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Study of Fuzzy Magic Graph on Intuitionistic Space

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Abstract: *This paper exhibits the properties of Fuzzy Magic Graph on Intuitionistic Space.*

Keywords: *Fuzzy Magic Graph, Membership and Non membership values, Intuitionistic Space AMS Classification :05C72*

I. INTRODUCTION

Fuzzy set is newly emerging mathematical framework to exemplify the phenomenon of uncertainty in real life tribulation. it was introduced by Zadeh [2] in 1965. Based on Zadeh's fuzzy relations,Kaufmann(1973)[1] introduced the first definition of fuzzy graph. Later in 1975 Rosenfeld [8] developed the theory of Fuzzy Graph by giving more elaborate definition considering fuzzy relations on fuzzy sets .Till date fuzzy graphs has been witnessing a tremendous growth and finds its applications in many branches. Only fuzzy graphs remain scanty to solve all the problems exist in real life.In 1994 Atanassov. K [7] introduced the concept of Intuitionistic fuzzy graph based on the theory of Intuitionistic fuzzy sets[6]. Atanassov added a new component degree of non-membershipin the definition of fuzzy set. The fuzzy sets give the degree of membership of an element in a given set while intuitionistic fuzzy sets give both a degree of membership and a degree of non-membership which are more-or-less independent from each other, the only requirement is that the sum of these two degrees is not greater than 1.An excellent survey of graph labeling can be found in Gallian's paper [2]. In 1963, Sedláček [8] introduced the concept of magic labeling. Let G be a graph with q edges. We say that G is magic if the edges can be labeled by the numbers 1, 2, . . . ,q so that the sum of labels of all the edges incident with any vertex is a constant. In 2014Nagoorgani[9] introduced fuzzy magic graphs and explained some of properties.In this paper we have extended the properties of fuzzy magic graph in Intuitionistic space and define Instuitionistic fuzzy magic graph. Also we have discussed its properties with cycle, path and Star graph. The advantage of representing fuzzy magic graph on intuitionistic space is it will give more accuracy into the problems, reduce the cost of implementation and improve efficiency.

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II. TERMINOLOGIES

Definition 2.1

A graph G=(σ, μ) is said to be a fuzzy labeling graph if $\sigma : V \longrightarrow [0,1]$ and $\mu: E \longrightarrow [0,1]$ are bijective such that the membership value of nodes and edges are distinct and

$$\mu(x,y) < \sigma(x) \wedge \sigma(y) \quad \forall\, x,y \in V$$

Definition 2.2

A Fuzzy labeling graph is said to be fuzzy magic graph if $\sigma(x) + \mu(x,y) + \sigma(y)\ \forall\, x,y \in V$

has same value

Definition 2.3

A fuzzy graph consisting of two node sets V and U with |V|=1 and $|U| > 1$, such that $\mu(v,u_i) > 0$ and $\mu(u_i,u_{i+1}) = 0, 1 \leq i \leq n$ is a fuzzy star graph
It is denoted by $S_{1,n}$

Definition 2.4

A Intuitionistic fuzzy graph (IFG) G=(V,E) where

(i) V= $\{v_1, v_2, \dots v_n\}$ such that $\sigma_1: V \longrightarrow [0,1]$ and $\sigma_2: V \longrightarrow [0,1]$denote the membership and non membership functions of the element $v_i \epsilon V$ respectively and $0 \leq \sigma_1(v_i) + \sigma_2(v_i) \leq 1$, $\forall v_i \in V (i = 1,2,3, \dots n)$

(ii) $E \subset V \times V$ where $\mu: V \times V \longrightarrow [0,1]$ and $\mu_2: V \times V \longrightarrow [0,1]$ are such that

$$\mu_1(v_i, v_j) \leq min[\sigma_1(v_i), \sigma_2(v_j)]$$

$$\mu_2(v_i, v_j) \leq max[\sigma_2(v_i), \sigma_2(v_j)]\ and$$

$$0 \leq \mu_1(v_i, v_j) + \mu_2(v_{i,} v_j) \leq 1, \quad \forall v_i v_j \in E \quad (i = 1,2,3, \dots n)$$

Definition 2.5

An IFG is said to be Intuitionistic fuzzy labeling graph if the membership and non membership functions are bijective with all distinct values for each edges and nodes.

Definition 2.6

An Intuitionistic fuzzy labeling graph is said to intuitionistic fuzzy magic graph if $\sigma_1(v_i) + \mu_1(v_i, v_j) + \sigma_1(v_j)$ and $\sigma_2(v_i) + \mu_2(v_i, v_j) + \sigma_2(v_j)$ has same value for all $v_i, v_j \in V$

1. Properties of Intutionistic Fuzzy Magic Graph

Property3.1

For all n ≥ 1, the path P_n is aIntutionistic Fuzzy magic graph

Proof:

Let P_n be any path of length n and let $v_1, v_2, \dots v_n$ be the edges of P. Let us define zas $z \longrightarrow (0,1]$ such that

$$z = \begin{cases} 0.1 & ; \; n < 5 \\ 0.01 & ; \text{n} \geq 5 \end{cases}$$

When n is odd:

$$\sigma_2(v_{2i-1}) = (2n + 2 - i)z\,, \quad 1 \leq i \leq \frac{n+1}{2}$$

$$\sigma_2(v_{2i}) = \min\left\{\sigma_2(v_{2i-1});\quad 1 \leq i \leq \frac{n+1}{2}\right\} - iz, \qquad 1 \leq i \leq \frac{n+1}{2}$$

$$\mu_2(v_{n-i+2}, v_{n+1-i}) = max\{\sigma_2(v_i);\; 1 \leq i \leq n+1\} - min\{\sigma_2(v_i);\; 1 \leq i \leq n+1\}$$

$$-iz, 1 \leq i \leq n$$

Let $M_1(P)$ and $M_1(P)$ be the magic value for membership and non-membership functions respectively.

Case (i): when i is even

Let us take $i = 2x$, where x is positive integer $M_1(P) = \sigma_1(v_{i+1}) + \mu_1(v_i, v_{i+1}) + \sigma_1(v_i)$

$$= \sigma_1(v_{2x+1}) + \mu_1(v_{2x+1}, v_{2x}) + \sigma_1(v_{2x})$$

$=(2n - x + 1)z + max\{\sigma_1(v_i);\; 1 \leq i \leq n +$ *1−minσ1vi; 1≤i≤n+1−*

$$(n - 2x)z + min\left\{\sigma_1(v_{2i-1});\quad 1 \leq i \leq \frac{n+1}{2}\right\} - xz$$

$=max\{\sigma_1(v_i);\; 1 \leq i \leq n+1\} - min\{\sigma_1(v_i);\quad 1 \leq i \leq n+1\} +$

$$min\left\{\sigma_1(v_{2i-1});\quad 1 \leq i \leq \frac{n+1}{2}\right\} + (n+1)z$$

$$M_2(P) = \sigma_2(v_{i+1}) + \mu_2(v_i, v_{i+1}) + \sigma_2(v_i)$$

$= \sigma_2(v_{2x+1}) + \mu_2(v_{2x+1}, v_{2x}) + \sigma_2(v_{2x})$

$=(2n - x + 1)z + max\{\sigma_2(v_i);\; 1 \leq i \leq n + 1\} - min\{\sigma_2(v_i);\quad 1 \leq i \leq n+1\}$

First we define Intuitionistic Fuzzy labeling for membership function

$$\sigma_1(v_{2i-1}) = (2n + 2 - i)z\,, \quad 1 \leq i \leq \frac{n+1}{2}$$

$$\sigma_1(v_{2i}) = \min\left\{\sigma_1(v_{2i-1});\quad 1 \leq i \leq \frac{n+1}{2}\right\} - iz, \qquad 1 \leq i \leq \frac{n+1}{2}$$

$$\mu_1(v_{n-i+2}, v_{n+1-i}) = max\{\sigma_1(v_i);\quad 1 \leq i \leq n+1\} - min\{\sigma_1(v_i);\quad 1 \leq i \leq n+1\}$$

$$-(\,i-1)z, 1 \leq i \leq n$$

Now, we define Intuitionistic Fuzzy labeling for non-membership function

$$-(n - 2x + 1)z + min\left\{\sigma_2(v_{2i-1});\quad 1 \leq i \leq \frac{n+1}{2}\right\} - xz$$

$=max\{\sigma_2(v_i);\; 1 \leq i \leq n+1\} - min\{\sigma_2(v_i);\quad 1 \leq i \leq n+1\} +$

$$min\left\{\sigma_2(v_{2i-1});\quad 1 \leq i \leq \frac{n+1}{2}\right\} + nz$$

Case(ii): when i is odd

Let us take $i = 2x + 1$

$$M_1(P) = \sigma_1(v_{i+1}) + \mu_1(v_i, v_{i+1}) + \sigma_1(v_i)$$

$$= \sigma_1(v_{2x+2}) + \mu_1(v_{2x+2}, v_{2x+1}) + \sigma_1(v_{2x+1})$$

$$=min\left\{\sigma_1(v_{2i-1});\quad 1 \leq i \leq \tfrac{n+1}{2}\right\}$$

$-(x+1)z \quad +max\{\sigma_1(v_i);\; 1 \leq i \leq n+1\} - min\{\sigma_1(v_i);\quad 1 \leq i \leq n+1\} - (n - 2x - 1)z + (2n - x + 1)z$

$=max\{\sigma_1(v_i);\; 1 \leq i \leq n+1\} - min\{\sigma_1(v_i);\quad 1 \leq i \leq n+1\} + min\left\{\sigma_1(v_{2i-1});\quad 1 \leq i \leq\right.$ *n+12+ n+1z*

$$M_2(P) = \sigma_2(v_{i+1}) + \mu_2(v_i, v_{i+1}) + \sigma_2(v_i)$$

$+\,max\{\sigma_2(v_i);\; 1 \leq i \leq n+1\} - min\{\sigma_2(v_i);\quad 1 \leq i \leq n+1\}$

$$-(n - 2x)z + (2n - x + 1)z$$

$$=max\{\sigma_2(v_i);\; 1 \leq i \leq n+1\} -$$

$$min\{\sigma_2(v_i);\quad 1 \le i \le n+1\}$$

$$+min\left\{\sigma_2(v_{2i-1});\quad 1 \le i \le \frac{n+1}{2}\right\} + nz$$

When n is even :

First we define Intuitionistic Fuzzy labeling for membership function

$$\sigma_1(v_{2i}) = min\left\{\sigma_1(v_{2i-1});\quad 1 \le i \le \tfrac{n}{2}\right\} - iz,\qquad 1 \le i \le \tfrac{n+2}{2}$$

$$\sigma_1(v_{2i-1}) = (2n+2-i)z\,,\quad 1 \le i \le \frac{n}{2}$$

$$\mu_1(v_{n-i+2}, v_{n+1-i}) = max\{\sigma_1(v_i); 1 \le i \le n+1\} - min\{\sigma_1(v_i)\ 1 \le i \le n+1\} - (\ i - 1)z,\qquad 1 \le i \le n$$

Now, we define Intuitionistic Fuzzy labeling for non-membership function

$$\sigma_2(v_{2i}) = min\left\{\sigma_2(v_{2i-1});\quad 1 \le i \le \frac{n}{2}\right\} - iz,\qquad 1 \le i \le \frac{n+2}{2}$$

$$\sigma_2(v_{2i-1}) = (2n+2-i)z\,,\quad 1 \le i \le \frac{n+1}{2}$$

$$\mu_2(v_{n-i+2}, v_{n+1-i}) = max\{\sigma_2(v_i);\ 1 \le i \le n+1\}$$

$$-min\{\sigma_2(v_i);\ 1 \le i \le n+1\}$$

$$-iz,\quad 1 \le i \le n$$

Let $M_1(P)$ and $M_2(P)$ be the magic value for membership and non membership functions respectively.

Case (i):when i is even

Let us take $i = 2x$

$$M_1(P) = \sigma_1(v_{i+1}) + \mu_1(v_{i+1}, v_i) + \sigma_1(v_i)$$

$$= \sigma_1(v_{2x+1}) + \mu_1(v_{2x+1}, v_{2x}) + \sigma_1(v_{2x})$$

$=(2n - x + 2)z + max\{\sigma_1(v_i); 1 \le i \le n+1\} - min\{\sigma_1(v_i); 1 \le i \le n+1\} - (n-2x)z + min\left\{\sigma_1(v_{2i-1});\quad 1 \le i \le \tfrac{n}{2}\right\} - (x+1)z$

$=max\{\sigma_1(v_i);\quad 1 \le i \le n+1\} - min\{\sigma_1(v_i);\quad 1 \le i \le n+1\} +$

$$min\left\{\sigma_1(v_{2i-1});\quad 1 \le i \le \frac{n}{2}\right\} + (n+1)z$$

$$M_2(P) = \sigma_2(v_{i+1}) + \mu_2(v_i, v_{i+1}) + \sigma_2(v_i)$$

$$= \sigma_2(v_{2x+1}) + \mu_2(v_{2x+1}, v_{2x}) + \sigma_2(v_{2x})$$

$=(2n - x + 1)z + max\{\sigma_2(v_i);\quad 1 \le i \le n+1\}$

$$-min\{\sigma_2(v_i);\quad 1 \le i \le n+1\} - (n-2x+1)z$$

$$+min\left\{\sigma_2(v_{2i-1});\quad 1 \le i \le \frac{n}{2}\right\} - (x)z$$

$=max\{\sigma_2(v_i);\quad 1 \le i \le n+1\} - min\{\sigma_2(v_i);\quad 1 \le i \le n+1\} +$

$$min\left\{\sigma_2(v_{2i-1});\quad 1 \le i \le \frac{n}{2}\right\} + nz$$

Case(ii): when i is odd

Let us take $i = 2x + 1$

$$M_1(P) = \sigma_1(v_{i+1}) + \mu_1(v_i, v_{i+1}) + \sigma_1(v_i)$$

$$= \sigma_1(v_{2x+2}) + \mu_1(v_{2x+2}, v_{2x+}) + \sigma_1(v_{2x+1})$$

$$=min\left\{\sigma_1(v_{2i-1});\quad 1 \le i \le \tfrac{n}{2}\right\} - (x+1)z$$

$$+ max\{\sigma_1(v_i);\quad 1 \le i \le n+1\} - min\{\sigma_1(v_i);\quad 1 \le i \le n+1\} -$$

$$(n - 2x - 1)z + (2n - x + 1)z$$

$=max\{\sigma_1(v_i);\quad 1 \le i \le n+1\} - min\{\sigma_1(v_i);\quad 1 \le i \le n+1\} +$

$$min\left\{\sigma_1(v_{2i-1});\quad 1 \le i \le \frac{n}{2}\right\} + (n+1)z$$

$$M_2(P) = \sigma_2(v_{i+1}) + \mu_2(v_i, v_{i+1}) + \sigma_2(v_i)$$

$$= \sigma_2(v_{2x+2}) + \mu_2(v_{2x+2}, v_{2x+1}) + \sigma_2(v_{2x+1})$$

$$= min\left\{\sigma_2(v_{2i-1});\quad 1 \le i \le \tfrac{n}{2}\right\} - (x+1)z$$

$$+ max\{\sigma_2(v_i);\quad 1 \le i \le n+1\} - min\{\sigma_2(v_i);\quad 1 \le i \le n+1\} -$$

$$(n - 2x)z + (2n - x + 1)z$$

$=max\{\sigma_2(v_i);\quad 1 \le i \le n+1\} - min\{\sigma_2(v_i);\quad 1 \le i \le n+1\} +$

$$min\left\{\sigma_2(v_{2i-1});\quad 1 \le i \le \frac{n}{2}\right\} + nz$$

Hence $M_1(P)$ is same in both the cases and also $M_2(P)$ is same in both the cases.

Thus P_n is Intuitionistic fuzzy magic graph for all n $\ge$ 1.

Example 1: Intuitionistic fuzzy magic Path P_5 with magic value $M_1(P)$= 0.19 and $M_2(P)$=0.27

Property 3.2

Every cycle C_n with odd n is a Instutionistic Fuzzy magic graph

Proof:

Let C_n be any cycle with odd number of nodes and $v_1, v_2, \dots v_n$ and $v_1v_2, v_2v_3, \dots v_nv_1$ be the nodes and edges of C_n.

Let us define $z \longrightarrow (0,1]$ such that $z = \begin{cases} 0.1 & ;\ n < 3 \\ 0.01 & ;\text{n} \geq 3 \end{cases}$

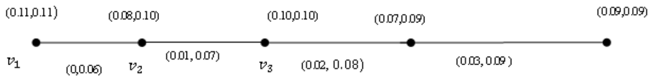
Now we define the Intuitionistic Fuzzy labeling for membership and non membership function of cycle as

$$\sigma_1(v_{2i}) = (2n + 1 - i)z\,, \quad 1 \leq i \leq \frac{n-1}{2}$$

$$\sigma_1(v_{2i-1}) = min\left\{\sigma_1(v_{2i});\quad 1 \leq i \leq \frac{n-1}{2}\right\} - iz, \qquad 1 \leq i \leq \frac{n+1}{2}$$

$$\mu_1(v_1, v_n) = \frac{1}{2} max\{\sigma_1(v_i);\quad 1 \leq i \leq n\}$$

$$\mu_1(v_{n-i+1}, v_{n-i}) = \mu_1(v_1, v_n) - \ iz, \qquad 1 \leq i \leq n - 1$$



$$\sigma_2(v_{2i-1}) = min\left\{\sigma_2(v_{2i});\quad 1 \leq i \leq \frac{n-1}{2}\right\} - iz, \qquad 1 \leq i \leq \frac{n+1}{2}$$

v_4 $\qquad$ v_5

$$\mu_2(v_1, v_n) = \frac{1}{2} max\{\sigma_2(v_i);\quad 1 \leq i \leq n\}$$

$$\mu_2(v_{n-i+1}, v_{n-i}) = \mu_2(v_1, v_n) - \ iz, \qquad 1 \leq i \leq n - 1$$

case(i) i is even

Let $i = 2x$ for any positive integer x

Let $M_1(C)$and $M_2(C)$ be the magic constant for the membership and non membership functions respectively

$$M_1(C) = \sigma_1(v_{i+1}) + \mu_1(v_{i+1}, v_i) + \sigma_1(v_i)$$

$$=\sigma_1(v_{2x+1}) + \mu_1(v_{2x+1}, v_{2x}) + \sigma_1(v_{2x})$$

$$=(2n - x + 1)z + \tfrac{1}{2} max\{\sigma_2(v_i);\quad 1 \leq i \leq n\} - (n - 2x)z + min\left\{\sigma_1(v_{2i});\quad 1 \leq i \leq \tfrac{n-1}{2}\right\} - (x + 1)z$$

$=\frac{1}{2} max\{\sigma_2(v_i);\quad 1 \leq i \leq n\} + min\left\{\sigma_1(v_{2i});\quad 1 \leq\right.$ $i \leq n - 12 + nz$

$$M_2(C) = \sigma_2(v_{i+1}) + \mu_2(v_i, v_{i+1}) + \sigma_2(v_i)$$

$$= \sigma_2(v_{2x+1}) + \mu_2(v_{2x+1}, v_{2x}) + \sigma_2(v_{2x})$$

$$= (2n - x - 1)z + \tfrac{1}{2} max\{\sigma_2(v_i);\quad 1 \leq i \leq n\}$$

$$-(n - 2x)z + min\left\{\sigma_1(v_{2i});\quad 1 \leq i \leq \frac{n-1}{2}\right\} - (x + 1)z$$

$$= \tfrac{1}{2} max\{\sigma_2(v_i);\quad 1 \leq i \leq n\} +$$

$$min\left\{\sigma_1(v_{2i});\quad 1 \leq i \leq \frac{n-1}{2}\right\} + (n - 2)z$$

Case(ii):when i is odd

Let us take $i = 2x + 1$

$$M_1(C) = \sigma_1(v_{i+1}) + \mu_1(v_i, v_{i+1}) + \sigma_1(v_i)$$

$$= \sigma_1(v_{2x+2}) + \mu_1(v_{2x+2}, v_{2x+}) + \sigma_1(v_{2x+1})$$

$$= min\left\{\sigma_1(v_{2i});\quad 1 \leq i \leq \tfrac{n-1}{2}\right\} - (x + 1)z + \tfrac{1}{2} max\{\sigma_1(v_i);\quad 1 \leq i \leq n\} - (n - 2x - 1)z + (2n - x)z$$

$=\frac{1}{2} max\{\sigma_1(v_i);\quad 1 \leq i \leq n\} + min\left\{\sigma_1(v_{2i}); 1 \leq i \leq\right.$ $n - 12 + nz$

$$M_2(C) = \sigma_2(v_{i+1}) + \mu_2(v_i, v_{i+1}) + \sigma_2(v_i)$$

$$= \sigma_2(v_{2x+2}) + \mu_2(v_{2x+2}, v_{2x+1}) + \sigma_2(v_{2x+1})$$

$$= min\left\{\sigma_2(v_{2i});\quad 1 \leq i \leq \tfrac{n-1}{2}\right\} - (x + 1)z + \tfrac{1}{2} max\{\sigma_2(v_i);\quad 1 \leq i \leq n\} - (n - 2x - 1)z + (2n - x - 2)z$$

$=\frac{1}{2} max\{\sigma_2(v_i);\quad 1 \leq i \leq n\} + min\left\{\sigma_2(v_{2i});\quad 1 \leq i \leq\right.$ $n - 12 + (n - 2)z$

Hence from above cases C_n is a Instutionistic Fuzzy magic graph.

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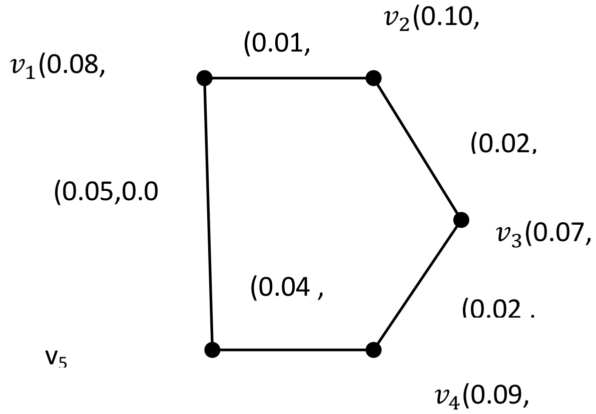
Example 2: Intuitionistic fuzzy magic Cycle C_5 with magic value $M_1(P)$= 0.19 and $M_2(P)$=0.14



Property 3.3:

For any n $\geq$ 2 , an Instutionistic Fuzzy Star $S_{1,n}$ is a Instutionistic Fuzzy magic graph.

Let $S_{1,n}$ be a Instutionistic Fuzzy Star graph, let us define $z \longrightarrow (0,1]$ such that $z = \begin{cases} 0.1 & ; n < 3 \\ 0.01 & ; n \geq 3 \end{cases}$

Now we define the Intuitionistic Fuzzy labeling for membership and non membership function of cycle as
$\sigma_1(u_i) = (2(n+1) - i)z\,,\ \ 1 \leq i \leq n$

$\sigma_1(v) = min\{\sigma_1(u_i);\ \ 1 \leq i \leq n\} - z,$

$\mu_1(v, v_{n-i}) = max\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\} - min\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\}$

$- iz,\ \ 0 \leq i \leq n-1$

$\sigma_2(u_i) = (2(n-1) + i)z\,,\ \ 1 \leq i \leq n$

$\sigma_2(v) = min\{\sigma_2(u_i);\ \ 1 \leq i \leq n\} - z,$

$\mu_2(v, u_{i+1}) = max\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq n\} - min\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq n\}$

$-iz,\ \ 0 \leq i \leq n-1$

case(i) i is even

Let $i = 2x$ for any positive integer x

Let $M_1(S)$and $M_2(S)$ be the magic constant for the membership and non membership functions respectively
$M_1(S) = \sigma_1(v) + \mu_1(v, u_i) + \sigma_1(u_i)$

$= \sigma_1(v) + \mu_1(v, u_{2x}) + \sigma_1(u_{2x})$

$= min\{\sigma_1(u_i);\ \ 1 \leq i \leq n\} - z + max\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\}$

$- min\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\} - (n - 2x)z + (2(n+1) - 2x)z$

$= min\{\sigma_1(u_i);\ \ 1 \leq i \leq n\} + max\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\}$

$- min\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\} + (n+1)z$

$M_2(S) = \sigma_2(v) + \mu_2(v, u_i) + \sigma_2(u_i)$

$= \sigma_2(v) + \mu_2(v, u_{2x}) + \sigma_2(u_{2x})$

$= min\{\sigma_2(u_i);\ \ 1 \leq i \leq n\} - z + max\{\sigma_2(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\}$

$- min\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq n\} - (2x-1)z + (2n + 2x - 2)z$

$= min\{\sigma_2(u_i);\ \ 1 \leq i \leq n\} + max\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq$ $n-$ $min\sigma 2ui,\sigma 2v;\ 1\leq i\leq n+2n-2z$

Case(ii (0.02, 0.01)

Let us take v_3(0.07, 0.04)

$M_1($ $_i)$

$= \sigma_1(v) + \mu_1(v, u_{2x+1}) + \sigma_1(u_{2x+1})$

$= min\{\sigma_1(u_i);\ \ 1 \leq i \leq n\} - z + max\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\}$

$- min\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\} - (n - 2x - 1)z + (2n - 2x + 1)z$

$= min\{\sigma_1(u_i);\ \ 1 \leq i \leq n\} + max\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\}$

$- min\{\sigma_1(u_i), \sigma_1(v);\ \ 1 \leq i \leq n\} + (n+1)z$

$M_2(S) = \sigma_2(v) + \mu_2(v, u_i) + \sigma_2(u_i)$

$= \sigma_1(v) + \mu_1(v, u_{2x+1}) + \sigma_1(u_{2x+1})$

$= min\{\sigma_2(u_i);\ \ 1 \leq i \leq n\} - z + max\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq n\}$

$- min\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq n\} - (2x)z + (2n + 2x - 1)z$

$= min\{\sigma_2(u_i);\ \ 1 \leq i \leq n\} + max\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq n\}$

$- min\{\sigma_2(u_i), \sigma_2(v);\ \ 1 \leq i \leq n\} + (2n-2)z$

Hence from above cases $S_{1,n}$ is a Instutionistic Fuzzy magic graph.

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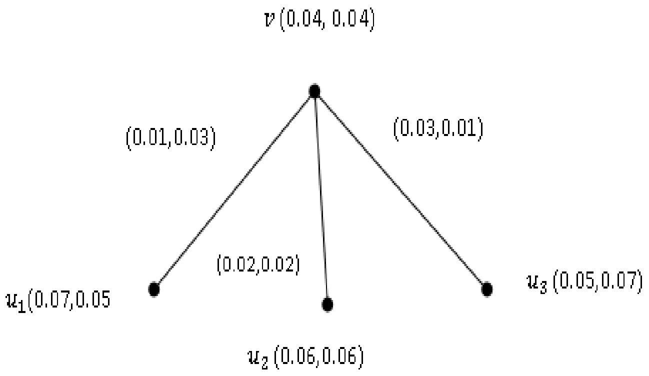
Example 3: Intuitionistic fuzzy magic Star $S_{1,3}$ with magic value $M_1(P) = 0.12$ and $M_2(P) = 0.12$



III. Conclusion

In this paper, we have shown the properties of Fuzzy magic graph in Intuitionistic space with example and these properties will be extended in real time applications. The main advantage of Intuitionistic Fuzzy space is it assigns to each element a membership and non-membership degree which will be applied in intuitionistic fuzzy expert systems, intuitionistic fuzzy neural networks, intuitionistic fuzzy decision and machine learning making.

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