Pythagorean Neutrosophic Fuzzy Soft Graph

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Abstract: This paper contains about Pythagorean neutrosophic fuzzy soft graphs (PNFSG).Let us consider neutosophic set and neutrosophic components and Pythagorean fuzzy set with condition 0≤αB (x)2 + δB(x)2 + ϕB(x)2 ≤1.Through this paper we can get idea to apply Pythagorean neutrosophic set to fuzzy soft graphs and can know some kind on PNFSG with examples.

1 INTRODUCTION

Fuzzy graphs are useful to represent relationships which deal with uncertainty and it differs greatly from classical graphs. It has numerous applications to problems in computer science, electrical engineering, system analysis, operation research, economics, networking routing, transportation, etc. interval-valued Fuzzy Graphs are defined by Akram and Dudec.

Atanassov introduced the concept of intuitionistic fuzzy relations and intuitionistic Fuzzy Graph. In fact interval-valued fuzzy graphs and intuitionistic fuzzy graphs are two different models that extend theory of fuzzy graph. S.N.Mishra and A.Pal introduces the product of interval values intuitionistic fuzzy graph.

Degree of Components of fuzzy set in neutrosophic set was introduced by smarandache. Let us consider three cases which is indeterminacy, truth and falsity with 0≤ α_B (x)^2 + δ_B(x)^2 + ϕ_B(x)^2 ≤1as Pythagorean neutrosophic set. From this paper we can apply Pythagorean neutrosophic set to fuzzy soft graphs

2 PYTHAGOREAN FUZZY SET (PFS)

Pythagorean fuzzy set (PFS) set of U is P = {< q, α_B (q), ϕ_B(q)>:q∈N where α_B (q) and ϕ_B(q) from N to [0,1] represents degree of membership and non-membership of q in P correspondingly for all q ∈ N the following Condition should be satisfied 0≤ α^2(q)+ϕ^2(q) ≤1

2.1 Pythagorean Fuzzy Graph (PFG)

A Pythagorean fuzzy graph (PFG) is G = (V, E) with α_1 and $\phi_1$from N to [0,1] be a membership, non-membership function of N and 0≤ α^2(q)+ϕ^2(q) ≤1 for all q∈N such that

$$\alpha_2(ab) \leq \alpha_1(a) \wedge \alpha_1(b)$$

$$\phi_2(ab) \leq \phi_1(a) \wedge \phi_1(b)$$

Where α_2, ϕ_2 from NxN to [0,1] be a membership, non-membership function of E and 0≤ α_2^2 (ab)+ϕ_2^2 (ab) ≤1 for all ab ∈E

3 PYTHAGOREAN NEUTROSOPHIC FUZZY SOFT GRAPHS

Definition 3.1: Fuzzy Soft Graph
The FSG is defined by 4 tuple as $G = (G^*, F_1, F_2, X)$ such that

- $G^* = (N, E)$ is a simple graph,
- X is a nonempty set of attributes,
- (F_1, X) is a FSS over N,
- (F_2, X) is a FSS over E,

1. $(F_1(i), F_2(i))$ is a fuzzy soft graph of $G^*, \forall i \in X$. That is, $F_2(i) \leq min\{F_1(i)(n_1), F_1(i)(n_2)\}$, $\forall i \in X$ and $n_1, n_2 \in N$. Note that $F_2(i)(n_1n_2) = 0$, $\forall n_1n_2 \in N \times N - E$ and $\forall i \in X$.

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The fuzzy soft graph ($F_1(i)$, $F_2(i)$) is defined by $H(i)$ for simplicity.

Definition 3.2: An Intuitionistic fuzzy soft graph

$G^{\sim}$ = (G*, $F^{\sim}$ μ, γ, $\widetilde{K}$ ρ, τ, A) is such that

(i) G* = (V, E) is a simple graph.

(ii) A is a nonempty set of parameters

(iii) ($F^{\sim}{}_{\mu}$,, A) is a intuitionistic fuzzy soft set over V.

(iv) ($\widetilde{K}_{\rho}$,, A) is a intuitionistic fuzzy soft set over E.

(v) ($F^{\sim}{}_{\mu,\gamma}$, $\widetilde{K}_{\rho,\tau}$) is a intuitionistic fuzzy soft graph of G* for all a $\in$ A is

$\widetilde{K}$ ρ (a) (xy) $\leq$ min {$F^{\sim}{}_{\mu}$, (a) (x), $F^{\sim}{}_{\mu}$ (a) (y)} and $\widetilde{K}$ τ (a) (xy) $\leq$ max {$F^{\sim}\gamma$ (a) (x), $F^{\sim}{}_{\gamma}$ (a) (y)} for all a$\in$A, x, y $\in$ V. The intuitionistic fuzzy soft graph ($F^{\sim}{}_{\mu}$, (a), $\widetilde{K}_{\rho,\tau}$ (a)) is denoted by $\widetilde{H}_{\beta,\delta}$ (a).

Example 3.2: Consider a simple graph G* = (V, E) such that V = {a_1, a_2, a_3} and E = {a_1a_2, a_2a_3, a_1a_3} Let A = {e_1, e_2, e_3} be a parameter set and ($F^{\sim}{}_{\mu}$,, A) be a intuitionistic fuzzy soft set over V with intuitionistic fuzzy approximate function $F^{\sim}{}_{\mu,\gamma}$: A $\rightarrow$ IF^{V}

Consider,

$F^{\sim}{}_{\mu}$, (e_1) = {a_1/(0.3, 0.6), a_2/(0.7, 0.2), a_3/(0.9, 0.1)}

$F^{\sim}{}_{\mu}$, (e_2) = {a_1/(0.2, 0.8), a_2/(0.4, 0.6), a_3/(0.8, 0.2)}

$F^{\sim}{}_{\mu}$, (e_3) = {a_1/(0.5, 0.4), a_2/(0.6, 0.3), a_3/(0.9, 0.1)}

Let ($\widetilde{K}_{\rho}$,, A) be a intuitionistic fuzzy soft set over E with

$\widetilde{K}_{\rho}$, (e_1) = {a_1a_2/(0.2, 0.6), a_2a_3/(0.6, 0.1), a_1a_3/(0.2, 0.6)}

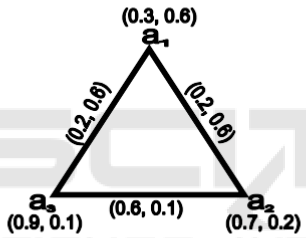
$\widetilde{K}_{\rho}$, (e_2) = {a_1a_2/(0.2, 0.7), a_2a_3/(0.3, 0.5), a_1a_3/(0.2, 0.7)}

$\widetilde{K}_{\rho}$, (e_3) = {a_1a_2/(0.5, 0.4), a_2a_3/(0.4, 0.3), a_1a_3/(0.3, 0.4)}

Thus $\widetilde{H}_{\beta}$,(e_1) = ($F^{\sim}{}_{\mu,\gamma}$ (e_1), $\widetilde{K}_{\rho,\tau}$ (e_1))(Figure 2)

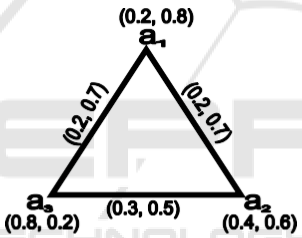
$\widetilde{H}_{\beta}$,(e_2) = ($F^{\sim}{}_{\mu,\gamma}$ (e_2), $\widetilde{K}_{\rho,\tau}$($e_2$)) (Figure 3)

$\widetilde{H}_{\beta}$,(e_3) = ($F^{\sim}{}_{\mu,\gamma}$ (e_3), $\widetilde{K}_{\rho,\tau}$ (e_3)) is an (Figure 4) intuitionistic fuzzy soft subgraph and $G^{\sim}$ = (G*, $F^{\sim}{}_{\mu}$, $\widetilde{K}_{\rho,\tau}$, A) is a intuitionistic fuzzy soft graph.



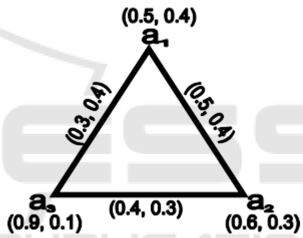
IFSG corresponding to the Parameter e_1

Figure (2)



IFSG Corresponding to the parameter e_2

Figure (3)



IFSG Corresponding to the parameter e_3

Figure (4)

Definition 3.3: Pythagorean Neutrosophic Fuzzy Soft Graphs

Pythagorean Neutrosophic Fuzzy soft Graph (PNFSG) is G = (G^*, F_1, F_2, X) ,here $G*$ = (N, E), where N = {n_1, n_2, …n_n} such that α_1 (x), δ_1(x), and σ_1(x)from N to [0,1] with $0 \leq \alpha(x)_1$ (x) $(n_i)^2$ + δ_1(x) $(n_i)^2$ + σ_1(x) $(n_i)^2$ $\leq$ 1 $\forall$ n_i in N signifies membership, indeterminacy and non-membership functions correspondingly and E $\subseteq$ N x N where α_2(x), δ_2(x), σ_2(x) from N xN to [0,1] such that

α_2(x)(n_in_j) $\leq$ α_1(x) (n_i) $\wedge$ α_1(x) (n_j)

δ_2(x) (n_in_j) $\leq$ δ_1(x) (n_i) $\wedge$ δ_1(x) (n_j)

σ_2(x) (n_in_j) $\leq$ σ_1(x) (n_i) $\vee$ σ_1(x) (n_j)

With 0 $\leq$ ((α_2(x)(n_in_j)) + (δ_2(x)n_i n_j)) + (σ_2(x) (n_in_j)) $\leq$1 $\forall$ (n_in_j) $\in$ E

Definition 3.4: Complete PNFSG

A PNFSG is G = ($G*$, F_1, F_2, X) where G^* = (N, E) is termed as complete PNFSG (CPNFSG)

If α_2 (x) (n_in_j) = α_1 (x) (n_i) $\wedge$ α_1 (x) (n_j), δ_2 (x) (n_in_j) = δ_1(x)(n_i) $\wedge$ δ_1(x)(n_j), σ_2(x) (n_in_j) = σ_1(x)(n_i) $\vee$ σ_1(x)(n_j) for every n_i, n_j $\in$ N.

Definition 3.5: strong PNFSG

A PNFSG G = ($G*$, F_1, F_2, X) is named as strong PNFSG if

α_2(x) (n_in_j) = min (α_1(x) (n_i), α_1(x) (n_j))

δ_2(x) (n_in_j) = min ($_1$(x) (n_i), δ_1(x) (n_j))

σ_2(x) (n_in_j) = max ($_1$(x) (n_i), σ_1(x) (n_j)) $\forall$ (n_in_j) $\in$ E.

Definition 3.6: Pythagorean Neutrosophic Fuzzy soft Graph (PNFSG) and subgraph (PNFSSG)

Let $G = (G^{*}, F_1, F_2, X)$ with α(x), δ (x), σ(x) as the membership, indeterminacy and non-membership degree be a Pythagorean Neutrosophic Fuzzy soft Graph (PNFSG)

Then a Pythagorean Neutrosophic Fuzzy soft Graph G' = (G'^{*}, F'_1, F'_2, X) with N' ⊆ N and E' ⊆E, α'(x), δ'(x), σ'(x) as the membership, indeterminacy and non-membership is called Pythagorean Neutrosophic Fuzzy soft subgraph (PNFSSG)

if $\alpha'(x)(\vartheta) \leq \alpha(x)(\vartheta)$, $\delta'(x)(\vartheta) \leq \delta(x)(\vartheta)$, $\sigma'(x)(\vartheta) \geq \sigma(x)(\vartheta)$ for $\vartheta \in$ N.

Definition 3.7: Intersection of Pythagorean Neutrosophic Fuzzy soft Graph (IPNFSG)

Let G' = (G'^{*}, F'_1, F'_2, X) , G'' = (G''^{*}, F'_1, F'_2, X) be Pythagorean Neutrosophic Fuzzy soft Graph where G'^{*} = (N′, E'), G''^{*} = (N″, E'') with (α′(x), δ'(x), Φ′(x)) and (α″(x), δ''(x), Φ″(x)) as their membership, indeterminacy and non-membership correspondingly .Then the intersection of G' and G'',G=(G^{*}, F_1, F_2, X), G^{*} = (N, E) is a Pythagorean Neutrosophic Fuzzy soft Graph where N= N'∩N'', E=E'∩E'' membership, indeterminacy and non-membership of N and E of for all u,v, $\omega \in$ N such that

(i)

$$\alpha_1(x)(\omega) = \begin{cases} \alpha'_1(x)(\omega) & \text{if } \omega \text{ is in N' and not in N''} \\ \alpha''_1(x)(\omega) & \text{if } \omega \text{ is in N'' and not in N'} \\ \alpha'_1(x)(\omega) \wedge \alpha''_1(x)(\omega) & \text{if } \omega \text{ is in N' and not in N''} \end{cases}$$

(ii)

$$\delta_1(x)(\omega) = \begin{cases} \delta'_1(x)(\omega) & \text{if } \omega \text{ is in N' and not in N''} \\ \delta''_1(x)(\omega) & \text{if } \omega \text{ is in N'' and not in N'} \\ \delta'_1(x)(\omega) \wedge \delta''_1(x)(\omega) & \text{if } \omega \text{ is in N' and not in N''} \end{cases}$$

(iii)

$$\Phi_1(x)(\omega) = \begin{cases} \Phi'_1(x)(\omega) & \text{if } \omega \text{ is in N' and not in N''} \\ \Phi''_1(x)(\omega) & \text{if } \omega \text{ is in N'' and not in N'} \\ \Phi'_1(x)(\omega) \wedge \Phi''_1(x)(\omega) & \text{if } \omega \text{ is in N' and not in N''} \end{cases}$$

(iv)

$$\alpha_2(x)(uv) = \begin{cases} \alpha'_2(x)(uv) & \text{if uv is in E' and not in E''} \\ \alpha''_2(x)(uv) & \text{if uv is in E'' and not in E'} \\ \alpha'_2(x)(uv) \wedge \alpha''_2(x)(uv) & \text{if } \omega \text{ is in E' and not in E''} \end{cases}$$

(v)

$$\delta_2(x)(uv) = \begin{cases} \delta'_2(x)(uv) & \text{if uv is in E' and not in E''} \\ \delta''_2(x)(uv) & \text{if uv is in E'' and not in E'} \\ \delta'_2(x)(uv) \wedge \delta''_1(x)(uv) & \text{if } \omega \text{ is in E' and not in E''} \end{cases}$$

(vi)

$$\Phi_2(x)(uv) = \begin{cases} \Phi'_2(x)(uv) & \text{if uv is in E' and not in E''} \\ \Phi''_1(x)(uv) & \text{if uv is in E'' and not in E'} \\ \Phi'_2(x)(uv) \wedge \Phi''_2(x)(uv) & \text{if } \omega \text{ is in E' and not in E''} \end{cases}$$

Definition3.8: Union of Pythagorean Neutrosophic Fuzzy soft Graph (UPNFSG)

Let G' = (G'^{*}, F'_1, F'_2, X) , G'' = (G''^{*}, F'_1, F'_2, X) be Pythagorean Neutrosophic Fuzzy soft Graph where G'^{*} = (N′, E'), G''^{*} = (N″, E'') with (α′(x), δ'(x), Φ′(x)) and (α″(x), δ''(x), Φ″(x)) as their membership, indeterminacy and non-membership of the vertices and edges correspondingly. Then the union of G' & G'',G =(G^{*}, F_1, F_2, X), G^{*} = (N, E) is a PNFSG where N = N′ ∪ N″, $E = E' \cup E''$ and the membership, indeterminacy and non-membership of vertices (N), edges (E) of G for all p, q,k ∈ N such that Consider the following, If G = (N,E,λ,ϱ)where λ = (α$_1$(x), δ_1(x), σ_1(x)) and ϱ=(α$_2$(x), δ_2(x), σ_2(x)) are membership, indeterminacy and non-membership of PNFSG

(i)

$$\alpha_1(x)(k) = \begin{cases} \alpha'_1(x)(k) & \text{if } k \text{ is in N' and not in N''} \\ \alpha''_1(x)(k) & \text{if } k \text{ is in N'' and not in N'} \\ \alpha'_1(x)(k) \vee \alpha''_1(x)(k) & \text{if } k \text{ is in N' or in N''} \end{cases}$$

(ii)

$\delta_1(x)(k) = \begin{cases} \delta_1'(x)(k) & \text{if } k \text{ is in N' and not in N''} \\ \delta_1''(x)(k) & \text{if } k \text{ is in N'' and not in N'} \\ \delta_1'(x)(k) \vee \delta_1''(x)(k) & \text{if } k \text{ is in N' or in N''} \end{cases}$

(iii)

$\Phi_1(x)(k) = \begin{cases} \Phi_1'(x)(k) & \text{if } k \text{ is in N' and not in N''} \\ \Phi_1''(x)(k) & \text{if } k \text{ is in N'' and not in N'} \\ \Phi_1'(x)(k) \vee \Phi_1''(x)(k) & \text{if } k \text{ is in N' or in N''} \end{cases}$

(iv)

$\alpha_2(x)(pq) = \begin{cases} \alpha_2'(x)(pq) & \text{if pq is in E' and not in E''} \\ \alpha_2''(x)(pq) & \text{if pq is in E'' and not in E'} \\ \alpha_2'(x)(pq) \vee \alpha_2''(x)(pq) & \text{if pq is in E' or in E''} \end{cases}$

(v)

$\delta_2(x)(pq) = \begin{cases} \delta_2'(x)(pq) & \text{if pq is in E' and not in E''} \\ \delta_2''(x)(pq) & \text{if pq is in E'' and not in E'} \\ \delta_2'(x)(pq) \vee \delta_1''(x)(pq) & \text{if pq is in E' or in E''} \end{cases}$

(vi)

$\Phi_2(x)(pq) = \begin{cases} \Phi_2'(x)(pq) & \text{if pqis in E' and not in E''} \\ \Phi_1''(x)(pq) & \text{if pq is in E'' and not in E'} \\ \Phi_2'(x)(pq) \vee \Phi_2''(x)(pq) & \text{if pq is in E' or in E''} \end{cases}$

Definition 3.8: Pythagorean Neutrosophic soft path P (PNSP)

A Pythagorean Neutrosophic soft path P (PNSP) in PNSFG G =(N,E,λ,ϱ) where $\varrho(x)(n_{i-1},n_i)>0$,i = 1 to k where k is the length of the PNSP and that pair of PNSP are called the edges.

Definition 3.9: Longest PNSP

The diameter of a, b in N is the length of the longest PNSP joining a and b and denoted as $diam\ (a, b)$.The strength of PNSP P is represented by (P) or $S(P)$ and defined as

$\prod_{k=1}^{n}(n_{k-1}, n_k) = (\prod_{k=1}^{n} \alpha_2(n_{k-1}, n_k), \prod_{k=1}^{n} \beta_2(n_{k-1}, n_k), \prod_{k=1}^{n} \sigma_2(n_{k-1}, n_k))$

where $n_k \in N$ ($k = 1,2, \ldots , k$)

Definition 3.10: pythagorean neutrosophic Soft strength of connectedness

The pythagorean neutrosophic Soft strength of connectedness of vertices a and b of PNFSG is defined as the maximum of the strength of all PNSP's among a and b and represented by $PNCONN(x, y)$. $PNCONN_G$(x,y)=(max(S(P)) where P is x-y PNSP in G

If k≥3 and $N_0 = N_n$ then PNSP P is called a Pythagorean Neutrosophic Soft Cycle(PNSC)

Example: 3.10

Let us take the follwoing PNFSG

v_1(0.6,0.4,0.8),v_2(0.8,0.6,0.4),v_3(0.8,0.3,0.5), v_4(0.9,0.4,0.3)

e_1(0.5,0.5,0.4),e_2(0.6,0.4,0.2),e_3(0.7,0.4,0.2), e_4(0.6,0.4,0.5)

Pythagorean Neutrosophic Soft strength of connectedness of PNFSG

$PNCONN(v_1, v_2)$ = (max(0.6,0.8),max(0.4,0.6),min(0.8,0.4) = (0.8,0.6,0.4)

$PNCONN(v_1, v_3)$ = (max(0.6,0.8),max(0.4,0.3),min(0.8,0.4) = (0.8,0.4,0.4)

$PNCONN(v_1, v_4)$ = (max(0.6,0.9),max(0.4,0.3),min(0.5,0.4) =(0.9,0.4,0.4)

Definition 3.11: pythogorean neutrosophic fuzzy soft bridge (PNFSB)

Let G = (N,E,λ,ϱ)be a PNFSG let x,y be two vertices,

and G' be a PNFSG of G attained by eliminate the edge xy.

xy is a pythogorean neutrosophic fuzzy soft bridge(PNFSB)

in G if PNCONN G'(a,b)<PNCONN G(a,b)

For some a,b.

The elimination of the edge xy decreases the strength of connectedness among vertices in G.

Thus, xy is a PNFSB if and only if there exists vertices a, b such that xy is an edge of each strongest path from a to b.

Theorem 3.11

Let G = (N,E,λ,ϱ)be a PNFSG. Then the subsequent statements are equivalent.
1. xy is a PNFSB
2. $PNCONN\ G'\ (x, y) < \varrho\ (xy)$
3. xy is not the weakest edge of any Pythagorean neutrosophic soft cycle (PNSC)

Proof:
2 ⇒1 If xy is not a PNFSB, then $PCONN\ G'\ (x, y) = PCONN\ G(x, y) \geq \varrho\ (xy)$.
1 ⇒ 3 If xy is the weakest edge of a PNSC, then any PNSP P including the edge xy can be converted into a PNSP P' not involving xy but at least as strong as P, by replacement of the PNSC as a PNSP from x to y. Thus, xy cannot be a PNFSB.
3 ⇒ 2 If $PCONN\ \ G'\ (x, y) < \varrho\ (xy)$, there is a PNSP from x to y not including xy with strength ≥ $\varrho\ (xy)$, and this PNSP together with xy forms a PNSC of G in which xy is a weakest edge.

Definition 3.12: Pythagorean neutrosphic fuzzy soft cutvertex
Let w be any vertex and let G' = (N',E',λ',ϱ')be a PNFSSG of G = (N,E,λ,ϱ)attained by removing the vertex w. That is, G' = (N',E',λ',ϱ')is the PNFSSG of G such that λ' (w) = 0, $\lambda' = \lambda$ for all other vertices, ϱ' (wz) = 0 for all vertices z, and $\varrho' = \varrho$ for all other edges. Thus we call w a Pythagorean neutrosphic fuzzy soft cutvertex in G if $PNCON\ \ '\ (u,\ v) < PNCONN\ G(u, v)$ for some u, v in N such that $u \neq$ w $\neq v$.

Definition 3.13: Pythagorean neutrosphic intuitionistic fuzzy soft graph (PNIFSG)
A Pythagorean neutrosphic intuitionistic fuzzy soft graph is $G = (G^*, F$a,b, Fc,d, $X)$,here $G* = (N, E)$, where N = {$n_1, n_2, \ldots n_n$} such that $\alpha_{a,b}$ (x), $\delta_{a,b}$(x), and $\sigma_{a,b}$(x)from N to [0,1] with $0 \leq \alpha_{a,b}(x)$ (x) $(n_i)^2 + \delta_{a,b}(x)\ (n_i)^2 + \sigma_{a,b}(x)\ (n_i)^2 \leq 1$ ∀ n_i in N signifies membership, indeterminacy and non-membership functions correspondingly and $E \subseteq$ N x N where $\alpha_{c,d}$(x), $\delta_{c,d}$(x), $\sigma_{c,d}$(x) from N xN to [0,1] such that

$\alpha_{c,d}(x)(n_i n_j) \leq \alpha_{a,b}(x)\ (n_i) \wedge \alpha_{a,b}(x)\ (n_j)$
$\delta_{c,d}(x)\ (n_i n_j) \leq \delta_{a,b}(x)\ (n_i) \wedge \delta_{a,b}(x)\ (n_j)$
$\sigma_{c,d}(x)\ (n_i n_j) \leq \sigma_{a,b}(x)\ (n_i) \vee \sigma_{a,b}(x)\ (n_j)$
With $0 \leq ((\alpha_{c,d}(x)(n_i n_j)) + (\delta_{c,d}(x)n_i\ n_j)) + (\sigma_{c,d}(x)\ (n_i n_j)) \leq 1$ ∀ $(n_i n_j) \in E$

4 CONCLUSIONS

Here in, we get some idea by applying pythagorean neutrosophic set to fuzzy soft graph and some of its basic definitions and properties of the pythagorean neutrosophic fuzzy soft graphs. Here after we will extend some other field with real time example.

REFERENCES

8. Sarala.N, Deepa.R, "The Arithmetical Edifices of Strength of Connectedness in Intuitionistic Fuzzy Soft Graph", International Journal of Scientific and Technology Research volume 9, Issue 02, February 2020. PP: 4815-4821, ISSN: 2277-8616,

Ajay.D,"Pythagorean Neutrosophic Fuzzy Graphs", International Journal of Neutrosophic Science, Vil.11.No.2.PP.108-114, 2020.

Atanassov.K."Intuitionistic Fuzzy Sets",Fuzzy Sets and System,Vol 20.PP.87-96,1986.

Attanassov.k, Intuitionistic fuzzy sets, Fuzzy sets and Systems, 20(1986)87-96

Attanassov.k, Intuitionistic fuzzy sets theory and Applications, springer-verlag, Heidelberg, 1999

Mohinda.S and Samanta.T.K, An Introduction to fuzzy soft graph, Mathematics Moravica, 19-2(2015) 35-48.

Rosenfeld.A,Fuzzy graphs Zadeh.L.A., Tanka.K and shimura.M, Fuzzy sets and their publications to cognitive and decision process Academic Process, New York,1975,75-95

Sarala.N, Deepa.R," invention of best technology In agriculture using intuitionstic fuzzy soft graphs", International Journal of Mathematical Archive-9(7), 2018, 47-57.

Sarala.N, Deepa.R,"Regular Interval valued Intuitionistic Fuzzy Soft Graph",The international journal of analytical and experimental modal analysis.ISSN NO:0886-9367.

Smarandache,F.,"A Unifying Field in Logics:Neutrosohic Logic.Neutrosophy,Neutrosophic Set.Neutrosophic Pr obability",American Research Press:Rehoboth,DE,US A,PP.1-141,1999.

Thumbakara.R.K and George.B, Soft graph, Gen. Mathematics Notes, 21(2) (2014)75-86.

Yager.R.R.,"Pythagorean Fuzzy Subsets", In:Proc Joint IFSA World Congress and NAFIPS Annual Meeting .Edmonton,Canada.PP.57-61.2013.

Yang.H.L, Notes on generalized fuzzy soft sets, Journal of Mathematical Research and Exposition, 31(3) (2011) 567-570.

Zadeh.L. A Fuzzy sets Information and control 8(1965) 338- 353.

Zadeh.L.A.," Fuzzy Sets", Inform and Control, Vol.8, PP. 338-353,1965.