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Super Hyper Dominating and Super Hyper Resolving on Neutrosophic Super Hyper Graphs and Their Directions in Game Theory and Neutrosophic Super Hyper Classes

Henry Garrett

Independent Researcher

***Corresponding Author:**
Henry Garrett, Independent Researcher.

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Abstract
In this research article, the notions of Super Hyper Dominating and Super Hyper Resolving are defined in the setting of neutrosophic Super Hyper Graphs. Some ideas are introduced on both notions of Super Hyper Dominating and Super Hyper Resolving, simultaneously and as the same with each other. Some neutrosophic Super Hyper Classes are defined based on the notion, Super Hyper Resolving. The terms of duality, totality, perfectness, connectedness, and stable, are added to basic framework and initial notions, Super Hyper Dominating and Super Hyper Resolving but the concentration is on the "perfectness" to figure out what's going on when for all targeted Super Hyper Vertices, there's only one Super Hyper Vertex in the intended set. There are some instances and some clarifications to make sense about what's happened and what's done in the starting definitions. The key point is about the minimum sets. There are some questions and some problems to be taken as some avenues to pursue this study and this research. A basic familiarity with Super Hyper Graph theory and neutrosophic Super Hyper Graph theory is proposed.

Keywords: Super Hyper Dominating, Super Hyper Resolving, Super Hyper Graphs, Neutrosophic Super Hyper Graphs, Neutrosophic Super Hyper Classes.

AMS Subject Classification: 05C17, 05C22, 05E45

Background

There are some studies covering the topic of this research. In what follows, there are some discussion and literature reviews about them. First article is titled "properties of Super Hyper Graph and neutrosophic Super Hyper Graph" by Henry Garrett [1]. It's first step toward the study on neutrosophic Super Hyper Graphs. This research article is published on the journal "Neutrosophic Sets and Systems" in issue 49 and the pages 531-561. In this research article, different types of notions like dominating, resolving, coloring, Eulerian (Hamiltonian) neutrosophic path, n-Eulerian (Hamiltonian) neutrosophic path, zero forcing number, zero forcing neutrosophic- number, independent number, independent neurosophic-number, clique number, clique neutrosophic-number, matching number, matching neutrosophic-number, girth, neutrosophic girth, 1-zero-forcing number, 1-zero- forcing neutrosophic-number, failed 1-zero-forcing.number, failed 1-zero-forcing neutrosophic-number, global- offensive alliance, t-offensive alliance, t-defensive alliance, t-powerful alliance, and global-powerful alliance are defined in Super Hyper Graph and neutrosophic Super Hyper Graph. Some Classes of Super Hyper Graph and Neutrosophic Super Hyper Graph are cases of study. Some results are applied in family of Super Hyper Graph and neutrosophic Super Hyper Graph. Thus, this research article has concentrated on the vast notions and introducing the majority of notions.

The seminal paper and groundbreaking article are titled "neutrosophic co-degree and neutrosophic degree alongside chromatic numbers in the setting of some classes related to neutrosophic Hyper Graphs" by Henry Garrett [2]. In this research article, a novel approach is implemented on Super Hyper Graph and neutrosophic Super Hyper Graph based on general forms without using neutrosophic classes of neutrosophic Super Hyper Graph. It's published in prestigious and fancy journal is entitled "Journal of Current Trends in Computer Science Research (JCTCSR)" with abbreviation "J Curr Trends Comp Sci Res" in volume 1 and issue 1 with pages 06-14. The research article studies deeply with choosing neutrosophic Hyper Graphs instead of neutrosophic Super Hyper Graph. It's the breakthrough toward independent results based on initial background.

In two articles are titled "Initial Material of Neutrosophic Preliminaries to Study Some Neutrosophic Notions Based on Neutrosophic Super HyperEdge (NSHE) in Neutrosophic Super Hyper Graph (NSHG)" by Henry Garrett and "Basic Neutrosophic Notions Concerning Super Hyper Dominating and Neutrosophic Super Hyper Resolving in Super Hyper Graph" by Henry Garrett, there are some efforts to formalize the basic notions about neutrosophic Super Hyper Graph and Super Hyper Graph [3, 4].

Some studies and researches about neutrosophic graphs, are proposed as book by Henry Garrett which is indexed by Google Scholar and has more than 1850 readers in Scribd [5]. It's titled "Beyond Neutrosophic Graphs" and published by Ohio: E-publishing: Educational Publisher 1091 West 1st Ave Grandview Heights, Ohio 43212 United State. This research book covers different types of notions and settings in neutrosophic graph theory and neutrosophic Super Hyper Graph theory.

Also, some studies and researches about neutrosophic graphs, are proposed as book in by Henry Garrett which is indexed by Google Scholar and has more than 2534 readers in Scribd [6]. It's titled "Neutrosophic Duality" and published by Florida: GLOBAL KNOWLEDGE - Publishing House 848 Brickell Ave Ste 950 Miami, Florida 33131 United States. This research book presents different types of notions Super Hyper Resolving and Super Hyper Dominating in the setting of duality in neutrosophic graph theory and neutrosophic Super Hyper Graph theory. This research book has scrutiny on the complement of the intended set and the intended set, simultaneously. It's smart to consider a set but acting on its complement that what's done in this research book which is popular in the terms of high readers in Scribd.

Motivation and Contributions

In this study, there's an idea which could be considered as a motivation.

Question 1.1. How to define a set of Super Hyper Vertices such that its Super Hyper Vertices either "connect" to all other Super Hyper Vertices or "separate" all other couple of Super Hyper Vertices?

It's motivation to find notions to use in this dense model is titled "neutrosophic Super Hyper Graphs". The new notions, Super Hyper Resolving and Super Hyper Dominating, are applied in this setting. Different versions of these notions are introduced and studied like perfect, dual, connected, stable and total. How to figure out these notions lead us to get more results and to introduce neutrosophic classes of neutrosophic Super Hyper Graphs. The connections amid Super Hyper Vertices motivates us to find minimum set such that this set only contains Super Hyper Vertices and it has some elements connecting to other elements outside of this set. Another motivation is the key term "separation". Separating Super Hyper Vertices from each other to distinguish amid them. It leads us to new measurement acting on the number of connections between Super Hyper Vertices. Thus, these ideas are the motivations to start this study. Minimum set concludes the discussion in every direction. Also, there are some avenues to extend these notions.

The framework of this study is as follows. In the beginning, I introduce basic definitions to clarify about preliminaries. In the subsection "Preliminaries", new notions of neutrosophic Super Hyper Graphs, perfect, dual, connected, stable, total, Super Hyper Resolving, and Super Hyper Dominating are defined for introduced results and used classes. In the section "The Setting of The Neutrosophic Super Hyper Dominating", new notions are clarified and there are more instances to make more senses about the new ideas. In the section "The Setting of Maximum Number of The Neutrosophic Stable Perfect", the notion of stable is applied on the notion, perfect. The maximum number is the matter of minds and there is sufficient clarifications. In the section "The Setting of Maximum Number of The Neutrosophic Dual Perfect", the notion of dual is applied on the notion, perfect. The maximum number is intended and there are many examples and illustrations. There are other sections like "The Setting of Minimum Number of The Neutrosophic Notions", "The Setting of Minimum Number of The Neutrosophic Total Perfect", "The Setting of Minimum Number of The Neutrosophic Connected Perfect", "The Setting of The Neutrosophic Super Hyper Resolving","Some Results on Neutrosophic Classes Via Minimum Super Hyper DominatingSet", "Minimum Super Hyper Dominating Set and Minimum Perfect Super Hyper DominatingSet", "Applications in GameTheory", "Open Problems", "Conclusion and Closing Remarks". In the section "Applications in Game Theory", two applications are posed. In the section "Open Problems", some problems and questions for further studies are proposed. In the section "Conclusion and Closing Remarks", gentle discussion about results and applications is featured. In the section "Conclusion and Closing Remarks", a brief overview concerning advantages and limitations of this study alongside conclusions is formed.

Preliminaries

In this subsection, basic material which is used in this article, is presented. Also, new ideas and their clarifications are elicited.

Definition 1.2 (Neutrosophic Set). (Definition 2.1, p.87) [7].
Let X be a space of points (objects) with generic elements in X denoted by x; then the neutrosophic set A (NS A) is an object having the form

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

where the functions $T, I, F: X \rightarrow] -0,1+ [$ define respectively a truth-membership function, an indeterminacy-membership function, and a falsity-membership function of the element x ∈ X to the set A with the condition

$0- \leq T_A(x) + I_A(x) + F_A(x) \leq 3+$.

The functions TA(x), IA(x) and FA(x) are real standard or nonstandard subsets of] −0,1+ [.

Definition 1.3 (Single Valued Neutrosophic Set). (Definition 6, p.2) [8].
Let X be a space of points (objects) with generic elements in X

denoted by x. A single valued neutrosophic set A (SVNS A) is characterized by truth-membership function $T_A(x)$, an indeterminacy-membership function $I_A(x)$, and a falsity-membership function $F_A(x)$. For each point x in X, $T_A(x)$, $I_A(x)$, $F_A(x) \in [0,1]$. A SVNS A can be written as

$A = \{< x: T_A(x), I_A(x), F_A(x) >, x \in X\}$.

Definition 1.4. The degree of truth-membership, indeterminacy-membership and falsity-membership of the subset $X \subset A$ of the single valued neutrosophic set

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

$T_A(X) = min\ [T_A\ (vi), T_A\ (v_j)] v_i, v_j \in X$,

$I_A(X) = min\ [I_A\ (v_i), I_A\ (v_j)] v_i, v_j \in X$,

and $F_A(X) = \min\ [F_A\ (v_i), F_A\ (v_j)] v_i, v_j \in X$.

Definition 1.5. The support of $X \subset A$ of the single valued neutrosophic set

$A = \{< \mathrm{x}: \mathrm{T_A(x)}, \mathrm{I_A(x)}, \mathrm{F_A(x)} >, \mathrm{x} \in \mathrm{X}\}$:

$supp(X) = \{x \in X: T_A(x), I_A(x), F_A(x) > 0\}$.

Definition 1.6 (Neutrosophic Super Hyper Graph (NSHG)). (Definition 3, p.291) [9].

Assume V 0 is a given set. A neutrosophic Super Hyper Graph (NSHG) S is an ordered pair

$S = (V, E)$, where

(i) $V = \{V_1, V_2,...,V_n\}$ a finite set of finite single valued neutrosophic subsets of V:

(ii) $V = \{(V_i, T_V\ 0(V_i), I_V\ 0(V_i), F_V\ 0(V_i)): T_V\ 0(V_i), I_V\ 0(V_i), F_V\ 0(V_i) \geq 0\}, (i =1, 2,...,n)$;

(iii) $E = \{E_1, E_2,...,E_{n'}\}$ a finite set of finite single valued neutrosophic subsets of V ;

(v) V_i 6= ∅, (i = 1, 2,...,n);

(vi) E_i /6= ∅, (i0 = 1, 2,...,n');

(vii) $\Sigma_i\ supp(V_i) = V$, (i = 1, 2, . . . , n);

(viii) $\Sigma_i'\ supp\ (E_i) = V$, ($i'$ = 1,2,...,n');

(ix) and the following conditions hold:

$T_V'\ (E_i') \leq \min\ [T_V\ '(V_i),T_V\ '(V_j)] V_i,V_j \in E_i'$,

$I_V'\ (E_i') \leq \min\ [I_V\ '(V_i),I_V\ '(V_j)] V_i,V_j \in E_i'$,

and $F_V'\ (E_i') \leq \min[F_V\ '(V_i),F_V\ '(V_j)] V_i,V_j \in E_i'$

where i' = 1, 2,...,n.

Here the neutrosophic Super Hyper Edges (NSHE) E_j' and the neutrosophic Super Hyper Vertices (NSHV) V_j are single valued neutrosophic sets. $T_V\ '(V_i)$,$I_V\ '(V_i)$, and $F_V\ '(V_i)$ denote the degree of truth-membership, the degree of indeterminacy-membership and the degree of falsity-membership the neutrosophic Super Hyper Vertex (NSHV) V_i to the neutrosophic Super Hyper Vertex (NSHV) V. $T'_V\ (E_i')$; $T'_V\ (E_i')$; and $T'_V\ (E_i')$ denote the degree of truth-membership, the degree of indeterminacy-membership and the degree of falsity-membership of the neutrosophic Super HyperEdge (NSHE) E_i' to the neutrosophic Super HyperEdge (NSHE) E. Thus, the ii0th element of the incidence matrix of neutrosophic Super Hyper Graph (NSHG) are of the form (V_i, $T_V'\ (E_i')$, $I_V'\ (E_i')$, $F_V'\ (E_i')$), the sets V and E are crisp sets.

Definition 1.7 (Characterization of the Neutrosophic Super Hyper Graph (NSHG)).

(Section 4, pp.291-292) [9].

Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair $S = (V, E)$.

The neutrosophic Super Hyper Edges (NSHE) E_i' and the neutrosophic Super Hyper Vertices (NSHV) V_i of neutrosophic Super Hyper Graph (NSHG) $S = (V, E)$ could be characterized as follow-up items.

(i) If $|V_i| = 1$, then V_i is called vertex;

(ii) if $|V_i| \geq 1$, then V_i is called Super Vertex;

(iii) if for all V_is are incident in E_i', $|V_i| = 1$, and $|E_i'| = 2$, then Ei0 is called edge;

(iv) if for all Vis are incident in E_i', $|V_i| = 1$, and $|E_i'| \geq 2$, then E_i' is called HyperEdge;

(v) if there's a V_i is incident in E_i' such that $|V_i| \geq 1$, and $|E_i'| = 2$, then E_i' is called SuperEdge;

(vi) if there's a V_i is incident in E_i' such that $|V_i| \geq 1$, and $|E_i'| \geq 2$, then E_i' is called Super HyperEdge.

If we choose different types of binary operations, then we could get hugely diverse types of general forms of neutrosophic Super Hyper Graph (NSHG).

Definition 1.8 (t-norm). (Definition 5.1.1, pp.82-83) [10].

A binary operation ⊗: [0,1] × [0,1] → [0,1] is a t-norm if it satisfies the following 147 for x, y, z, w ∈ [0,1]:

(i) $1 \otimes x = x$;

(ii) $x \otimes y = y \otimes x$;

(iii) $x \otimes (y \otimes z) = (x \otimes y) \otimes z$;

(iv) *If* $w \leq x$ *and* $y \leq z$ *then* $w \otimes y \leq x \otimes z$.

Definition 1.9. The degree of truth-membership, indeterminacy-membership and falsity-membership of the subset $X \subset A$ of the single valued neutrosophic set

$A = \{< x: T_A(x), I_A(x), F_A(x) >, x \in X\}$ (with respect to t-norm T_{norm}):

$T_A(X) = T_{norm}[T_A(v_i),T_A(v_j)] v_i,v_j \in X$,

$I_A(X) = T_{norm}[I_A(v_i),I_A(v_j)] v_i,v_j \in X$, and $F_A(X) = T_{norm}[F_A(v_i),F_A(v_j)] v_i,v_j \in X$.

Definition 1.10. The support of $X \subset A$ of the single valued neutrosophic set

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

$supp(X) = \{x \in X: T_A(x), I_A(x), F_A(x) > 0\}$.

Definition 1.11. (General Forms of Neutrosophic Super Hyper Graph (NSHG)).

Assume V' is a given set. A neutrosophic Super Hyper Graph (NSHG) S is an ordered pair

$S = (V, E)$, where

(i) $V = \{V_1, V_2,...,V_n\}$ a finite set of finite single valued neutrosophic subsets of V';

(ii) $V = \{(V_i, T_V\ '(V_i), I_V\ '(V_i), F_V\ '(V_i)): T_V\ '(V_i), I_V\ '(V_i), F_V\ '(V_i) \geq 0\}$, ($i$ =1, 2,...,n);

(iii) $E = \{E_1, E_2, ..., E_n'\}$ a finite set of finite single valued neutrosophic subsets of V;
(iv) $E = \{(E_i', T_V' (E_i'), I_V' (E_i'), F_V' (E_i')): T_V' (E_i'), I_V' (E_i'), F_V' (E_i') \geq 0\}, (i' = 1, 2, ..., n')$;
(v) Vi 6= ∅, (i = 1, 2,...,n);
(vi) E_i' 6= ∅, (i' = 1, 2,...,n');
(vii) $\Sigma_i \; supp \; (V_i) = V, (i = 1, 2, ..., n)$;
(viii) $\Sigma_i' \; supp \; (E_i') = V, (i' = 1, 2, ..., n')$.

Here the neutrosophic Super Hyper Edges (NSHE) E_j' and the neutrosophic 166 Super Hyper Vertices (NSHV) Vj are single valued neutrosophic sets. $T_V'(V_i)$, $I_V'(V_i)$, 167 and $F_V'(V_i)$ denote the degree of truth-membership, the degree of 168 indeterminacy-membership and the degree of falsity-membership the neutrosophic Super Hyper Vertex (NSHV) V_i to the neutrosophic Super Hyper Vertex (NSHV) V., and) denote the degree of truth-membership, the degree of indeterminacy-membership and the degree of falsity-membership of the neutrosophic Super HyperEdge (NSHE) Ei0 to the neutrosophic Super HyperEdge (NSHE) E. Thus, the ii0th element of the incidence matrix of neutrosophic Super Hyper Graph (NSHG) are of the form $(V_i; T'_V (E_i'); I'_V (E_i'); F'_V (E_i'))$,the sets V and E are crisp sets.

Definition 1.12 (Characterization of the Neutrosophic Super Hyper Graph (NSHG)).
(Section 4, pp.291-292) [9].
Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair $S = (V, E)$.
The neutrosophic Super Hyper Edges (NSHE) E_i' and the neutrosophic Super Hyper Vertices (NSHV) V_i of neutrosophic Super Hyper Graph (NSHG)
could be characterized as follow-up items.
(i) If $|V_i| = 1$, then V_i is called vertex;
(ii) if $|V_i| \geq 1$, then V_i is called Super Vertex;
(iii) if for all Vis are incident in E_i', $|V_i| = 1$, and $|E_i'| = 2$, then E_i' is called edge;
(iv) if for all $V_i s$ are incident in E_i', $|V_i| = 1$, and $|E_i'| \geq 2$, then Ei0 is called HyperEdge;
(v) if there's a V_i is incident in E_i' such that $|V_i| \geq 1$, and $|E_i'| = 2$, then E_i' is called SuperEdge
(vi) if there's a V_i is incident in E_i' such that $|V_i| \geq 1$, and $|E_i'| \geq 2$, then E_i' is called Super HyperEdge.

Definition 1.13. (Neutrosophic Super Hyper Dominating).
Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair S = (V, E)
Let D be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertex (NSHV) N in $V \setminus D$, there's at least a neutrosophic Super Hyper Vertex (NSHV) D_i in D such that N,D_i is in a neutrosophic Super HyperEdge (NSHE) is neutrosophic then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophic Super Hyper Dominating set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Dominating sets is called neutrosophic Super Hyper Dominating number and it's denoted by D(NSHG) where (neutrosophic cardinality of the single valued neutrosophic set
$A = \{< x: T_A(x), I_A(x), F_A(x) >, x \in X\}$:
$|A|T = X [T_A (v_i), T_A (v_j)]v_i, v_j \in A$,
$|A|I = X [I_A (v_i), I_A (v_j)]v_i, v_j \in A$,
$|A|F = X [F_A (v_i), F_A (v_j)]v_i, v_j \in A$, *and*
$|A| = X [|A|T, |A|I, |A|F]$.

Definition 1.14. (Neutrosophic Dual Super Hyper Dominating).
Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair Let D be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertex (NSHV) Di in D, there's at least a neutrosophic Super Hyper Vertex (NSHV) N in V \ D, such that N,Di is in a neutrosophic Super HyperEdge (NSHE) is neutrosophic then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophic dual Super Hyper Dominating set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Dominating sets is called neutrosophic dual Super Hyper Dominating number and it's denoted by D(NSHG) where neutrosophic cardinality of the single valued neutrosophic set
$A = \{< x: T_A(x), I_A(x), F_A(x) >, x \in X\}$:
$|A|T = X [T_A (v_i), T_A (v_j)]v_i, v_j \in A$,
$|A|I = X [I_A (v_i), I_A (v_j)]v_i, v_j \in A$,
$|A|F = X [F_A (v_i), F_A (v_j)]v_i, v_j \in A$, *and*
$|A| = X [|A|T, |A|I, |A|F]$.

Definition 1.15. (Neutrosophic Perfect Super Hyper Dominating).
Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair Let D be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertex (NSHV) N in V \ D, there's only one neutrosophic Super Hyper Vertex (NSHV) Di in D such that N, Di is in a neutrosophic Super HyperEdge (NSHE) is neutrosophic then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophic perfect Super Hyper Dominating set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Dominating sets is called neutrosophic perfect Super Hyper Dominating number and it's denoted by D(NSHG) where neutrosophic cardinality of the single valued neutrosophic set
$A = \{< x : T_A(x), I_A(x), F_A(x) >, x \in X\}$:
$|A|T = X [T_A (v_i), T_A (v_j)]v_i, v_j \in A$,
$|A|I = X [I_A (v_i), I_A (v_j)]v_i, v_j \in A$,
$|A|F = X [F_A (v_i), F_A (v_j)]v_i, v_j \in A$, *and*
$|A| = X[|A|T, |A|I, |A|F]$.

Definition 1.16. (Neutrosophic Total Super Hyper Dominating).
Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair Let D be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values

is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertex (NSHV) N in V, there's at least a neutrosophic Super Hyper Vertex (NSHV) D_i in D such that N, D_i is in a neutrosophic Super HyperEdge (NSHE) is neutrosophic then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophictotal Super Hyper Dominating set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Dominating sets is called neutrosophictotal Super Hyper Dominating number and it's denoted by D(NSHG) where neutrosophic cardinality of the single valued neutrosophic set

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

$|A|T = X [T_A (v_i), T_A (v_j)]v_i, v_j \in A,$

$|A|I = X [I_A (v_i), I_A (v_j)]v_i, v_j \in A,$

$|A|F = X [F_A (v_i), F_A (v_j)]v_i, v_j \in A,$ *and* $|A| = X[|A|T,|A|I,|A|F].$

Definition 1.17. (Neutrosophic Super Hyper Resolving).

Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair. Let R be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertices (NSHV) N and N0 in V \ R, there's at least a neutrosophic Super Hyper Vertex (NSHV) Ri in R such that N and N' are neutrosophic resolved by R_i, then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophicSuper Hyper Resolving set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Resolving sets is called neutrosophic Super Hyper Resolving number and it's denoted by R(NSHG) where neutrosophic cardinality of the single valued neutrosophic set

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

$|A|T = X[T_A(v_i),T_A(v_j)]v_i, v^j \in A,$

$|A|I = X[I_A(v_i),I_A(v_j)]v_i, v_j \in A,$

$|A|F = X[F_A(v_i),F_A(v_j)]v_i, v_j \in A,$ *and*

$|A| = X[|A|T,|A|I,|A|F].$

Definition 1.18. (Neutrosophic Dual Super Hyper Resolving).

Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair

Let R be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertices (NSHV) R_i and R_j in R, there's at least a neutrosophic Super Hyper Vertex (NSHV) N in V \ R such that R_i and R_j are neutrosophic resolved by Ri, then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophic dual Super Hyper Resolving set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Resolving sets is called neutrosophicdual Super Hyper Resolving number and it's denoted by R(NSHG) where neutrosophic cardinality of the single valued neutrosophic set

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

$|A|T = X[T_A (v_i),T_A(v_j)]v_i, v_j \in A,$

$|A|I = X[I_A(v_i),I_A(v_j)]v_i, v_j \in A,$

$|A|F = X[F_A(v_i),F_A(v_j)]v_i, v_j \in A,$ *and*

$|A| = X[|A|T,|A|I,|A|F].$

Definition 1.19. (Neutrosophic Perfect Super Hyper Resolving).

Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair.

Let R be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertices (NSHV) N and N0 in V \ R, there's only one neutrosophic Super Hyper Vertex (NSHV) R_i in R such that N and N' are neutrosophic resolved by R_i, then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophic perfect Super Hyper Resolving set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Resolving sets is called neutrosophic perfect Super Hyper Resolving number and it's denoted by R(NSHG) where neutrosophic cardinality of the single valued neutrosophic set

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

$|A|T = X[T_A(v_i),T_A(v_j)]v_i, v_j \in A,$

$|A|I = X[I_A(v_i),I_A(v_j)]v_i, v_j \in A,$

$|A|F = X[F_A(v_i),F_A(v_j)]v_i, v_j \in A,$ *and* $|A| = X[|A|T,|A|I,|A|F].$

Definition 1.20. (Neutrosophic Total Super Hyper Resolving).

Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair.

Let R be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).]. If for every neutrosophic Super Hyper Vertices (NSHV) N and N' in V, there's at least a neutrosophic Super Hyper Vertex (NSHV) R_i in R such that N and N' are neutrosophic resolved by Ri, then the set of neutrosophic Super Hyper Vertices (NSHV) S is called neutrosophic total Super Hyper Resolving set. The minimum neutrosophic cardinality between all neutrosophic Super Hyper Resolving sets is called neutrosophic total Super Hyper Resolving number and it's denoted by R(NSHG) where neutrosophic cardinality of the single valued neutrosophic set

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

$|A|T = X[T_A (v_i),T_A(v_j)]v_i, v_j \in A,$

$|A|I = X[I_A(v_i),I_A(v_j)]v_i, v_j \in A,$

$|A|F = X[F_A(v_i),F_A(v_j)]v_i, v_j \in A,$ *and*

$|A| = X[|A|T,|A|I,|A|F].$

Definition 1.21. (Neutrosophic Stable and Neutrosophic Connected).

Assume a neutrosophic Super Hyper Graph (NSHG) S is an ordered pair S = (V, E)

Let Z be a set of neutrosophic Super Hyper Vertices (NSHV) [a Super Hyper Vertex alongside triple pair of its values is called neutrosophic Super Hyper Vertex (NSHV).].

Then Z is called

(i) stable if for every two neutrosophic Super Hyper Vertices (NSHV) in Z, there's no Super HyperPaths amid them;

(ii) connected if for every two neutrosophic Super Hyper Vertices

(NSHV) in Z, there's at least one Super HyperPath amid them.
Thus, Z is called
(i) stable (k-number/dual/perfect/total)
(Super Hyper Resolving/Super Hyper Dominating) set if Z is (k-number/dual/perfect/total) (Super Hyper Resolving/Super Hyper Dominating)
set and stable;
(ii) connected (k-number/dual/perfect/total)
(Super Hyper Resolving/Super Hyper Dominating) set if Z is
(k-number/dual/perfect/total) (Super Hyper Resolving/Super Hyper Dominating) set and connected.
A number N is called
(i) stable (k-number/dual/perfect/total)
(Super Hyper Resolving/Super Hyper Dominating) number if its corresponded set Z is (k-number/dual/perfect/total)
(Super Hyper Resolving/Super Hyper Dominating) set and stable;
(ii) connected (k-number/dual/perfect/total)
(Super Hyper Resolving/Super Hyper Dominating) number if its corresponded set Z is (k-number/dual/perfect/total)
(Super Hyper Resolving/Super Hyper Dominating) set and connected.
Thus, Z is called
(i) (-/stable/connected) (-/dual/total) perfect
(Super Hyper Resolving/Super Hyper Dominating) set if Z is
(-/stable/connected) (-/dual/total) perfect
(Super Hyper Resolving/Super Hyper Dominating) set.
A number N is called
(i) (-/stable/connected) (-/dual/total) perfect (Super Hyper Resolving/Super Hyper Dominating) number if its
corresponded set Z is -/stable/connected) (-/dual/total) perfect
(Super Hyper Resolving/Super Hyper Dominating) set.

The Setting of The Neutrosophic Super Hyper Dominating

The Definitions of the terms in this section are referred by the previous chapter.

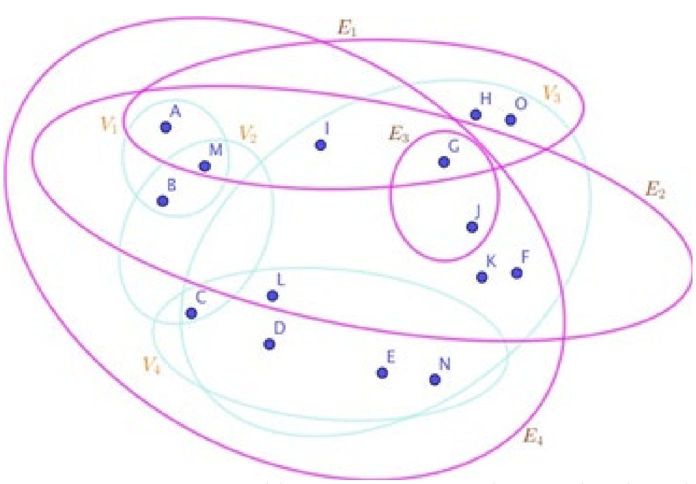

Figure 1: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (2.1)

Example 2.1. In Figure (1), the Super Hyper Graph is highlighted and featured. The sets, {*A, B, C, D, E, F, G, H, I, J, K, L, M, N, O*}, {V_1, V_2, V_3, V_4}, {E_3}, {E_1}, and {E_2, E_4} are the sets of vertices, SuperVertices, edges, Hyper Edges, and Super Hyper Edges, respectively. The SuperVertices V1, V2 and V4 Super HyperDominate each other by the Super HyperEdge E4. The Super Vertex V3 doesn't Super HyperDominate. The vertices G and J dominate each other by the edge E_3. The vertices *A, B, C, D, E, F, G, I, J, K, L, M,* and *N* HyperDominate each other by the Super HyperEdge E_4. The vertices H and O HyperDominate each other by the HyperEdge E_1. The set of vertices and SuperVertices, {*A, H,* V_1, V_3} is minimal Super Hyper Dominating set. The minimum Super Hyper Dominating number is 17. The sets of vertices and SuperVertices, which are listed below, are the minimal Super Hyper Dominating sets corresponded to the minimum Super Hyper Dominating number which is 17.
$\{A,H,V_1,V_3\},\{M,H,V_1,V_3\},\{B,H,V_1,V_3\},\{C,H,V_1,V_3\},\{L,H,V_1,V_3\},$ $\{D,H,V_1,V_3\},\{E,H,V_1,V_3\},\{N,H,V_1,V_3\},\{A,H,V_2,V_3\},\{M,H,V_2,V_3\},$ $\{B,H,V_2,V_3\},\{C,H,V_2,V_3\},\{L,H,V_2,V_3\},\{D,H,V_2,V_3\},\{E,H,V_2,V_3\},$ $\{N,H,V_2,V_3\},\{A,O,V_1,V_3\},\{M,O,V_1,V_3\},\{B,O,V_1,V_3\},\{C,O,V_1,V_3\},$ $\{L,O,V_1,V_3\},\{D,O,V_1,V_3\},\{E,O,V_1,V_3\},\{N,O,V_1,V_3\},\{A,O,V_2,V_3\},$ $\{M,O,V_2,V_3\},\{B,O,V_2,V_3\},\{C,O,V_2,V_3\},\{L,O,V_2,V_3\},\{D,O,V_2,V_3\},$ $\{E,O,V_2,V_3\},\{N,O,V_2,V_3\}.$

By using the Figure (2.1) and the Table (1), the neutrosophic Super Hyper Graph is
obtained.

There are some points for the vertex A as follows.
(i): The vertex A Super HyperDominates *M, I* and *G* by using three Super Hyper Edges
E_1, E_2, and E_4.
(ii): The vertex A Super HyperDominates *B, J, K, L*, and *F* by using two Super Hyper Edges E_2, and E_4.

Table 1: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (2.1)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

Table 2: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (2.2)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

(iii): The vertex A Super HyperDominates *C, D, E, H*, and N by using one Super HyperEdge E_4.
There are some points for the vertex H as follows.
(i): The vertex H Super HyperDominates *A, M, G*, and O by using one Super HyperEdge E_1.
There are some points for the Super Vertex V_1 as follows.
(i): The Super Vertex V_1 Super HyperDominates V_2, and V_4 by using one Super HyperEdge E_4.
There are some points for the Super Vertex V_3 as follows.
(i): The Super Vertex V_3 Super HyperDominates no Super Vertex. It's an isolated
Super Vertex.

In this case, there's no Super HyperMatching.
With the exception of the isolated Super Vertex and the isolated vertex, the neutrosophic notion of perfect has no set here. In the upcoming section, a kind of a neutrosophic Super Hyper Graph will be featured. This kind is based on one kind of neutrosophic notions, perfect, total, global, connected, stable, k-number, dual, and the combinations of them.

Example 2.2. In Figure (2), the Super Hyper Graph is highlighted and featured. The sets, {*A, B, C, D, E, F, G, H, I, J, K, L, M, N, O*}, {V_1, V_2, V_3, V_4}, {E_3}, {E_1, E_2}, and {E_4} are the sets of vertices, SuperVertices, edges, Hyper Edges, and Super Hyper Edges, respectively. By using the Figure (2.2) and the Table (2), the neutrosophic Super Hyper Graph is obtained.
There are some points for the vertex A as follows.
(i): The vertex A Super HyperDominates *B, C, D, E, F, G, H, I, J, K, M, N* and O by using one Super HyperEdge E_4.
There are some points for the Super Vertex V_1 as follows.

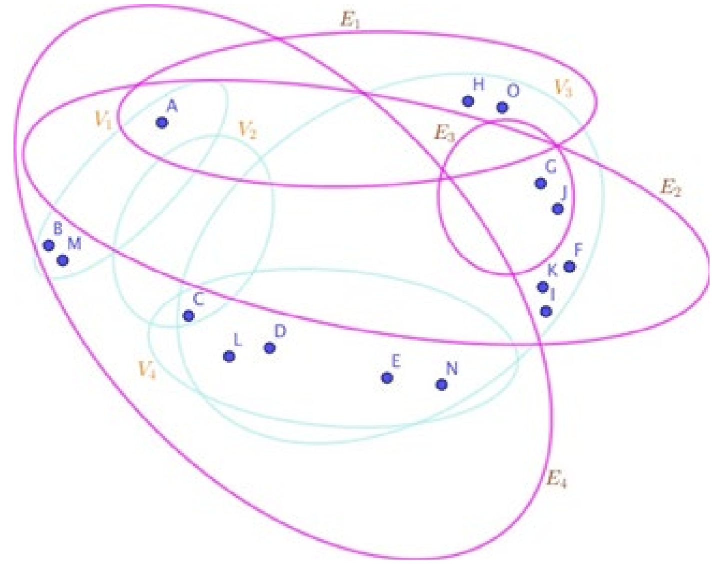

Figure 2: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (2.2)

(i): The Super Vertex V_1 Super HyperDominates V_2, and V_4 by using one Super HyperEdge E_4.
There are some points for the Super Vertex V_3 as follows.
(ii): The Super Vertex V_3 Super HyperDominates no Super Vertex. It's an isolated Super Vertex.
To sum them up, the set of SuperVertices and vertices {A, V_1, V_3} is perfect Super Hyper Dominating set. It's neither of connected, dual, total and stable Super Hyper Dominating set. In this case, there's no Super HyperMatching.

Proposition 2.3. Consider a Super Hyper Graph. If a Super Hyper Dominating set has either an isolated Super Vertex or an isolated vertex, then the set isn't connected, dual, and total.

Proposition 2.4. Consider a Super Hyper Graph. If a Super Hyper Dominating set has either an isolated Super Vertex or an isolated vertex but neither all SuperVertices nor all vertices, then the set isn't connected, dual, total and stable.

The Example (2.2), presents the obvious case in that, the set is perfect but neither of connected, dual, total and stable. The relation between the notion perfect and other notions, namely, connected, dual, total and stable are illustrated as follows.

Example 2.5. In Figure (3), the Super Hyper Graph is highlighted and featured. The sets, {*A, B, C, D, E, F, H, I, K, L, M, N, O*}, {V_1, V_2, V_3}, {E_2}, {E_3}, {E_1}, and {E_4} are the sets of vertices, SuperVertices, loops, edges, Hyper Edges, and Super Hyper Edges, respectively. By using the Figure (2.5) and the Table (3), the neutrosophic Super Hyper Graph is obtained.

There are some points for the vertex A as follows.
(i): The vertex A Super HyperDominates *B, C, D, E, F, H, I, K, L,*

M, N and *O* by using one Super HyperEdge E4.

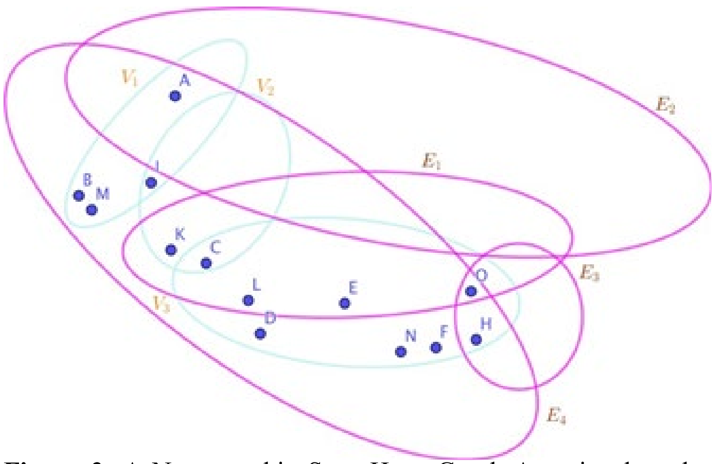

Figure 3: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (2.5)

Table 3: The Values of Vertices, SuperVertices, Edges, Hyper-Edges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (2.5)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVer-tices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdg-es	The Minimum Values of Its Vertices
The Values of The SuperHyp-erEdges	The Minimum Values of Its Endpoints

There are some points for the Super Vertex V_1 as follows.
(i): The Super Vertex V_1 Super HyperDominates V_2, and V_3 by using one Super HyperEdge E_4.
To sum them up, the set of SuperVertices and vertices $\{A, V_1\}$ is perfect SuperHyper Dominating set. It's either of connected, dual, and total Super Hyper Dominating set but not stable Super Hyper Dominating set. In this case, there's only one obvious Super HyperMatching, namely, $\{E_4\}$.

Example 2.6. In Figure (4), the Super Hyper Graph is highlighted and featured. The sets, $\{A, B, C, D, E, F, H, I, K, L, M, N, O\}$, $\{V_1, V_2, V_3, V_4\}$, $\{E_3\}$, $\{E_1, E_2\}$, and $\{E_4, E_5\}$ are the sets of vertices, SuperVertices, loops, SuperEdges, Hyper Edges, and Super Hyper Edges, respectively. By using the Figure (2.6) and the Table (4), the neutrosophic Super Hyper Graph is obtained.
In this case, there's a Super HyperMatching, namely, $\{E_1, E_4, E_5, E_2\}$.

Table 4: The Values of Vertices, SuperVertices, Edges, Hyper Edges, and Super Hyper Edges Belong to The Neutrosophic Super Hyper Graph Mentioned in the Example (2.6)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVer-tices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdg-es	The Minimum Values of Its Vertices
The Values of The SuperHyp-erEdges	The Minimum Values of Its Endpoints

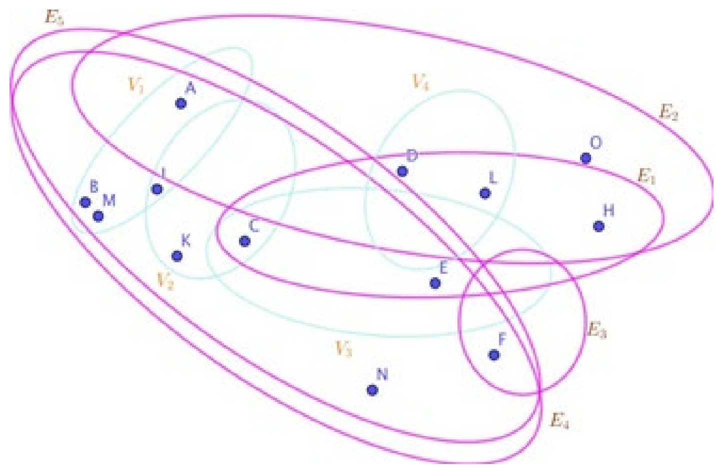

Figure 4: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (2.6)

In the Example (2.6), the Super HyperMatching, namely, $\{E_1, E_4, E_5, E_2\}$, is proper.
The term "proper" is referred to the case where edges, SuperEdges, Hyper Edges, and Super Hyper Edges have no common endpoints with the exception in which the vertices and their SuperVertices could be endpoints for same SuperEdges, Hyper Edges, and Super Hyper Edges.

Definition 2.7. Assume a neutrosophic Super Hyper Graph. Then
(i): two vertices are isolated if there's no edge amid them;
(ii): two vertices are HyperIsolated if there's no HyperEdge amid them;
(iii): two vertices or SuperVertices are SuperIsolated if there's no SuperEdge amid them;
(iv): two vertices or SuperVertices are Super HyperIsolated if there's no Super HyperEdge amid them;
(v): a notion holds if the connections amid points are all edges;
(vi): a HyperNotion holds if the set of connections amid points contains at least one Hyper Edges;
(vii): a SuperNotion holds if the connections amid points are all

SuperEdges;

(viii): a Super HyperNotion holds if the set of connections amid points contains at least one Super Hyper Edges;

(ix): If the connections amid vertices and the SuperVertices include them, count one time then the notion is Super HyperProper;

Assume there's a point which connects to all other points and there's no connection more.

(x): it's a star if the connections amid points are all edges;

(xi): it's a HyperStar if the set of connections amid points contains at least one Hyper Edges;

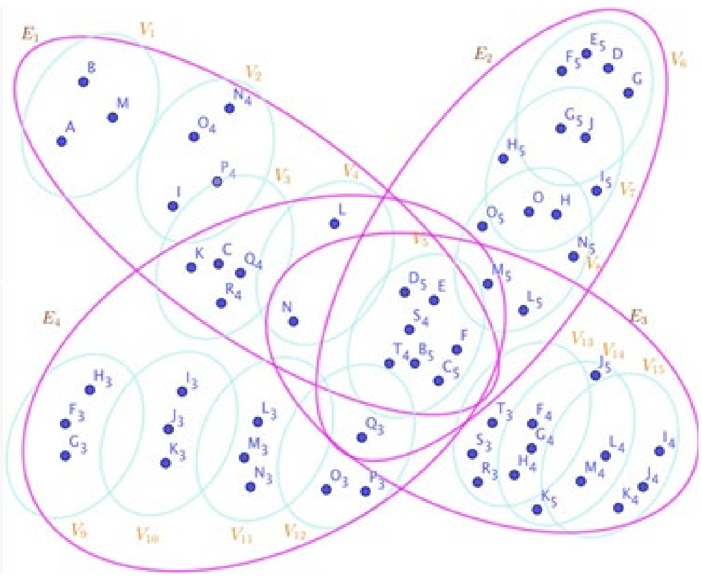

Figure 5: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (3.1)

Table 5: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (3.1)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

(xii): it's a SuperStar if the connections amid points are all SuperEdges;

(xiii): it's a Super HyperStar if the set of connections amid points contains at least one Super Hyper Edges.

A Super HyperStar is illustrated in the Example (3.1).

The Setting of Maximum Number of The Neutrosophic Stable Perfect

The natural extension is concerned to find minimum number of neutrosophic notions.

Since the maximum number is always the number of vertices or neutrosophic number [which could be defined in different ways] of vertices.

Example 3.1. In Figure (5), the Super Hyper Graph is highlighted and featured. By using the Figure (3.1) and the Table (5), the neutrosophic Super Hyper Graph is obtained.

In this case, there's the minimum Super Hyper Dominating, namely, $\{E, V_5\}$.

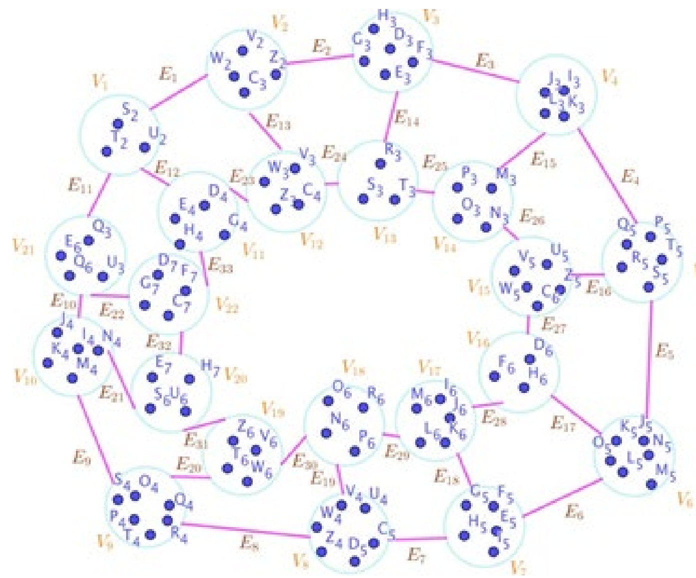

Figure 6: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (4.1)

Table 6: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (4.1)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

The Setting of Maximum Number of The Neutrosophic Dual Perfect

Example 4.1. In Figure (6), the Super Hyper Graph is highlighted and featured. By using the Figure (4.1) and the Table (6), the neutrosophic Super Hyper Graph is obtained.

In this case, there's the maximum dual perfect Super Hyper Dominating set, namely,
$\{V_{11}, V_{12}, V_{13}, V_{14}, V_{15}, V_{16}, V_{17}, V_{18}, V_{19}, V_{20}, V_{22}\}$.

Example 4.2. In Figure (7), the Super Hyper Graph is highlighted and featured. By using the Figure (4.2) and the Table (7), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the maximum dual perfect Super Hyper Dominating set, namely,
$\{V_1, V_2, V_3, V_4, V_5, V_6, V_7, V_8, V_9, V_{10}, V_{11}\}$.

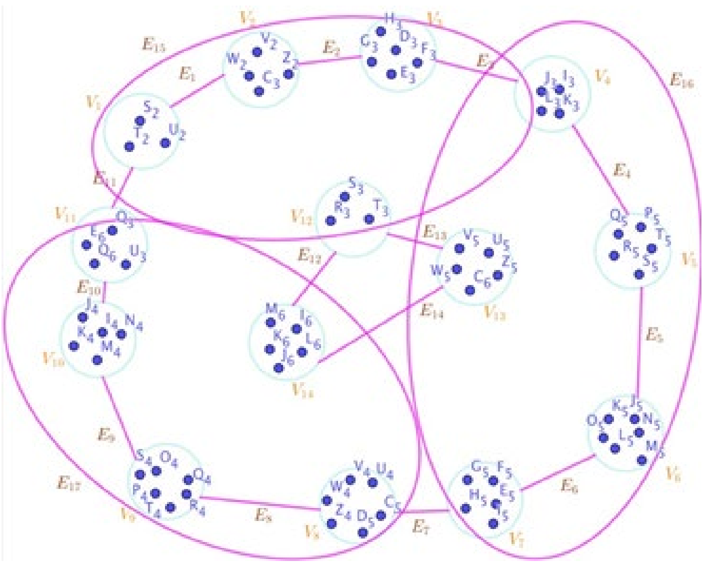

Figure 7: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (4.2)

Table 7: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (4.2)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

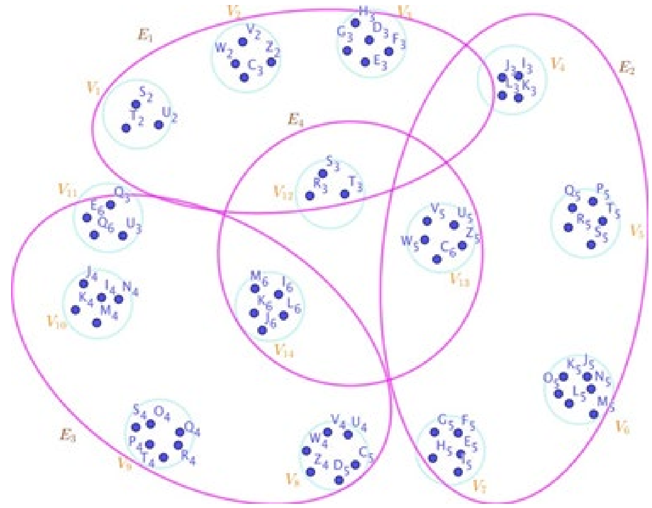

Figure 8: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (6.1)

Table 8: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (6.1)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

The Setting of Minimum Number of The Neutrosophic Notions

The Setting of Minimum Number of The Neutrosophic Total Perfect

Since there's a possibility to have a Super HyperEdge contains multiple SuperVertices, instead of selecting a Super Vertex, the section of a Super HyperEdge is substituted in the Definition of Super Hyper Dominating. In the context of perfect, finding unique Super HyperEdge is only matter.

Example 6.1. In Figure (8), the Super Hyper Graph is highlighted and featured. By using the Figure (6.1) and the Table (8), the neutrosophic Super Hyper Graph is obtained.

In this case, there's the minimum total perfect Super Hyper Dominating set, namely, $\{V_{12}, V_{13}, V_{14}\}$.
Example 6.2. In Figure (9), the Super Hyper Graph is highlighted and featured. By using the Figure (6.2) and the Table (9), the neutrosophic Super Hyper Graph is obtained.

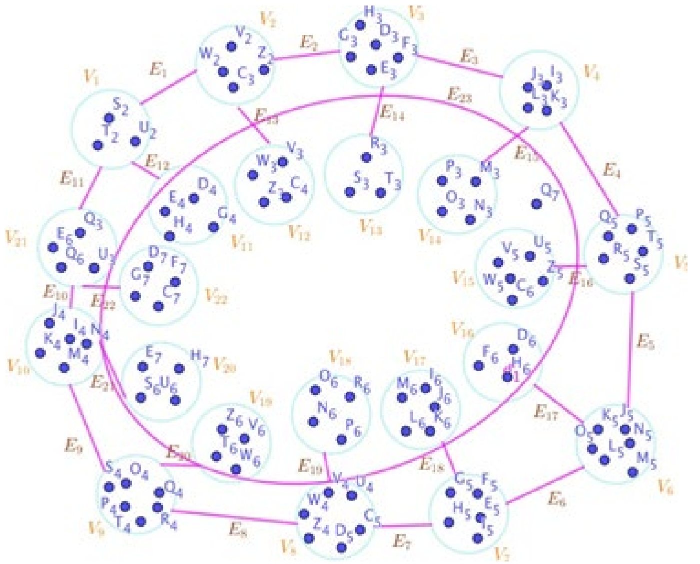

Figure 9: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (6.2)

Table 9: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (6.2)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

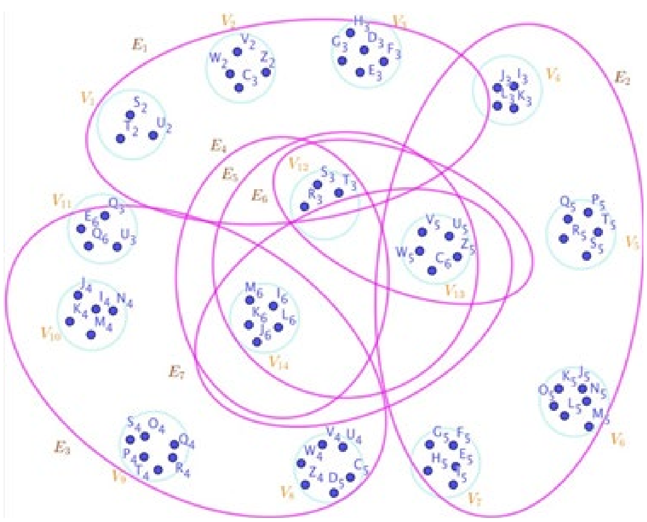

Figure 10: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating in the Example (7.1)

Table 10: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (7.1)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

In this case, there's the minimum total perfect Super Hyper Dominating set, namely, $\{V_{11}, V_{12}, V_{13}, V_{14}, V_{15}, V_{16}, V_{17}, V_{18}, V_{19}, V_{20}, V_{22}\}$.

The Setting of Minimum Number of The Neutrosophic Connected Perfect

Example 7.1. In Figure (10), the Super Hyper Graph is highlighted and featured. By using the Figure (7.1) and the Table (10), the neutrosophic Super Hyper Graph is obtained.

In this case, there's the minimum connected perfect Super Hyper Dominating set, namely, $\{V_{12}, V_{13}, V_{14}\}$ but neither of minimum total perfect Super Hyper Dominating set, minimum dual perfect Super Hyper Dominating set and minimum stable perfect Super Hyper Dominating set.

The Setting of The Neutrosophic Super Hyper Resolving

The Definitions of the terms in this section are referred by the previous chapter.

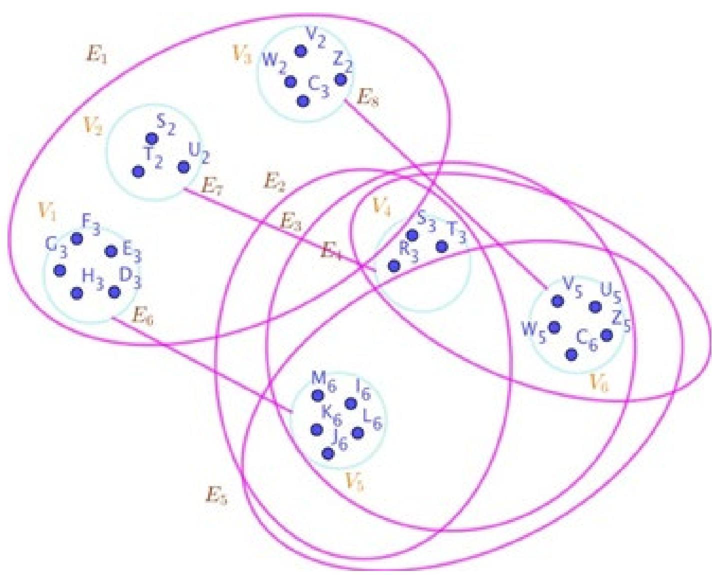

Figure 11: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.1)

Table 11: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.1)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

Example 8.1. In Figure (11), the Super Hyper Graph is highlighted and featured. By using the Figure (8.1) and the Table (11), the neutrosophic Super Hyper Graph is obtained.

In this case, there's the minimum Super Hyper Resolving set, namely, $\{V_4, V_5, V_6\}$. It's also minimum perfect Super Hyper Resolving set, minimum dual, Super Hyper Resolving set and minimum connected Super Hyper Resolving set but not minimum stable Super Hyper Resolving set.

Example 8.2. In Figure (12), the Super Hyper Graph is highlighted and featured. By using the Figure (8.2) and the Table (12), the neutrosophic Super Hyper Graph is obtained.

Table 12: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.2)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

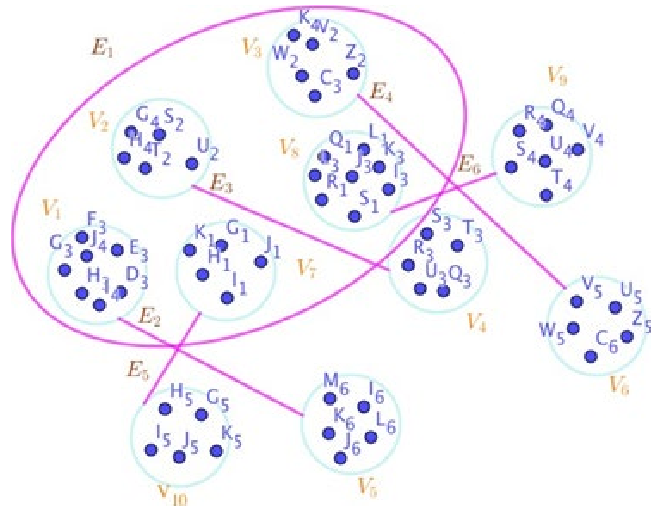

Figure 12: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.2)

Table 13: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.4)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

In this case, there's the minimum Super Hyper Resolving set, namely, $\{V_4, V_5, V_6\}$.
It's also minimum perfect Super Hyper Resolving set and minimum stable SuperHyper Resolving set.

Example 8.3.
Example 8.4. In Figure (13), the Super Hyper Graph is highlighted and featured. By using the Figure (8.4) and the Table (13), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set, namely, $\{V_4, V_5, V_6\}$.
It's also minimum perfect Super Hyper Resolving set and minimum total Super Hyper Resolving set.

Example 8.5. In Figure (24), the Super Hyper Graph is highlighted and featured. By using the Figure (8.5) and the Table (24), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set, namely, {V3}. It's also minimum perfect Super Hyper Resolving set and minimum total Super Hyper Resolving set. There's the

minimum dual Super Hyper Resolving set, namely, $\{V_1, V_2\}$.

Example 8.6. In Figure (15), the Super Hyper Graph is highlighted and featured. By using the Figure (8.6) and the Table (15), the neutrosophic Super Hyper Graph is obtained.

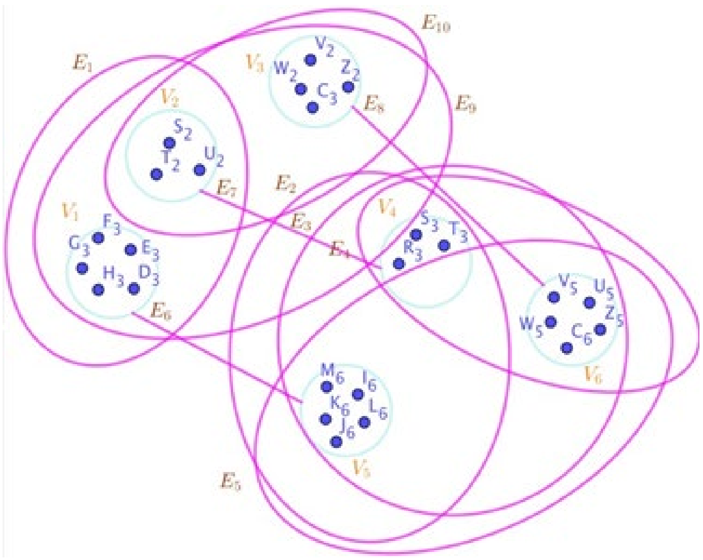

Figure 13: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.4)

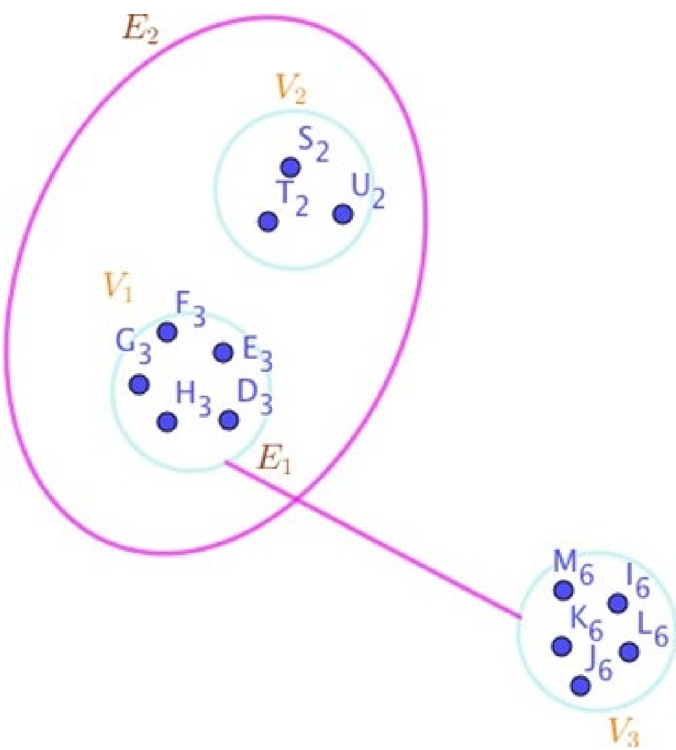

Figure 14: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.5)

Table 14: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.5)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

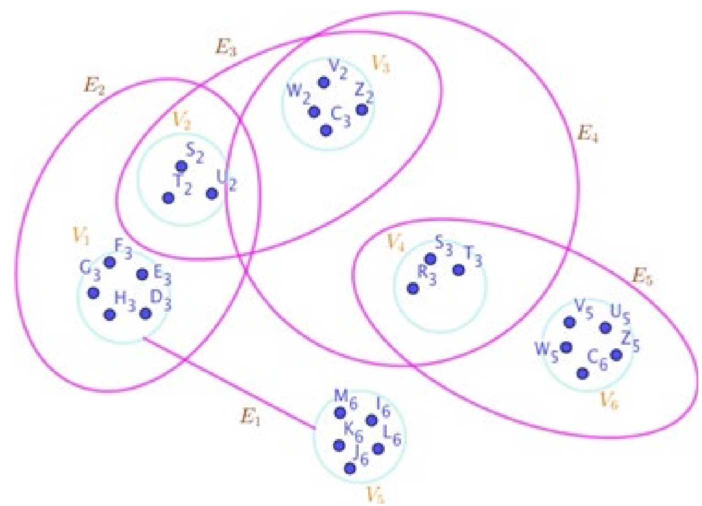

Figure 15: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.6)

Table 15: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.6)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

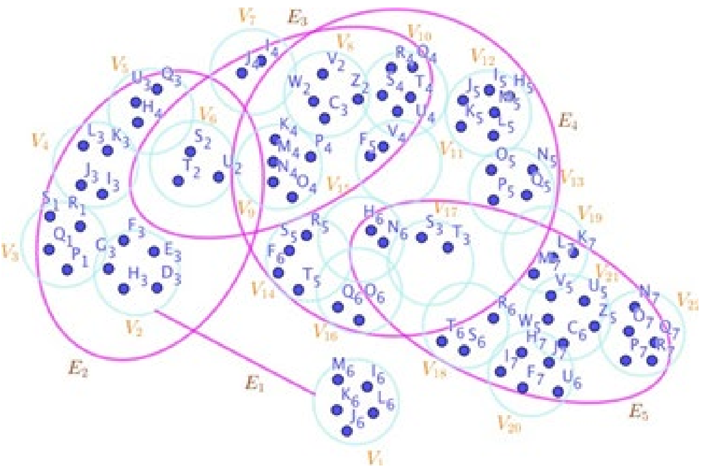

Figure 16: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.7)

Table 16: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.7)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

In this case, there's the minimum Super Hyper Resolving set, namely, {V5}. It's also minimum perfect Super Hyper Resolving set and minimum total Super Hyper Resolving set. There's the minimum dual Super Hyper Resolving set, namely, $\{V_1, V_2, V_3, V_4\}$.

Example 8.7. In Figure (16), the Super Hyper Graph is highlighted and featured. By using the Figure (8.7) and the Table (16), the neutrosophic Super Hyper Graph is obtained.

In this case, there's the minimum Super Hyper Resolving set, namely, $\{V_1, V_3, V_4, V_5, V_7, V_8, V_9, V_{10}, V_{12}, V_{13}, V_{14}, V_{15}, V_{16}, V_{18}, V_{19}, V_{20}, V_{21}\}$. It's also the minimum dual Super Hyper Resolving set, namely, $\{V_2, V_6, V_{11}, V_{17}, V_{22}\}$.

Example 8.8. In Figure (17), the Super Hyper Graph is highlighted and featured. By using the Figure (8.8) and the Table (17), the neutrosophic Super Hyper Graph is obtained.

Table 17: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.8)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

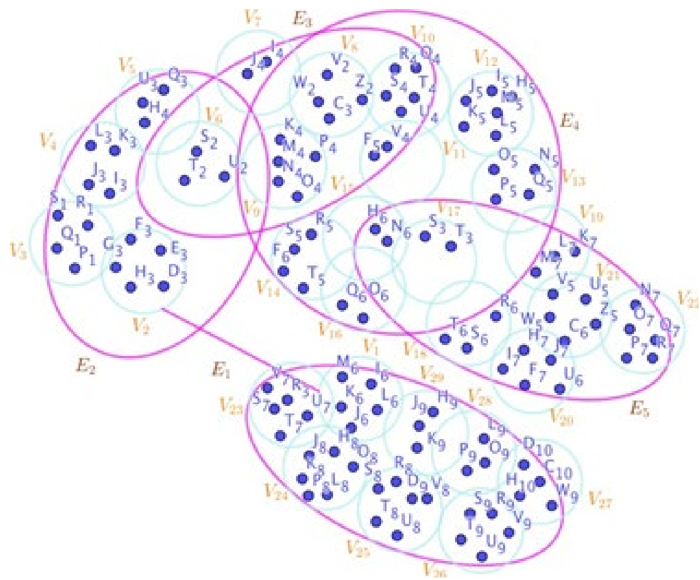

Figure 17: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.8)

Table 18: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.9)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

In this case, there's the minimum Super Hyper Resolving set, namely, $\{V_{29}, V_3, V_4, V_5, V_7, V_8, V_9, V_{10}, V_{12}, V_{13}, V_{14}, V_{15}, V_{16}, V_{18}, V_{19}, V_{20}, V_{21}, V_{23}, V_{24}, V_{25}, V_{26}, V_{27}, V_{28}\}$.

It's also the minimum dual Super Hyper Resolving set, namely, $\{V_1, V_2, V_6, V_{11}, V_{17}, V_{22}\}$.
Example 8.9. In Figure (18), the Super Hyper Graph is highlighted and featured. By using the Figure (8.9) and the Table (18), the neutrosophic Super Hyper Graph is obtained.

In this case, there's the minimum Super Hyper Resolving set, namely, It's also the, minimum dual Super Hyper Resolving set, namely, $\{V_1, V_2, V_6, V_{11}, V_{17}, V_{22}\}$.

Definition 8.10. Assume a neutrosophic Super Hyper Graph. In the terms of Super Hyper Resolving, there's are some Super Hyper Classes as follows.
(i). it's R-Super HyperPath if it's only one Super Vertex as intersection amid two
given Super Hyper Edges with two exceptions as illustrated in the Example (8.9);
(ii). it's R-Super HyperCycle if it's only one Super Vertex as intersection amid two
given Super Hyper Edges as illustrated in the Example (8.11);

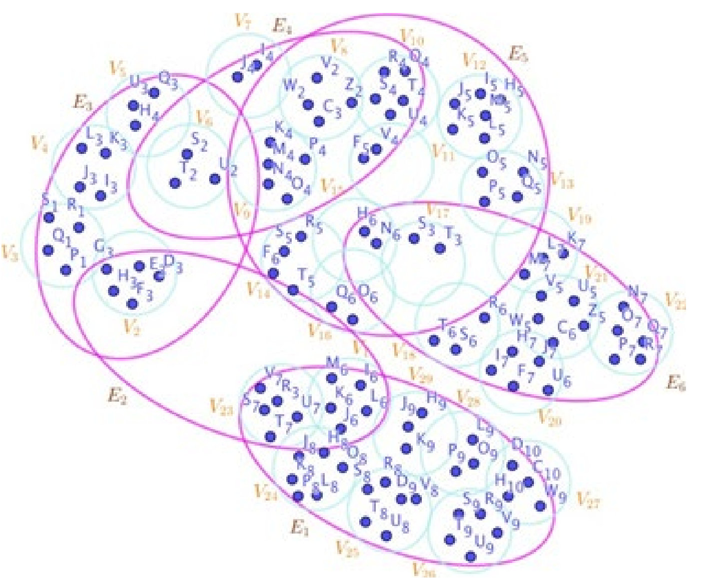

Figure 18: A Neutrosophic Super Hyper Graph Associated to the Notions of Super Hyper Resolving in the Example (8.9)

Table 19: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.11)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

(iii). it's R-Super HyperStar it's only one Super Vertex as intersection amid all
Super Hyper Edges as illustrated in the Example (8.12);
(iv). it's R-Super Hyper Bipartite it's only one Super Vertex as intersection amid two
given Super Hyper Edges and these Super Vertices, forming two separate sets, has
no Super Hyper Edge in common as illustrated in the Example (8.13);
(v). it's R-Super Hyper Multi Partite it's only one Super Vertex as intersection amid
two given Super Hyper Edges and these Super Vertices, forming multi separate sets,
has no Super Hyper Edge in common as illustrated in the Example (8.14);
(vi). it's R-Super Hyper Wheel if it's only one Super Vertex as intersection amid two
given Super Hyper Edges and one Super Vertex has one Super Hyper Edge with any
common Super Vertex as illustrated in the Example (8.15);

Example 8.11. In Figure (19), the Super Hyper Graph is highlighted and featured. By using the Figure (8.11) and the Table (19), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set as illustrated in the Figure (19).

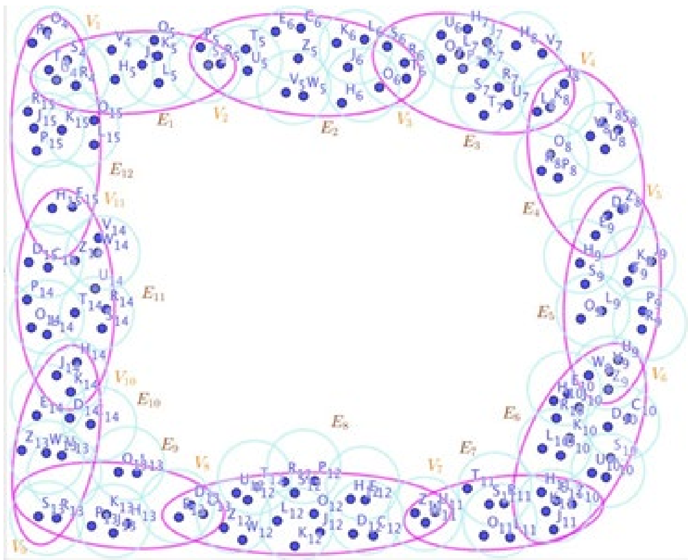

Figure 19: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.11)

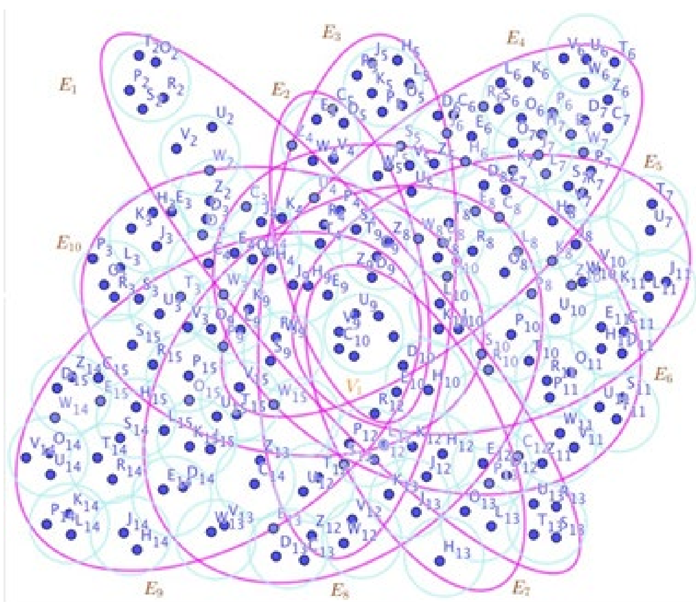

Figure 20: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy-perResolving in the Example (8.12)

Table 20: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.12)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

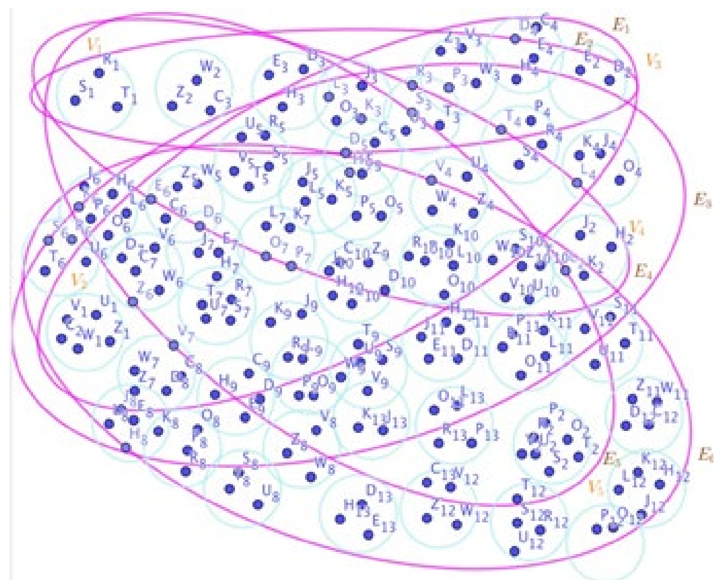

Figure 21: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.13)

Example 8.12. In Figure (20), the Super Hyper Graph is highlighted and featured. By using the Figure (8.12) and the Table (20), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set as illustrated in the Figure (20).

Example 8.13. In Figure (21), the Super Hyper Graph is highlighted and featured. By using the Figure (8.13) and the Table (21), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set as illustrated in the Figure (21).

Table 21: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.13)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

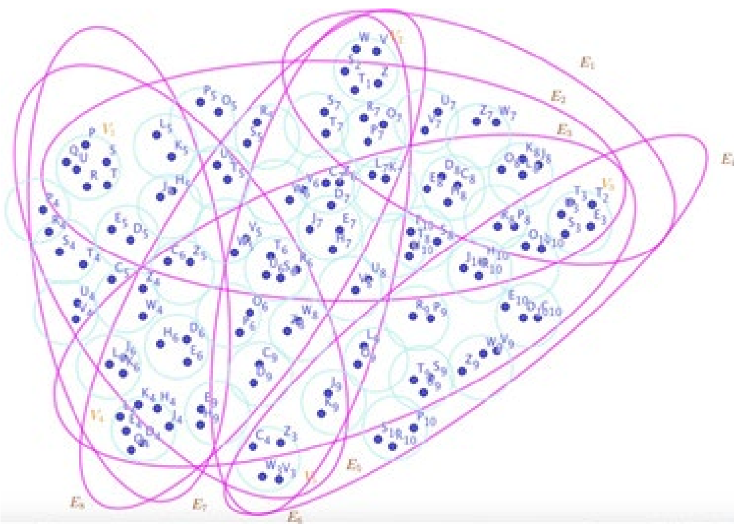

Figure 22: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.14)

Table 22: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.14)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

Example 8.14. In Figure (22), the Super Hyper Graph is highlighted and featured. By using the Figure (8.14) and the Table (22), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set as illustrated in the Figure (22).

Example 8.15. In the Figure (23), the Super Hyper Graph is highlighted and featured.
By using the Figure (8.15) and the Table (23), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set as illustrated in the Figure (23).

Definition 8.16. Assume a neutrosophic Super Hyper Graph. An interior Super Hyper Vertex is a Super Hyper Vertex which is contained in only one.

Table 23: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy- perEdges Belong to The Neutrosophic SuperHyperGraph Mentioned in the Example (8.15)

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

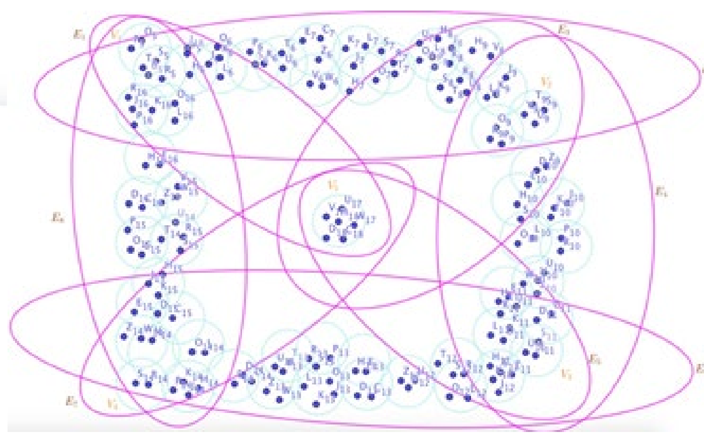

Figure 23: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving in the Example (8.15)

Super Hyper Edge.
Definition 8.17. Assume a neutrosophic Super Hyper Graph. An exterior Super Hyper Vertex is a Super Hyper Vertex which is contained in more than one Super Hyper Edge.

Definition 8.18. Assume a neutrosophic Super Hyper Path. A Super Hyper Leaf is a Super Hyper Vertex which is contained in a Super Hyper Edge connects to only one Super Hyper Edge.

Definition 8.19. Assume a neutrosophic Super Hyper Graph. A Su-

per Hyper Center is a Super Hyper Vertex which is contained in any Super Hyper Edge contains Super Hyper Vertex.
Definition 8.20. Assume a Super Hyper Graph. If two Super Hyper Vertices have same Super Hyper Edge, then these Super Hyper Vertices are said to be Super Hyper Neighbors.

Definition 8.21. Assume a Super Hyper Graph. If two Super Hyper Vertices have same Super Hyper Neighbors, then these Super Hyper Vertices are said to be Super Hyper Twins.

Definition 8.22. Assume a Super Hyper Graph. The minimum number of Super Hyper Edges amid two Super Hyper Vertices is said to be Super Hyper Distance amid them.

Proposition 8.23. Assume a neutrosophic Super Hyper Graph. The minimum Super Hyper Resolving set contains all interior Super Hyper Vertices.

Proof. Consider a neutrosophic Super Hyper Graph. All interior Super Hyper Vertices with related exterior Super Hyper Vertices have the Super Hyper Distance one. Thus, one of them could only be out of the minimum Super Hyper Resolving set.

Proposition 8.24. Assume a neutrosophic R-Super Hyper Path. The minimum Super Hyper Resolving set contains only one of Super Hyper Leaves.

Proof. Consider a neutrosophic R-Super Hyper Path. Assume A is a Super Hyper Leaf.
Then there are new arrangements of Super Hyper Vertices such that Super Hyper Distance amid them with Super Hyper Leaf is distinct where Super Hyper Vertices are neither interior Super Hyper Vertex nor exterior Super Hyper Vertex more than one.

Definition 8.25. Assume a Super Hyper Cycle. If two Super Hyper Vertices have same Super Hyper Distance with any two given Super Hyper Vertices, then these Super Hyper Vertices are said to be Super Hyper Antipodals.

Proposition 8.26. Assume a neutrosophic R-Super Hyper Cycle. The minimum Super Hyper Resolving set contains two exterior Super Hyper Vertices have only one Super Hyper Edge in common [and not more].
Proof. Assume a neutrosophic R-Super Hyper Cycle. Two exterior Super Hyper Vertices have only one Super Hyper Edge in common [and not more] aren't the Super Hyper Antipodals. Thus, the Super Hyper Vertices such that Super Hyper Distance amid them with at least one of these two exterior Super Hyper Vertices is distinct were Super Hyper Vertices are neither interior Super Hyper Vertex nor exterior Super Hyper Vertex more than one.

Proposition 8.27. Assume a neutrosophic R-Super Hyper Star. The minimum Super Hyper Resolving set contains all exterior Super Hyper Vertices excluding the Super Hyper Center and another Super Hyper Vertex.

Proof. Assume a neutrosophic R-Super Hyper Star. All Super Hyper Vertices are the Super Hyper Twins with the only exception the Super Hyper Center. Thus, one of Super Hyper Twins could be only out of minimum Super Hyper Resolving set. Any given Super Hyper Vertex in the minimum Super Hyper Resolving set has the Super Hyper Distance one with the Super Hyper Center and the Super Hyper Distance two with the latter Super Hyper Vertex.

Proposition 8.28. Assume a neutrosophic R-Super Hyper Bipartite. The minimum Super Hyper Resolving set contains all exterior Super Hyper Vertices excluding two Super Hyper Vertices in different parts.

Proof. Assume a neutrosophic R-Super Hyper Bipartite. All Super Hyper Vertices are the Super Hyper Twins in the same parts. Thus, one of Super Hyper Twins could be only out of minimum Super Hyper Resolving set. Any given Super Hyper Vertex in the minimum Super Hyper Resolving set has the Super Hyper Distance one with the Super Hyper Vertex in different part and the Super Hyper Distance two with the Super Hyper Vertex in same part. Thus, the minimum Super Hyper Resolving set contains all exterior Super Hyper Vertices excluding two Super Hyper Vertices in different parts.

Proposition 8.29. Assume a neutrosophic R-Super HyperMultiPartite. The minimum Super Hyper Resolving set contains all exterior Super Hyper Vertices excluding two Super Hyper Vertices in different parts.

Proof. Assume a neutrosophic R-Super HyperMultiPartite. All Super Hyper Vertices are the Super HyperTwins in the same parts. Thus, one of Super HyperTwins could be only out of minimum Super Hyper Resolving set. Any given Super Hyper Vertex in the minimum Super Hyper Resolving set has the Super HyperDistance one with the Super Hyper Vertex in different part and the Super HyperDistance two with the Super Hyper Vertex in same part. Thus, the minimum Super Hyper Resolving set contains all exterior Super Hyper Vertices excluding two Super Hyper Vertices in different parts.

Proposition 8.30. Assume a neutrosophic R-Super HyperWheel. The minimum Super Hyper Resolving set contains all exterior Super Hyper Vertices excluding three Super Hyper Vertices, namely, two Super Hyper Vertices have only one Super HyperEdge in common [and not more] and the Super HyperCenter.

Proof. Assume a neutrosophic R-Super HyperWheel. Any given Super Hyper Vertex in the minimum Super Hyper Resolving set has the Super HyperDistance one with its Super HyperNeighbors and the Super HyperDistance two with the other Super Hyper Vertex. Thus, the minimum Super Hyper Resolving set contains all exterior Super Hyper Vertices excluding three Super Hyper Vertices, namely, two Super Hyper Vertices have only one Super HyperEdge in common [and not more] and the Super HyperCenter.

Some Results on Neutrosophic Classes Via Minimum Super Hyper Dominating Set

Proposition 9.1. Assume a neutrosophic Super Hyper Graph. A Super Hyper Vertex Super HyperDominates if and only if it has Super HyperDistance one.

Proposition 9.2. Assume a neutrosophic Super Hyper Graph. The minimum Super Hyper Dominating set contains only Super Hyper Vertices with Super HyperDistances one from other Super Hyper Vertices.

Proposition 9.3. Assume a neutrosophic R-Super HyperPath. The minimum Super Hyper Dominating set contains only Super Hyper Vertices with Super HyperDistances at least n over 3.
Proof. Consider a neutrosophic R-Super HyperPath. Any Super Hyper Vertex has two Super HyperNeighbors with the exceptions Super HyperLeaves. Thus, any Super Hyper Vertex has two Super Hyper Vertices with Super HyperDistances one with the exceptions Super HyperLeaves. Super Hyper Vertices with Super HyperDistances. The upper Hyper Vertices are consecutive. Thus, the minimum Super Hyper Dominating set contains only Super Hyper Vertices with Super HyperDistances at least n over 3.

Proposition 9.4. Assume a neutrosophic R-Super HyperCycle. The minimum Super Hyper Dominating set contains only Super Hyper Vertices with Super HyperDistances at least n over 3.

Proof. Assume a neutrosophic R-Super HyperCycle. Any Super Hyper Vertex has two Super HyperNeighbors. Thus, any Super Hyper Vertex has two Super Hyper Vertices with Super HyperDistances one. Super Hyper Vertices with Super HyperDistances. The Super Hyper Vertices are consecutive. Thus, the minimum Super Hyper Dominating set contains only Super Hyper Vertices with Super HyperDistances at least n over 3.

Proposition 9.5. Assume a neutrosophic R-Super Hyper Star. The minimum Super Hyper Dominating set contains only the Super HyperCenter.

Proof. Assume a neutrosophic R-Super HyperStar. The Super HyperCenter is Super HyperNeighbor with all Super Hyper Vertices. Thus, Super HyperCenter with any Super Hyper Vertex has Super HyperDistances one. Thus, the minimum Super Hyper Dominating set contains only the Super HyperCenter.

Proposition 9.6. Assume a neutrosophic R-Super HyperBipartite. The minimum Super Hyper Dominating set contains only two Super Hyper Vertices in different parts.

Proof. Assume a neutrosophic R-Super HyperBipartite. The Super Hyper Vertex is Super HyperNeighbor with all Super Hyper Vertices in opposite part. Thus, Super Hyper Vertex with Super Hyper Vertex in opposite part has Super HyperDistances one. The minimum Super Hyper Dominating set contains only two Super Hyper Vertices in different parts.

Proposition 9.7. Assume a neutrosophic R-Super HyperMultiPartite. The minimum Super Hyper Dominating set contains only two Super Hyper Vertices in different parts.

Proof. Assume a neutrosophic R-Super HyperMultiPartite. The Super Hyper Vertex is Super HyperNeighbor with all Super Hyper Vertices in opposite part. Thus, Super Hyper Vertex with Super Hyper Vertex in opposite part has Super HyperDistances one. The minimum Super Hyper Dominating set contains only two Super Hyper Vertices in different parts.

Proposition 9.8. Assume a neutrosophic R-Super HyperWheel. The minimum Super Hyper Dominating set contains only the Super HyperCenter.

Proof. Assume a neutrosophic R-Super HyperWheel. The Super HyperCenter is Super HyperNeighbor with all Super Hyper Vertices. Thus, Super HyperCenter with any Super Hyper Vertex has Super HyperDistances one. Thus, the minimum Super Hyper Dominating set contains only the Super HyperCenter.

Minimum Super Hyper Dominating Set and Minimum Perfect Super Hyper Dominating Se

Proposition 10.1. Assume a neutrosophic R-Super HyperStar. The minimum Super Hyper Dominating set is minimum perfect Super Hyper Dominating set.
Proposition 10.2. Assume a neutrosophic R-Super HyperBipartite. The minimum Super Hyper Dominating set is minimum perfect Super Hyper Dominating set.
Proposition 10.3. Assume a neutrosophic R-Super HyperMultiPartite. The minimum Super Hyper Dominating set is minimum perfect Super Hyper Dominating set.
Proposition 10.4. Assume a neutrosophic R-Super HyperWheel. The minimum
Super Hyper Dominating set is minimum perfect Super Hyper Dominating set.

Applications in Game Theory

In this section, two applications are proposed for the minimum Super Hyper Dominating set and the minimum Super Hyper Resolving set in the field of game theory concerning multiple players using winning strategy to tackle each other. Game theory is the vast section for study. The majority of approaches is about using the strategies to win the game.

Step 1. (Definition) There are some points and the connections between either them or group of them. This game is used in the multiple versions of players. Multi players use this game-board.

The game is about finding winning strategies to have proper set. The set with minimum number of elements which has special attributes. The set isn't unique thus it's possible to have many winners and even more there's a case in that, all players are winners and there's no loser. There are two different types of this game. Firstly, the set has the points which connect to all other vertices. Secondly, the set has the points which has different minimum number of connections amid any two given vertices from all other vertices.

Step 2. (Issue) In both versions of game, the issue is to find the optimal set. Every player tries to form the optimal set to win the game. The set isn't unique thus designing appropriate strategies to find the intended set is the matter.

Table 24: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyper- Edges Belong to The Neutrosophic SuperHyperGraph.

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

Step 3. (Model) The models use different types of colors and lines to illustrate the situation. Sometimes naming the group of points and the connection, is rarely done since to have concentration on the specific elements. The number of points and groups of points in the connection isn't the matter. Thus, it's possible to have some groups of points and some points in one connection.

Case 1: The Game Theory contains the Game-Board in the Terms of the minimum Super Hyper Dominating set

Step 4. (Solution) The optimal set has 17 number of elements. Thus, the players find these types of set. In what follows, all optimal sets are obtained. There 27 optimal sets. If one of them is chosen, the corresponded player is winner. In other viewpoint, if there are 27 players, then every player could be winner, if there are 28 players, then one player is loser and so on. In what follows, the mathematical terminologies and mathematical structures explain the ways in the strategies of winning are found in specific model.

In Figure (24), the Super Hyper Graph is highlighted and featured. The sets, $\{A, B, C, D, E, F, G, H, I, J, K, L, M, N, O\}$, $\{V_1, V_2, V_3, V_4\}$, $\{E_3\}$, $\{E_1\}$, and $\{E_2, E_4\}$ are the sets of vertices, SuperVertices, edges, Hyper Edges, and Super Hyper Edges, respectively. The SuperVertices V_1, V_2 and V_4 Super HyperDominate each other by the Super HyperEdge E_4. The Super Vertex Doesn't Super HyperDominate. The vertices G and J dominate each other by the edge E_3. The vertices $A, B, C, D, E, F, G, I, J, K, L, M,$ and N HyperDominate each other by the Super HyperEdge E4. The vertices H and O HyperDominate each other by the HyperEdge E_1. The set of vertices and SuperVertices, $\{A, H, V_1, V_3\}$ is minimal Super Hyper Dominating set. The minimum Super Hyper Dominating number is 17. The sets of vertices and SuperVertices, which are listed below, are the minimal Super Hyper Dominating sets corresponded to the minimum Super Hyper Dominating number which is 17.

$\{A, H, V_1, V_3\}$, $\{M, H, V_1, V_3\}$, $\{B, H, V_1, V_3\}$, $\{C, H, V_1, V_3\}$, $\{L, H, V_1, V_3\}$,
$\{D,H,V_1,V_3\}$,$\{E,H,V_1,V_3\}$,$\{N,H,V_1,V_3\}$,$\{A,H,V_2,V_3\}$,$\{M,H,V_2,V_3\}$, $\{B,H,V_2,V_3\}$,$\{C,H,V_2,V_3\}$,$\{L,H,V_2,V_3\}$,$\{D,H,V_2,V_3\}$,$\{E,H,V_2,V_3\}$, $\{N,H,V_2,V_3\}$,$\{A,O,V_1,V_3\}$,$\{M,O,V_1,V_3\}$,$\{B,O,V_1,V_3\}$,$\{C,O,V_1,V_3\}$, $\{L,O,V_1,V_3\}$,$\{D,O,V_1,V_3\}$,$\{E,O,V_1,V_3\}$,$\{N,O,V_1,V_3\}$,$\{A,O,V_2,V_3\}$, $\{M,O,V_2,V_3\}$,$\{B,O,V_2,V_3\}$,$\{C,O,V_2,V_3\}$,$\{L,O,V_2,V_3\}$,$\{D,O,V_2,V_3\}$, $\{E,O,V2,V3\}$,$\{N,O,V2,V3\}$. Numbers ani subscript lo petandi. see in original article By using the Figure (24) and the Table (24), the neutrosophic Super Hyper Graph is obtained.

There are some points for the vertex A as follows.

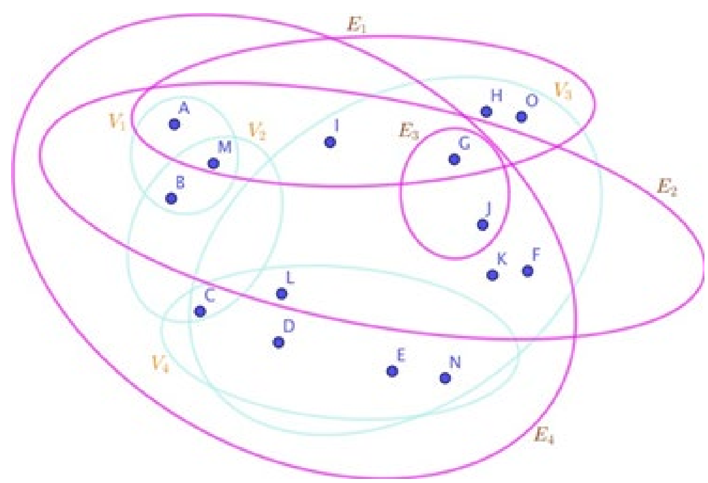

Figure 24: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perDominating.

(i): The vertex A Super HyperDominates M, I and G by using three Super Hyper Edges E_1, E_2, and E_4.
(ii): The vertex A Super HyperDominates $B, J, K, L,$ and F by using two Super Hyper Edges E_2, and E_4.
(iii): The vertex A Super HyperDominates $C, D, E, H,$ and N by using one Super HyperEdge E_4.
There are some points for the vertex H as follows.
(i): The vertex H Super HyperDominates A, M, G, and O by using one Super HyperEdge E_1.
There are some points for the Super Vertex V_1 as follows.
(i): The Super Vertex V_1 Super HyperDominates V_2, and V_4 by using one Super HyperEdge E_4.
There are some points for the Super Vertex V_3 as follows.
(i): The Super Vertex V_3 Super HyperDominates no Super Vertex.

It's an isolated Super Vertex.

Case 2: The Game Theory contains the Game-Board in the Terms of the minimum Super Hyper Resolving set

Step 4. (Solution) The optimal set has twenty-three elements. One of winning set is featured as follows. The specific model of game-board is illustrated in the Figure (25). In what follows, the winning strategies are formed in the mathematical literatures. If the number of players exceeds from the number of optimal sets, then there's number of losers which the difference amid the number of players and the number of optimal sets. If the number doesn't exceed, then there's a possibility to have no number of losers. This game-board seems so hard since the winner has to find a specific set with twenty-three elements.

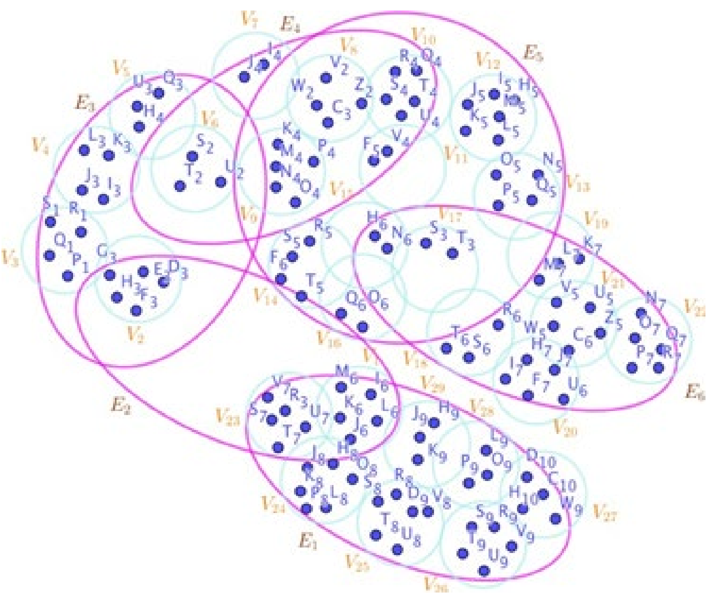

Figure 25: A Neutrosophic SuperHyperGraph Associated to the Notions of SuperHy- perResolving.

Table 25: The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyper- Edges Belong to The Neutrosophic SuperHyperGraph.

The Values of The Vertices	The Number of Position in Alphabet
The Values of The SuperVertices	The Minimum Values of Its Vertices
The Values of The Edges	The Minimum Values of Its Vertices
The Values of The HyperEdges	The Minimum Values of Its Vertices
The Values of The SuperHyperEdges	The Minimum Values of Its Endpoints

In Figure (25), the Super Hyper Graph is highlighted and featured. By using the
Figure (25) and the Table (25), the neutrosophic Super Hyper Graph is obtained.
In this case, there's the minimum Super Hyper Resolving set, namely,
$\{V_{29}, V_3, V_4, V_5, V_7, V_8, V_9, V_{10}, V_{12}, V_{13}, V_{14}, V_{15}, V_{16}, V_{18}, V_{19}, V_{20}, V_{21}, V_{23}, V_{24}, V_{25}, V_{26}, V_{27}, V_{28}\}$.

Open Problems

In this section, some questions and problems are proposed to give some avenues to pursue this study. The structures of the definitions and results give some ideas to make new settings which are eligible to extend and to create new study. The Neutrosophic Super Hyper Graphs facilitate the environment with the dense styles of objects thus the questions and the problems in this topic could open the ways to have new directions and more applications.

In this study, some notions are defined in the framework of neutrosophic Super Hyper Graphs. Super Hyper Resolving and Super Hyper Dominating are new ideas applying in neutrosophic Super Hyper Graphs. The keyword in this study is to find minimum set and the study highlight the results from minimum sets.

Question 12.1. How to create some classes of neutrosophic Super Hyper Graphs alongside obtaining some results from them?
Question 12.2. How to characterize the number one for introduced classes of neutrosophic Super Hyper Graphs?
Question 12.3. How to characterize the number two for introduced classes of neutrosophic Super Hyper Graphs?
Question 12.4. How to characterize the number three for introduced classes of neutrosophic Super Hyper Graphs?
Problem 12.5. Is it possible to find the avenues to pursue this study in general form such that the results aren't about classes, in other words, beyond neutrosophic classes of eutrosophic Super Hyper Graphs?
Problem 12.6. Is it possible to find a real-world problem handling the situation such
that introducing special neutrosophic classes of neutrosophic Super Hyper Graphs?
Problem 12.7. Is it possible to find a real-world problem to define new environment concerning specific behaviors of results?

Conclusion and Closing Remarks

In this section, concluding remarks and closing remarks are represented. The drawbacks of this article are illustrated. Some benefits and advantages of this study are highlighted. This study uses some approaches to make neutrosophic Super Hyper Graphs more understandable. In this way, some neutrosophic graphs are introduced. The notion of how much "close" leads us toward the ideas of direct connections and indirect connections. Direct connection is interpreted by Super Hyper Edges. When finding the minimum number of Super Hyper Vertices such that they've Super Hyper Edges with others, is the matter, the notion of "Super Hyper Dominating" is assigned. But when indirect connections separate any couple of Super Hyper Vertices in the terms of direct connections forming indirect connections, the notion of "Super Hyper Resolving" is sparked. Some notions are added to both settings of "Super Hyper Dominating" and "Super Hyper Resolving".

These notions are duality, perfectness, totality, stable and connectedness. The existence of direct connections between the elements of intended set indicates the idea of "connectedness" but the lack of them points out the concept of "stable". Acting on itself by intended set introduces the term, totality but acting reversely is about the word, duality. In all the mentioned cases, if the intended set acts uniquely, then the prefix, perfect, is assigned to them. There are some results about these mentioned new notions. Sometimes some neutrosophic classes of neutrosophic Super Hyper Graphs based on one of the notions "Super Hyper Dominating" or "Super Hyper Resolving" is introduced to figure out what's happened to make neutrosophic Super Hyper Graphs more understandable and to make sense about what's going on in the terms of the directions. In the future research, the framework will be on the general forms of neutrosophic Super Hyper Graphs and in this endeavor, the upcoming research will be formed based on them. In the Table (26), some limitations and advantages of this study are pointed out.

Table 26: A Brief Overview about Advantages and Limitations of this Study

Advantages	Limitations
1. Defining Different Versions 2. Defining SuperHyperResolving 3. Neutrosophic Classes 4. Duality, Totality, Connectedness 5. Stable, Perfect	1. Defining SuperHyperDominating 2. General Results 3. Connections Amid Nnotions

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