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A Research on Cancer's Recognition and Neutrosophic Super Hypergraph by Eulerian Super Hyper Cycles and Hamiltonian Sets as Hyper Covering Versus Super separations

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Abstract
In this research, assume a Super Hyper Graph. Then some notions on Extreme Super Hyper Cycle based on the backgrounds of Eulerian and Hamiltonian styles are proposed. Some results are directed in the way that, the starting definitions make sense on the motivation and the continuous approaches for this research. A basic familiarity with neutrosophic SuperHyperCycle theory, SuperHyperGraphs, and neutrosophic SuperHyperGraphs theory are proposed.

Keywords: Neutrosophic Superhypergraph, (Neutrosophic) Superhypercycle, Cancer's Neutrosophic Recognition

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

Wondering open Problems but As the Directions to Forming the Motivations

In what follows, some "Neutrosophic problems" and some "Neutrosophic questions" are Neutrosophicly proposed.

The SuperHyperCycle and the neutrosophic SuperHyperCycle are Neutrosophicly defined on a real-world Neutrosophic application, titled "Cancer's neutrosophic recognitions".

Question 1.1. Which the else neutrosophic SuperHyperModels could be defined based on Cancer's neutrosophic recognitions?

Question 1.2. Are there some neutrosophic SuperHyperNotions related to SuperHyperCycle and the neutrosophic SuperHyperCycle?

Question 1.3. Are there some Neutrosophic Algorithms to be defined on the neutrosophic SuperHyperModels to compute them Neutrosophicly?

Question 1.4 Which the neutrosophic SuperHyperNotions are related to beyond the SuperHyperCycle and the neutrosophic SuperHyperCycle?

Problem 1.5 The SuperHyperCycle and the neutrosophic SuperHyperCycle do Neutrosophicly a neutrosophic SuperHyperModel for the Cancer's neutrosophic recognitions and they're based Neutrosophicly on neutrosophic SuperHyperCycle, are there else Neutrosophicly?

Problem 1.6 Which the fundamental Neutrosophic SuperHyperNumbers are related to these Neutrosophic SuperHyperNumbers types-results?

Problem 1.7 What's the independent research based on Cancer's neutrosophic recognitions concerning the multiple types of neutrosophic SuperHyperNotions?

The Surveys of Mathematical Sets on The Results but As the Initial Motivation

For the SuperHyperCycle, extreme SuperHyperCycle, and the neutrosophic SuperHyperCycle, some general results are introduced.

Proposition 2.1 Let ESHG : (V, E) be a neutrosophic SuperHyperUniform SuperHyperGraph which is a SuperHyperStar/SuperHyperComplete SuperHyperBipartite/SuperHyperComplete SuperHyperMultipartite. Then Then the number of

(i) : dual SuperHyperDefensive SuperHyperCycle;
(ii) : strong dual SuperHyperDefensive SuperHyperCycle;
(iii) : connected dual SuperHyperDefensive SuperHyperCycle;
(iv) : $\frac{O(ESHG)}{2}+1$ dual SuperHyperDefensive SuperHyperCycle;
(v) : strong $\frac{O(ESHG)}{2}+1$- dual SuperHyperDefensive SuperHyperCycle;
(vi) : connected $\frac{O(ESHG)}{2}+1$- dual SuperHyperDefensive SuperHyperCycle.

is one and it's only S, a SuperHyperSet contains [the SuperHyperCenter and] the half of multiplying r with the number of all the SuperHyperEdges plus one of all the SuperHyperVertices.

Where the exterior SuperHyperVertices and the interior SuperHyperVertices coincide.

Proposition 2.2 Let ESHG : (V, E) be a neutrosophic SuperHyperGraph. The number of connected component is |V − S| if there's a SuperHyperSet which is a dual
(i) : SuperHyperDefensive SuperHyperCycle;
(ii) : strong SuperHyperDefensive SuperHyperCycle;
(iii) : connected SuperHyperDefensive SuperHyperCycle;
(iv) : SuperHyperCycle;
(v) : strong 1-SuperHyperDefensive SuperHyperCycle;
(vi) : connected 1-SuperHyperDefensive SuperHyperCycle.

Proposition 2.3 Let ESHG : (V, E) be a neutrosophic SuperHyperGraph. Then the number is at most O(ESHG) and the neutrosophic number is at most O_n(ESHG).

Proposition 2.4 Let ESHG : (V, E) be a neutrosophic SuperHyperGraph which is SuperHyperComplete. The number is $\frac{O(ESHG:(V,E))}{2}+1$ and the neutrosophic number is min $\Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{O(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of dual
(i) : SuperHyperDefensive SuperHyperCycle;
(ii) : strong SuperHyperDefensive SuperHyperCycle;
(iii) : connected SuperHyperDefensive SuperHyperCycle;
(iv) :$(\frac{O(ESHG:(V,E))}{2}+1)$- SuperHyperDefensive SuperHyperCycle;
(v) : strong $(\frac{O(ESHG:(V,E))}{2}+1)$- SuperHyperDefensive SuperHyperCycle;
(vi) : connected$(\frac{O(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperCycle.

Proposition 2.5 Let ESHG : (V, E) be a neutrosophic SuperHyperGraph which is . The number is 0 and the neutrosophic number is 0, for an independent SuperHyperSet in the setting of dual
(i) : SuperHyperDefensive SuperHyperCycle;
(ii) : strong SuperHyperDefensive SuperHyperCycle;
(iii) : connected SuperHyperDefensive SuperHyperCycle;
(iv) : 0-SuperHyperDefensive SuperHyperCycle;
(v) : strong 0-SuperHyperDefensive SuperHyperCycle;
(vi) : connected 0-SuperHyperDefensive SuperHyperCycle.

Proposition 2.6 Let ESHG : (V, E) be a neutrosophic SuperHyperGraph which is SuperHyperComplete. Then there's no independent SuperHyperSet.

Proposition 2.7 Let ESHG : (V, E) be a neutrosophic SuperHyperGraph which is SuperHyperCycle/SuperHyperPath/SuperHyperWheel. The number is O(ESHG : (V, E)) and the neutrosophic number is On(ESHG : (V, E)), in the setting of a dual
(i) : SuperHyperDefensive SuperHyperCycle;
(ii) : strong SuperHyperDefensive SuperHyperCycle;
(iii) : connected SuperHyperDefensive SuperHyperCycle;
(iv) : O(ESHG : (V, E))-SuperHyperDefensive SuperHyperCycle;
(v) : strong O(ESHG : (V, E))-SuperHyperDefensive SuperHyperCycle;
(vi) : connected O(ESHG : (V, E))-SuperHyperDefensive SuperHyperCycle.

Proposition 2.8 Let ESHG : (V, E) be a neutrosophic SuperHyperGraph which is SuperHyperStar/complete SuperHyperBipartite/complete SuperHyperMultiPartite. The number is $\frac{O(ESHG:(V,E))}{2}+1$ and the neutrosophic number is min $\Sigma_{v\in\{v_1,v_2,\cdots,v_t\}_{t>\frac{O(ESHG:(V,E))}{2}}\subseteq V}\sigma(v)$, in the setting of a dual

(i) : SuperHyperDefensive SuperHyperCycle;
(ii) : strong SuperHyperDefensive SuperHyperCycle;
(iii) : connected SuperHyperDefensive SuperHyperCycle;
(iv) :$(\frac{O(ESHG:(V,E))}{2}+1)$- SuperHyperDefensive SuperHyper Cycle;
(v) : strong$(\frac{O(ESHG:(V,E))}{2}+1)$ -SuperHyperDefensive SuperHyperCycle;
(vi) : connected $(\frac{O(ESHG:(V,E))}{2}+1)$-SuperHyperDefensive SuperHyperCycle.

Proposition 2.9 Let : (V, E) be a SuperHyperFamily of the ESHGs : (V, E) neutrosophic SuperHyperGraphs which are from one-type SuperHyperClass which the result is obtained for the individuals. Then the results also hold for the SuperHyperFamily : (V, E) of these specific SuperHyperClasses of the neutrosophic SuperHyperGraphs.

Proposition 2.10 Let ESHG : (V, E) be a strong neutrosophic SuperHyperGraph. If
S is a dual SuperHyperDefensive SuperHyperCycle, then ∀v ∈ V \ S, ∃x ∈ S such that
(i) $v \in N_s(x)$;
(ii) vx ∈ E.

Proposition 2.11 Let ESHG : (V, E) be a strong neutrosophic SuperHyperGraph. If
S is a dual SuperHyperDefensive SuperHyperCycle, then
(i) S is SuperHyperDominating set;
(ii) there's S ⊆ S′ such that |S′| is SuperHyperChromatic number.

Proposition 2.12 Let ESHG : (V, E) be a strong neutrosophic SuperHyperGraph.
Then
(i) $\Gamma \leq O$;
(ii) $\Gamma s \leq O_n$.

Proposition 2.13 Let ESHG : (V, E) be a strong neutrosophic SuperHyperGraph which is connected. Then
(i) $\Gamma \leq O - 1$;

(ii) $\Gamma_s \leq O_n - \Sigma^3_{i=1}\sigma_i(x)$.

Proposition 2.14 Let ESHG : (V, E) be an odd SuperHyperPath. Then
(i) the SuperHyperSet S = $v_2, v_4, \ldots, v_{n-1}$ is a dual SuperHyperDefensive SuperHyperCycle;

(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor + 1$ and corresponded SuperHyperSet is $S = \{v_2, v_4, \cdots, v_{n-1}\}$;
(iii) $\Gamma_s = \min\{\Sigma_{s \in S = \{v_2, v_4, \cdots, v_{n-1}\}} \Sigma_{i=1}^{3} \sigma_i(s), \Sigma_{s \in S = \{v_1, v_3, \cdots, v_{n-1}\}} \Sigma_{i=1}^{3} \sigma_i(s)\}$;
(iv) the SuperHyperSets $S_1 = v_2, v_4, \ldots, v_{n-1}$ and $S_2 = v_1, v_3$, , v_{n-1} are only a dual SuperHyperCycle.

Proposition 2.15 Let ESHG : (V, E) be an even SuperHyperPath. Then
(i) the set S = $\{v_2, v_4, \cdots .v_n\}$ is a dual SuperHyperDefensive SuperHyperCycle;
(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor$ and corresponded SuperHyperSets are $\{v_2, v_4, \cdots .v_n\}$ and $\{v_1, v_3, \cdots .v_{n-1}\}$;
(iii) $\Gamma_s = \min\{\Sigma_{s \in S = \{v_2, v_4, \cdots, v_n\}} \Sigma_{i=1}^{3} \sigma_i(s), \Sigma_{s \in S = \{v_1, v_3, \cdots .v_{n-1}\}} \Sigma_{i=1}^{3} \sigma_i(s)\}$;
(iv) the SuperHyperSets $S_1 = \{v_2, v_4, \ldots .v_n\}$ *and* $S_2 = \{v_1, v_3, \ldots .v_{n-1}\}$
.vn−1 are only dual SuperHyperCycle.

Proposition 2.16. Let ESHG : (V, E) be an even SuperHyperCycle. Then
(i) the SuperHyperSet $S = \{v_2, v_4, \ldots, v_n\}$ is a dual SuperHyperDefensive SuperHyperCycle;
(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor$ and corresponded SuperHyperSets are $\{v_2, v_4, \cdots, vn\}$ and $\{v_1, v_3, \cdots, v_{n-1}\}$;
(iii) $\Gamma_s = \min\{\Sigma_{s \in S = \{v_2, v_4, \cdots, v_n\}} \sigma(s), \Sigma_{s \in S = \{v_1, v_3, \cdots, v_{n-1}\}} \sigma(s)\}$;
(iv) the SuperHyperSets $\{S_1 = v_2, v_4, , v_n\}$ and $\{S_2 = v_1, v_3, , v_{n-1}\}$ are only dual SuperHyperCycle.

Proposition 2.17. Let ESHG : (V, E) be an odd SuperHyperCycle. Then
(i) the SuperHyperSet $S = \{v_2, v_4, \ldots, v_{n-1}\}$ is a dual SuperHyperDefensive SuperHyperCycle;
(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor + 1$ and corresponded SuperHyperSet is $S = \{v_2, v_4, \ldots, v_{n-1}\}$
(iii) $\Gamma_s = \min\{\Sigma_{s \in S = \{v_2, v_4, \cdots .v_{n-1}\}} \Sigma_{i=1}^{3} \sigma_i(s), \Sigma_{s \in S = \{v_1, v_3, \cdots .v_{n-1}\}} \Sigma_{i=1}^{3} \sigma_i(s)\}$;
(iv) the SuperHyperSets $S_1 = \{v_2, v_4, \ldots, v_{n-1}\}$ and $S2 = \{v_1, v_3, \ldots, v_{n-1}\}$ are only dual SuperHyperCycle.

Proposition 2.18 Let ESHG : (V, E) be SuperHyperStar. Then
(i) the SuperHyperSet S = {c} is a dual maximal SuperHyperCycle;
(ii) Γ = 1;
(iii) $\Gamma_s = \Sigma_{i=1}^{3} \sigma_i(c)$;
(iv) the SuperHyperSets S = {c} and S ⊂ S′ are only dual SuperHyperCycle.

Proposition 2.19 Let ESHG : (V, E) be SuperHyperWheel. Then
(i) the SuperHyperSet $S = \{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \le n}$ is a dual maximal SuperHyperDefensive SuperHyperCycle;
(ii) $\Gamma = |\{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \le n}|$;
(iii) $\Gamma_s = \Sigma_{\{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \le n}} \Sigma_{i=1}^{3} \sigma_i(s)$;
(iv) the SuperHyperSet $\{v_1, v_3\} \cup \{v_6, v_9 \cdots, v_{i+6}, \cdots, v_n\}_{i=1}^{6+3(i-1) \le n}$ is only a dual maximal SuperHyperDefensive SuperHyperCycle.

Proposition 2.20 Let ESHG : (V, E) be an odd SuperHyperComplete. Then
(i) the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual SuperHyperDefensive SuperHyperCycle;
(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor + 1$;
(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}}$;
(iv)the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is only a dual SuperHyperDefensive SuperHyperCycle.

Proposition 2.21 Let ESHG : (V, E) be an even SuperHyperComplete. Then
(i) the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is a dual SuperHyperDefensive SuperHyperCycle;
(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor$;
(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}}$;
(iv) the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is only a dual maximal SuperHyperDefensive
SuperHyperCycle.

Proposition 2.22. Let N SHF : (V, E) be a m-SuperHyperFamily of neutrosophic SuperHyperStars with common neutrosophic SuperHyperVertex SuperHyperSet. Then
(i) the SuperHyperSet $S = \{c_1, c_2, \cdots, c_m\}$ is a dual SuperHyperDefensive SuperHyperCycle for N SHF;
(ii) Γ = m for N SHF : (V, E);
(iii) $\Gamma_s = \Sigma_{i=1}^{m} \Sigma_{j=1}^{3} \sigma_j(c_i)$ *for* N SHF : (V, E);
(iv) the SuperHyperSets $S = \{c_1, c_2, \cdots, c_m\}$ and S ⊂ S′ are only dual SuperHyperCycle for N SHF : (V, E).

Proposition 2.23 Let N SHF : (V, E) be an m-SuperHyperFamily of odd SuperHyperComplete SuperHyperGraphs with common neutrosophic SuperHyperVertex SuperHyperSet. Then
(i) the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ is a dual maximal SuperHyperDefensive SuperHyperCycle for N SHF;
(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor + 1$ for N SHF : (V, E);
(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}}$ *for* N SHF : (V, E);
(iv) the SuperHyperSets $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor + 1}$ are only a dual maximal SuperHyperCycle for N SHF : (V, E).i i=1

Proposition 2.24. Let N SHF : (V, E) be a m-SuperHyperFamily of even SuperHyperComplete SuperHyperGraphs with common neutrosophic SuperHyperVertex SuperHyperSet. Then
(i) the SuperHyperSet $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ is a dual SuperHyperDefensive SuperHyperCycle for N SHF : (V, E);
(ii) $\Gamma = \lfloor \frac{n}{2} \rfloor$ for N SHF : (V, E);
(iii) $\Gamma_s = \min\{\Sigma_{s \in S} \Sigma_{i=1}^{3} \sigma_i(s)\}_{S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}}$ *for* N SHF : (V, E);
(iv) the SuperHyperSets $S = \{v_i\}_{i=1}^{\lfloor \frac{n}{2} \rfloor}$ are only dual maximal SuperHyperCycle for
N SHF : (V, E).

Proposition 2.25 Let ESHG : (V, E) be a strong neutrosophic SuperHyperGraph. Then following statements hold;
(i) if s ≥ t and a SuperHyperSet S of SuperHyperVertices is an t-SuperHyperDefensive SuperHyperCycle, then S is an s-SuperHyperDefensive SuperHyperCycle;
(ii)if s ≤ t and a SuperHyperSet S of SuperHyperVertices is a dual t-SuperHyperDefensive SuperHyperCycle, then S is a dual s-SuperHyperDefensive SuperHyperCycle.

Proposition 2.26 Let ESHG : (V, E) be a strong neutrosophic SuperHyperGraph. Then following statements hold;

(i) if $s \geq t + 2$ and a SuperHyperSet S of SuperHyperVertices is an *t*- SuperHyperDefensive SuperHyperCycle, then S is an s-SuperHyperPowerful SuperHyperCycle;

(ii) if $s \leq t$ and a SuperHyperSet S of SuperHyperVertices is a dual *t*-SuperHyperDefensive SuperHyperCycle, then S is a dual s-SuperHyperPowerful SuperHyperCycle.

Proposition 2.27. Let ESHG : (V, E) be a[an][r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph. Then following statements hold;

(i) if $\forall a \in S,\ |N_s(a) \cap S| < \lfloor \frac{r}{2} \rfloor + 1,$ then ESHG : (V, E) is an 2-SuperHyperDefensive SuperHyperCycle;

(ii)if $\forall a \in V \setminus S,\ |N_s(a) \cap S| > \lfloor \frac{r}{2} \rfloor + 1,$ then ESHG : (V, E) is a dual 2-SuperHyperDefensive SuperHyperCycle;

(iii)if $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0,$ then ESHG : (V, E) is an r-SuperHyperDefensive SuperHyperCycle;

(iv) if $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0,$ then ESHG : (V, E) is a dual r-SuperHyperDefensive SuperHyperCycle.

Proposition 2.28 Let ESHG : (V, E) is a[an [r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph.Then following statements hold;

(i) $\forall a \in S,\ |N_s(a) \cap S| < \lfloor \frac{r}{2} \rfloor + 1$ if ESHG : (V, E) is an 2-SuperHyperDefensive SuperHyperCycle;

(ii) $\forall a \in V \setminus S,\ |N_s(a) \cap S| > \lfloor \frac{r}{2} \rfloor + 1$ *if ESHG* (V, E) is a dual 2-SuperHyperDefensive SuperHyperCycle;

(iii) $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0$ *if ESHG* (V, E) is an r-SuperHyperDefensive SuperHyperCycle;

(iv) $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0$ *if ESHG* (V, E) is a dual r-SuperHyperDefensive SuperHyperCycle.

Proposition 2.29 Let ESHG : (V, E) is a[an]
[r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then following statements hold;

(i) $\forall a \in S,\ |N_s(a) \cap S| < \lfloor \frac{O-1}{2} \rfloor + 1$ if ESHG : (V, E) is an 2-SperHyperDefensive SuperHyperCycle;

(ii) $\forall a \in V \setminus S,\ |N_s(a) \cap S| > \lfloor \frac{O-1}{2} \rfloor + 1$ if ESHG : (V, E) is a dual 2-SuperHyperDefensive SuperHyperCycle;

(iii) $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0$ *if ESHG* : *(V, E) is an* $(O - 1)$ SuperHyperDefensive SuperHyperCycle;

(iv) $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0$ *if ESHG* : *(V, E)* is a dual $(O - 1)$-SuperHyperDefensive SuperHyperCycle.

Proposition 2.30 Let ESHG : (V, E) is a[an]
[r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is a SuperHyperComplete. Then following statements hold;

(i)if a $\forall a \in S,\ |N_s(a) \cap S| < 2$ *if ESHG* : *(V, E))* then ESHG : (V, E) is an 2-SuperHyperDefensive SuperHyperCycle;

(ii) if a $\forall a \in V \setminus S,\ |N_s(a) \cap S| > 2$ then ESHG : (V, E) is a dual 2-SuperHyperDefensive SuperHyperCycle;

(iii) $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0$ then ESHG : (V, E) is $(O - 1)$-SuperHyperDefensive SuperHyperCycle;

(iv) if $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0$ then ESHG : (V, E) is a dual $(O - 1)$-SuperHyperDefensive SuperHyperCycle.

Proposition 2.31 Let ESHG : (V, E) is a[an]
[*r*-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then following statements hold;

(i) *if* $\forall a \in S,\ |N_s(a) \cap S| < 2,$ *then ESHG* : *(V, E)* is an 2-SuperHyperDefensive SuperHyperCycle;

(ii) *if* $\forall a \in V \setminus S,\ |N_s(a) \cap S| > 2,$ *then ESHG* : *(V, E)* is a dual 2-SuperHyperDefensive SuperHyperCycle;

(iii) *if* $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0,$ *then ESHG* : *(V, E)* is an 2-SuperHyperDefensive SuperHyperCycle;

(iv) *if* $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0,$ *then ESHG* : *(V, E)* is a dual 2-SuperHyperDefensive SuperHyperCycle.

Proposition 2.32 Let ESHG : (V, E) is a[an]
[r-]SuperHyperUniform-strong-neutrosophic SuperHyperGraph which is SuperHyperCycle. Then following statements hold;

(i) *if* $\forall a \in S,\ |N_s(a) \cap S| < 2,$ *then ESHG* : *(V, E)* is an 2-SuperHyperDefensive SuperHyperCycle;

(ii) *if* $\forall a \in V \setminus S,\ |N_s(a) \cap S| > 2,$ *then ESHG* : *(V, E)* is a dual 2-SuperHyperDefensive SuperHyperCycle;

(iii) *if* $\forall a \in S,\ |N_s(a) \cap V \setminus S| = 0,$ *then ESHG* : *(V, E)* is an 2-SuperHyperDefensive SuperHyperCycle;

(iv *if* $\forall a \in V \setminus S,\ |N_s(a) \cap V \setminus S| = 0,$ *then ESHG* : *(V, E)* is a dual 2-SuperHyperDefensive SuperHyperCycle.

Applied Notions Under The Scrutiny Of The Motivation Of This Research

In this research, there are some ideas in the featured frameworks of motivations. I try to bring the motivations in the narrative ways.

Question 3.1. How to define the SuperHyperNotions and to do research on them to find the " amount of SuperHyperCycle" of either individual of cells or the groups of cells based on the fixed cell or the fixed group of cells, extensively, the "amount of SuperHyperCycle" based on the fixed groups of cells or the fixed groups of group of cells?

Question 3.2. What are the best descriptions for the "Cancer's Recognition" in terms of these messy and dense SuperHyperModels where embedded notions are illustrated?

It's motivation to find notions to use in this dense model is titled "SuperHyperGraphs". Thus it motivates us to define different types of " SuperHyperCycle" and "neutrosophic SuperHyperCycle" on "SuperHyperGraph" and "neutrosophic SuperHyperGraph".

Preliminaries Of This Research On the Redeemed Ways

In this section, the basic material in this research, is referred to [Single Valued neutrosophic Set] [38],Definition 2.2,p.2), [neutrosophic Set] [47],Definition 2.1,p.1), [neutrosophic SuperHyperGraph (NSHG)]([47],Definition 2.5,p.2), [Characterization of the neutrosophic SuperHyperGraph (NSHG)]([47],Definition 2.7,p.3), [t-norm][47], Definition 2.7, p.3), and [Characterization of the neutrosophic SuperHyperGraph (NSHG)]([47],Definition 2.7,p.3). Also, the new ideas and their clarifications are addressed to [47].

Definition 4.1. ((neutrosophic) SuperHyperCycle).
Assume a SuperHyperGraph. Then

(i) an **Extreme SuperHyperCycle** (NSHG) for an extreme SuperHyperGraph NSHG : (V, E) is the maximum extreme cardinality of an extreme SuperHyperSet S of high extreme cardinality of the extreme SuperHyperEdges in the consecutive extreme sequence of extreme SuperHyperEdges and extreme SuperHyperVertices such that they form the extreme SuperHyperCycle and either all extreme SuperHyperVertices or all extreme SuperHyperEdges;

(ii) a **Neutrosophic SuperHyperCycle** (NSHG) for a neutrosophic SuperHyperGraph NSHG : (V, E) is the maximum neutrosophic cardinality of the neutrosophic SuperHyperEdges of a neutrosophic SuperHyperSet S of high neutrosophic cardinality consecutive neutrosophic SuperHyperEdges and neutrosophic SuperHyperVertices such that they form the neutrosophic SuperHyperCycle and either all neutrosophic SuperHyperVertices or all neutrosophic SuperHyperEdges;

(iii) an **Extreme SuperHyperCycle** SuperHyperPolynomial (NSHG) for an extreme SuperHyperGraph NSHG : (V, E) is the extreme SuperHyperPolynomial contains the extreme coefficients defined as the extreme number of the maximum extreme cardinality of the extreme SuperHyperEdges of an extreme SuperHyperSet S of high extreme cardinality consecutive extreme SuperHyperEdges and extreme SuperHyperVertices such that they form the extreme SuperHyperCycle and either all extreme SuperHyperVertices or all extreme SuperHyperEdges; and the extreme power is corresponded to its extreme coefficient;

(iv) a **Neutrosophic SuperHyperCycle SuperHyperPolynomial** (NSHG) for a neutrosophic SuperHyperGraph NSHG : (V, E) is the neutrosophic SuperHyperPolynomial contains the neutrosophic coefficients defined as the neutrosophic number of the maximum neutrosophic cardinality of the neutrosophic SuperHyperEdges of a neutrosophic SuperHyperSet S of high neutrosophic cardinality consecutive neutrosophic SuperHyperEdges and neutrosophic SuperHyperVertices such that they form the neutrosophic SuperHyperCycle and either all neutrosophic SuperHyperVertices or all neutrosophic SuperHyperEdges; and the neutrosophic power is corresponded to its neutrosophic coefficient;

(v) an **Extreme R-SuperHyperCycle (NSHG**) for an extreme SuperHyperGraph NSHG : (V, E) is the maximum extreme cardinality of an extreme SuperHyperSet S of high extreme cardinality of the extreme SuperHyperVertices in the consecutive extreme sequence of extreme SuperHyperEdges and extreme SuperHyperVertices such that they form the extreme SuperHyperCycle and either all extreme SuperHyperVertices or all extreme SuperHyperEdges;

(vi) a **Neutrosophic R-SuperHyperCycle** (NSHG) for a neutrosophic SuperHyperGraph NSHG : (V, E) is the maximum neutrosophic cardinality of the neutrosophic SuperHyperVertices of a neutrosophic SuperHyperSet S of high neutrosophic cardinality consecutive neutrosophic SuperHyperEdges and neutrosophic SuperHyperVertices such that they form the neutrosophic SuperHyperCycle and either all neutrosophic SuperHyperVertices or all neutrosophic SuperHyperEdges;;

(vii) an **Extreme R-SuperHyperCycle** SuperHyperPolynomial (NSHG) for an extreme SuperHyperGraph NSHG : (V, E) is the extreme SuperHyperPolynomial contains the extreme coefficients defined as the extreme number of the maximum extreme cardinality of the extreme SuperHyperVertices of an extreme SuperHyperSet S of high extreme cardinality consecutive extreme SuperHyperEdges and extreme SuperHyperVertices such that they form the extreme SuperHyperCycle and either all extreme SuperHyperVertices or all extreme SuperHyperEdges; and the extreme power is corresponded to its extreme coefficient;

(viii) a **Neutrosophic SuperHyperCycle** SuperHyperPolynomial (NSHG) for a neutrosophic SuperHyperGraph NSHG : (V, E) is the neutrosophic SuperHyperPolynomial contains the neutrosophic coefficients defined as the neutrosophic number of the maximum neutrosophic cardinality of the neutrosophic SuperHyperVertices of a neutrosophic SuperHyperSet S of high neutrosophic cardinality consecutive neutrosophic SuperHyperEdges and neutrosophic SuperHyperVertices such that they form the neutrosophic SuperHyperCycle and either all neutrosophic SuperHyperVertices or all neutrosophic SuperHyperEdges; and the neutrosophic power is corresponded to its neutrosophic coefficient.

Definition 4.2. ((neutrosophic/neutrosophic)δ SuperHyperCycle). Assume a SuperHyperGraph. Then

(i) an δ **SuperHyperCycle** is a neutrosophic kind of neutrosophic SuperHyperCycle such that either of the following expressions hold for the neutrosophic cardinalities of SuperHyperNeighbors of $s \in S$:

$$|S \cap N(s)| > |S \cap (V \setminus N(s))| + \delta;$$
$$|S \cap N(s)| < |S \cap (V \setminus N(s))| + \delta.$$

The Expression (4.1), holds if S is an δ−SuperHyperOffensive. And the Expression (4.1), holds if S is an δ−SuperHyperDefensive;

(ii) a Neutrosophic δ SuperHyperCycle is a neutrosophic kind of neutrosophic SuperHyperCycle such that either of the following neutrosophic expressions hold

Table 1. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHy-perEdges Belong to The neutrosophic SuperHyperGraph Mentioned in the Definition (4.5)

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

Table 2. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The neutrosophic SuperHyperGraph, Mentioned in the Definition

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

for the neutrosophic cardinalities of SuperHyperNeighbors of s ∈ S :

$|S \cap N(s)|_{Neutrosophic} > |S \cap (V \setminus N(s))|_{Neutrosophic} + \delta;$
$|S \cap N(s)|_{Neutrosophic} < |S \cap (V \setminus N(s))|_{Neutrosophic} + \delta.$

The Expression (4.1), holds if S is a Neutrosophic δ SuperHyperOffensive. And the Expression (4.1), holds if S is a Neutrosophic δ−SuperHyperDefensive.

For the sake of having a neutrosophic SuperHyperCycle, there's a need to "redefine" the notion of "neutrosophic SuperHyperGraph". The SuperHyperVertices and the SuperHyperEdges are assigned by the labels from the letters of the alphabets. In this procedure, there's the usage of the position of labels to assign to the values.

Definition 4.3. Assume a neutrosophic SuperHyperGraph. It's redefined Neutrosophic SuperHyperGraph if the Table (1) holds.

It's useful to define a "neutrosophic" version of SuperHyperClasses. Since there's more ways to get neutrosophic type-results to make a neutrosophic more understandable.

Definition 4.4 Assume a neutrosophic SuperHyperGraph. There are some Neutrosophic SuperHyperClasses if the Table (2) holds. Thus neutrosophic SuperHyperPath , SuperHyperCycle, SuperHyperStar, SuperHyperBipartite, SuperHyperMultiPartite, and SuperHyperWheel, are Neutrosophic SuperHyperPath , Neutrosophic SuperHyperCycle, Neutrosophic SuperHyperStar, Neutrosophic Superhype Bipartite, Neutrosophic SuperHyperMultiPartite, and Neutrosophic SuperHyperWheel if the Table(2) holds.

It's useful to define a "neutrosophic" version of a neutrosophic SuperHyperCycle. Since there's more ways to get type-results to make a neutrosophic SuperHyperCycle more neutrosophicly understandable.

For the sake of having a neutrosophic SuperHyperCycle, there's a need to "redefine" the neutrosophic notion of "neutrosophic SuperHyperCycle". The SuperHyperVertices and the SuperHyperEdges are assigned by the labels from the letters of the alphabets. In this procedure, there's the usage of the position of labels to assign to the values

Table 3. The Values of Vertices, SuperVertices, Edges, HyperEdges, and SuperHyperEdges Belong to The neutrosophic SuperHyperGraph Mentioned in the Definition

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

Definition 4.5. Assume a SuperHyperCycle. It's redefined a Neutrosophic SuperHyperCycle if the Table (3) holds.

Neutrosophic SuperHyperCycle But As The Extensions Except From Eulerian And Hamiltonian Forms

The extreme SuperHyperNotion, namely, extreme SuperHyperCycle, is up. Thus the non-obvious extreme SuperHyperCycle, S is up. The extreme type-SuperHyperSet of the extreme SuperHyperCycle, is: S is an extreme SuperHyperSet, is: S does include only more than four extreme SuperHyperVertices in a connected neutrosophic SuperHyperGraph ESHG : (V, E). It's interesting to mention that the extreme type-SuperHyperSet called the "extreme SuperHyperCycle" amid those obvious[non-obvious] simple[non-simple] extreme type-SuperHyperSets called the SuperHyperCycle, is only and only S in a connected neutrosophic SuperHyperGraph ESHG : (V, E) with an illustrated Super Hyper Modeling. But all only obvious[non-obvious] simple[non-simple] extreme type-SuperHyperSets of the obvious[non-obvious] simple[non-simple] extreme SuperHyperCycle amid those type-SuperHyperSets, are S.

A connected neutrosophic SuperHyperGraph ESHG : (V, E) as a linearly-over-packed SuperHyperModel is featured on the Figures.

Example 5.1 Assume the SuperHyperGraphs in the Figures (??), (??), (??), (??), (??), (??), (??), (??), (??), (??), (??), (??), (??), (??), (??), (1), (??), (??), (??), and (??), the SuperHyperNotion, namely, SuperHyperCycle, is up. The Algorithm is straightforward. But we regard to one instance, instantly.

On the Figure (1), the SuperHyperNotion, namely, SuperHyperCycle, is up. There's neither empty SuperHyperEdge nor loop SuperHyperEdge. The following neutrosophic SuperHyperSet of neutrosophic SuperHyperEdges[SuperHyperVertices] is the simple neutrosophic type-SuperHyperSet of the neutrosophic SuperHyperCycle. The Neutrosophic SuperHyperSet of neutrosophic SuperHyperEdges[SuperHyperVertices],

$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, E_3, V_9, E_4, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, E_3, V_{10}, E_4, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, E_3, V_{11}, E_4, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, E_3, V_8, E_4, V_9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, E_3, V_{10}, E_4, V_9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, E_3, V_{11}, E_4, V_9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{10}, E_3, V_8, E_4, V_{10}\}.$

$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{10}, E_3, V_9, E_4, V_{10}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{10}, E_3, V_{11}, E_4, V_{10}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{11}, E_3, V_8, E_4, V_{11}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{11}, E_3, V_9, E_4, V_{11}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{11}, E_3, V_{10}, E_4, V_{11}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, E_4, V_9, E_3, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, E_4, V_{10}, E_3, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, E_4, V_{11}, E_3, V_8\}.$

$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, E_4, V_8, E_3, V_9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, E_4, V_{10}, E_3, V_9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, E_4, V_{11}, E_3, V_9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{10}, E_4, V_8, E_3, V_{10}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{10}, E_4, V_9, E_3, V_{10}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{10}, E_4, V_{11}, E_3, V_{10}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{11}, E_4, V_8, E_3, V_{11}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{11}, E_4, V_9, E_3, V_{11}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{11}, E_4, V_{10}, E_3, V_{11}\}.$

$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{15}, E_4, V_{17}, E_5, V_{15}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{17}, E_4, V_{15}, E_5, V_{17}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{15}, E_5, V_{17}, E_4, V_{15}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_{17}, E_5, V_{15}, E_4, V_{17}\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycleSuperHyperPolynomial} = 28z$.
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, V_9, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, V_{10}, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_8, V_{11}, V_8\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, V_8, V_9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_9, V_{10}, V_9\}.$

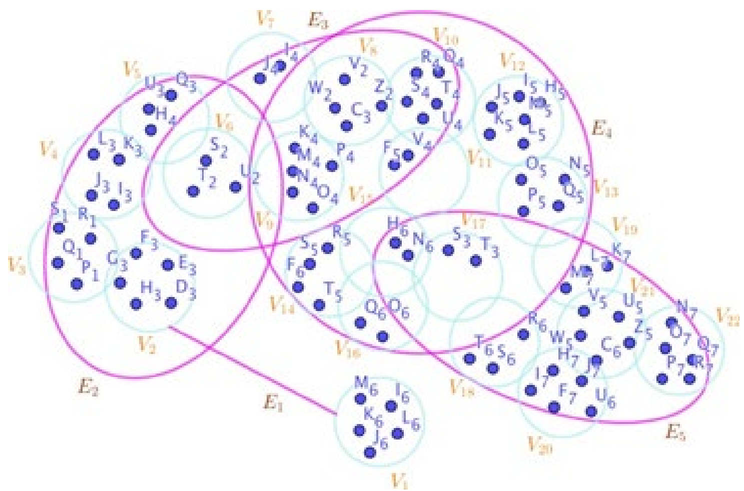

Figure 1. The SuperHyperGraphs Associated to the Notions of SuperHyperCycle in the Example (5.1)

Example (5.1)
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V9, V11, V9\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V10, V8, V10\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V10, V9, V10\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V10, V11, V10\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V11, V8, V11\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V11, V9, V11\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V11, V10, V11\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V15V17, V15\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V17, V15, V17\}.$

$C(NSHG)^{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = 14z$.

Proposition 5.2. Assume a connected loopless neutrosophic SuperHyperGraph
ESHG : (V, E). Then in the worst case, literally,
$C(NSHG)^{NeutrosophicQuasi-SuperHyperCycle} = \{V_1, E_1, V_2, E_2, V_3, E_3, V_4, E_4, V_1\}.$
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycleSuperHyperPolynomial} = z$.
$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V1, V_2, V_3, V_4, V_1\}.$
$C(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = z$.

Is a neutrosophic type-result-SuperHyperCycle. In other words, the least cardinality, the lower sharp bound for the cardinality, of a neutrosophic type-result-SuperHyperCycle is the cardinality of $C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_1, E_1, V_2, E_2, V_3, E_3, V_4, E_4, V_1\}$.

$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycleSuperHyperPolynomial} = z$.

$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{V_1, V_2, V_3, V_4, V_1\}$.

$C(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = z$.

Proposition 5.3. Assume a simple neutrosophic SuperHyperGraph ESHG : (V, E).

Then the neutrosophic number of type-result-R-SuperHyperCycle has, the least neutrosophic cardinality, the lower sharp neutrosophic bound for neutrosophic cardinality, is the neutrosophic cardinality of

$V \setminus V \setminus \{a_E, b_E', c_E'', c_E'''\}_E = \{E^{\in}_{EESHG:(V,E)} \mid |E| = \max\{|E| \mid E \in E_{ESHG:(V,E)}\}\}$.

If there's a neutrosophic type-result-R-SuperHyperCycle with the least neutrosophic cardinality, the lower sharp neutrosophic bound for cardinality.

The Departures on The Theoretical Results Toward Theoretical Motivations

The previous neutrosophic approaches apply on the upcoming neutrosophic results on neutrosophic SuperHyperClasses.

Proposition 6.1 Assume a connected neutrosophic SuperHyperPath *ESHP : (V, E)*.

Then

$$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{E_{2i-1}\}_{i=1}^{\lfloor \frac{|E_{ESHG:(V,E)}|_{Neutrosophic\ Cardinality}}{2} \rfloor}.$$

$$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycleSuperHyperPolynomial} = 2z^{\lfloor \frac{|E_{ESHG:(V,E)}|_{Neutrosophic\ Cardinality}}{2} \rfloor}.$$

$$C(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycle} = \{V_i\}_{i=1}^{s}, \{V_j\}_{j=1}^{t}.$$

$$C(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = az^s + bz^t.$$

Proof. Let $P : V_1, E_1, V_2, E_2, \ldots, V_z$ is a longest path taken from a connected neutrosophic SuperHyperPath ESHP : (*V, E*). Then there's no cycle. Thus the notion of quasi is up. The latter is straightforward.

Example 6.2. In the Figure (2), the connected neutrosophic SuperHyperPath ESHP : (*V, E*), is highlighted and featured. The neutrosophic SuperHyperSet, in the neutrosophic SuperHyperModel (2), is the SuperHyperCycle.

Proposition 6.3. Assume a connected neutrosophic SuperHyperCycle ESHC : (V, E).

Then

$$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{E_{2i-1}\}_{i=1}^{\lfloor \frac{|E_{ESHG:(V,E)}|_{Neutrosophic\ Cardinality}}{2} \rfloor}.$$

$$C(NSHG)_{NeutrosophicQuasi-SuperHyperCycleSuperHyperPolynomial} = 2z^{\lfloor \frac{|E_{ESHG:(V,E)}|_{Neutrosophic\ Cardinality}}{2} \rfloor}.$$

$$C(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycle} = \{V_i\}_{i=1}^{s}, \{V_j\}_{j=1}^{t}.$$

$$C(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = az^s + bz^t.$$

Proof. Let $C : V_1, E_1, V_2, E_2, \ldots, V_z$ is a longest cycle taken from a connected neutrosophic SuperHyperCycle *ESHC : (V, E)*. Then there's at least one cycle. Thus the notion of quasi isn't up and the SuperHyperNotions based on SuperHyperCycle could be applied. The latter is straightforward.

Example 6.4. In the Figure (3), the connected neutrosophic SuperHyperCycle NSHC : (V, E), is highlighted and featured. The obtained neutrosophic SuperHyperSet, in the neutrosophic SuperHyperModel (3), is the neutrosophic SuperHyperCycle.

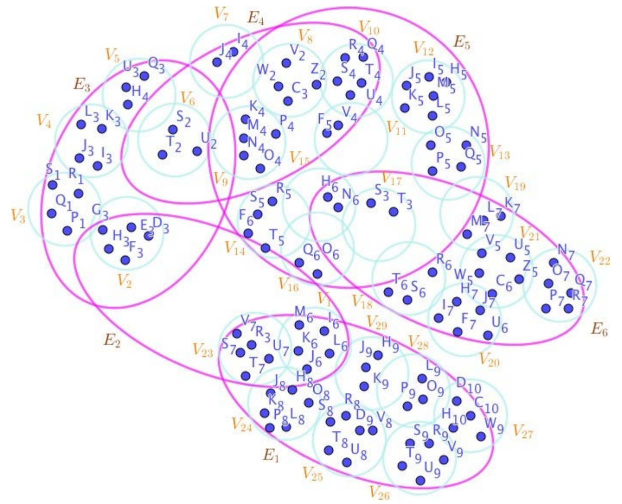

Figure 2: a neutrosophic SuperHyperPath Associated to the Notions of neutrosophicSuperHyperCycle in the Example (6.2)

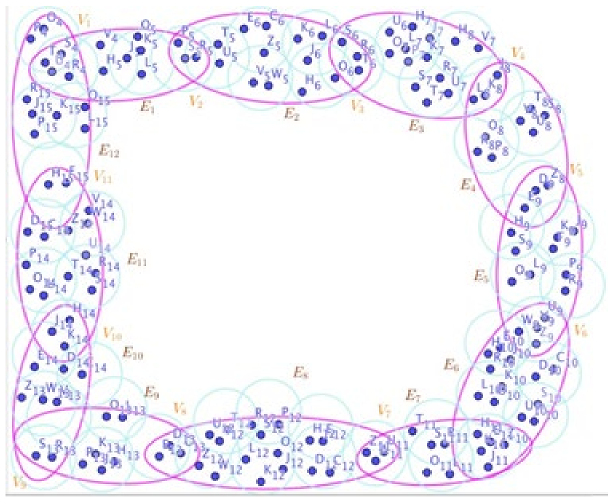

Figure 3: a neutrosophic SuperHyperCycle Associated to the neutrosophic Notions of neutrosophic SuperHyperCycle in the neutrosophic Example (6.4)

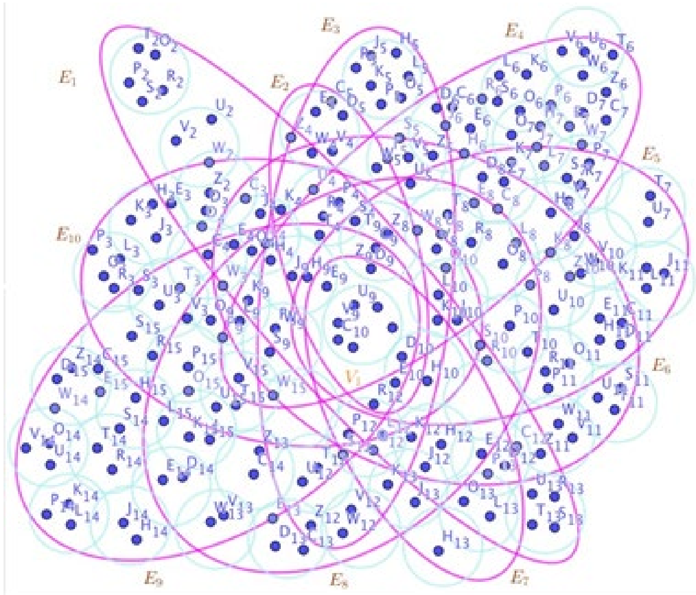

Figure 4: a neutrosophic SuperHyperStar Associated to the neutrosophic Notions of neutrosophic SuperHyperCycle in the neutrosophic Example (6.6)

Proposition 6.5. Assume a connected neutrosophic SuperHyperStar ESHS : (V, E).

Then

$$\mathcal{C}(NSHG)_{Neutrosophic Quasi-SuperHyperCycle} = \{E \in E_{ESHG:(V,E)}\}.$$

$$\mathcal{C}(NSHG)_{Neutrosophic Quasi-SuperHyperCycleSuperHyperPolynomial} = \sum_{|E_{ESHG:(V,E)}|_{Neutrosophic\ Cardinality}} z^{|E|_{Neutrosophic\ Cardinality}} \mid E : \in E_{ESHG:(V,E)}.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycle} = \{V_i\}_{i=1}^{s}, \{V_j\}_{j=1}^{t}, \ldots.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = z^s + z^t +, \ldots.$$

Proof. Let $P : V_1, E_1, V_2, E_2, \ldots, V_z$ is a longest path taken from a connected neutrosophic SuperHyperStar *ESHS* : (*V*, *E*). Then there's no cycle. Thus the notion of quasi is up. The latter is straightforward.

Example 6.6. In the Figure (4), the connected neutrosophic SuperHyperStar *ESHS* : (*V*, *E*), is highlighted and featured. The obtained neutrosophic SuperHyperSet, by the Algorithm in previous neutrosophic result, of the neutrosophic SuperHyperVertices of the connected neutrosophic SuperHyperStar *ESHS : (V, E)*, in the neutrosophic SuperHyperModel (4), is the neutrosophic SuperHyperCycle.

Proposition 6.7. Assume a connected neutrosophic SuperHyperBipartite

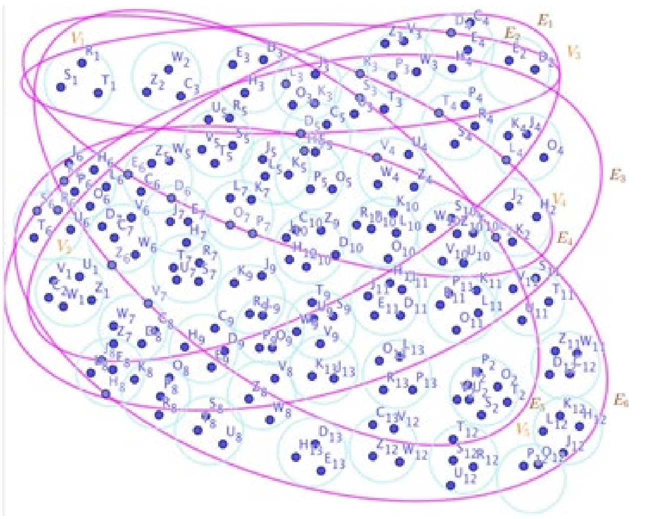

Figure 5: a neutrosophic SuperHyperBipartite neutrosophic Associated to the neutro- sophic Notions of neutrosophic SuperHyperCycle in the Example (6.8)

ESHB : (*V*, *E*). Then

$$\mathcal{C}(NSHG)_{Neutrosophic Quasi-SuperHyperCycle} = \{E\} - \min_{i=1} |P_{ESHG:(V,E)}|_{Neutrosophic\ Cardinality}$$

$$\mathcal{C}(NSHG)_{Neutrosophic Quasi-SuperHyperCycleSuperHyperPolynomial} = z^{\min |P_{ESHG:(V,E)}|_{Neutrosophic\ Cardinality}}.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycle} = \{V_i\}_{i=1}^{s}.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = az^s.$$

Proof. Let $C : V_1, E_1, V_2, E2, \ldots, V_z$ is a longest cycle taken from a connected neutrosophic SuperHyperBipartite *ESHB : (V, E)*. Then there's at least one cycle. Thus the notion of quasi isn't up and the SuperHyperNotions based on SuperHyperCycle could be applied. There are only two SuperHyperParts. Thus every SuperHyperPart could have one SuperHyperVertex as the representative in the $C : V_1, E_1, V_2, E_2, \ldots, V_z$ is a longest cycle taken from a connected neutrosophic SuperHyperBipartite *ESHB : (V, E)*. Thus only four SuperHyperVertices and only four SuperHyperEdges are attained in any solution $C : V_1, E_1, V_2, E_2, \ldots, V_z$. The latter is straightforward.

Example 6.8. In the neutrosophic Figure (5), the connected neutrosophic SuperHyperBipartite *ESHB* : (*V*, *E*), is neutrosophic highlighted and neutrosophic featured. The obtained neutrosophic SuperHyperSet, by the neutrosophic Algorithm in previous neutrosophic result, of the neutrosophic SuperHyperVertices of the connected neutrosophic SuperHyperBipartite *ESHB* : (*V*, *E*), in the neutrosophic SuperHyperModel (5), is the neutrosophic SuperHyperCycle.

Proposition 6.9. Assume a connected neutrosophic SuperHyperMultipartite

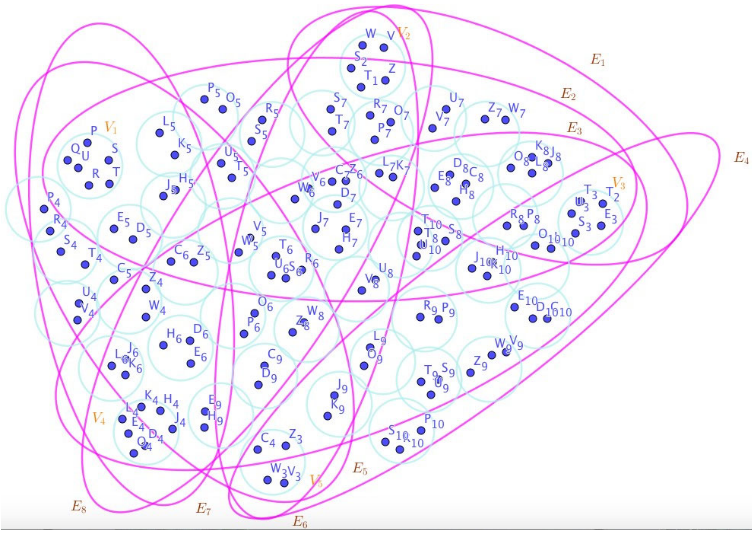

Figure 6. a neutrosophic SuperHyperMultipartite Associated to the Notions of neutro- sophic SuperHyperCycle in the Example (6.10)

$ESHM : (V, E)$. *Then*

$$\mathcal{C}(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \{E\} - \min_{i=1} |P_{ESHG:(V,E)}|_{Neutrosophic\ \ Cardinality}$$

$$\mathcal{C}(NSHG)_{NeutrosophicQuasi-SuperHyperCycleSuperHyperPolynomial} = z^{\min |P_{ESHG:(V,E)}|_{Neutrosophic\ \ Cardinality}}.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycle} = \{V_i\}_{i=1}^{s}.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = az^{s}.$$

Proof. Let $C : V_1, E_1, V_2, E_2, \ldots, V_z$ is a longest cycle taken from a connected neutrosophic SuperHyperMultipartite *ESHM : (V, E)*. Then there's at least one cycle. Thus the notion of quasi isn't up and the SuperHyperNotions based on SuperHyperCycle could be applied. There are only z' SuperHyperParts. Thus every SuperHyperPart could have one SuperHyperVertex as the representative in the $C : V_1, E_1, V_2, E_2, \ldots, V_z$ is a connected neutrosophic SuperHyperMultipartite *ESHM : (V, E)*. Thus only z' SuperHyperVertices and only z' SuperHyperEdges are attained in any solution $C : V_1, E_1, V_2, E_2, \ldots, V_z$. The latter is straightforward.

Example 6.10. In the Figure (6), the connected neutrosophic SuperHyperMultipartite ESHM : (V, E), is highlighted and neutrosophic featured. The obtained neutrosophic SuperHyperSet, by the Algorithm in previous neutrosophic result, of the neutrosophic SuperHyperVertices of the connected neutrosophic SuperHyperMultipartite *ESHM : (V, E),* in the neutrosophic SuperHyperModel (6), is the neutrosophic SuperHyperCycle.

Proposition 6.11. Assume a connected neutrosophic SuperHy- perWheel

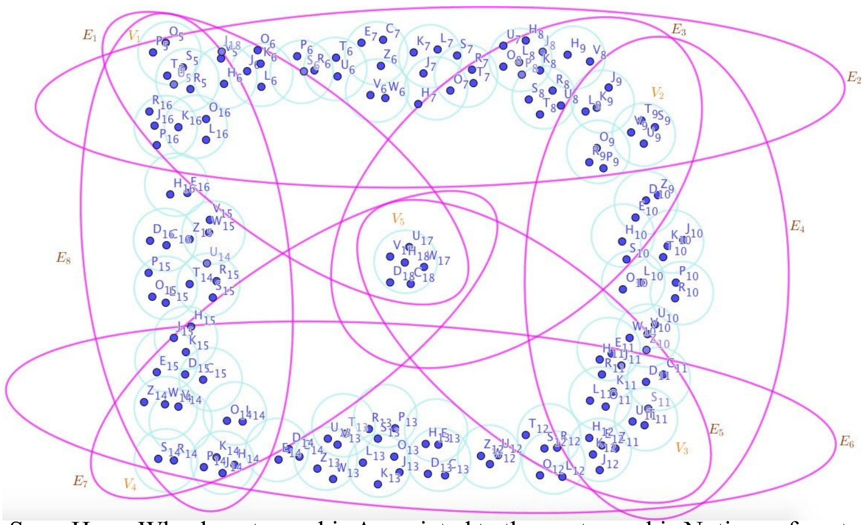

Figure 7: a neutrosophic SuperHyperWheel neutrosophic Associated to the neutrosophic Notions of neutrosophic SuperHyperCycle in the neutrosophic Example (6.12)

$ESHW\ :\ (V, E).\ Then,$

$$\mathcal{C}(NSHG)_{NeutrosophicQuasi-SuperHyperCycle} = \left|\{E_{2i-1}\}_{i=1}^{\lfloor \frac{|E_{ESHG:(V,E)}|_{Neutrosophic\quad Cardinality}}{2} \rfloor}\right|.$$

$$\mathcal{C}(NSHG)_{NeutrosophicQuasi-SuperHyperCycleSuperHyperPolynomial} = 2z^{\lfloor \frac{|E_{ESHG:(V,E)}|_{Neutrosophic\quad Cardinality}}{2} \rfloor}.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycle} = \{V_i\}_{i=1}^{s},\ \{V_j\}_{j=1}^{t}.$$

$$\mathcal{C}(NSHG)_{NeutrosophicR-Quasi-SuperHyperCycleSuperHyperPolynomial} = az^{s} + bz^{t}.$$

Neutron sophic Super Hyper Wheel ESHW : (V, E). Then there's at least one cycle. Thus the notion of quasi isn't up and the SuperHyperNotions based on SuperHyperCycle could be applied. The unique embedded SuperHyperCycle proposes some longest cycles excerpt from some representatives. The latter is straightforward.

Example 6.12. In the neutrosophic Figure (7), the connected neutrosophic SuperHyperWheel NSHW : (V, E), is neutrosophic highlighted and featured. The obtained neutrosophic SuperHyperSet, by the Algorithm in previous result, of the neutrosophic SuperHyperVertices of the connected neutrosophic SuperHyperWheel ESHW : (V, E), in the neutrosophic SuperHyperModel (7), is the neutrosophic SuperHyperCycle.

Background

Bounds on the average and minimum attendance in preference-based activity scheduling in [1] by Aronshtam and Ilani, investigating the recoverable robust single machine scheduling problem under interval uncertainty in [2] by Bold and Goerigk , polyhedra associated with locating-dominating, open locating-dominating and locating total-dominating sets in graphs in Ref. [41] by G. Argiroffo et al., a Vizing-type result for semi-total domination in [3] by J. Asplund et al., total domination cover rubbling in [4] by R.A. Beeler et al., on the global total k-domination number of graphs in [5] by S. Bermudo et al. , maker–breaker total domination game in [6] by V. Gledel et al., a new upper bound on the total domination number in graphs with minimum degree six in [7] by M.A. Henning, and A. Yeo , effect of predomination and vertex removal on the game total domination number of a graph in [8] by V. Irsic, hardness results of global total k-domination problem in graphs in [9] by B.S. Panda, and P. Goyal, are studied.

See the seminal researches [10–13]. The formalization of the notions on the framework of Extreme SuperHyperCycle theory, Neutrosophic SuperHyperCycle theory, and (Neutrosophic) SuperHyperGraphs theory at [14–47]. Two popular research books in Scribd in the terms of high readers, 2638 and 3363 respectively, on neutrosophic science is on [48, 49].

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