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DOM-CHRO Number In Operations On Intuitionistic Fuzzy Graphs

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ABSTRACT

The concept of Domination-Chromatic set (Dom-Chro) and Dom-Chro number of an IFG is introduced in this paper. In Addition to study the Dom-Chro number of a complete IFG and complete bipartite IFG and identify some more bounds of Dom-Chro number are studied. Finally he Dom-Chro number of a join IFG's and a Cartesian product of IFG's are examined.

Keywords: Intuitionistic fuzzy graphs,

1. Introduction

For a given χ -coloring of an IFG G, a dominating set $S \subseteq V(G)$ is named to be Dom-Chro set if it covers at least single vertex from each colour of G. The Dom-chro number $\chi_{ifd}(G)$ is the minimum cardinality taken among the Dom-Chro sets of IFG G.

The concept of Dom-Chro set and Dom-Chro number of an IFG is introduced in this paper. In Addition to study the Dom-Chro number of a complete IFG and complete bipartite IFG and identify some more bounds of Dom-Chro number are studied. Finally he Dom-Chro number of a join IFG's and a Cartesian product of IFG's are examined.

2. Domination chromatic number of IFG

In this section we develop the concept of domination chromatic (Dom-Chro) number in IFG and investigate the bounds of Dom-Chro number in different IFG

Theorem 2.1: In a complete IFG $G(V,E)$, then the Dom-Chro number $\chi_{ifd}(G) = O(G)$.

Proof: Assume $G(V,E)$ remain a complete IFG. Therefore there exist an effective edge among all couple of vertices in V clearly $G(V,E)$ n-color IFG . Assume D be a γ_{if} set of complete IFG $G(V,E)$. Clearly $D = \{v_1 | v_1 = \Delta_N(G)\}$ this implies D did not cover all color in $G(V,E)$. This implies the set V is a Dom-Chro set and it cover all the colours in complete IFG $G(V,E)$. Hence $\chi_{ifd}(G) = |V| \Rightarrow \chi_{ifd}(G) = O(G).$

Example 2.1:

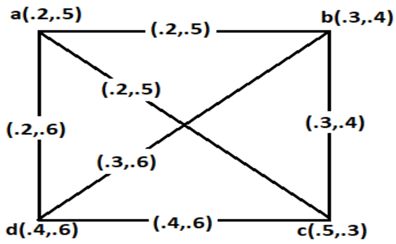

Fig 2.1: Complete IFG $G(V,E)$

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In figure 2.1, the Dom-Chro set and Dom-Chro number of the complete bipartite IFG $G(V,E)$ are $\{a,b,c,d\} = V$ & $\chi_{ifd}(G) = 1.8 = O(G)$ respectively.

Theorem 2.2: In a complete bipartite IFG $G(V,E)$, then the Dom-Chro number $\chi_{ifd}(G) = \gamma_{if}(G)$.

Proof: Undertake $G(V,E)$ remain a complete bipartite IFG. This implies the vertex set V_1 & V_2 are disjoint sets clearly $G(V,E)$ 2-color IFG . Let D stands a γ_{if} set of complete bipartite IFG. Clearly $D = \{v_1, v_2 | v_1 \in V_1 \,\&\, v_2 \in V_2\}$ this implies v_1 & v_2 having the different color, since $v_1 \in V_1 \,\&\, v_2 \in V_2$. Therefore the set D cover all the colors in complete bipartite IFG $G(V,E)$. Hence $\chi_{ifd}(G) = |D| \Rightarrow \chi_{ifd}(G) = \gamma_{if}(G)$.

Example 2.2:

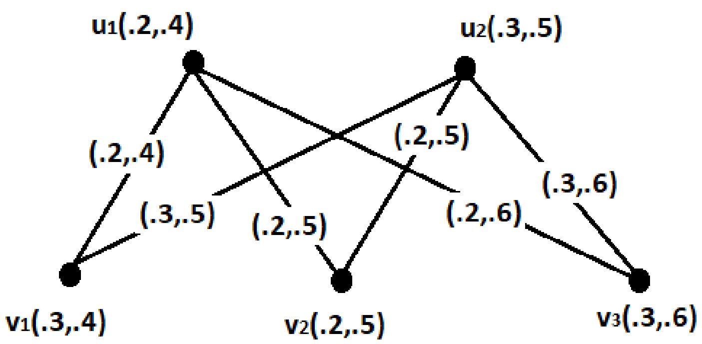

Fig 2.2: Complete bipartite IFG $G(V,E)$

In figure 2.2, the Dom-Chro set and number of the complete bipartite IFG $G(V,E)$ are $\{u_1, v_2\}$ & $\chi_{ifd}(G) = 0.75 = \gamma_{if}(G)$ respectively.

Theorem 2.3: In an IFG's $G_1(V_1,E_1)$ *and* $G_2(V_2,E_2)$, then the Dom-Chro number $\chi_{ifd}(G_1 \cup G_2) = \chi_{ifd}(G_1) + \chi_{ifd}(G_2)$.

Proof: Let $G_1(V_1,E_1)$ *and* $G_2(V_2,E_2)$ be an IFG with Dom-Chro number $\chi_{ifd}(G_1)$ *and* $\chi_{ifd}(G_2)$ respectively . Let $D_C \subseteq V(G)$ be a minimal Dom-Chro number of an IFG $G_1 + G_2$. In $G_1 + G_2$ edges are in the following form

(i). $xy \in G_1$

(ii). $xy \in G_2$

This implies there is an effective edge among vertices in G_1 *and* G_2. This indicates minimal Dom-Chro sets D_{C_1} *and* D_{C_2} of G_1 *and* G_2 are dominating set of $G_1 + G_2$. Therefore the different set of colours used in G_1 *and* G_2 . Clearly D_{C_1} *and* D_{C_2} are not a Dom-Chro set of $G_1 \cup G_2$. Since some of the vertex color in $G_1 \cup G_2$ are not covered by D_{C_1} *and* D_{C_2}. The set $D_{C_1} \cup D_{C_2}$ cover all the colors in $G_1 \cup G_2$. Hence the set $D_C = (D_{C_1} \cup D_{C_2})$ is a dom-chro set of $G_1 \cup G_2$.

$D_C = (D_{C1} \cup D_{C_2})$

$|D_C| = |D_{C1}| + |D_{C_2}|$

$\chi_{ifd}(G_1 \cup G_2) = \chi_{ifd}(G_1) + \chi_{ifd}(G_2)$

Example 2.3:

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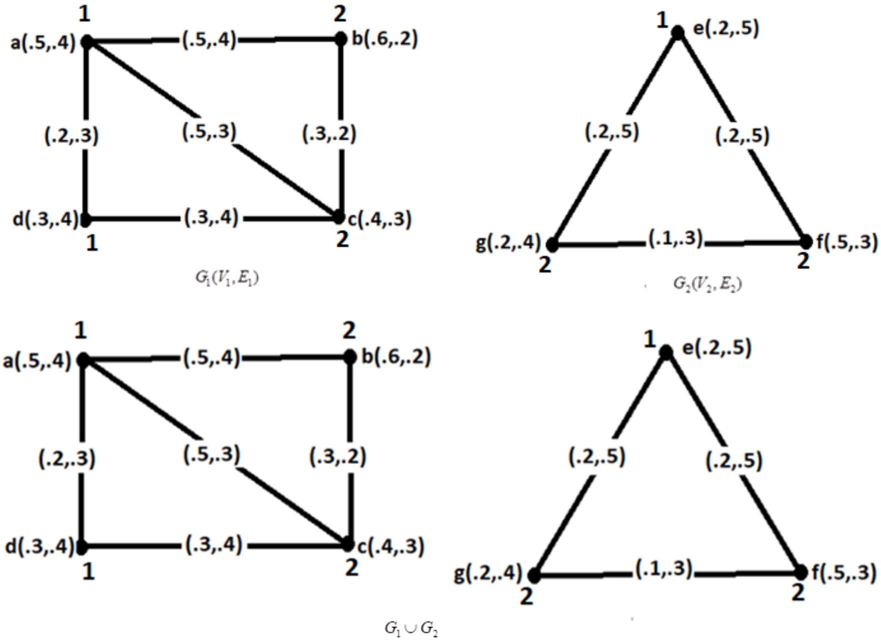

Fig 2.3: $G_1 \cup G_2$

In figure 2.3, the dom- chro sets of an IFG's $G_1 \, and \, G_2$ are $\{a,c\} \& \{e,g\}$ respectively. Note the dom- chro number of the IFG's $G_1 \, and \, G_2$ are $\chi_{ifd}(G_1) = 1.1 \& \chi_{ifd}(G_2) = .75$. The dom- chro set and number of the IFG $G_1 \cup G_2$ are $\{a,c,e,g\} \& \chi_{ifd}(G_1 \cup G_2) = 1.85$ respectively.

Theorem 2.4: In an IFG $G_1(V_1, E_1) \, and \, G_2(V_2, E_2)$, then the Dom-Chro number $\chi_{ifd}(G_1 + G_2) = \chi_{ifd}(G_1) + \chi_{ifd}(G_2)$.

Proof: Assume $G_1(V_1, E_1) \, and \, G_2(V_2, E_2)$ be an IFG with Dom-Chro number $\chi_{ifd}(G_1) \; and \; \chi_{ifd}(G_2)$ respectively. Let $D_C \subseteq V(G)$ be a minimal Dom-Chro number of an IFG $G_1 + G_2$. In $G_1 + G_2$ edges are in the following form

(i). $xy \in G_1$

(ii). $xy \in G_2$

(iii). $xy \in (G_1 + G_2)$

This implies there exist a strong edge among vertices in $G_1 \, and \, G_2$. This indicates minimal Dom-Chro sets $D_{C_1} \, and \, D_{C_2}$ of $G_1 \, and \, G_2$ are dominating set of $G_1 + G_2$. Therefore the different set of colours used in $G_1 \, and \, G_2$. Clearly $D_{C_1} \, and \, D_{C_2}$ are not a Dom-Chro set of $(G_1 + G_2)$. Since some of the vertex colour in $(G_1 + G_2)$ are not covered by $D_{C_1} \, and \, D_{C_2}$. The set $D_{C_1} \cup D_{C_2}$ cover all the colours in $(G_1 + G_2)$. Hence the set $D_C = (D_{C_1} \cup D_{C_2})$ is a Dom-Chro set of $(G_1 + G_2)$.

$$D_C = (D_{C1} \cup D_{C_2})$$

$$|D_C| = |D_{C1}| + |D_{C_2}|$$

$$\chi_{ifd}(G_1 + G_2) = \chi_{ifd}(G_1) + \chi_{ifd}(G_2)$$

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Example 2.4

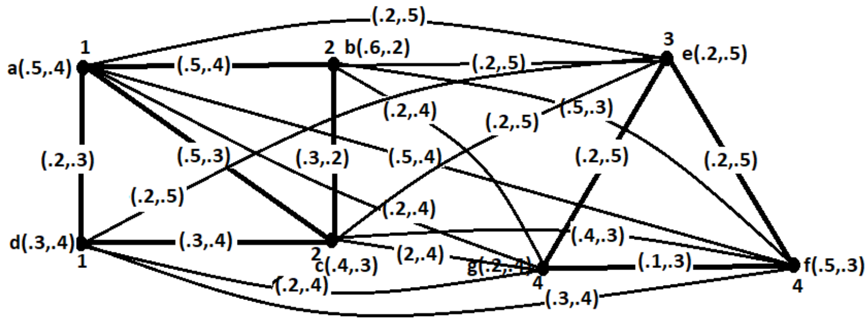

Fig 2.4: (G_1+G_2)

In figure 2.4, the Dom-Chro set of the IFG's $G_1\, and\, G_2$ are $\{a,c\}\,\&\,\{e,g\}$ respectively. Note the Dom-Chro number of the IFG's $G_1\, and\, G_2$ are $\chi_{ifd}(G_1)=1.1$ & $\chi_{ifd}(G_2)=.75$. The Dom-Chro set and number of the IFG G_1+G_2 are $\{a,c,e,g\}$ & $\chi_{ifd}(G_1+G_2)=1.85$ respectively.

Theorem 2.5: In an IFG's $G_1(V_1,E_1)\, and\, G_2(V_2,E_2)$, then the Dom-Chro number $\chi_{ifd}(G_1\times G_2)=\gamma_{if}(G_1\times G_2)$

Proof: Assume $G_1(V_1,E_1)$ *and* $G_2(V_2,E_2)$ be an IFG with γ_{if} set D_1 *and* D_2 individually. Let $D_C\subseteq V(G)$ be a minimal Dom-Chro number of an IFG $G_1\times G_2$. In $G_1\times G_2$ edges are in the following form

(i). $(x_1y_1)(x_1y_2)\in G_1\times G_2$

(ii). $(x_1y_1)(x_2y_1)\in G_1\times G_2$

Let D be a γ_{if} set of $(G_1\times G_2)$. Assume D is not a minimal Dom-Chro set of $(G_1\times G_2)$. There is a Colouring set of $G_1\times G_2$ are not covered by the set D. This implies there exist a vertex (x_1y_1) in $(G_1\times G_2)$ is not an dominated by D. This is contradict to our assumption D be a γ_{if} set of $(G_1\times G_2)$. Henceforth D is a minimal Dom-Chro set of $G_1\times G_2$. Therefore we get $D_C=D\Rightarrow|D_C|=|D|\Rightarrow\chi_{ifd}(G_1\times G_2)=\gamma_{if}(G_1\times G_2)$.

Example 2.5:

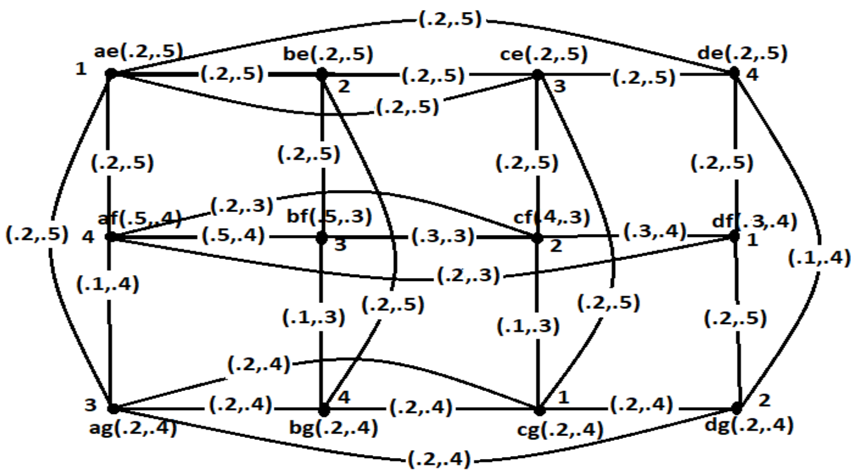

Fig 2.5: $G_1\times G_2$

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In figure 2.5, the Dom-Chro set and number of the IFG $G_1 \times G_2$ are $\{ae, be, ce, de\}$& $\chi_{ifd}(G_1 \times G_2) = 1.4 = \gamma_{if}(G_1 \times G_2)$ respectively.

3. Conclusion

The concept of Dom-Chro set and Dom-Chro number of an IFG is introduced in this paper. In Addition to study the Dom-Chro number of a complete IFG and complete bipartite IFG and identify some more bounds of Dom-Chro number are studied. Finally he Dom-Chro number of a join IFG's and a Cartesian product of IFG's are examined. In future we will develop the domination chromatic (Dom-Chro) number for various Dominating set.

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