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On (5, k_1)–regular and totally (5, k_1) regular fuzzy grid

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Abstract
In 1965, Loft A. Zadeh led the helm of a fuzzy set of a crew as a skill for signifying the marvels of insecurity in genuine realm state of doings. Nagoor Gani and Radha hosted fixed fuzzy grids, total degree and totally fixed fuzzy grids. Alison Northup willful some stuffs on (5, k_1) – regular graphs in her free view. They lead (r, 5, k_1) – regular graphs and willful some stuffs on $(r,5,k_1)$ – regular graphs. Throughout this broadsheet, we have a trend to shape d_5 – degree and total degree of a peak in fuzzy grids. Any we have a trend to study (5, k_1) – predictability and totally (5, k_1) – regularity of fuzzy grids and also the relation between (5, k_1) – regularity and totally (5, $_1$) – regularity. Conjointly we have a trend to learning (5, k_1) – regularity on trial on six peaks and cycle $c_n(n \geq 5$ with some exact association tasks.

Keywords
d_5 – degree and total d_5- degree of a vertex in fuzzy grids, (5, k_1) – regular fuzzy grids, totally (5, k_1) – regular fuzzy grids.

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Contents

1. Introduction

In 1965, Loft A. Zadeh led the helm of a fuzzy set of a crew as a skill for signifying the marvels of insecurity in genuine realm state of doings. Nagoor Gani and Radha hosted fixed fuzzy grids, total degree and totally fixed fuzzy grids. Alison Northup willful some stuffs on $(5,k_1)$ – regular graphs in her free view. They lead $(r,5,k_1)$ – regular graphs and willful some stuffs on $(r,5,k_1)$ – regular graphs. Throughout this broadsheet, we have a trend to shape d_5 – degree and total degree of a peak in fuzzy grids. Any we have a trend to study $(5,k_1)$ – predictability and totally $(5,k_1)$ – regularity of fuzzy grids and also the relation between $(5,k_1)$ – regularity and totally $(5,k_1)$ – regularity. Conjointly we have a trend to learning $(5,k1)$ – regularity on trial on six peaks and c_n with some exact association tasks.

2. Preliminaries

Definition 2.1. *Grid G_1, the d_5-degree of a peak V in G_1, meant by $d_5(V)$ means number of peaks at a space five rapt as of V.*

Definition 2.2. *A drid G_1 is alleged to be $(5,k_1)$ regular (d_5-regular) if $d_5(V) = k_1$, for all V in G_1. We obverse that $(5,k_1)$ regular graph and semi-regular graphs and d_5-regular graphs are the identical.*

Definition 2.3. *The gift of connectedness between two peaks u and v is*

$$\begin{aligned}\mu^\infty(uv) =& sup\{\mu^{k_1}(uv)|k=1,2,\ldots\}\\ \mu(uv) =& sup\{\mu(uu_1)\wedge\mu(u_1u_2)\wedge\ldots\wedge\mu(u_{k_1-1}v)|\\ & u,u_1,u_2,\ldots,u_{k_1-1}\in V\\ & \text{may be a path connecting } u \text{ and } v \text{ of length } k_1\}\end{aligned}$$

Definition 2.4. *Let $G:(\sigma,\mu)$ be a fuzzy grid on $G_1^*:(V,E)$. If $d(v)=k_1$ for all $v\in V$, then G_1 is alleged to be regular fuzzy graph of degree k_1.*

Definition 2.5. *Let $G_1 : (\sigma, \mu)$ be a fuzzy grid on $G_1^* : (V, E)$. The total degree of a vertex u is defined as*

$$td(u) = \Sigma\mu(uv) + \sigma(u)$$
$$= d(u) + \sigma(u),\ u, v \in E$$

If each vertex of G_1 has the same total degree k_1, then G_1 is said to be totally regular fuzzy graph of degree k_1 or k_1-totally regular fuzzy graph.

3. d_5-degree of a vertex in fuzzy graphs

Definition 3.1. *Let $G_1 : (\sigma, \mu)$ be a fuzzy grid. The d_5-degree of a vertex u in G_1 is $d_5(u) = \Sigma\mu^5(uv)$, where $sup\{\mu(uu_1) \wedge \mu(u_1u_2) \wedge \mu(u_2u_3) \wedge \mu(u_3u_4) \wedge \mu(u_4u_5)\}$ Also $\mu(uv) = 0$ for u,v not in E.*

The min d_5-degree of G is $\delta_5(G1) = \wedge\{d_5(v) : v \in V\}$

The max d_5-degree of G is $\Delta_5(G1) = \vee\{d_5(v) : v \in V\}$

Example 3.2. *Consider $G_1^* : (V, E)$ where $V = \{u, v, w, x, y, z\}$ and $E = \{uv, vw, wx, xy, yz, zu\}$ Define $G_1 : (\sigma, \mu)$ by*

$\sigma(u) = 0.3$, $\sigma(v) = 0.2$, $\sigma(w) = 0.2$, $\sigma(x) = 0.2$, $\sigma(y) = 0.2$, $\sigma(z) = 0.3$, $\mu(uv) = 0.2$, $\mu(vw) = 0.2$, $\mu(wx) = 0.1$, $\mu(xy) = 0.1$, $\mu(yz) = 0.2$, $\mu(zu) = 0.3$

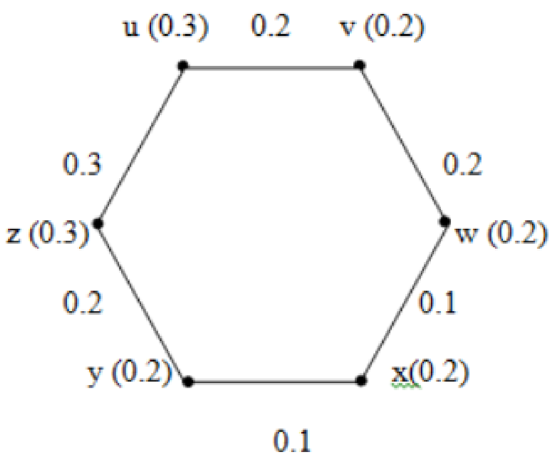

Figure 1

$$d_5(u) = \{0.2 \wedge 0.2 \wedge 0.1 \wedge 0.1 \wedge 0.2\}$$
$$+ \{0.3 \wedge 0.2 \wedge 0.1 \wedge 0.1 \wedge 0.2\}$$
$$= \{0.1 + 0.1\} = 0.2$$

$$d_5(v) = \{0.2 \wedge 0.1 \wedge 0.1 \wedge 0.2 \wedge 0.3\}$$
$$+ \{0.2 \wedge 0.3 \wedge 0.2 \wedge 0.1 \wedge 0.1\}$$
$$= \{0.1 + 0.1\} = 0.2$$

$$d_5(w) = \{0.1 \wedge 0.1 \wedge 0.2 \wedge 0.3 \wedge 0.2\}$$
$$+ \{0.2 \wedge 0.2 \wedge 0.3 \wedge 0.2 \wedge 0.1\}$$
$$= \{0.1 + 0.1\} = 0.2$$

$$d_5(x) = \{0.1 \wedge 0.2 \wedge 0.3 \wedge 0.2 \wedge 0.2\}$$
$$+ \{0.1 \wedge 0.2 \wedge 0.2 \wedge 0.3 \wedge 0.2\}$$
$$= \{0.1 + 0.1\} = 0.2$$

$$d_5(y) = \{0.2 \wedge 0.3 \wedge 0.2 \wedge 0.2 \wedge 0.1\}$$
$$+ \{0.1 \wedge 0.1 \wedge 0.2 \wedge 0.2 \wedge 0.3\}$$
$$= \{0.1 + 0.1\} = 0.2$$

$$d_5(z) = \{0.3 \wedge 0.2 \wedge 0.2 \wedge 0.1 \wedge 0.1\}$$
$$+ \{0.2 \wedge 0.1 \wedge 0.1 \wedge 0.2 \wedge 0.2\}$$
$$= \{0.1 + 0.1\} = 0.2$$

Example 3.3. *Consider $G_1^* : (V, E)$ where $V = \{s, u, v, w, x, y, z\}$ and $E = \{su, uv, vw, wx, xy, yz, zs\}$ Define $G_1 : (\sigma, \mu)$ by*

$\sigma(s) = 0.3$, $\sigma(u) = 0.3$, $\sigma(v) = 0.4$, $\sigma(w) = 0.6$, $\sigma(x) = 0.7$, $\sigma(y) = 0.5$, $\sigma(z) = 0.4$, $\mu(su) = 0.3$, $\mu(uv) = 0.4$, $\mu(vw) = 0.2$, $\mu(wx) = 0.3$, $\mu(xy) = 0.3$, $\mu(yz) = 0.4$, $\mu(zs) = 0.3$

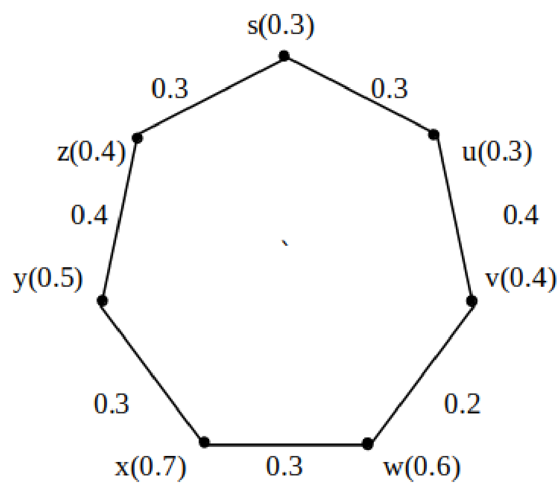

Figure 2

$$d_5(s) = sup\{0.3 \wedge 0.4 \wedge 0.2 \wedge 0.3 \wedge 0.3,$$
$$0.3 \wedge 0.4 \wedge 0.3 \wedge 0.3 \wedge 0.2\}$$
$$= sup\{0.2, 0.2\} = 0.2$$

$$d_5(u) = sup\{0.4 \wedge 0.2 \wedge 0.3 \wedge 0.3 \wedge 0.4,$$
$$0.3 \wedge 0.3 \wedge 0.4 \wedge 0.3 \wedge 0.3\}$$
$$= sup\{0.2, 0.3\} = 0.3$$

$$d_5(v) = sup\{0.2 \wedge 0.3 \wedge 0.3 \wedge 0.4 \wedge 0.3,$$
$$0.4 \wedge 0.3 \wedge 0.3 \wedge 0.4 \wedge 0.3\}$$
$$= sup\{0.2, 0.3\} = 0.3$$

$$
\begin{aligned}
d_5(w) =& sup\{0.3\wedge 0.3\wedge 0.4\wedge 0.3\wedge 0.3,\\
& \quad 0.2\wedge 0.4\wedge 0.3\wedge 0.3\wedge 0.4\}\\
=& sup\{0.3,0.2\} = 0.3
\end{aligned}
$$

$$
\begin{aligned}
d_5(x) =& sup\{0.3\wedge 0.4\wedge 0.3\wedge 0.3\wedge 0.4,\\
& \quad 0.3\wedge 0.2\wedge 0.4\wedge 0.3\wedge 0.3\}\\
=& sup\{0.3,0.2\} = 0.3
\end{aligned}
$$

$$
\begin{aligned}
d_5(y) =& sup\{0.4\wedge 0.3\wedge 0.3\wedge 0.4\wedge 0.2,\\
& \quad 0.3\wedge 0.3\wedge 0.2\wedge 0.4\wedge 0.3\}\\
=& sup\{0.2,0.2\} = 0.2
\end{aligned}
$$

$$
\begin{aligned}
d_5(z) =& sup\{0.3\wedge 0.3\wedge 0.4\wedge 0.2\wedge 0.3,\\
& \quad 0.4\wedge 0.3\wedge 0.3\wedge 0.2\wedge 0.4\}\\
=& sup\{0.2,0.2\} = 0.2
\end{aligned}
$$

4. (5, k_1) - regular and totally (5, k_1) – regular graphs

Definition 4.1. *Let $G : (\sigma,\mu)$ be a fuzzy grid on $G_1^* : (V,E)$. If $d_5 = k_1$ for all $v \in V$, then G is so-called to be $(5,k_1)$ – regular fuzzy graph.*

Example 4.2. *Reflect $G_1^* : (V,E)$ anywhere $V = \{w_1, w_2, w_3, w_4, w_5, w_6\}$ and $E = \{w_1w_2, w_2w_3, w_3w_4, w_4w_5, w_5w_6\}$. Define $G_1 : (\sigma,\mu)$ by*

$\sigma(w_1) = 0.6$, $\sigma(w_2) = 0.5$, $\sigma(w_3) = 0.4$, $\sigma(w_4) = 0.3$, $\sigma(w_5) = 0.5$, $\sigma(w_6) = 0.6$ and $\mu(w_1w_2) = 0.4$, $\mu(w_2w_3) = 0.4$, $\mu(w_3w_4) = 0.4$, $\mu(w_4w_5) = 0.4$, $\mu(w_5w_6) = 0.4$.

Figure 3

Here $d_5(w_1) = 0.4$, $d_5(w_2) = 0.4$, $d_5(w_3) = 0.4$, $d_5(w_4) = 0.4$, $d_5(w_5) = 0.4$ and $d_5(w_6) = 0.4$. This graph could be a (5, 0.4) - regular fuzzy graph.

Definition 4.3. *Let $G : (\sigma,\mu)$ be a fuzzy grid on $G_1^* : (V,E)$. The entire d_5 degree of a vertex $u \in V$ is defined as*

$$
\begin{aligned}
d_5(u) &= \Sigma\mu^5(uv) + \sigma(u)\\
&= d_5(u) + \sigma(u)
\end{aligned}
$$

Definition 4.4. *If all peak of G_1 has the same total d_5-degree k_1, then G_1 is sued to be totally $(5,k_1)$ - regular fuzzy grid.*

Example 4.5. *A $(5,k_1)$ – regular fuzzy grid needn't be a $(5,k_1)$ – totally regular fuzzy graph. Reflect $G_1^* : (V,E)$ anywhere $V = \{s_1, s_2, s_3, s_4, s_5, s_6, s_7, s_8, s_9, s_{10}\}$ and $E = \{s_1s_2, s_2s_3, s_3s_4, s_4s_5, s_5s_6, s_6s_7, s_7s_8, s_8s_9, s_9s_10, s_{10}s_1\}$.*

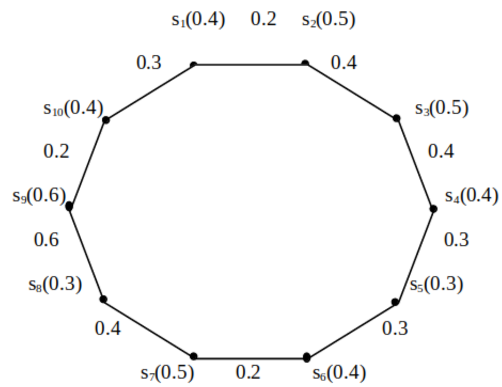

Figure 4

Here, $d_5(s_1) = 0.4$, $d_5(s_2) = 0.4$, $d_5(s_3) = 0.4$, $d_5(s_4) = 0.4$, $d_5(s_5) = 0.4$, $d_5(s_6) = 0.4$, $d_5(s_7) = 0.4$, $d_5(s_8) = 0.4$, $d_5(s_9) = 0.4$, $d_5(s_{10}) = 0.4$ and $td_5(s_1) = 0.8$, $td_5(s_2) = 0.9$, $td_5(s_3) = 0.9$, $td_5(s_4) = 0.8$, $td_5(s_5) = 0.7$, $td_5(s_6) = 0.8$, $td_5(s_7) = 0.9$, $td_5(s_8) = 0.7$, $td_5(s_9) = 1.0$, $td_5(s_{10}) = 0.8$

Each vertex has same d_5-degree 0.4. So G_1 is (5, 0.4) regular fuzzy grid. But G_1 isn't a totally $(5,k_1)$ regular fuzzy grid.

Example 4.6. *An exact $(5,k_1)$ regular fuzzy grid needn't be a $(5,k_1)$ regular fuzzy grid. Reflect $G_1^* : (V,E)$ anywhere $V = \{b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8\}$ and $E = \{b_1b_2, b_2b_3, b_3b_4, b_4b_5, b_5b_6, b_6b_7, b_7b_8, b_8b_1\}$.*

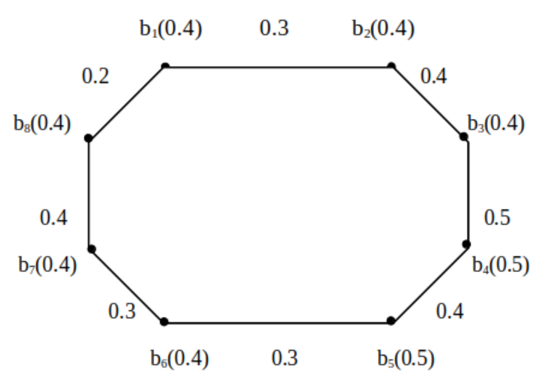

Figure 5

Here $d_5(b_1) = 0.5$, $d_5(b_2) = 0.5$, $d_5(b_3) = 0.5$, $d_5(b_4) = 0.4$, $d_5(b_5) = 0.4$, $d_5(b_6) = 0.5$, $d_5(b_7) = 0.5$, $d_5(b_8) = 0.5$ and $td_5(b_1) = 0.9$, $td_5(b_2) = 0.9$, $td_5(b_3) = 0.9$, $td_5(b_4) = 0.9$, $td_5(b_5) = 0.9$, $td_5(b_6) = 0.9$, $td_5(b_7) = 0.9$, $td_5(b_8) = 0.9$. Each vertex has the identical totally d_5- degree 0.9. So G_1 is totally (5, 0.9) – regular fuzzy grid. But G_1 is not $(5,k_1)$ regular fuzzy grid.

Example 4.7. *A $(5,k_1)$ – regular fuzzy grid which is totally $(5,k_1)$ regular fuzzy grid. Reflect $G_1^* : (V,E)$ anywhere $V = \{a,b,c,d,e,f,g\}$ and $E = \{ab,bc,cd,de,ef,fg,ga\}$.*

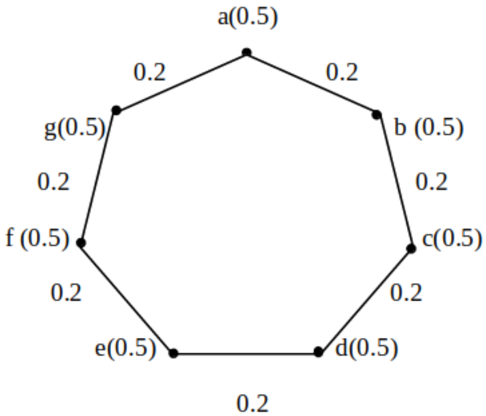

Figure 6

Here $d_5(a) = 0.2$, $d_5(b) = 0.2$, $d_5(c) = 0.2$, $d_5(d) = 0.2$, $d_5(e) = 0.2$, $d_5(f) = 0.2$, $d_5(g) = 0.2$ and $td_5(a) = 0.7$, $td_5(b) = 0.7$, $td_5(c) = 0.7$, $td_5(d) = 0.7$, $td_5(e) = 0.7$, $td_5(f) = 0.7$, $td_5(g) = 0.7$.

Each vertex has the identical d_5 – degree 0.2. So G_1 may be a (5, 0.2) regular fuzzy graph. Each vertex has the identical total d_5 – degree 0.8. So G_1 could be a totally (5, 0.7) regular fuzzy graph.

Theorem 4.8. *Let $G : (\sigma, \mu)$ be a fuzzy grid on $G_1^* : (V, E)$. Then $\sigma(u) = c_1$, for all $u \in V$ if and as long as the later after illnesses are the same.*

1. *$G_1 : (\sigma, \mu)$ is a $(5, k_1)$ – regular fuzzy grid.*
2. *$G_1 : (\sigma, \mu)$ may be a totally $(5, k_1 + c_1)$ – regular fuzzy grid.*

Proof. Expect that $\sigma(u) = c_1$, for all $u \in V$. Adopt that $G_1 : (\sigma, \mu)$ is a $(5, k_1)$ – regular fuzzy grid. Then $d_5(u) = k_1$, for all $u \in V$. Hence, $td_5(u) = d_5(u) + \sigma(u)$ for all $u \in V$. Therefore, $td_5(u) = k_1 + c_1$ for all $u \in V$. Therefore, $G_1 : (\sigma, \mu)$ could be a totally $(5, k_1 + c_1)$ – regular fuzzy grid. Thus $1 \Rightarrow 2$ is proved.

Suppose $G_1 : (\sigma, \mu)$ is a totally $(5, k_1 + c_1)$ – regular fuzzy grid.

$\Rightarrow td_5(u) = k_1 + c_1$ for all $u \in V$
$\Rightarrow d_5(u) + \sigma(u) = k_1 + c_1$ for all $u \in V$
$\Rightarrow d_5(u) + c_1 = k_1 + c_1$ for all $u \in V$
$\Rightarrow d_5(u) = k_1$ for all $u \in V$

Therefore, $G_1 : (\sigma, \mu)$ could be a $(5, k_1)$ – regular fuzzy grids. Thus $2 \Rightarrow 1$ is proved. Hence (1) & (2) are equivalent. Equally adopt that (1) & (2) are same. Let $G_1 : (\sigma, \mu)$ could be a totally $(5, k_1 + c_1)$ – regular fuzzy grid and $(5, k_1)$ – regular fuzzy grid.

$\Rightarrow td_5(u) = k_1 + c_1$ and $d_5(u) = k_1$ for all $u \in V$
$\Rightarrow d_5(u) + \sigma(u) = k_1 + c_1$ and $d_5(u) = k_1$ for all $u \in V$
$\Rightarrow k_1 + \sigma(u) = k_1 + c_1$ for all $u \in V$
$\Rightarrow \sigma(u) = c_1$ for all $u \in V$

Hence, $\sigma(u) = c_1$ for all $u \in V$ □

5. 5, k_1)-regular fuzzy graphs on a path on 6 vertices with some specific membership Functions

Throughout this segment $(5, k_1)$ – regularity and totally $(5, k_1)$ – regularity on fuzzy graph whose underlying crisp graph may be a path on 6 apexes is planned with some exact affiliation tasks.

Theorem 5.1. *Tenancy $G : (\sigma, \mu)$ be a fuzzy grid stated $G_1^* : (V, E)$ could be a trail on six apexes. Then, $G : (\sigma, \mu)$ is a $(5, k_1)$- regular fuzzy grid if $\mu(uv) = k_1$ for all $uv \in V$.*

Proof. Suppose that could be a constant function say $\mu(uv) = k_1$ for all $uv \in V$, then $d_5(v) = k_1$, for all $v \in V$. Hence, G_1 is a $(5, k_1)$ regular fuzzy graph. □

Example 5.2. *Cogitate a fuzzy grid $G : (\sigma, \mu)$ such that $G_1^* : (V, E)$ may be a trail on six peaks.*

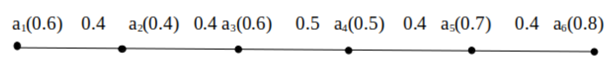

Figure 7

Here $d_5(a_1) = 0.4$, $d_5(a_2) = 0.4$, $d_5(a_3) = 0.4$, $d_5(a_4) = 0.4$, $d_5(a_5) = 0.4$ and $d_5(a_6) = 0.4$. So G_1 is (5, 0.4) – regular. But μ isn't a relentless task.

6. (5, k_1) Regularity on a cycle with some specific membership functions

During this section, $(5, k_1)$- regularity on cycle C_n is studied with some specific membership functions.

Theorem 6.1. *Let $G_1 : (\sigma, \mu)$ be a fuzzy graph such $G_1 : (V, E)$ is phase of size ≥ 6. If μ could be a perpetual task, then G_1 could be a $(5, k_1)$ – regular fuzzy grid where $k_1 = 2\mu(uv)$.*

Proof. Expect that, μ is perpetual task say $\mu(uv) = c_1$ for all $uv \in E$, then $d_5(v) = 2c_1$. Hence G_1 stands $(5, 2c_1)$ - regular fuzzy grid. □

Remark 6.2. *As a model muse $G_1 : (\sigma, \mu)$ a fuzzy grid listed $G_1 : (V, E)$ is an odd set of size seven. Anywhere $V = \{a, b, c, d, e, f, g\}$ and $E = \{ab, bc, cd, de, ef, fg, ga\}$.*

Define $G_1 : (\sigma, \mu)$ by

$\sigma(a) = 0.5$, $\sigma(b) = 0.5$, $\sigma(c) = 0.6$, $\sigma(d) = 0.5$, $\sigma(e) = 0.3$, $\sigma(f) = 0.7$, $\sigma(g) = 0.5$, $\mu(ab) = 0.3$, $\mu(bc) = 0.4$, $\mu(cd) = 0.3$, $\mu(de) = 0.3$, $\mu(ef) = 0.4$, $\mu(fg) = 0.3$, $\mu(ga) = 0.3$

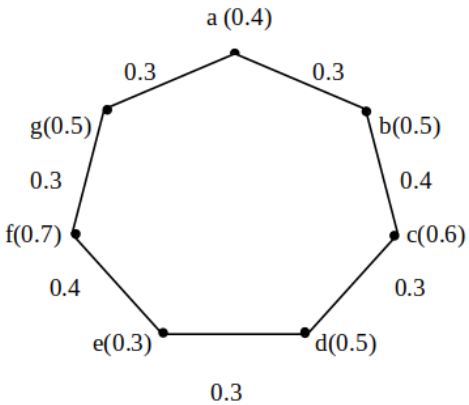

Figure 8

Here, $d_5(a) = 0.6$, $d_5(b) = 0.6$, $d_5(c) = 0.6$, $d_5(d) = 0.6$, $d_5(e) = 0.6$, $d_5(f) = 0.6$ and $d_5(g) = 0.6$. So G_1 could be a (5, 0.6) - regular fuzzy grid. But μ isn't a harsh task.

Theorem 6.3. *Let $G_1 : (\sigma, \mu)$ a fuzzy grid listed $G_1 : (V, E)$ is a superb phase. If the limits have the same affiliation prices, then G may be a $(5, k_1)$ – regular fuzzy grid.*

Proof. If the alternate edges have the identical membership values, then

$$\mu(e_i) = \begin{cases} c_1 & \text{if } i \text{ is odd} \\ c_2 & \text{if } i \text{ is even} \end{cases}$$

If $c_1 = c_2$, then μ could be a continual task. So G_1 could be a $(5, 2c_1)$ – regular fuzzy grid.

If $c_1 < c_2$, then $d_5(v) = 2c_1$ for all $v \in V$. So G_1 could be a $(5, 2c_1)$ – regular fuzzy grid.

If $c_1 > c_2$, then $d_5(v) = 2c_2$ for all $v \in V$. So G_1 may be a $(5, 2c_1)$ – regular fuzzy grid. □

Example 6.4. *Reflect $G_1 : (\sigma, \mu)$ a fuzzy grid specified $G_1 : (V, E)$ is offbeat set of size*

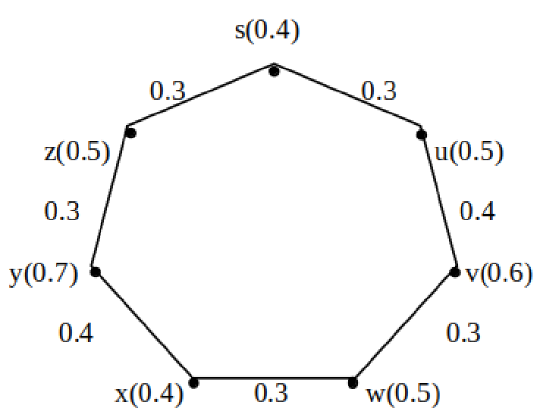

Figure 9

Here $d_5(s) = 0.6$, $d_5(u) = 0.6$, $d_5(v) = 0.6$, $d_5(w) = 0.6$, $d_5(x) = 0.6$, $d_5(y) = 0.6$ and $d_5(z) = 0.6$. So G_1 is (5, 0.6) – regular grid.

Theorem 6.5. *Let $G1 : (\sigma, \mu)$ be a fuzzy grid such $G_1^* : (V, E)$ is cycle of length ≥ 6. Tenancy*

$$\mu(e_i) = \begin{cases} c_1 & \textit{if i is odd} \\ c_2 \geq c_1 & \textit{if i is even} \end{cases}$$

Then G_1 may be a $(5, k_1)$ – regular fuzzy graph.

Proof. Tenancy

$$\mu(e_i) = \begin{cases} c_1 & \text{if } i \text{ is odd} \\ c_2 \geq c_1 & \text{if } i \text{ is even} \end{cases}$$

Case (i):

Tenancy $G1 : (\sigma, \mu)$ be a fuzzy grid such $G_1^* : (V, E)$ is a fair phase of size ≤ 6.

$$d_5(v_i) = \{c_1 \wedge c_2\} + \{c_2 \wedge c_1\} = c_1 + c_1 = 2c_1$$

for all $v_i \in V$. So G_1 capability is a $(5, 2c_1)$ – regular fuzzy grid.

Case (ii):

Let $G1 : (\sigma, \mu)$ be a fuzzy grid such $G_1^* : (V, E)$ is an odd cycle of length ≥ 7.

Let $e_1, e_2, e_3, \ldots, e_{2n+1}$ be perimeters of an odd cycle of G_1^* in this order.

$$\begin{aligned} d_5(v_1) &= \{\mu(e_1) \wedge \mu(e_2)\} + \{\mu(e_{2n}) \wedge \mu(e_{2n+1})\} \\ &= \{c_1 \wedge c_2\} + \{c_2 \wedge c_1\} = c_1 + c_1 = 2c_1 \\ d_5(v_2) &= \{\mu(e_1) \wedge \mu(e_{2n+1})\} + \{\mu(e_2) \wedge \mu(e_3)\} \\ &= \{c_1 \wedge c_2\} + \{c_2 \wedge c_1\} = c_1 + c_1 = 2c_1 \end{aligned}$$

for $i = 3, 4, \ldots, 2n$

$$\begin{aligned} d_5(v_i) &= \{\mu(e_{i-1}) \wedge \mu(e_{i-2})\} + \{\mu(e_{i+1}) \wedge \mu(e_{i+2})\} \\ &= \{c_1 \wedge c_2\} + \{c_2 \wedge c_1\} = c_1 + c_1 = 2c_1 \\ d_5(v_{2n}) &= \{\mu(e_1) \wedge \mu(e_{2n+1})\} + \{\mu(e_{2n}) \wedge \mu(e_{2n-1})\} \\ &= \{c_1 \wedge c_2\} + \{c_2 \wedge c_1\} = c_1 + c_1 = 2c_1 \\ \therefore d_5(v_i) &= 2c_1 \text{ for all } v_i \in V \end{aligned}$$

So G_1 may be a $(5, 2c1)$ – regular fuzzy grid. □

Remark 6.6. *Tenancy $G1 : (\sigma, \mu)$ be a fuzzy grid such $G_1^* : (V, E)$ could be a phase of size ≥ 6. Even if*

$$\mu(e_i) = \begin{cases} c_1 & \textit{if i is odd} \\ c_2 \geq c_1 & \textit{if i is even} \end{cases}$$

G_1 needn't be a very $(5, k_1)$ – regular fuzzy grid. Since if σ isn't a permanent task then G_1 exists not an exact $(5, k_1)$ – regular fuzzy grid.

7. Conclusion

In this paper, $(5,k_1)$ – regular fuzzy graphs and totally $(5,k_1)$ regular fuzzy graphs are compared through various examples. A necessary and sufficient condition under which they are equivalent is provided. Also we provide $(5,k_1)$ regular fuzzy graphs and totally $(5,k_1)$ – regular fuzzy graphs in which underlying crisp graphs are a path on six vertices, and a cycle of length ≥ 5 is studied with some specific membership function. The results discussed may be used to study about various fuzzy graphs.

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