STRUCTURAL CORE GRAPH OF TRIPLE LAYERED FUZZY GRAPH

L. Jethruth Emelda Mary[1] and P. Amutha[2]
Assistant Professor[1], Research Scholar[2]
PG & Research Scholar Department of Mathematics,
St. Joseph's College of Arts and Science (Autonomous)
Cuddalore, Tamil Nadu, India

***Abstract:** The Triple Layered Fuzzy Graph (TLFG) gives the 3–D structure to fuzzy graph. In this paper, we constructed the structural core graph for the given TLFG of order n=6, 7, 8 using a new algorithm and also the structural core graph for the union of two TLFG is also constructed using the same algorithm. Some of its diagrammatic properties are studied.*

***Keywords:** Fuzzy graph, Triple layered fuzzy graph, Face value, Structural core graph.*

1. INTRODUCTION:

Fuzzy graph theory was introduced by Rosenfeld in 1975 [5]. The degree of a vertex in some fuzzy graphs was discussed by Nagoorgani and Radha [7]. Nagoorgani and Malarvizhi have defined different types of fuzzy graphs and discussed its relationships with isomerism in fuzzy graphs [3]. The double layered fuzzy graph was introduced by Pathinathan and Jesintha Rosline, they have examined some of the properties of DLFG [4].

In this paper, Mrs. L.Jethruth Emelda Mary and P. Amutha established the structural core graph of Triple Layered Fuzzy Graph of order n= 6, 7, 8 this is on extended work of our previous paper Using new algorithm.

2. PRELIMINARIES

We start with some basic definitions.

Definition 2.1:

A fuzzy graph G is a pair of functions G : (σ,μ) where σ is a fuzzy subset of a non empty set S and μ is a symmetric fuzzy relation on σ The underlying crisp graph of G :(σ,μ) is denoted by G^* : (σ^*, μ^*)

Definition: 2.2:

Let G :(σ,μ) be a fuzzy graph, The order of G is defined as $O(G) = \sum_{u\in V} \sigma(u)$

Definition: 2.3:

Let G :(σ, μ) be a fuzzy graph, the size of G is defined as $S(G) = \sum_{u\in V} \mu(u,v)$

Definition: 2.4:

Let G :(σ,μ) be a fuzzy graph the degree of a vertex u in G is defined as d(u)=∑μ(u,v) and is denoted as $d_G(u)$.

Definition: 2.5.

Let G be a fuzzy graph, The μ - complement of G is denoted as $G^\mu : (\sigma^\mu, \mu^\mu)$ where

$$\sigma^* \cup \mu^* \text{ and } \mu^\mu(u,v) = \begin{cases} \sigma(u)\sigma(v) - \mu(u,v) & \text{if } \mu(u,v) > 0 \\ 0, & \text{if } \mu(u,v) = 0 \end{cases}$$

Definition: 2.6.

Let G_1: (σ_1,μ_1) and G_2: (σ_2,μ_2) be two fuzzy graphs with crisp graph G_1^*: (V_1,E_1) and G_2^*: (V_2, E2), with the union of G_1^* and G_2^*. Then the union of two fuzzy graphs G_1 and G_2 is a fuzzy graphs $G = G_1 \cup G_2$: $(\sigma_1\cup\sigma_2, \mu_1\cup\mu_2)$ defined by

$$(\sigma_1\cup\sigma_2)(u) = \begin{cases} \sigma_1(u) & \text{if } u\in V_1 - V_2 \\ \sigma_2(u) & \text{if } u\in V_1 - V_2, \end{cases}$$

And

$$(\mu_1\cup\mu_2)(uv) = \begin{cases} \mu_1(uv) & \text{if } uv \in E_1 - E_2 \\ \mu_2(uv) & \text{if } uv \in E_1 - E_2 \end{cases}$$

Definition: 2.7:

Let G: (σ, μ) be a fuzzy graph with the underlying crisp graph G^*: (σ^*, μ^*). The pair DL: (σ_{DL}, μ_{DL}) is defined as follows. The node set of DL (G) be σ^* U μ^*. The fuzzy subset σ_{DL} is defined as

$$\sigma_{DL} = \begin{cases} \sigma(u) & \text{if } u \in \sigma^* \\ \mu(uv) & \text{if } uv \in \mu^* \end{cases}$$

The fuzzy graph relation μ_{DL} on σ^*U μ^* is defined as

$$\sigma_{DL} = \begin{cases} \mu(uv) \text{ if } u, v \in \sigma^* \\ \mu(e_i) \wedge \mu(e_j) \text{ if the edge } e_i \text{ and } e_j \text{ have a node in common between them} \\ \sigma(\mu_i) \wedge \mu(e_i) \text{ if } \mu_i \in \sigma^* \text{ and } e_i \in \mu^* \text{ and each } e_i \text{ is incident with single } \mu_i \text{ either} \\ \text{clockwise or anticlockwise} \\ 0 \text{ otherwise} \end{cases}$$

By definition $\sigma_{DL}(u,v) \le \mu_{DL}(u) \le \mu_{DL}(v)$ for all u,v in σ^*U μ^*. Here μ_{DL} is a fuzzy relation on the fuzzy subset σ_{DL}. Hence the pair DL (G): (σ_{DL}, μ_{DL}) is defined as Double Layered Fuzzy Graph (DLFG).

3. Definition of Triple Layered Fuzzy Graph:

Let G :(σ, μ) be a fuzzy graph with the underlying crisp graph G^* : (σ^*,μ^*) the pair TL(G): (σ_{TL},μ_{TL}) is defined as follows. The node set of TL (G) be $\sigma^*\cup\mu^*\cup\mu^*$. The fuzzy subset σ_{TL} is defined as

$$\sigma_{TL} = \begin{cases} \sigma(u) \text{if } u \in \sigma * \\ 2\mu(uv) \text{ if } uv \in \mu * \end{cases}$$

The fuzzy relation μ_{TL} on $\sigma^*\cup \mu^*$ is defined as

$$\mu_{TL} = \begin{cases} \mu(u,v) & \text{if } u,v \in \sigma^* \\ \mu(e_i) \wedge \mu(e_j) & \text{if the edge } e_i \text{ and } e_j \text{ have a node in common between them.} \\ \sigma(u_i) \wedge \mu(e_i) & \text{if } u_i\in\sigma^* \text{ and } e_i\in\mu^* \text{ and each } e_i \text{ is incident with } u_i \text{ in clockwise direction} \\ \sigma(u_i) \wedge \mu(e_i) & \text{if } u_i\in\sigma^* \text{ and } e_i\in\mu^* \text{ and each } e_i \text{ is incident with } u_i \text{ in anticlockwise direction} \\ 0 & \text{otherwise} \end{cases}$$

By definition, $\mu_{TL}(u, v) \le \sigma_{TL}(u) \wedge \sigma_{TL}(v)$ for all u ,v in $\sigma^*\cup\mu^*$. Here μ_{TL} is a fuzzy relation on the fuzzy subset σ_{TL}. Hence the pair TL (G): (σ_{TL},μ_{TL}) is defined as Triple Layered Fuzzy Graph (TLFG).

Structural core graph: 3.1

In this section, we have introduced new algorithm to construct a structural core graph of Triple Layered Fuzzy Graph. (i.e.) to obtain a spanning tree for the given Triple Layered Fuzzy Graph.

Algorithm: 3.2

1. Construct a TLFG with 6n vertices and 8n edges where n is the number of vertices in the base graph whose crisp graph a cycle.
2. Calculate face values using the formulae $\min\left\{\frac{\mu(a,b)}{\sigma(a)\wedge\sigma(b)}\right\}$ where μ (a, b) is the weight of the edge (a ,b) and $\sigma(a)$ & $\sigma(b)$ are membership value of vertices a and b in TLFG.
3. Select a face with least value. If two (or) more faces are there with least value, choose a Face with least order value.
4. Choose a vertex with least value in the selected face.
5. Select the smallest fuzzy distance, fuzzy distance edge from the selected vertex and include that in T. If two (or) more edges are there with the same value choose an edge with least adjacent vertex value, where T is a tree of TLFG.
6. If two (or) more vertices are there with same value then choose the edge with least intersecting face value.
7. Repeat this procedure till we cover all the vertices of TLFG.
8. Stop, when T becomes Spanning tree of TLFG.

Example: 3.3

Consider a fuzzy graph G: (σ, μ) with n=6 vertices whose crisp graph is a cycle C6.

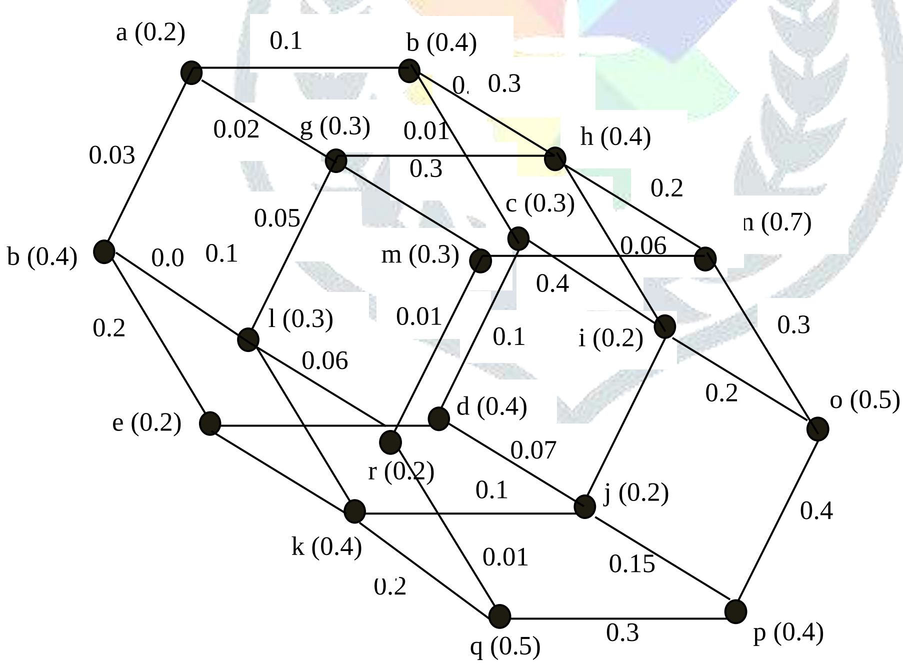

Figure 1: TLFG of n=6 vertices whose crisp graph is a cycle of order n=6

Face Value calculation:

F_1 (a b c d e f) → min {0.5, 0.33, 0.0., 0.05, 1, 0.15} =0.03
F_2 (g h I j k l) → min {1, 0.05, 0.15, 0.5, 1, 0.16} = 0. 05

F_3 (m n o p q r) → min {0.2, 0.6, 1, 0.75, 0.05,} = 0.05
F_4 (a b h g) → min {0.5, 0.75, 1, 1} = 0.5
F_5 (g h n m) → min {0.5, 0.75, 1, 1} = 0.5
F_6 (a g l f) → min {0.1, 0.16, 0.03, 0.15} 0.03
F_7 (g m r l) → min {0.03, 0.5, 0.3, 016} = 0.3
F_8 (c I j d) → min {0.05, 0.15, 0.35, 0.03} = 0.03
F_9 (i o p j) → min {1, 1, 0.75, 1} = 0.05
F_{10} (t l k e) → min {0.03, 1, 0.5, 1} = 0.03
F_{11} (l r q k) → min {0.3, 0.05, 0.05, 1} = 0.05
F_{13} (d j k e) → min {0.35, 0.5, 0.5, 0.05,} – 0.05
F_{14} (j p q k) → min {0.75, 0.75, 0.5, 0.5} = 0.5
F_{15} (h n o I) → {0.5, 0.6, 1} = 0.5

Reached node	**Edge**	**Membership Value**	**Iteration**
e	**Ed**	**0.01**	**1**
ed	**dj**	**0.07**	**2**
edj	**jk**	**0.1**	**3**
edjk	**ke (form cycle)**	**-**	**No**
edjk	**kl**	**0.3**	**4**
edjkl	**lr**	**0.06**	**5**
edjklr	**rm**	**0.1**	**6**
edjklrm	**mg**	**0.01**	**7**
edjklrmg	**gl(from cycle)**	**-**	**No**
edjklrmg	**ga**	**0.02**	**8**
edjklrmga	**ab**	**0.1**	**9**
edjklrmgab	**bh**	**0.1**	**10**
edjklrmgabh	**hg (from cycle)**	**-**	**No**
edjklrmgabh	**hn**	**0.2**	**11**
edjklrmgabhn	**hm (from cycle)**	**-**	**No**
edjklrmgabhn	**no**	**0.3**	**12**
edjklrmgabhno	**oi**	**0.2**	**13**
edjklrmgabhnoi	**ih (from cycle)**	**-**	**No**
edjklrmgabjnoi	**ij**	**0.03**	**14**
edjklrmgabhnoij	**jp**	**0.15**	**15**
edjklrmgabhnoijp	**po (from cycle)**	**-**	**No**
edjklrmgabhnoijp	**pq**	**0.3**	**16**
edjklrmgabhnoijapq	**qk (from cycle)**	**-**	**No**
edjklrmgabhnoijpq	**qr**	**0.01**	**17**
edjklrmgabhoijpqr	**rl**	**0.06**	**18**
edjklrmgabhnoijpqrl	**lf**	**0.01**	**19**
edjklrmgabhnoijpqrlf	**fe (from cycle)**	**-**	**No**
edjklrmgabhnoipqrlf	**fa (from cycle)**	**-**	**No**
edjklrmgabhnoipqrlf	**fl**	**0.01**	**20**
edjklrmgabhnoipqrlfl	**lr**	**0.06**	**21**
edjklrmgabhnoipqrlflr	**rq**	**0.014**	**22**
edjklrmgabhnoipqrlflrq	**qp**	**0.3**	**23**
edjklrmgabhnoipqrlflrqp	**pj**	**0..15**	**24**
edjklrmgabhnoipqrlflrqpj	**ji (from cycle)**	**-**	**No**
edjklrmgabhnoipqrlflrqpj	**jd**	**0.07**	**25**
edjklrmgabhnoipqrlflrqpjd	**dc**	**0.01**	**26**
edjklrmgabhnoipqrlflrqpjdc	**ci (from cycle)**	**-**	**No**
edjklrmgabhnoipqrlflrqpjdc	**cd**	**0.1**	**27**

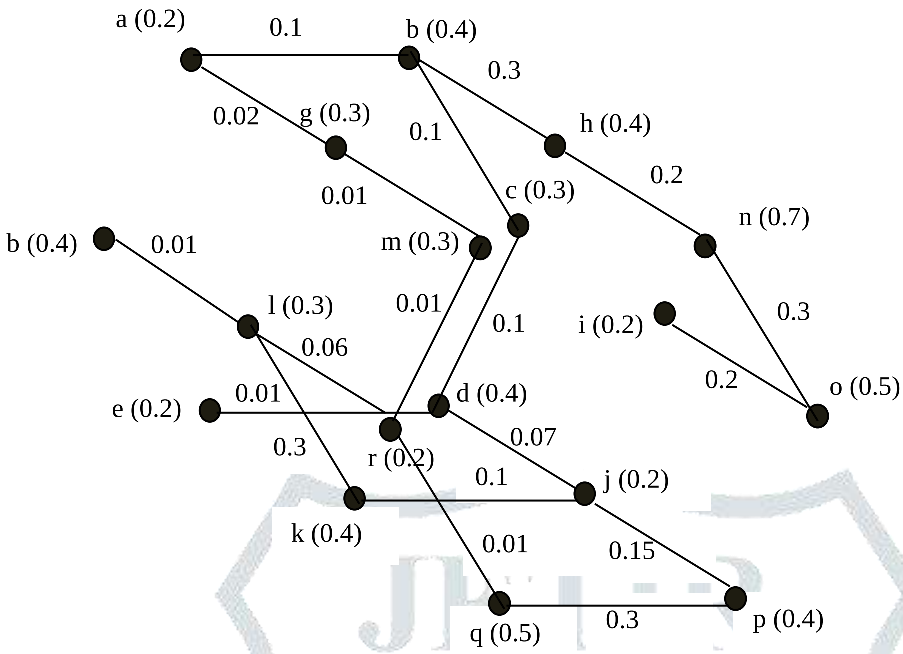

Figure 2: Structural core graph of TLFG of n=6 vertices

Example: 3.4

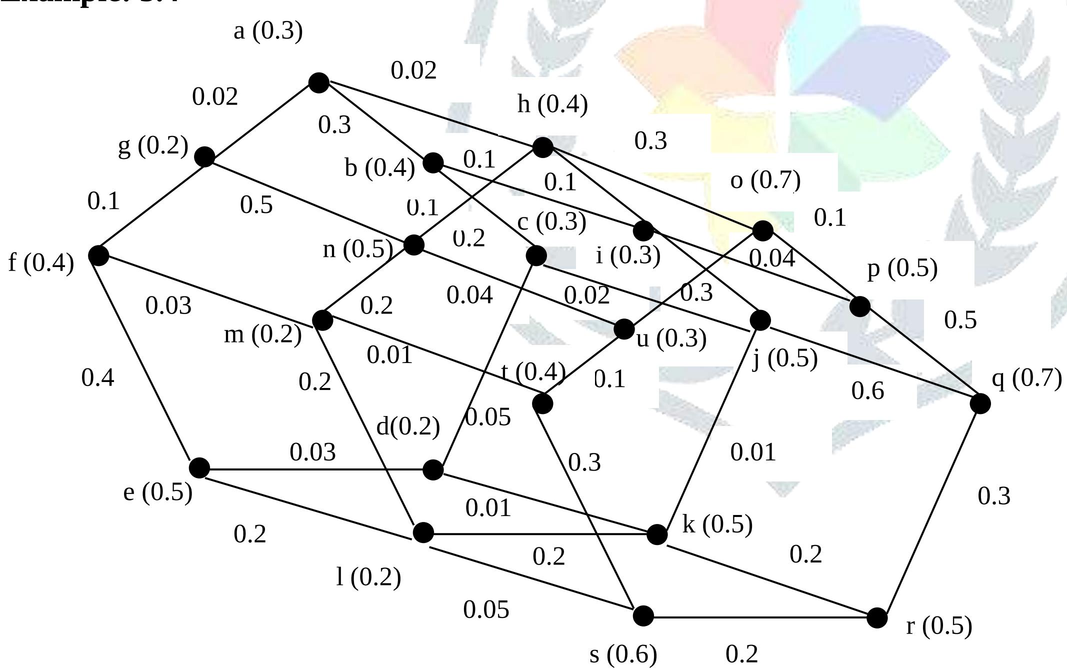

Figure 3: TLFG of a simple fuzzy graph with=7 vertices whose crisp graph is c_7

Face Value Calculation:

F_1 (a b c d e f g) → min {0.3, 0.33, 0.25, 0.15, 0.1} = 0.1

F_2 (h I j k l m n) → min {0.33, 0.03, 1, 1, 1, 0.25} = 0.03

F_3 (o p q r s t u) → min {0.2, 1, 1, 0.66, 1, 0.33) = 0.2

F_4 (a h i b) → min {0.03, 0.33, 0.33, 0.3} = 0.03

F_5 (h o p i) → min {0.75, 0.2, 0.13, 0.33} = 0.13

F_6 (b i j c) → min {0.33, 1, 0.06, 0.33} = 0.06
F_7 (i p q j) → min {0.13, 1, 0.12, 1} = 0.12
F_8 (a h n g) → min {0.03, 0.25, 0.25, 0.1} = 0.25
F_9 (h o u n) → min {0.75, 0.33, 0.13, 0.25} = 0.13
F_{10} (g n m t) → min {0.25, 1, 0.15, 0.5} = 0.13
F_{11} (n u t m) → min {0.13, 1, 0.05, 1} = 0.05
F_{12} (f m l c) → min {0.15, 1, 1, 1} = 0.15
F_{13} (m t s l) → min { 0.05, 1, 0.25, 1 } = 0.05
F_{15} (j q r k) → min { 0.05, 1, 0.4, 0.03} = 0.03
F_{16} (e d k l) → min { 0.12, 1, 0.4, 0.03} = 0.05
F_{17} (k r s r) → min {0.4, 0.66, 0.25, 1 } = 0.25

Reached node	Edge	Membership Value	Iteration
m	Mt	0.01	1
mt	tu	0.3	2
mtu	un	0.04	3
mtun	nm (form Cycle)	-	No
mtun	ng	0.05	4
mtung	ga	0.02	5
mtunga	ah	0.01	6
mtungah	hn (form Cycle)	-	No
mtungah	hi	0.1	7
mtungahi	ib	0.1	8
mtungahib	ba (form Cycle)	-	No
mtungahib	bc	0.1	9
mtungahibc	cj	0.02	10
mtungahibcj	ji (form Cycle)	-	No
mtungahibcj	jk	0.01	11
mtungahibcjk	kd	0.01	12
mtungahibcjkd	dc (form Cycle)	-	No
mtungahibcjkd	de	0.03	13
mtungahibcjkde	ef	0.4	14
mtungahibcjkdef	fm	0.03	15
mtungahibcjkdefm	ml	0.2	16
mtungahibcjkdefml	le (form Cycle)	-	No
mlungahibcjkdefml	lk	0.2	17
mtungahibcjkdefmlk	kr	0.2	18
mtungahibcjkdefmlkr	rs	0.2	19
mtungahibcjkdefmlkrs	sl (form Cycle)	-	No
mtungahibcjkdefmlkrs	st (form Cycle)	-	No
mtungahibcjkdefmlkrs	sr	0.2	20
mtungahibcjkdefmlkrsr	rq	0.3	21
mtungahibcjkdefmlkrsrq	qj	0.06	22
mtungahibcjkdefmlkrsrqj	jk (form Cycle)	-	No
mtungahibcjkdefmlkrsrqj	jq	0.06	23
mtungahibcjkdefmlkrsrqjq	qp	0.5	24
mtungahibcjkdefmlkrsrqjqp	po	0.1	25
mtungahibcjkdefmlkrsrqjqpo	ou	0.1	26
mtungahibcjkdefmlkrsrqjqpou	un (form Cycle)	-	No
mtungahibcjkdefmlkrsrqjqpou	oh	0.3	27
mtungahibcjkdefmlkrsrqjqpouh	ha (form Cycle)	-	No
mtungahibcjkdefmlkrsrqjqpouh	hi	0.1	28
mtungahibcjkdefmlkrsrqjqpouhi	ip (form Cycle)	-	No
mtungahibcjkdefmlkrsrqjqpouhi	pq (form Cycle)	-	No
mtungahibcjkdefmlkrsrqjqpouhi	ib	0.1	29

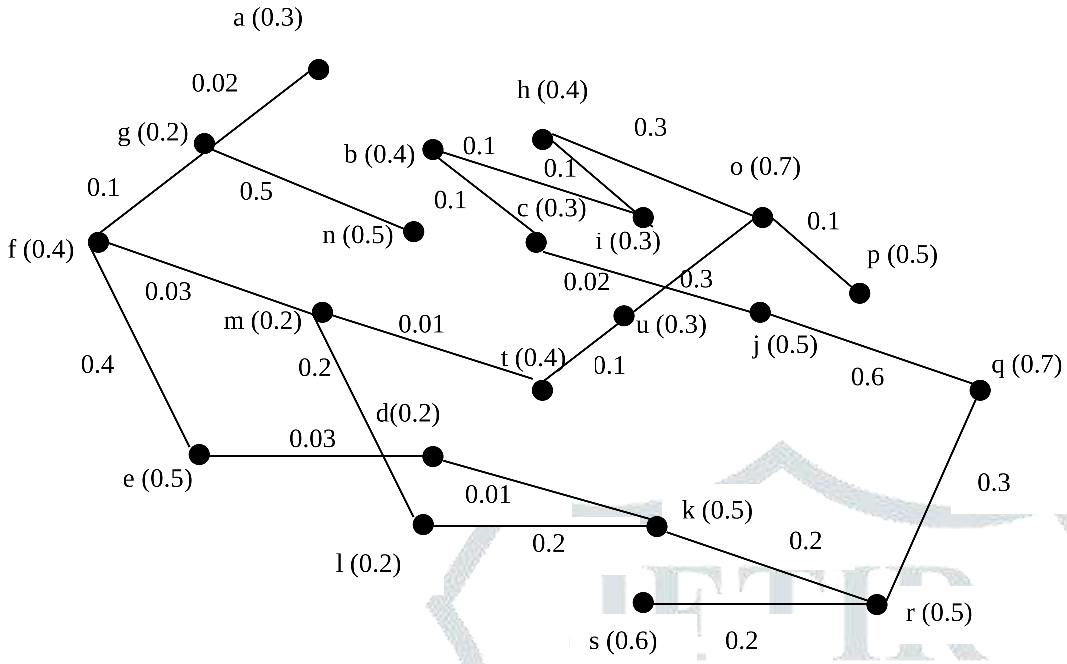

Figure 4: Structural core graph of TLFG of n=7 vertices whose crisp graph is c_7

Example: 3.5

Consider the TLEG of order n=8 this graph has 3(8) = 24 vertices

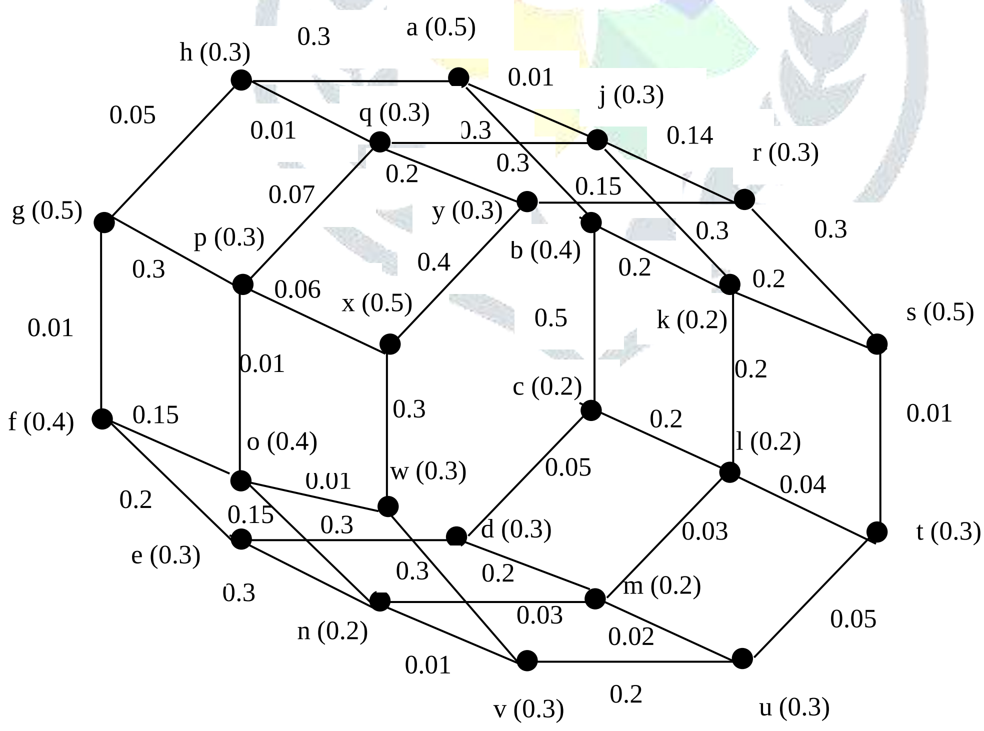

Figure 5: TLFG of n=8 vertices

Face Value Calculation:

F_1 (a b c d e f g h t) → min {0.03, 0.25, 0.25, 0.33, 0.66, 0.25, 0.15, 1} = 0.15

F_2 (j k l n m o p q) → min {0.25, 1, 0.1, 0.05, 0.15, 1, 0.233, 1} = 0.06

F_3 (r s t u v w x y) → min {1, 0.33, 0.16, 0.66, 1, 1, 0.133, 0.5} = 0.033

F_4 (a j q h) → min {0.03, 1, 0.33, 1} = 0.33

F_5 (j q p g) → min {0.33, 0.23, 1, 0.15} = 0.23

F_6 (g p l f) → min {1, 1, 0.375, 0.025} = 0.0.25

F_7 (f o n e) → min {0. 3.5, 0.15, 1, 0.66} = 0.15

F_8 (j r y a) → min {0.46, 0.5, 0.66, 1} = 0.46

F_9 (q y x p) → min {0.66, 0.13, 0.2, 0.233} = 0.13

F_{10} (p x w o) → min {0.2, 1, 0.033, 1} 0.033

F_{11} (o w v n) → min {0.33, 1, 0.33, 1} = 0.03

F_{12} (j r s k) → min {0.46, 1, 1, 0.25} = 0.25

F_{13} (b k l c) → min {1, 1, 1, 0.75, 0.25} = 0.25

F_{14} (c l m d) → min { 0.75, 0.06, 0.2, 0.33} = 0.33

F_{15} (d m n e) → min {0.2, 0.1, 1, 0.33} = 0.2

F_{16} (s k l t) → min {1, 1, 0.13, 0.033} = 0.033

F_{17} (l t u m) → min {0.13, 0.16, 0.06, 6, 0.1} = 0.066

F_{18} (m u v n) → min {0.066, 0.66, 0.33, 0.06} = 0.06

F_{19} (a j k b) → min {0.03, 0.25, 1, 0.33} = 0.25

Reached node	Edge	Membership Value	Iteration
N	**Nv**	**0.01**	**1**
nv	**vu**	**0.2**	**2**
nvum	**um**	**0.02**	**3**
nvum	**mn (form Cycle)**	**-**	**No**
nvum	**md**	**0.06**	**4**
nvumd	**de**	**0.1**	**5**
nvumde	**en (form Cycle)**	**-**	**No**
nvumde	**ef**	**0.2**	**6**
nvundef	**fo**	**0.15**	**7**
nvumdefo	**ow**	**0.01**	**8**
nvumdefow	**wv (form Cycle)**	**-**	**No**
nvumdefow	**wx**	**0.3**	**9**
nvumdefowx	**xp**	**0.06**	**10**
nvumdefowxp	**po (form Cycle)**	**-**	**No**
nvumdefowxp	**pq**	**0.07**	**11**
nvumdefowxpq	**qh**	**0.01**	**12**
nvumdefowxpqh	**hg**	**0.05**	**13**
nvumdefowxpqhg	**gp (form Cycle)**	**-**	**No**
nvumdefowxpqhg	**gf (form Cycle)**	**-**	**No**
nvumdefowxpqhg	**gh**	**0.05**	**14**
nvumdefowxpqhgh	**ha**	**0.3**	**15**
nvumdefowxpqhgha	**aj**	**0.01**	**16**
nvumdefowxpqhghaj	**jq**	**0.3**	**17**
nvumdefowxpqhghajq	**qh (form Cycle)**	**-**	**No**
nvumdefowxpqhghajq	**qy**	**0.2**	**18**
nvumdefowxpqhghajq	**yr**	**0.15**	**19**
nvumdefowxpqhghajqyr	**rj (form Cycle)**	**-**	**No**
nvumdefowxpqhghajqyr	**rs**	**0.3**	**20**
nvumdefowxpqhghajqyrs	**sk**	**0.2**	**21**
nvumdefowxpqhghajqyrsk	**kl**	**0.2**	**22**
nvumdefowxpqhghajqyrskl	**lc**	**0.2**	**23**
nvumdefowxpqhghajqyrsklc	**cb**	**0.12**	**24**
nvumdefowxpqhghajqyrsklcb	**bk (form Cycle)**	**-**	**No**
nvumdefowxpqhghajqyrsklcb	**bc**	**0.15**	**25**
nvumdefowxpqhghajqyrsklcbc	**cl**	**0.02**	**26**

nvumdefowxpqhghajqyrsklcbcl	**lm (form Cycle)**	**-**	**No**
nvumdefowxpqhghajqyrsklcbcl	**lt**	**0.04**	**27**
nvumdefowxpqhghajqyrsklcbclt	**ts (form Cycle)**	**-**	**No**
nvumdefowxpqhghajqyrsklcbclt	**lt**	**0.04**	**28**
nvumdefowxpqhghajqyrsklcbctl	**lk**	**0.2**	**29**
nvumdefowxpqhghajqyrsklcbclk	**kj(form Cycle)**	**0.3**	**30**
nvumdefowxpqhghajqyrsklcbclk	**ks**	**0.2**	**31**

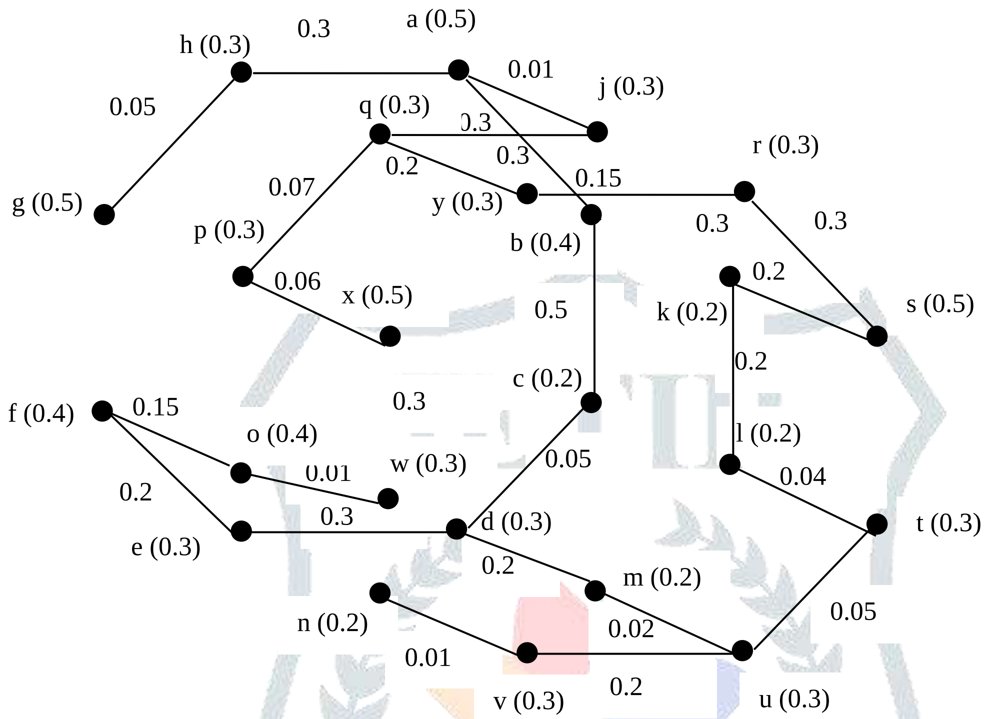

Figure 6: Structural core graph of TLFG of n=8 vertices

For different values of n we will get different TLFG and when we apply the algorithm we will get different structures for each graph.

4. Theoretical Concepts

Consider the TLFG from example 3.3 with different labeling.

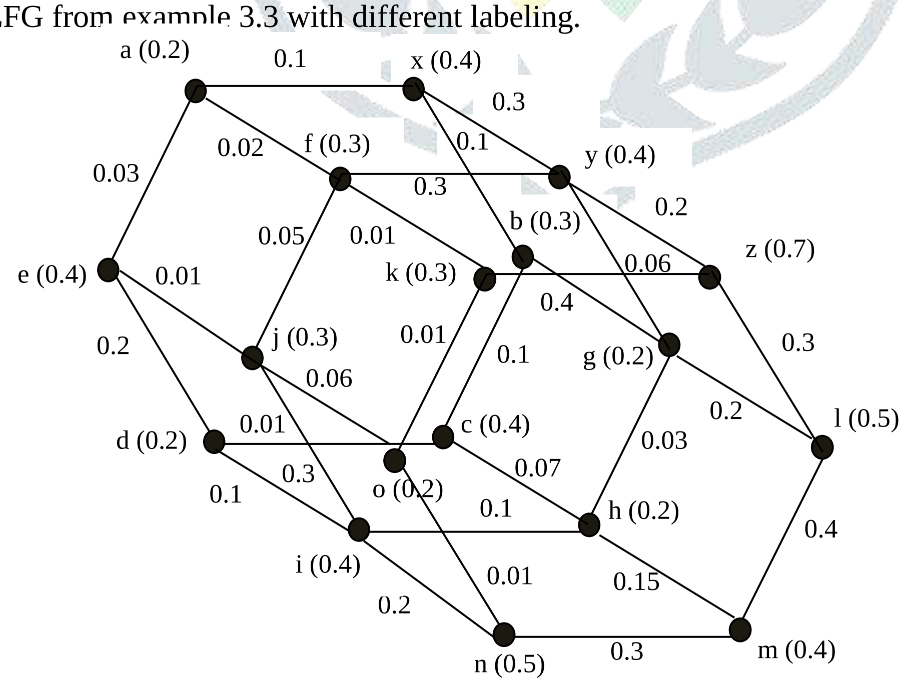

Figure 7: TL (G_1)

Consider the TLFG from example 3.4 with different tabeling

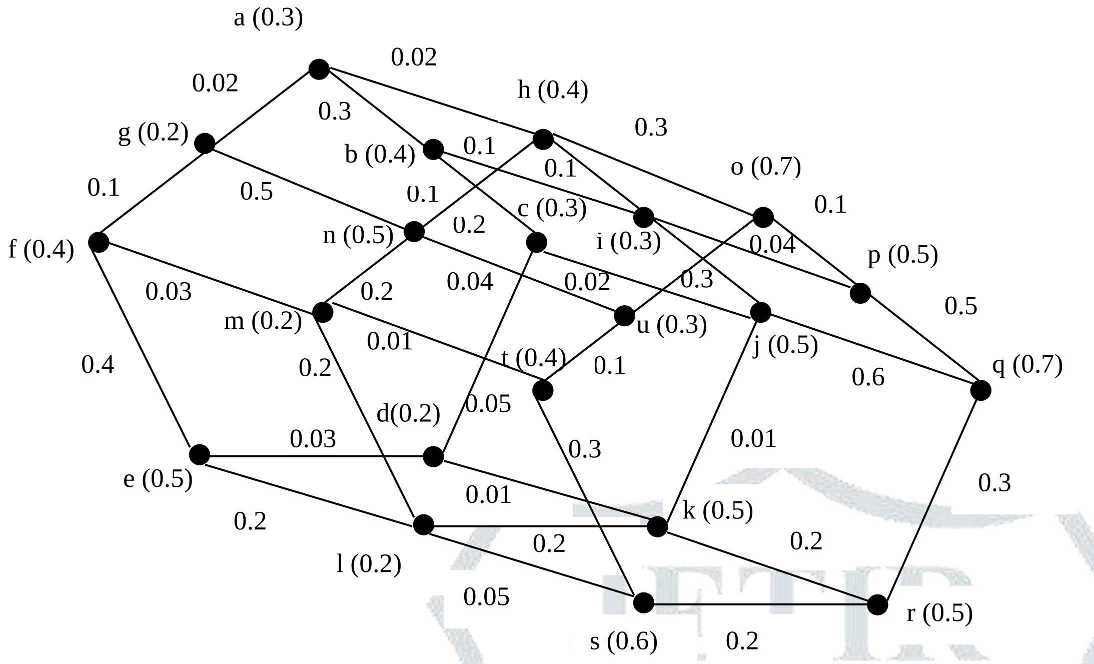

Figure 8: TL (G_2)

The union of G, and G2 graph is shown in figure

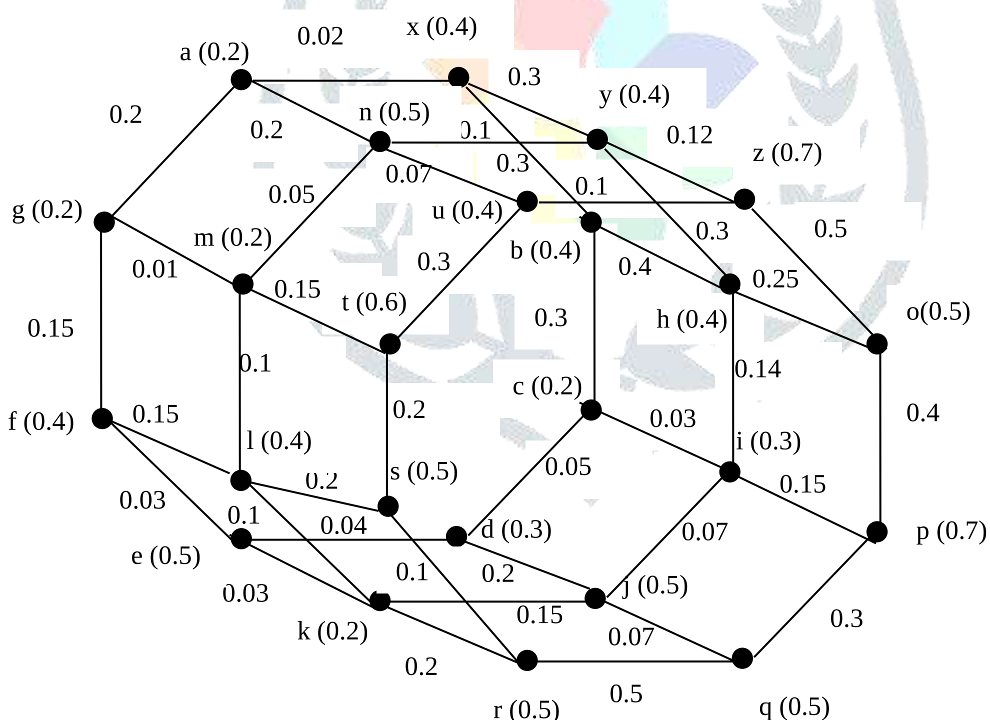

Figure 9: $TL(G_1) \cup TL(G_2)$

Then the core graph is given by obtained by using by

Face Value Calculation:

F1 (a x b c d e f g**)** → min {0.1, 0.75, 1, 0.15, 0.2, 1, 0.75, 1,} = 0.1

F2 (y h I j k l m n) → min {0.5, 0.466, 0.23, 0.75, 0.5, 0.5, 0.25, 0.25} = 0.23

F3 (z o p q r s t u) → min {1, 0.8, 0.6, 1, 0.2, 0.4, 0.25, 0.25} = 0.2
F4 (a x y n) → min {0.1, 0.25, 0.25, 1} = 0.1
F5 (g m l f) → min {1, 0.25, 0.25, 1,} = 0.25
F6 (g m l f) → min {0.25, 0.5, 1, 0.75} = 0.25
F7 (f l k e) → min {1, 0.5, 0.06, 1} = 0.06
F8 (y z u n) → min {0.3, 0.25, 1, 0.25} = 0.25
F9 (x y h b) → min {0.25, 0.5, 1, 0.75} = 0.25
F10 (n u t m) → min {1, 0.25, 0.15, 0.25} = 0.15
F11 (m t s l) → min {0.15, 0.4, 1, 0.5} = 0.15
F12 (l s r k) → min {1, 0.4, 1, 0.5} = 0.4
F13 (e d j k) → min {0.2, 1, 0.75, 0.06} = 0.06
F14 (y z o h) → min {0.3, 1, 0.625, 0.5} = 0.3
F15 (b h I c) → min {1, 0.466, 1, 1} = 0.466
F16 (c I j d) → min {1, 0.23, 1, 0.15} = 0.15
F17 (h o p I) → min {0.25, 0.8, 0.5, 0.466} = 0.466
F18 (j q r k) → min {0.14, 1, 1, 0.75} = 0.14
F19 (j p q j) → min {0.5, 0.6, 0.14, 0.23} = 0.14

Reached node	Edge	Membership Value	Iteration
m	Mg	0.01	1
mg	ga	0.2	2
mga	an	0.2	3
mgan	nm (form Cycle)	-	No
mgan	ny	0.1	4
mgany	yx	0.3	5
mganyx	xa (form Cycle)	-	No
mganyx	xb	0.3	6
mganyxb	bh	0.4	7
mganyxbh	hy (form Cycle)	-	No
mganyxbh	hi	0.14	8
mganyxbhi	ic	0.03	9
mganyxbhic	cb (form Cycle)	-	No
mganyxbhic	cd	0.15	10
mganyxbhicd	dj	0.2	11
mganyxbhicdj	ji (form Cycle)	-	No
mganyxbhicdj	jk	0.15	12
mganyxbhicdjk	kl	0.1	13
mganyxbjicdjkl	ls	0.2	14
mganyxbhicdjkls	sr	0.2	15
mganyxbhicdjklsr	rk (form Cycle)	-	No
mganyxbhicdjklsr	rq	0.5	16
mganyxbhicdjklsrq	qj (form Cycle)	-	No
mganyxbhicdjklsrq	qp	0.3	17
mganyxbhicdjklsrqp	po	0.4	18
mganyxbhicdjklsrqpo	oh (form Cycle)	-	No
mganyxbhicdjklsrqpo	oz	0.5	19
mganyxbhicdjklsrqpoz	zu	0.1	20
mganyxbhicdjklsrqpozu	ut	0.1	21
mganyxbhicdjklsrqpozut	tm	0.1	22
mganyxbhicdjklsrqpozutm	ml	0.1	23
mganyxbhicdjklsrqpozutml	lf	0.2	24
mganyxbhicdjklsrqrqpozutmlf	fg (form Cycle)	-	No
mganyxbhicdjklsrqpozutmlf	fe	0.4	25
mganyxbhicdjklsrqpozutmlfe	ek	0.3	26
mganyxbhicdjklsrqpozutmlfek	kl (form Cycle)	-	No
mganyxbhicdjklsrqpozutmlfek	ke	0.03	27
mganyxbhicdjklsrqpozutmlfeke	ef	0.4	28
mganyxbhicdjklsrqpozutmlfekef	fl	0.2	29
mganyxbhicdjklsrqpozutmlfekefl	ls	0.2	30

mganyxbhicdjklsrqpozutmlfekefls	**st (form Cycle)**	**-**	**No**
mganyxbhicdjklsrqpozutmlfeketls	**sl**	**0.2**	**31**
mganyxbhicdjklsrqpozutmlfekelsr	**rq**	**0.5**	**32**
mganyxbhicdjklsrqpozutmlfekelsrq	**qp**	**0.3**	**33**
mganyxbhicdjklsrqpozutmlfekelsrqp	**pi (from Cycle)**	**-**	**No**
mganyxbhicdjklsrqpozutmlfekelsrqp	**po**	**0.4**	**34**

Note For each TLEG, Clearly mentioned the number of vertices, no of edges and no. of faces

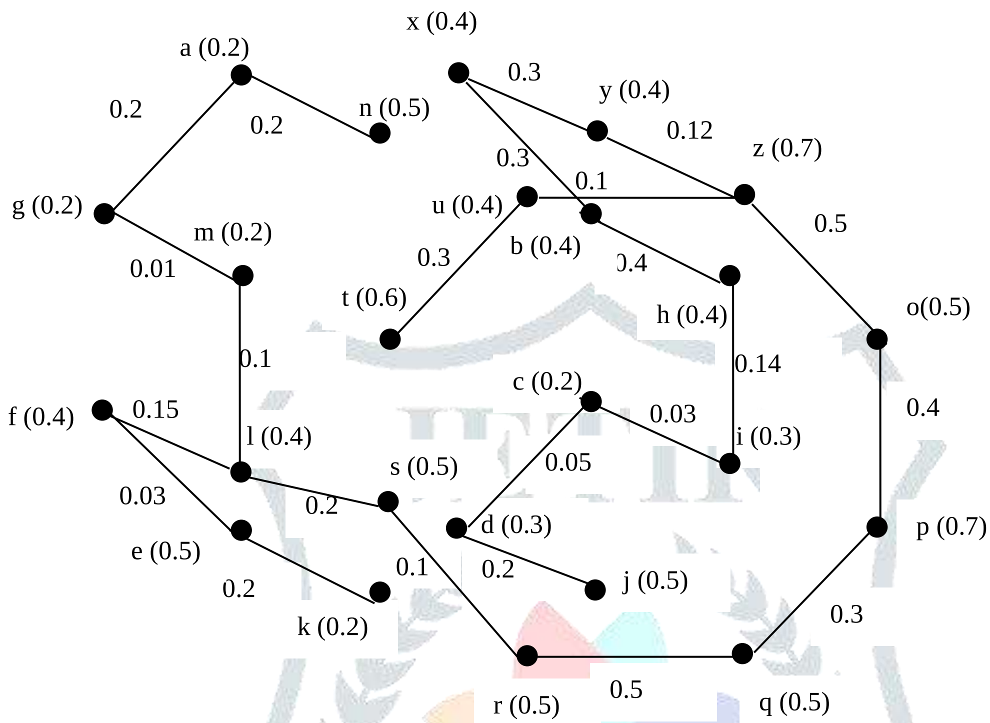

Figure 10: Structural core graph of $TLFG_1$ U $TLFG_2$.

5. CONCLUSION:

The structural core graph for both the TLFG and the union of two TLFG is constructed in this paper. This graph can be used in different networks to minimize the time for any particular problem whose graphical representation is a triple layered. Further work can be done to apply this concept of Structural core graph in real life situations. For every DLFG and TLFG of order

n ≥3, we have obtained on optimal tree using structural core graph consent

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