. 925-932, 2023.

[15] C. Li, H. Zhang, and Y. Zhao, "A New Correlation Coefficient of Neutrosophic Z-Numbers for Multi-Criteria Decision Making," *Soft Computing*, vol. 27, no. 15, pp. 10835-10849, 2023.

[16] P. Liu and Y. Wang, "Multiple Attribute Decision Making Method Based on Single Valid Neutrosophic Normalized Weighted Bonferroni Mean," *Natural Computing and Applications*, 2014.

[17] C. S. Malik, M. Raj, and R. Thakur, "Weighted Correlation Coefficient Measure for Intuitionistic Fuzzy Set Based on Cosine Entropy Measure," *International Journal of Information Technology*, vol. 15, pp. 3449-3461, 2023.

[18] P. A. Ejegwa, "Modified and Generalized Correlation Coefficient between Intuitionistic Fuzzy Sets with Applications," *Intuitionistic Fuzzy Sets*, vol. 26, pp. 8-22, 2020.

DOI: https://doi.org/10.54216/IJNS.260203

[19] P. Rajarajeswari and N. Uma, "Intuitionistic Fuzzy Multi Relations," *International Journal of Mathematical Archives*, vol. 4, pp. 244-249, 2013.

[20] F. Smarandache, *A Unifying Field in Logics Neutrosophy: Neutrosophic Probability, Set and Logic*, Rehoboth, American Research Press, 1998.

[21] N. X. Thao, "A New Correlation Coefficient of Intuitionistic Fuzzy Sets and Its Application," *Journal of Intelligent and Fuzzy Systems*, vol. 35, 2018.

[22] H. Wang, F. Smarandache, Y. Zhang, and S. Sundaraman, "Single-Valued Neutrosophic Sets," *Multi-Space and Multi-Structure*, vol. 4, pp. 410-413, 2010.

[23] L. A. Zadeh, "Fuzzy Sets," *Information and Control*, vol. 8, pp. 338-353, 1965.

[24] X. Zhang, X. Mao, Y. Wu, and X. Zhai, "Neutrosophic Filters in Pseudo BCI Algebra," *International Journal for Uncertainty Quantification*, vol. 8, pp. 511-526, 2018.

[25] P. Rajarajeswari and N. Uma, "Intuitionistic Fuzzy Multi Relations," *International Journal of Mathematical Archives*, vol. 4, pp. 244-249, 2013.

DOI: https://doi.org/10.54216/IJNS.260203