



Neutrosophic Vague Hypersoft Sets on Correlation Coefficient

Abstract: Neutrosophic Vague Hypersoft Sets (NVHSSs) provide a powerful mathematical framework for representing uncertain, vague, inconsistent, and multi-attribute information encountered in complex decision-making problems. In this paper, we introduce the concept of the correlation coefficient for Neutrosophic Vague Hypersoft Sets to measure the degree of association between two NVHSSs. The proposed correlation coefficient is formulated by incorporating the truth-membership, indeterminacy-membership, and falsity-membership functions while preserving the multi-parameter structure of hypersoft sets. Fundamental properties of the proposed measure, including boundedness, symmetry, non-negativity, and identity, are established and rigorously proved. Furthermore, illustrative numerical examples are presented to demonstrate the validity and effectiveness of the proposed correlation coefficient. The proposed approach provides a reliable tool for measuring similarity and dependence under neutrosophic vague hypersoft environments and can be applied to pattern recognition, medical diagnosis, decision-making, and other uncertainty-based applications. The results indicate that the proposed correlation coefficient effectively captures the relationships between Neutrosophic Vague Hypersoft Sets and extends existing correlation measures available in the literature.

Sharviya Sona S ¹, Elvina Mary L ¹

Affiliation

¹ Research Scholar, PG & Research Department of Mathematics, Nirmala College for Women, Coimbatore, India.

¹ Assistant Professor, PG & Research Department of Mathematics, Nirmala College for Women, Coimbatore, India.

Corresponding Author

Sharviya Sona S * - sharviyasona2611@gmail.com

Article History:

Received Date : Jul 17, 2026

Revised Date : Aug 28, 2026

Accepted Date : Aug 28, 2026

Published Date : Sep 28, 2026

Keywords

Neutrosophic Set, Correlation Coefficient of Neutrosophic Set, Weighted Correlation Coefficient of Neutrosophic vague HyperSoft Set.

1. Introduction

Neutrosophy was pioneered by Smarandache [1]. It is a branch of philosophy which studies

the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra [2]. Neutrosophic set theory is a powerful formal framework which generalizes the concept of the classic set, fuzzy set [3], interval-valued fuzzy set [4], intuitionistic fuzzy set [5], interval-valued intuitionistic fuzzy set [6], and so on. Neutrosophy introduces a new concept called which represents indeterminacy with respect to . It can solve certain problems that cannot be solved by fuzzy logic. For example, a paper is sent to two reviewers, one says it is 90% acceptable and another says it is 90% unacceptable. But the two reviewers may have different backgrounds. One is an expert, and another is a newcomer in this field. The impacts on the final decision of the paper by the two reviewers should be different, even though they give the same grade level of the acceptance. There are many similar problems, such as weather forecasting, stock price prediction, and political elections containing indeterminate conditions that fuzzy set theory does not handle well. This theory deals with imprecise and vague situations where exact analysis is either difficult or impossible. After the pioneering work of Smarandache. In 2005, Wang et al. [7] introduced the notion of interval

neutrosophic set (INS) which is a particular case of the neutrosophic set (NS) that can be described by a membership interval, a non-membership interval, and an indeterminate interval, thus the NS is flexible and practical, and the NS provides a more reasonable mathematical framework to deal with indeterminate and inconsistent information. The theories of both neutrosophic set and interval neutrosophic set have achieved great success in various areas such as medical diagnosis [8], database [9,10], topology[11], image processing [12,13,14], and decision making problem [15]. Although several distance measures, similarity measures, and correlation measure of neutrosophic sets have been recently presented in [16, 17], there is a rare investigation on correlation of interval neutrosophic sets. It is very common in statistical analysis of data to finding the correlation between variables or attributes, where the correlation coefficient is defined on ordinary crisp sets, fuzzy sets [18], intuitionistic fuzzy sets [19,20,21], and neutrosophic set [16,17] respectively. In this paper we first discuss and derive a formula for the correlation coefficient defined on the domain of interval neutrosophic sets. The paper unfolds as follows. The next section briefly introduces some definitions related to the method. Section III presents the correlation and weighted correlation coefficient of the interval neutrosophic set. Conclusions appear in the last section.

2. Neutrosophic Vague Hypersoft Set (NVHSS)

Let $F(S_1)$ be the worldwide collection X and $P(X)$ be a power set of X . Consider as $k_{a1}, k_{a2}, k_{a3}, \dots, k_{an}$ and for $n \geq 1$, There are a few unique characteristics such as $k_{a1}, k_{a2}, k_{a3}, \dots, k_{an}$ and $K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}$ are sets with the following constraints for corresponding values and characteristics, correspondingly $K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}$ with $K_{ai} \cap K_{al} = \emptyset$, The relationship between $ai \neq al$ and $ak, al \in \{1, 2, 3, \dots, n\}$ and

$K_{a1}, K_{a2}, K_{a3}, \dots, K_{an} = S$. Fis a mapping from $K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}$ to $P(X)$ and $F(K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}) = \{ \langle ax, T(ax), I(ax), F(ax) \rangle, ax \in X \}$ where T, I, F are membership values respectively such that $T, I, F : X \rightarrow [0^-, 1^+]$ and Where $T(ax) = [T^-, T^+], I(ax) = [I^-, I^+], F(ax) = [F^-, F^+]$ $T^+ = 1 - F^-, F^+ = 1 - T^-, 0 \leq T(ax) + I(ax) + F(ax) \leq 3$.

Definition.

- An NVHSS A is empty if in $fT_A(AX) = \sup T_A(AX) = 0, \inf I_A(AX) = \sup I_A(AX) = 1, \inf F_A(AX) = \sup F_A(AX) = 0$, for all x in A .

Definition

Let A and B be two neutrosophic vague Hypersoft sets in the universe of discourse

$X = \{X_{a1}, X_{a2}, X_{a3}, X_{a4}, \dots, X_{an}\}$. The correlation coefficient of Aa and Ba is given by

$$R(Aa, Ba) = \frac{C(Aa, Ba)}{(C(Aa, Aa) \cdot C(Ba, Ba))^{\frac{1}{2}}}$$

where the correlation of two NVHSSs A and B is given by

$$C(Aa, Ba) = \sum_{i=0}^n ((T_{Aa}(x_i) \cdot (T_{Ba}(x_i)) + (I_{Aa}(x_i) \cdot (I_{Ba}(x_i)) + (F_{Aa}(x_i) \cdot (F_{Ba}(x_i))) \quad (3)$$

And the informational energy of two NVHSSs A and B are given by

$$C(Aa, Aa) = \sum_{i=0}^n ((T_{Aa}(x_i) \cdot (T_{Aa}(x_i)) + (I_{Aa}(x_i) \cdot (I_{Aa}(x_i)) + (F_{Aa}(x_i) \cdot (F_{Aa}(x_i))) \quad (4)$$

$$C(Ba, Ba) = \sum_{i=0}^n ((T_{Ba}(x_i) \cdot (T_{Ba}(x_i)) + (I_{Ba}(x_i) \cdot (I_{Ba}(x_i)) + (F_{Ba}(x_i) \cdot (F_{Ba}(x_i))) \quad (5)$$

3. Correlation Coefficient of Neutrosophic vague Hypersoft Set

Let X be a non-empty set (universe). X and $P(X)$ be a power set of X . Consider as $k_{a1}, k_{a2}, k_{a3}, \dots, k_{an}$ and for $n \geq 1$, There are a few unique characteristics such as $k_{a1}, k_{a2}, k_{a3}, \dots, k_{an}$ and

$K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}$ are sets with the following constraints for corresponding values and characteristics, correspondingly

$K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}$ with $K_{ai} \cap K_{al} = \emptyset$, The relationship between $ai \neq al$ and $k, l \in \{1, 2, 3, \dots, n\}$ and $K_{a1}, K_{a2}, K_{a3}, \dots, K_{an} = S$. Fis a mapping

from $K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}$ to $P(X)$ and $F(K_{a1}, K_{a2}, K_{a3}, \dots, K_{an}) = \{ \langle xa, T(xa), I(xa), F(xa) \rangle : xa \in X \}$ where T, I, F are membership values respectively such that $T, I, F : X \rightarrow [0^-, 1^+]$ and Where $T(xa) = [T^-, T^+], I(xa) = [I^-, I^+], F(xa) = [F^-, F^+]$ $T^+ = 1 - F^-, F^+ = 1 - T^-, 0 \leq T(xa) + I(xa) + F(xa) \leq 3$. Then the Correlation Coefficient of Aa and Ba

$$R(Aa, Ba) = \frac{C(Aa, Ba)}{(C(Aa, Aa) \cdot C(Ba, Ba))^{\frac{1}{2}}}$$

where the correlation of two NVHSSs Aa and Ba is given by

$$C(Aa, Ba) = \sum_{i=0}^n ((T_{Aa}^-(xa_i) \cdot T_{Ba}^-(xa_i)) + (I_{Aa}^-(xa_i) \cdot I_{Ba}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Ba}^-(xa_i)) + ((T_{Aa}^+(xa_i) \cdot T_{Ba}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Ba}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Ba}^+(xa_i)))$$

And the informational energy of two NVHSSs

Aa and Ba are given by

$$C(Aa, Aa) = \sum_{i=0}^n ((T_{Aa}^-(xa_i) \cdot T_{Aa}^-(xa_i)) + (I_{Aa}^-(xa_i) \cdot I_{Aa}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Aa}^-(xa_i)) + ((T_{Aa}^+(xa_i) \cdot T_{Aa}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Aa}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Aa}^+(xa_i)))$$

$$C(Ba, Ba) = \sum_{i=0}^n ((T_{Ba}^-(xa_i) \cdot T_{Ba}^-(xa_i)) + (I_{Ba}^-(xa_i) \cdot I_{Ba}^-(xa_i)) + (F_{Ba}^-(xa_i) \cdot F_{Ba}^-(xa_i)) + ((T_{Ba}^+(xa_i) \cdot T_{Ba}^+(xa_i)) + (I_{Ba}^+(xa_i) \cdot I_{Ba}^+(xa_i)) + (F_{Ba}^+(xa_i) \cdot F_{Ba}^+(xa_i)))$$

Definition 3.2

Let X be a nonempty set and I the unit interval [0, 1]. A Neutrosophic Vague set with T and F are dependent neutrosophic components [NVS] Aa and Ba of the form $A = \{(ax, T_{Aa}, F_{Aa}, F_{Aa}) : ax \in X\}$ and $B = \{(ax, T_{Ba}, F_{Ba}, F_{Ba}) : ax \in X\}$ Then

1. $Aa_C = \{(ax, T_{Aa}, F_{Aa}, F_{Aa}) : ax \in X\}$
2. $Aa \cup Ba = \{(ax, \max(T_{Aa}(ax), T_{Ba}(ax)), \max(I_{Aa}(ax), I_{Ba}(ax)), \min(F_{Aa}(ax), F_{Ba}(ax))) : ax \in X\}$
3. $Aa \cap Ba = \{(ax, \max(T_{Aa}((ax), T_{Ba}(ax)), \max(I_{Aa}((ax), I_{Ba}((ax)), \min(F_{Aa}((ax), F_{Ba}((ax))) : ax \in X\}$

Definition 3.3

Let X be a nonempty set and I the unit interval [0, 1]. A Neutrosophic Vague set with T and F are dependent neutrosophic components [NVS] Aa and Ba of the form $Aa = \{(ax, T_{Aa}, F_{Aa}, F_{Aa}) : ax \in X\}$ and $Ba =$

$\{(ax, T_{Ba}, F_{Ba}, F_{Ba}) : ax \in X\}$. Then the correlation coefficient of Aa and Ba

$$\rho(Aa, Ba) = \frac{C(Aa, Ba)}{\sqrt{C(Aa, Aa) \cdot C(Ba, Ba)}}$$

$$C(Aa, Ba) = \sum_{i=0}^n ((T_{Aa}^-(xa_i) \cdot T_{Ba}^-(xa_i)) + (I_{Aa}^-(xa_i) \cdot I_{Ba}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Ba}^-(xa_i)) + ((T_{Aa}^+(xa_i) \cdot T_{Ba}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Ba}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Ba}^+(xa_i)))$$

And the informational energy of two NVHSSs

Aa and Ba are given by

$$C(Aa, Aa) = \sum_{i=0}^n ((T_{Aa}^-(xa_i) \cdot T_{Aa}^-(xa_i)) + (I_{Aa}^-(xa_i) \cdot I_{Aa}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Aa}^-(xa_i)) + ((T_{Aa}^+(xa_i) \cdot T_{Aa}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Aa}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Aa}^+(xa_i)))$$

$$C(Ba, Ba) = \sum_{i=0}^n ((T_{Ba}^-(xa_i) \cdot T_{Ba}^-(xa_i)) + (I_{Ba}^-(xa_i) \cdot I_{Ba}^-(xa_i)) + (F_{Ba}^-(xa_i) \cdot F_{Ba}^-(xa_i)) + ((T_{Ba}^+(xa_i) \cdot T_{Ba}^+(xa_i)) + (I_{Ba}^+(xa_i) \cdot I_{Ba}^+(xa_i)) + (F_{Ba}^+(xa_i) \cdot F_{Ba}^+(xa_i)))$$

Proposition 3.4

The defined correlation measure between NVS A and NVS B satisfies the following properties

1. $0 \leq \rho(A, B) \leq 1$
2. $\rho(A, B) = 1$ if and only if $A = B$
3. $\rho(A, B) = \rho(B, A)$.

Proof:

- (i) $0 \leq \rho(A, B) \leq 1$

As the membership, indeterminate and non-membership functions of the NVS lies between 0 and 1, $\rho(A, B)$ also lies between 0 and 1. We will prove

$$C(Aa, Ba) = \sum_{i=0}^n ((T_{Aa}^-(xa_i) \cdot T_{Ba}^-(xa_i)) + (I_{Aa}^-(xa_i) \cdot I_{Ba}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Ba}^-(xa_i)) + ((T_{Aa}^+(xa_i) \cdot T_{Ba}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Ba}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Ba}^+(xa_i)))$$

$$= \sum_{i=0}^n ((T_{Aa}^-(xa_1) \cdot T_{Ba}^-(xa_1)) + (I_{Aa}^-(xa_1) \cdot I_{Ba}^-(xa_1)) + (F_{Aa}^-(xa_1) \cdot F_{Ba}^-(xa_1)) + ((T_{Aa}^+(xa_2) \cdot T_{Ba}^+(xa_2)) + (I_{Aa}^+(xa_2) \cdot I_{Ba}^+(xa_2)) + (F_{Aa}^+(xa_2) \cdot F_{Ba}^+(xa_2)) + \dots + ((T_{Aa}^+(xa_n) \cdot T_{Ba}^+(xa_n)) + (I_{Aa}^+(xa_n) \cdot I_{Ba}^+(xa_n)) + (F_{Aa}^+(xa_n) \cdot F_{Ba}^+(xa_n))))$$

By Cauchy-Schwarz inequality, $(x_{a1}y_{a1} + x_{a2}y_{a2} + \dots + x_{an}y_{an})^2 \leq (x_{a12} + x_{a22} + \dots + x_{an2}) \cdot (y_{a12} + y_{a22} + \dots + y_{an2})$, where $(x_{a12} + x_{a22} + \dots + x_{an2}) \in \mathbb{R}_n$ and $(y_{a12} + y_{a22} + \dots + y_{an2}) \in \mathbb{R}_n$, we get

$$(C(Aa, Ba))^2 = \left\{ \left((T_{Aa}^-(xa_1))^4 + (I_{Aa}^-(xa_1))^4 + (F_{Aa}^-(xa_1))^4 \right) + \left((T_{Aa}^+(xa_1))^4 + (I_{Aa}^+(xa_1))^4 + (F_{Aa}^+(xa_1))^4 \right) + \dots + \left((T_{Aa}^-(xa_n))^4 + (I_{Aa}^-(xa_n))^4 + (F_{Aa}^-(xa_n))^4 \right) + \left((T_{Aa}^+(xa_n))^4 + (I_{Aa}^+(xa_n))^4 + (F_{Aa}^+(xa_n))^4 \right) \right\}$$

$$(C(Aa, Ba))^2 \leq (C(Aa, Aa)) \times (C(Ba, Ba))$$

AND $\rho(A, B) \leq 1$.

Therefore the property $0 \leq \rho(A, B) \leq 1$ is proved.

(ii) $\rho(A, B) = 1$ if and only if $A = B$

Let the two NVHSS Aa and Ba be equal (i.e. Aa=Ba). Hence for any

$$C(Aa, Aa) = C(Ba, Ba) = \sum_{i=0}^n (T_{Aa}^-(xa_i) \cdot T_{Aa}^-(xa_i) + (I_{Aa}^-(xa_i) \cdot I_{Aa}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Aa}^-(xa_i)) + (T_{Aa}^+(xa_i) \cdot T_{Aa}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Aa}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Aa}^+(xa_i)))$$

$$C(Aa, Ba) = \sum_{i=0}^n (T_{Aa}^-(xa_i) \cdot T_{Ba}^-(xa_i) + (I_{Aa}^-(xa_i) \cdot I_{Ba}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Ba}^-(xa_i)) + (T_{Aa}^+(xa_i) \cdot T_{Ba}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Ba}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Ba}^+(xa_i))) = C(Aa, Aa)$$

Hence

$$\rho(A, B) = \frac{C(Aa, Ba)}{\sqrt{C(Aa, Aa) \cdot C(Ba, Ba)}}$$

$$= \frac{C(Aa, Aa)}{\sqrt{C(Aa, Aa) \cdot C(Aa, Aa)}} = 1$$

Let the $\rho(A, B) = 1$. Then, the unite measure is possible only if

$$\frac{C(Aa, Ba)}{\sqrt{C(Aa, Aa) \cdot C(Ba, Ba)}} = 1$$

Hence $A = B$

iii) If $\rho(A, B) = \rho(B, A)$, It obvious that

$$\frac{C(Aa, Ba)}{\sqrt{C(Aa, Aa) \cdot C(Ba, Ba)}} = \frac{C(Aa, Ba)}{\sqrt{C(Aa, Aa) \cdot C(Ba, Ba)}} = \rho(Ba, Aa)$$

$$C(Aa, Ba) = \sum_{i=0}^n (T_{Aa}^-(xa_i) \cdot T_{Ba}^-(xa_i) + (I_{Aa}^-(xa_i) \cdot I_{Ba}^-(xa_i)) + (F_{Aa}^-(xa_i) \cdot F_{Ba}^-(xa_i)) + (T_{Aa}^+(xa_i) \cdot T_{Ba}^+(xa_i)) + (I_{Aa}^+(xa_i) \cdot I_{Ba}^+(xa_i)) + (F_{Aa}^+(xa_i) \cdot F_{Ba}^+(xa_i))) = C(Ba, Aa)$$

Definition 3.5

Let A and B be two NVHSSs, then the correlation coefficient is defined as $\rho'(Aa, Ba) =$

$$\frac{C(Aa, Ba)}{\max\{C(Aa, Aa), C(Ba, Ba)\}}$$

4 Application Based on Correlation on NVHSS

In this section we given some application of NVHSS in Decision making method using the correlation measure.

Decision Making Problem

A company wants to invest a sum of money in a mobile Car Types industry.

Let S be the set of decision makers to decide best Car model given as

$$S = \{R_1, R_2, R_3\}$$

also consider the set of attributes as

A_1 =Engine Type, A_2 = Safety Rating, A_3 = Price Bracket

B_1 = Car type, B_2 = Seat, B_3 = Variate.

And their respective attributes are given as

A_1 = Engine Type = {Electric, Hybrid, Fuel}

A_2 = Safety Rating = {Bad, Good, 5 S}

A_3 = Price Bracket = {30 L, 50 L, 80 L}

B_1 = Car type = {Convertible, Coupe, Sedan}

B_2 = Seat = {7 S, 4 S, 5 S}

B_3 = Variate = {Low end, Midden end, Top end}

Table:1

A_1	Electric	Hybrid	Fuel
x_1	[0.4,0.6][0.4, 0.5][0.4,0.6]	[0.4,0.5][0.1, 0.4][0.5,0.6]	[0.3,0.6][0.4, 0.5][0.4,0.7]
x_2	[0.2,0.5][0.2, 0.3][0.5,0.8]	[0.1,0.3][0.2, 0.3][0.7,0.9]	[0.1,0.2][0.3, 0.4][0.8,0.9]
x_3	[0.2,0.5][0.2, 0.3][0.5,0.8]	[0.4,0.5][0.1, 0.2][0.5,0.6]	[0.1,0.5][0.2, 0.3][0.5,0.9]



Table:2

A_2	Bad	Good	5 S
x_1	[0.2,0.5],[0.2,0.3],[0.5,0.8]	[0.1,0.2],[0.1,0.3],[0.8,0.9]	[0.4,0.5],[0.2,0.3],[0.5,0.6]
x_2	[0.4,0.5],[0.1,0.2],[0.5,0.6]	[0.2,0.3],[0.1,0.4],[0.7,0.8]	[0.1,0.3],[0.2,0.3],[0.7,0.9]
x_3	[0.1,0.5],[0.2,0.3],[0.5,0.9]	[0.6,0.8],[0.2,0.3],[0.2,0.4]	[0.1,0.2],[0.3,0.4],[0.8,0.9]

Table:5

B_2	7 S	4 S	5 S
Ba d	[0.4,0.5],[0.2,0.3],[0.5,0.6]	[0.2,0.7],[0.1,0.2],[0.3,0.8]	[0.1,0.3],[0.2,0.3],[0.7,0.9]
G oo d	[0.3,0.6],[0.4,0.5],[0.4,0.7]	[0.3,0.6],[0.4,0.5],[0.4,0.7]	[0.3,0.4],[0.1,0.2],[0.6,0.7]
5 S	[0.1,0.5],[0.2,0.3],[0.5,0.9]	[0.6,0.8],[0.2,0.3],[0.2,0.4]	[0.1,0.3],[0.2,0.3],[0.7,0.9]

Table:3

A_3	30 L	50 L	80 L
x_1	[0.2,0.7],[0.1,0.2],[0.3,0.8]	[0.4,0.5],[0.2,0.3],[0.5,0.6]	[0.2,0.5],[0.2,0.3],[0.5,0.8]
x_2	[0.3,0.6],[0.3,0.4],[0.4,0.7]	[0.1,0.3],[0.2,0.3],[0.7,0.9]	[0.4,0.5],[0.1,0.2],[0.5,0.6]
x_3	[0.3,0.4],[0.1,0.2],[0.6,0.7]	[0.1,0.2],[0.3,0.4],[0.8,0.9]	[0.1,0.5],[0.2,0.3],[0.5,0.9]

Table:6

B_3	Low end	Midden end	Top end
3 0 L	[0.1,0.2],[0.3,0.4],[0.8,0.9]	[0.4,0.5],[0.1,0.2],[0.5,0.6]	[0.4,0.5],[0.2,0.3],[0.5,0.6]
5 0 L	[0.2,0.7],[0.1,0.2],[0.3,0.8]	[0.1,0.5],[0.2,0.3],[0.5,0.9]	[0.2,0.5],[0.2,0.3],[0.5,0.8]
8 0 L	[0.1,0.3],[0.2,0.3],[0.7,0.9]	[0.3,0.6],[0.3,0.4],[0.4,0.7]	[0.3,0.4],[0.1,0.2],[0.6,0.7]

Table:4

B_1	Convertible	Coupe	Sedan
Ele ctri c	[0.2, 0.3],[0.2,0.4],[0.7,0.8]	[0.2,0.4],[0.3,0.5],[0.6,0.8]	[0.4,0.6],[0.4,0.5],[0.4,0.6]
Hy bri d	[0.2,0.4],[0.2,0.3],[0.6,0.8]	[0.2,0.5],[0.1,0.3],[0.5,0.8]	[0.4,0.5],[0.1,0.4],[0.5,0.6]
Fu el	[0.4,0.5],[0.1,0.5],[0.5,0.6]	[0.3,0.5],[0.3,0.4],[0.5,0.7]	[0.3,0.6],[0.4,0.5],[0.4,0.7]

Let's assume $F(A) = F(\text{Electric}, 5 \text{ S}, 50 \text{ L}) = \{x_1, x_2, x_3\}$

Table:7

$F(A)$	Electric	5 S	50 L
x_1	[0.4,0.6],[0.4,0.5],[0.4,0.6]	[0.4,0.5],[0.2,0.3],[0.5,0.6]	[0.4,0.5],[0.2,0.3],[0.5,0.6]
x_2	[0.2,0.5],[0.2,0.3],[0.5,0.8]	[0.1,0.3],[0.2,0.3],[0.7,0.9]	[0.1,0.3],[0.2,0.3],[0.7,0.9]
x_3	[0.2,0.5],[0.2,0.3],[0.5,0.8]	[0.1,0.2],[0.3,0.4],[0.8,0.9]	[0.1,0.2],[0.3,0.4],[0.8,0.9]



Let's assume $F(B) = F(\text{Convertible}, 5 \text{ S}, \text{Seat}, \text{Top end}) = \{x_1, x_2, x_3\}$

Table:7

F(B)	Convertible	5 S	Top end
Electric	[0.2, 0.3], [0.2, 0.4], [0.7, 0.8]	[0.1, 0.3], [0.2, 0.3], [0.7, 0.9]	[0.4, 0.5], [0.2, 0.3], [0.5, 0.6]
5 S	[0.2, 0.4], [0.2, 0.3], [0.6, 0.8]	[0.3, 0.4], [0.1, 0.2], [0.6, 0.7]	[0.2, 0.5], [0.2, 0.3], [0.5, 0.8]
50 L	[0.4, 0.5], [0.1, 0.5], [0.5, 0.6]	[0.1, 0.3], [0.2, 0.3], [0.7, 0.9]	[0.3, 0.4], [0.1, 0.2], [0.6, 0.7]

Using this equation $\rho(A, B) = \frac{C(A, B)}{\sqrt{C(A, A) \cdot C(B, B)}}$

Table:8

	Convertible	5 S	Top end
Electric	0.7532	0.5841	0.8643
5 S	0.5619	0.7824	0.5102
50 L	0.7044	0.5937	0.7289

$\rho'(A, B) = \frac{C(A, B)}{\max\{C(A, A), C(B, B)\}}$

Table:9

	Convertible	5 S	Top end
Electric	0.5738	0.5122	0.6997
5 S	0.3670	0.6134	0.4358
50 L	0.5292	0.5784	0.6729

The highest correlation measure from the Table 8 and Table 9 gives the proper decision

Highest Correlation: The strongest relationship is found between Electric and Top end ($\rho = 0.8643$), suggesting these attributes share the most similar informational energy profile in your model. It shows that the interval neutrosophic vague hypersoft sets A and B have a good positively correlation. Conclusion: In this paper we introduced a method to

calculate the correlation coefficient of two interval neutrosophic vague hypersoft sets.

Conflict of Interest. There is none among the authors

Funding.

No external funding, private or government financial support or grant was received before, during and after this study.



References

- [1] Smarandache, F. (1999). A unifying field in logics. Neutrosophy: Neutrosophic probability, set and logic. American Research Press.
- [2] Smarandache, F. (1999). Linguistic paradoxists and tautologies. *Libertas Mathematica*, XIX, 143-154.
- [3] Zadeh, L. A. (1965). Fuzzy sets. *Information and Control*, 8, 338-353.
- [4] Turksen. (1968). Interval valued fuzzy sets based on normal forms. *Fuzzy Sets and Systems*, 20, 191-210.
- [5] Atanassov, K. (1986). Intuitionistic fuzzy sets. *Fuzzy Sets and Systems*, 20, 87-96.
- [6] Atanassov, K., & Gargov, G. (1998). Interval valued intuitionistic fuzzy sets. *Fuzzy Sets and Systems*. *International Journal of General Systems*, 39(3), 343-349.
- [7] Wang, H., Smarandache, F., Zhang, Y.-Q., & Sunderraman, R. (2005). Interval neutrosophic sets and logic: Theory and applications in computing. Hexis.
- [8] Ansari, Biswas, & Aggarwal. (2011). Proposal for applicability of neutrosophic set theory in medical AI. *International Journal of Computer Applications*, 27(5), 5-11.
- [9] Arora, M., Biswas, R., & Pandey, U. S. (2011). Neutrosophic relational database decomposition. *International Journal of Advanced Computer Science and Applications*, 2(8), 121-125.
- [10] Arora, M., & Biswas, R. (2010). Deployment of neutrosophic technology to retrieve answers for queries posed in natural language. 3rd International Conference on Computer Science and Information Technology ICCSIT, IEEE catalog Number CFP1057E-art, 3, 435-439.
- [11] Lupiáñez, F. G. (2008). On neutrosophic topology. *Kybernetes*, 37(6), 797-800. Doi:10.1108/03684920810876990.
- [12] Cheng, H. D., & Guo, Y. (2008). A new neutrosophic approach to image thresholding. *New Mathematics and Natural Computation*, 4(3), 291-308.
- [13] Guo, Y., & Cheng, H. D. (2009). New neutrosophic approach to image segmentation. *Pattern Recognition*, 42, 587-595.
- [14] Zhang, M., Zhang, L., & Cheng, H. D. (2010). A neutrosophic approach to image segmentation based on watershed method. *Signal Processing*, 90(5), 1510-1517.
- [15] Kharal, A. (2013). A neutrosophic multicriteria decision making method. *New Mathematics & Natural Computation*.
- [16] Hanafy, I. M., Salama, A. A., & Mahfouz, K. M. (2013). Correlation coefficients of neutrosophic sets by centroid method. *International Journal of Probability and Statistics*, 2(1), 9-12. DOI: 10.5923/j.ijps.20130201.02.
- [17] Hanafy, I. M., Salama, A. A., & Mahfouz, K. (2012). Correlation of neutrosophic data. *International Refereed Journal of Engineering and Science (IRJES)*, 1(2), 39-43.
- [18] Chiang, D.-A., & Lin, N. P. (1999). Correlation of fuzzy sets. *Fuzzy Sets and Systems*, 102(2), 221-226. [http://dx.doi.org/10.1016/S0165-0114\(97\)00127-9](http://dx.doi.org/10.1016/S0165-0114(97)00127-9).
- [19] Szmidt, E., & Kacprzyk, J. (2010). Correlation of intuitionistic fuzzy sets. *Computational Intelligence for Knowledge-Based Systems Design, Lecture Notes in Computer Science*, 6178, 169-177.
- [20] Gerstenkorn, T., & Manko, J. (1991). Correlation of intuitionistic fuzzy sets. *Fuzzy Sets and Systems*, 44, 39-43.
- [21] Hong, D. H., & Hwang, S. Y. (1995). Correlation of intuitionistic fuzzy sets in probability spaces. *Fuzzy Sets and Systems*, 75, 77-81.