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PENTAPARTITIONED NEUTROSOPHIC PYTHAGOREAN SOFT SET

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ABSTRACT

The aim of this paper is to introduce the concept of Pentapartitioned Neutrosophic Pythagorean Soft Set with truth membership function T, contradiction membership function C, ignorance membership function U and false membership function F are dependent neutrosophic components and unknown membership function I as an independent neutrosophic component. Pentapartitioned neutrosophic pythagorean Soft set is an extension of Quadripartitioned neutrosophic pythagorean Soft set. By combining five value neutrosophic logic with neutrosophic pythagorean Soft set, we will obtain Pentapartitioned neutrosophic pythagorean Soft set. We establish some of its relative properties of Pentapartitioned neutrosophic pythagorean soft set.

Keywords: Neutrosophic set, Quadripartitioned Neutrosophic pythagorean set, Neutrosophic pythagorean soft set, Pentapartitioned neutrosophic set, Pentapartitioned neutrosophic pythagorean Soft set.

I. INTRODUCTION

The fuzzy set was introduced by Zadeh [19] in 1965. F. Smarandache, a mathematical tool for handling problems involving imprecise, indeterminacy and inaccurate data, introduced the idea of the Neutrosophic package.

Smarandache [15] in neutrosophic sets discussed. The indeterminacy membership function walks along independently of the membership of the reality or the membership of falsity in neutrosophic sets. Neutrosophic theory has been extensively discussed in the treatment of real-life conditions involving uncertainty by researchers for application purposes. While the hesitation margin of neutrosophical theory is independent of membership in truth or falsehood, it still seems more general than intuitionist fuzzy sets. Recently, the relationships between inconsistent intuitionistic fuzzy sets, image fuzzy sets, neutrosophic sets, and intuitionistic fuzzy sets have been examined in Atanassov et al. [3] however, it remains doubtful whether the indeterminacy associated with a particular element exists due to the element's ownership or non-belongingness. Chattejee et al. [4] have pointed out this while implementing a more general neutrosophical set structure, viz. Single valued quadripartitioned neutrosophical set (QSVNS). In fact, the principle of QSVNS is extended from Smarandache, s four numerical-valued neutrosophical logic, and Belnap, s four valued logic, where indeterminacy is split into two parts, i.e. "unknown," i.e., neither true nor false, and "contradiction," i.e., both true and false. However, in the sense of neutrosophic science, the QSVNS seems very logical. Chatterjee [4] et al. also studied a real-life example in their analysis for a better understanding of a QSVNS setting and showed that such conditions occur very naturally.

The degree of dependency between the components of the fuzzy set and neutrosophic sets was first introduced by F. Smarandache [14] in 2016. The key concept of Neutrosophic sets is to define each value statement in a 3D-Neutrosophic space, where each dimension of the space represents the true membership, falsity membership, and indeterminacy respectively, when two components T and F are dependent and I is independent then $T+I+F \leq 2$.

Rama Malik and Surpati Pramanik [12] introduced Pentapartitioned neutrosophic set and its properties. Here indeterminacy is divided into three parts as contradiction, ignorance and unknown membership function.

If T and F are dependent neutrosophic pythagorean components then $T^2 + F^2 \leq 1$. Similarly, for U and C as dependent neutrosophic pythagorean components then $C^2 + U^2 \leq 1$. When combining both we get Quadripartitioned pythagorean set with dependent components as

$T^2 + F^2 + C^2 + U^2 \leq 2$

Pentapartitioned neutrosophic pythagorean sets of T, C, U, F as dependent neutrosophic components were introduced by R. Radha and A. Stanis Arul Mary [10].

In this paper, we must introduce the definition of the introduction of the Pentapartitioned neutrosophic pythagorean Soft set with T, C, U and F as dependent neutrosophic components and I as an independent neutrosophic component and define some of its properties.

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II. PRELIMINARIES

2.1 Definition [14]

Let X be a universe. A Neutrosophic set A on X can be defined as follows: $A = \{< x, T_A(x), I_A(x), F_A(x) >: x \in X\}$

Where $T_A, I_A, F_A: U \to [0,1]$ and $0 \leq T_A(x) + I_A(x) + F_A(x) \leq 3$

Here, $T_A(x)$ is the degree of membership, $I_A(x)$ is the degree of interminancy and $F_A(x)$ is the degree of non-membership.

Here, $T_A(x)$ and $F_A(x)$are dependent neutrosophic components and $I_A(x)$ is an independent component.

2.2 Definition [10]

Let X be a universe. A Pentapartitioned neutrosophic pythagorean set A with T, F, C and U as dependent neutrosophic components and I as independent component for A on X is an object of the form

$$A = \{< x, T_A, C_A, I_A, U_A, F_A >: x \in X\}$$

Where $T_A + F_A \leq 1, C_A + U_A \leq 1$ and $(T_A)^2 + (C_A)^2 + (I_A)^2 + (U_A)^2 + (F_A)^2 \leq 3$

Here, $T_A(x)$ is the truth membership, $C_A(x)$ is contradiction membership, $U_A(x)$ is ignorance membership, $F_A(x)$ is the false membership and $I_A(x)$ is an unknown membership.

2.3 Definition [12]

Let P be a non-empty set. A Pentapartitioned neutrosophic set A over P characterizes each element p in P a truth -membership function T_A, a contradiction membership function C_A, an ignorance membership function G_A, unknown membership function U_A and a false membership function F_A, such that for each p in P

$$T_A + C_A + G_A + U_A + F_A \leq 5$$

2.4 Definition [10]

Let X be the initial universe set and E be set of parameters. Consider a non-empty set A on E, Let P(X) denote the set of all Quadripartitioned neutrosophic pythagorean subsets of X. The collection (F, A) is termed to be Quadripartitioned neutrosophic pythagorean soft set over X, where F is a mapping given by
$F: A \to P(X)$.

2.5 Definition [12]

A Quadripartitioned neutrosophic pythagorean Soft set A is contained in another Quadripartitioned neutrosophic pythagorean soft set B (i.e) $A \subseteq B$ if $T_A(x) \leq T_B(x), C_A(x) \leq C_B(x), U_A(x) \geq U_B(x)$ and $F_A(x) \geq F_B(x)$

2.6 Definition [12]

The complement of a Quadripartitioned neutrosophic pythagorean soft set (F, A) on X Denoted by $(K, A)^c$ and is defined as

$K^c(x) = \{< x, F_A(x), U_A(x), C_A(x), T_A(x) > : x \in X\}$

2.7 Definition [12]

Let $A = < x, T_A(x), C_A(x), U_A(x), F_A(x) >$ and $B = < x, T_B(x), I_B(x), F_B(x) >$ are Quadripartitioned neutrosophic pythagorean Soft sets. Then

$A \cup B = < x, \max(T_A(x), T_B(x)), \max(C_A(x), C_B(x)), \min(U_A(x), U_B(x)), \min(F_A(x), F_B(x)) >$

$A \cap B = < x, \min(T_A(x), T_B(x)), \min(C_A(x), C_B(x)), \max(U_A(x), U_B(x)), \max(F_A(x), F_B(x)) >$

III. PENTAPARTITIONED NEUTROSOPHIC PYTHAGOREAN SOFT SET

3.1 Definition

Let U be the initial universe set and E be set of parameters. Consider a non-empty set A on E, Let P(U) denote the set of all Pentapartitioned neutrosophic pythagorean subsets of U, The collection (F, A) is said to be Pentapartitioned neutrosophic pythagorean soft set over U, where F is a mapping given by $F: A \to P(U)$

3.2 Definition

A Pentapartitioned neutrosophic pythagorean Soft set A is contained in another Pentapartitioned neutrosophic pythagorean Soft set B (i.e) $A \subseteq B$ if $T_A \leq T_B, C_A \leq C_B, I_A \geq I_B, U_A \geq U_B$ and $F_A \geq F_B$

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3.3 Definition

The complement of a Pentapartitioned neutrosophic pythagorean Soft set (F, A) on X denoted by $(F, A)^c$ and is defined as $F^c(x) = \{< x, F_A, U_A, 1 - I_A, C_A, T_A >: x \in X\}$

3.4 Definition

Let X be a non-empty set, $A = < x, T_A, C_A, I_A, U_A, F_A >$ and $B = < x, T_B, C_B, I_B, U_B, F_B >$ are two Pentapartitioned neutrosophic pythagorean Soft sets. Then

$A \cup B = < x, \max(T_A, T_B), \max(C_A, C_B), \min(I_A, I_B), \min(U_A, U_B), \min(F_A, F_B) >$

$A \cap B = < x, \min(T_A, T_B), \min(C_A, C_B), \max(I_A, I_B), \max(U_A, U_B), \max(F_A, F_B) >$

3.5 Definition

A Pentapartitioned neutrosophic pythagorean Soft set (F, A) over the universe X is said to be empty Pentapartitioned neutrosophic pythagorean soft set ∅ with respect to the parameter A if

$T_{F(e)} = 0, C_{F(e)} = 0, I_{F(e)} = 1, U_{F(e)} = 1, F_{F(e)} = 1, \forall x \in X, \forall e \in A$. It is denoted by ∅

3.6 Definition

A Pentapartitioned neutrosophic pythagorean soft set (F, A) over universe X is said to be a Pentapartitioned neutrosophic pythagorean soft set with respect to parameter A if the universe is said to be a neutrosophic pythagorean set with respect to parameter A if

$T_{F(e)} = 1, C_{F(e)} = 1, I_{F(e)} = 0, U_{F(e)} = 0, F_{F(e)} = 0 \ \forall x \in X, \forall e \in A$. It is denoted by Δ

3.7 Definition

Let A and B be two Pentapartitioned neutrosophic pythagorean soft sets on X then A\B can be described as

$A \backslash B = < x, \min(T_A, F_B), \min(C_A, U_B), \max(I_A, 1 - I_B), \max(U_A, C_B), \max(F_A, T_B) >$

3.8 Definition

F_E is said to be absolute Pentapartitioned neutrosophic pythagorean soft set over X if F(e) = Δ for any e ∈ E. We denote it by X_E

3.9 Definition

F_E is referred to as relative null Pentapartitioned neutrosophic pythagorean soft set over X if

F(e) = ∅ for any e ∈ E and it is denoted by $\emptyset_E$

Obviously $\emptyset_E = X_E^c$ and $X_E = \emptyset_E^c$

3.10 Definition

A Pentapartitioned neutrosophic pythagorean soft complement (F, A) over X can also be defined as $(F, A)^c = U_E \backslash F(e)$ for all e ∈ A.

Note: We denote X_E by X in the proofs of proposition.

3.11 Definition

If (F, A) and (G, B) be two Pentapartitioned neutrosophic pythagorean soft set then "(F, A) AND (G, B)" is a denoted by (F, A) ∧(G, B)

and is defined by (F, A)∧ (G, B) = (H, A ×B)

where H (a, b) = F(a) ∩ G(b) ∀a ∈ A and ∀b ∈ B, where ∩ is the operation intersection of Pentapartitioned neutrosophic pythagorean soft set.

3.12 Definition

If (F, A) and (G, B) be two Pentapartitioned neutrosophic pythagorean soft set then "(F, A) OR (G, B)" is a denoted by (F, A) ∨(G, B) and is defined by (F, A)∨ (G, B) = (K, A ×B)

where K (a, b) = F(a) ∪ G(b) ∀a ∈ A and ∀b ∈ B, where ∪ is the operation union of Pentapartitioned neutrosophic pythagorean soft set.

3.13 Theorem

Let (F, A) and (G, A) be Pentapartitioned neutrosophic pythagorean soft set over the universe X. Then the following are true.

(i) (F, A)⊆ (G, A) iff (F, A) ∩ (G, A) = (F, A)
(ii) (F, A)⊆ (G, A) iff (F, A) ∪ (G, A) = (F, A)

Proof:

Assume that (F, A)⊆ (G, A),

then F(e) ⊆G(e) for all e ∈ A.

Let (F, A) ∩ (G, A) = (H, A).

Since H(e) = F(e) ∩ G(e) =F(e) for all e ∈ A,

by definition (H, A) = (F, A).

Suppose this is the case (F, A) ∩ (G, A) = (F, A).

Let (F, A) ∩ (G, A) = (H, A).

Since H(e) = F(e) ∩ G(e) =F(e) for all e ∈ A,

we know that F(e) ⊆ G(e) for all e ∈ A.

Hence (F, A)⊆ (G, A).

(ii)The proof is similar to (i).

3.14 Theorem

Let (F, A), (G, A), (H, A), and (S, A) are Pentapartitioned pythagorean neutrosophic soft set over the X universe. The following are real, then.
(i) If (F, A) ∩ (G, A) =$\emptyset_A$, then (F, A)⊆ $(G, A)^c$
(ii) If (F, A)⊆ (G, A) and (G, A)⊆ (H, A) then (F, A)⊆ (H, A)
(iii) If (F, A)⊆ (G, A) and (H, A)⊆ (S, A) then (F, A) ∩ (H, A) ⊆ (G, A) ∩ (S, A)
(iv) (F, A) ⊆ (G, A) iff $(G, A)^c \subseteq (F, A)^c$
Proof:

(i) Suppose (F, A) ∩ (G, A) =$\emptyset_A$.

Then F(e)∩ G(e) = ∅.

So, F(e) ⊆ U\G(e)= $G^c(e)$.

Then, for every e ∈ A, we therefore have

(F, A)⊆ $(G, A)^c$

Proof of (ii) and (iii) IS obvious.

(iv) Consider (F, A)⊆ (G, A)

⟺ F(e) ⊆ G(e) for all e ∈ A.

⟺ $(G(e))^c \subseteq (F(e))^c$ for all e ∈ A.

⟺ $G^c(e) \subseteq F^c(e)$ for all e ∈ A.

⟺$(G, A)^c \subseteq (F, A)^c$

3.15 Definition

Let I be an arbitrary index $\{(F_i, A)\}_{i\in I}$ be a subfamily of Pentapartitioned neutrosophic pythagorean soft set over the universe X.

(i)The union of these Pentapartitioned neutrosophic pythagorean soft set is the Pentapartitioned neutrosophic pythagorean soft set (H, A) where H(e) = $\cup_{i\in I} F_i(e)$ foreach e ∈ A.

We write $\cup_{i\in I}(F_i, A)$= (H, A)

(ii)The intersection of these Pentapartitioned neutrosophic pythagorean soft set is the Pentapartitioned neutrosophic pythagorean soft set (M, A) where M(e) = $\cap_{i\in I} F_i(e)$ for each e ∈ A.

We write $\cap_{i\in I}(F_i, A)$ = (M, A)

3.16 Theorem

Let I be an arbitrary index set and $\{(F_i, A)\}_{i\in I}$be a subfamily of Pentapartitioned neutrosophic pythagorean soft set over the universe X. Then

(i) $(\cup_{i\in I}(F_i, A))^C = \cap_{i\in I}(F_i, A)^C$
(ii) $(\cap_{i\in I}(F_i, A))^C = \cup_{i\in I}(F_i, A)^C$

Proof:

(i) $(\cup_{i\in I}(F_i, A))^C = (H, A)^C$,
By definition $H^C(e) = X_E \backslash H(e) = X_E \backslash \cup_{i\in I} F_i(e)$
$= \cap_{i\in I}(X_E \backslash F_i(e))$ for all $e \in A$.
On the other hand, $(\cap_{i\in I}(F_i, A))^C = (K, A)$.
By definition, $K(e) = \cap_{i\in I} F_i^C(e) = \cap_{i\in I}(X - F_i(e))$ for all $e \in A$.
(ii) It is obvious.

Note: We denote $\emptyset_E$ by $\emptyset$ and X_E by X.

3.17 Theorem

Let (F,A) be Pentapartitioned neutrosophic pythagorean soft set over the X. Then the following is valid then.

(i) $(\emptyset, A)^c = (X, A)$
(ii) $(X, A)^c = (\emptyset, A)$

Proof:

(i) Let $(\emptyset, A) = (F, A)$
Then $\forall e \in A$,
$F(e) = \{< x, T_{F(e)}, C_{F(e)}, I_{F(e)}, U_{F(e)}, F_{F(e)} >: x \in X\}$
$= \{(x,0,0,1,1,1): x \in X\}$
Thus $(\emptyset,A)^c = (F,A)^c$. Then $\forall e \in A$,
$(F(e))^c = \{< x, T_{F(e)}, C_{F(e)}, I_{F(e)}, U_{F(e)}, F_{F(e)} > : x \in X\}^c$
$= \{< x, F_{F(e)}, U_{F(e)}, 1 - I_{F(e)}, C_{F(e)}, T_{F(e)} > : x \in X\}$
$= \{(x1,1,0,0,0): x \in X\} = X$. Thus $(\emptyset, A)^c = (X, A)$
(iii) Proof is similar to (i)

3.18 Theorem

Let (F, A) be Pentapartitioned neutrosophic pythagorean soft set over the universe X. Then the following are true.

(i) $(F, A) \cup (\emptyset, A) = (F, A)$
(ii) $(F, A) \cup (X, A) = (X, A)$

Proof:

(i) $(F, A) = \{e,(x, T_{F(e)}, C_{F(e)}(x), I_{F(e)}, U_{F(e)}, F_{F(e)}): x \in X\}\ \forall e \in A$
$(\emptyset, A) = \{e, (x,0,0,1,1,1): x \in X\}\ \forall e \in A$
$(F, A) \cup (\emptyset,A) = \{e,(x, \max(T_{F(e)}, 0), \max(C_{F(e)}, 0), \min(I_{F(e)}, 1), \min(U_{F(e)}, 1), \min(F_{F(e)}, 1))\}\ \forall e \in A$
$= \{e, (x, T_{F(e)}, C_{F(e)}, I_{F(e)}, U_{F(e)}, F_{F(e)})\}\ \ \forall e \in A$
$= (F, A)$
(ii) Proof is similar to (i).

3.19 Theorem

Let (F, A) be a Pentapartitioned neutrosophic pythagorean soft set over the X universe. The following is, then, real.

(i) $(F, A) \cap (\emptyset, A) = (\emptyset, A)$
(ii) $(F, A) \cap (X, A) = (F, A)$

Proof:

(i) $(F, A) = \{e, (x, T_{F(e)}, C_{F(e)}, U_{F(e)}, F_{F(e)})\}\ \forall e \in A$
$(\emptyset, A) = \{e, (x,0,0,1,1,1): x \in X\}\ \forall e \in A$

$(F, A) \cap (\emptyset, A) = \{e, (x, \min(T_{F(e)}, 0), \min(C_{F(e)}, 0), \max(I_{F(e)}, 1), \max(U_{F(e)}, 1) \max(F_{F(e)}, 1))\}$

$\forall e \in A$

$= \{e, , (x, 0,0,1,1,1)\} \ \forall e \in A$

$= (\emptyset, A)$

(ii) Proof is similar to (i).

3.20 Theorem

Let (F, A) and (G, B) are Pentapartitioned neutrosophic pythagorean soft set over the universe X. Then the following are true.

(i) $(F, A) \cup (\emptyset, B) = (F, A)$ iff $B \subseteq A$

(ii) $(F, A) \cup (X, B) = (X, A)$ iff $A \subseteq B$

Proof:

We have for (F, A),
$F(e) = \{(x, T_F, C_F, I_F, U_F, F_F): x \in X\} \ \forall e \in A$
Also let $(\emptyset, B) = (G, B)$, then $G(e) = \{(x, 0,0,1,1,1): x \in X\} \ \forall e \in B$

Let $(F, A) \cup (\emptyset, B) = (F, A) \cup (G, B) = (H, C)$ where $C = A \cup B$ and for all $e \in C$

H(e) may be defined as

$H(e) = F(e)$ if $e \in A - B$,

$= G(e)$ if $e \in B - A$

$= F(e) \cup G(e)$ if $e \in A \cap B$

Here, $F(e) \cup G(e) = F(e)$. Then

$H(e) = F(e)$ if $e \in A - B\}$,

$= G(e)$ if $e \in B - A$

$= F(e)$ if $e \in A \cap B$

Let $B \subseteq A$

Then $H(e) = F(e)$ if $e \in A - B$

$= F(e)$ if $e \in A \cap B$

Hence $H(e) = F(e) \ \forall e \in A$

Conversely Let $(F, A) \cup (\emptyset, B) = (F, A)$

Then $A = A \cup B \Longrightarrow B \subseteq A$

(ii) Proof is similar to (i)

3.21 Theorem

Let (F, A) and (G, B) are two Pentapartitioned neutrosophic pythagorean soft set over the universe X. Then the following are true.

(i) $(F, A) \cap (\emptyset, B) = (\emptyset, A \cap B)$

(ii) $(F, A) \cap (X, B) = (F, A \cap B)$

Proof:

(i) We have for (F, A)

$F(e) = \{(x, T_{F(e)}, C_{F(e)}, I_{F(e)}, U_{F(e)}, F_{F(e)}): x \in X\} \quad \forall e \in A$

Also let $(\emptyset, B) = (G, B)$ then $G(e) = \{(x, 0,0,1,1,1): x \in X\} \ \forall e \in B$

Let $(F, A) \cap (\emptyset, B) = (F, A) \cap (G, B) = (H, C)$ where $C = A \cap B$ and $\forall e \in C$

$H(e) = \{(x, \min(T_{F(e)}, T_{G(e)}), \min(C_{F(e)}, C_{G(e)}), \max(I_{F(e)}, I_{G(e)}), \max(U_{F(e)}, U_{G(e)}),$

$\max(F_{F(e)}, F_{G(e)})): x \in X\}$

$= \{(x, \min(T_{F(e)}, 0), \min(C_{F(e)}, 0), \max(I_{F(e)}, 1), \max(U_{F(e)}, 1), \max(F_{F(e)}, 1)): x \in X\}$

$= \{(x, 0,0,1,1,1): x \in X\}$

=G, B) = (∅, B)

Thus (F, A)∩ (∅, B) = (∅, B) = (∅, A∩B)

(ii) Proof is similar to (i).

3.22 Theorem

Let (A, F) and (B, G) are Pentapartitioned pythagorean neutrosophic soft set over Universe X. The following are real, then.

(i) $((A, F)\cup (B, G))^{C} \subseteq (A, F)^{C} \cup (B, G)^{C}$

(ii) $(A, F)^{C} \cap (B, G)^{C} \subseteq ((F, A)\cap (B, G))^{C}$

3.23 Theorem

Two Pentapartitioned neutrosophic Pythagorean soft sets are Let (F, A) and (G, A) over the same universe X. We've had the following

(i) $((F, A)\cup (G, A))^{C} = (F, A)^{C} \cap (G, A)^{C}$

(ii) $((F, A)\cap (G, A))^{C} = (F, A)^{C}\cup (G, A)^{C}$

Proof:

(i) Let (F, A) ∪ (G, A) = (H, A) ∀ e∈ A

H(e) = F(e)∪G(e)

$$=(x, \max(T_{F(e)}, T_{G(e)}), \max(C_{F(e)}, C_{G(e)}), \min(I_{F(e)}, I_{G(e)}), \min(U_{F(e)}, U_{G(e)}), \min(F_{F(e)}, F_{G(e)})\}$$

Thus $(F, A) \cup (G, A))^{C} = (H, A)^{C}$ ∀ e∈ A

$(H(e))^{C} = (F(e)\cup G(e))^{C}$

$$=\{(x, \max(T_{F(e)}, T_{G(e)}), \max(C_{F(e)}, C_{G(e)}), \min(I_{F(e)}, I_{G(e)}), \min(U_{F(e)}, U_{G(e)}), \min(F_{F(e)}, F_{G(e)})\}^{C}$$

$$=\{(x, \min(F_{F(e)}, F_{G(e)}), \min(U_{F(e)}, U_{G(e)}), \max(1 - I_{F(e)}, 1 - I_{G(e)}), \max(C_{F(e)}, C_{G(e)}), \max(T_{F(e)}, T_{G(e)})\}$$

Again $(F, A)^{C}\cap (G, A)^{C} = (I, A)$ where∀ e ∈ A

$I(e) = (F(e))^{C}\cap (G(e))^{C}$

$$=\{(x, \min(F_{F(e)}, F_{G(e)}), \min(U_{F(e)}, U_{G(e)}), \max(1 - I_{F(e)}, 1 - I_{G(e)}), \max(C_{F(e)}, C_{G(e)}), \max(T_{F(e)}, T_{G(e)})\}$$

Thus $((F, A)\cup (G, A))^{C} = (F, A)^{C} \cap (G, A)^{C}$

(ii) Let (F, A) ∩ (G, A) = (H, A) ∀ e∈ A

H(e) = F(e)∩G(e)

$$=\{(x, \min(T_{F(e)}, T_{G(e)}), \min(C_{F(e)}, C_{G(e)}), \max(I_{F(e)}, I_{G(e)}), \max(U_{F(e)}, U_{G(e)}), \max(F_{F(e)}, F_{G(e)})\} \ \forall\ e\in A$$

Thus $(F, A) \cap (G, A))^{C} = (H, A)^{C}$

$(H(e))^{C} = (F(e)\cap G(e))^{C}$

$$=\{(x, \min(T_{F(e)}, T_{G(e)}), \min(C_{F(e)}, C_{G(e)}), \max(I_{F(e)}, I_{G(e)}), \max(U_{F(e)}, U_{G(e)}), \max(F_{F(e)}, F_{G(e)})\}^{C}$$

$$= \{(x, \min(T_{F(e)}, T_{G(e)}), \min(U_{F(e)}, U_{G(e)}), \max\left(I_{F(e)}(x), I_{G(e)}(x)\right), \max(C_{F(e)}, C_{G(e)}) \max\left(F_{F(e)}(x), F_{G(e)}(x)\right)\}^{C}$$

$$=\{(x, \max(F_{F(e)}, F_{G(e)}), \max(U_{F(e)}, U_{G(e)}), \min(1 - I_{F(e)}, 1 - I_{G(e)}), \min(C_{F(e)}, C_{G(e)}), \min(T_{F(e)}, T_{G(e)})\} \forall\ e \in A$$

Again $(F, A)^{C}\cup (G, A)^{C} = (I, A)$ where∀ e ∈ A

I(e) = (F(e)) ^{C}∪ (G(e)) ^{C}

$$=\{(x, \max(F_{F(e)}, F_{G(e)}), \max(U_{F(e)}, U_{G(e)}), \min\left(1 - I_{F(e)}, 1 - I_{G(e)}\right), \min\left(C_{F(e)}, C_{G(e)}\right), \min(T_{F(e)}, T_{G(e)})\} \forall e \in A$$

Thus ((F, A)∩ (G, A)) ^{C} = (F, A) ^{C} ∪ (G, A) ^{C}

3.24 Theorem

Two Pentapartitioned neutrosophic pythagorean soft sets are Let (F, A) and (G, A) over the same universe X. We've got the following ones

(i) ((F, A)∧ (G, A)) ^{C} = (F, A) ^{C} ∨ (G, A) ^{C}

(ii) ((F, A)∨ (G, A)) ^{C} = (F, A) ^{C}∧ (G, A) ^{C}

Proof:

Let (F, A) ∧ (G, B) = (H, A ×B) where

H (a, b) =F(a) ∩G(b) ∀ a ∈ A and ∀ b ∈ B where ∩ is the operation intersection of PNPSS.

Thus H (a, b) = F(a) ∩G(b)

$$=\{(x, \min(T_{F(a)}, T_{G(b)}), \min(C_{F(a)}, C_{G(b)}), \max\left(I_{F(a)}, I_{G(b)}\right), \max\left(U_{F(a)}, U_{G(b)}\right), \max(F_{F(a)}, F_{G(b)})\}$$

((F, A) ∧ (G, B)) ^{C} = (H, A ×B) ^{C} ∀(a, b) ∈ A × B

Thus (H (a, b)) ^{C} $=\{(x, \min(T_{F(a)}, T_{G(b)}), \min(C_{F(a)}, C_{G(b)}), \max\left(I_{F(a)}, I_{G(b)}\right), \max(U_{F(a)}, U_{G(b)}), \max(F_{F(a)}, F_{G(b)})\}^C$

$$=\{(x, \max(F_{F(a)}, F_{G(b)}), \max(U_{F(a)}, U_{G(b)}), \min\left(1 - I_{F(a)}, 1 - I_{G(b)}\right), \min\left(C_{F(a)}, C_{G(b)}\right), \min(T_{F(a)}, T_{G(b)})\}$$

Let (F, A) ^{C} ∨ (G, A) ^{C} = (R, A ×B) where R (a, b) =(F(a)) ^{C} ∪ (G(b)) ^{C} ∀ a ∈ A and ∀ b ∈ B where ∪ is the operation union of PNPSS.

R (a, b) $=\{(x, \max(F_{F(a)}, F_{G(b)}), \max(U_{F(a)}, U_{G(b)}), \min(1 - I_{F(a)}, 1 - I_{G(b)}), \min(C_{F(a)}, C_{G(b)}), \min(T_{F(a)}, T_{G(b)})\}$

Hence ((F, A)∧ (G, A)) ^{C} = (F, A) ^{C} ∨ (G, A) ^{C}. Similarly, we can prove (ii)

IV. CONCLUSION

In this paper, we have studied Pentapartitioned neutrosophic pythagorean soft set and we have put forward some theorems based on this new notion. We have introduced topological structure on PNPSS and characterized some of itd properties. We hope that this paper will promote he future study on PNPSS and PNPSSTS to carry out a general framework for their application in practical life.

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