Research Article

An Enhancement of Outer-Independent Total Roman Domination in FIS Graphs Using Adaptive Neuro Chromatic Polynomial Fuzzy

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Abstract
In this article, we begin by examining Outer-Independent Total Roman (OITRD) and introduce limits on the number of total external free Roman workers associated with the proposed Adaptive Neuro Chromatic Polynomial Fuzzy (ANCPF) rule set. The main type was an ANCPF diagram with a series of record vertices and a series of soft edges, and the next type was an ANCPF diagram with a series of ANCPFs and a series of ANCPF edges. Based on this, ANCPF color polynomials are examined for some ANCPF diagrams. Some interesting comments have been made on the soft chromatic polynomial of the ANCPF diagrams. In addition, some results identified with the idea will be demonstrated. The severity of an OITRD is the amount of its capacity estimated at all vertices, and the full Roman control number marked free on the outside (OITRD number) $\Psi_{OITR}(g')$ is the minimum weight of an OITRD g'. Additionally, a result is recorded.

Keywords: Outer-independent Total Roman domination, Total Roman domination, adaptive neuro fuzzy, Adaptive Neuro Chromatic Polynomial Fuzzy.

1. Introduction

Overwhelming set issues are among the main class of combinatorial issues in diagram enhancement, from a hypothetical just as from a commonsense perspective [1]. For a given diagram $G = G(V, E)$, a subset $D \subset V$ of vertices is alluded to as a ruling set if the leftover vertices, i.e., $\frac{V}{D}$ is overwhelmed by D as per a given topological connection (e.g., they are on the whole contiguous in any event one vertex from D). Ruling set issues (additionally frequently called control issues in charts) have pulled in the consideration of computer researchers and handled mathematicians since the mid 50s and their lose connection to covering and free set issues has lead to the advancement of an entire exploration territory. There are numerous applications where set control and related ideas assume a focal part, including school transport steering, correspondence organizations, radio broadcast area, informal communities investigation, natural organizations examination and furthermore chess-issues. Variations of ruling set issues e.g., the associated ruling set issues the (weighted) autonomous ruling set issues, among others for additional of the ruling set issues [2, 3].

1.1. Outer-Independent Total Domination

A subset $D \subseteq V(G)$ of a chart G is an OITDS if D is a complete ruling arrangement of G and $V(G)/D$ is free [4]. The external free complete control number of a chart G , indicated by $\Psi_{oit}(G)$, is the base cardinality of an OITDS of G . An OITDS of with least cardinality is known as a Ψ_{oit} - set of G .

The idea of external autonomous all out mastery was recently presented by Krzywkowski. A complete overwhelming arrangement D of a diagram G is known as an all out co-free ruling set if the arrangement of vertices of the subgraph actuated by $V(G)/D$ is autonomous and not unfilled. Note that the state of $V(G)/D$ to be not vacant isn't actually essential, since the chart comprising of the association of concedes P^2 no all out co-free overwhelming set [5,6].

1.2. Roman Domination

A Roman dominating function (RDF) on a diagram G is a capacity $f: V(G) \rightarrow \{0,1,2\}$ with the end goal that each vertex x for which $f(x)=0$ is nearby in any event one vertex y for which $f(y)=2$. The heaviness of a RDF is the worth $\alpha(f)=\sum_{x \in V(G)} f(x)$. The base load of a RDF on a chart is known as the Roman mastery number $\Psi_R(G)$ of G. It tends to be promptly seen that a Roman overwhelming capacity f creates three sets to V_0^f, V_1^f, V_2^f such an extent $V_0^f = \{v \in V(G): f(x)=a\}$ that for $a=0,1,2$. Since these three sets decide f and the other way around, we can proportionately $f=(V_0^f, V_1^f, V_2^f)$. On the off chance that the capacity f is obvious from the specific situation, we will essentially compose $f=(V_0, V_1, V_2)$.

1.3. Outer-Independent Roman Domination

A Roman overwhelming capacity $f=(V_0, V_1, V_2)$ on a diagram G is an external free Roman ruling capacity if V_0 is autonomous. The external free Roman control number $\Psi_{oiR}(G)$ is the base load of an external autonomous Roman overwhelming capacity on G.

1.4. Total Roman Domination

An all out Roman ruling capacity on a chart G with no segregated vertex is a Roman ruling capacity $f=(V_0, V_1, V_2)$ on G to such an extent that the subgraph of G instigated by the set $V_1 \cup V_2$ has no secluded vertices [7]. The complete Roman mastery number $\Psi_{tR}(G)$ is the base load of an all out Roman overwhelming capacity on G.

1.5. Outer-Independent Total Roman Domination

An absolute Roman overwhelming capacity $f=(V_0, V_1, V_2)$ is an outer independent double Roman dominating function (OIDRDF) on G if V_0 is free [8]. The external autonomous complete Roman control number $\Psi_{oitR}(G)$ is the base load of an OIDRDF on G. An OIDRDF f of G is known as a Ψ_{oitR}-capacity of G if $\alpha(f)=\Psi_{oitR}(G)$. Cabrera-Martínez, et al. demonstrated that the issue of choosing the external autonomous complete control number (resp. the external autonomous all out Roman control number) of a diagram is NP-finished, in any event, when confined to planar charts of greatest degree at generally 3. Also, they proposed a few issues [9, 10].

Problem 1:

Track down some non inconsequential groups of charts whose external autonomous complete control numbers can be settled in polynomial time.

Problem 2:

Study the external autonomous complete Roman control number of different groups of diagram like trees or item charts. Moreover, Cabrera-Martínez *et al*. [6] acquired the accompanying imbalance and characterized the charts fulfilling the correct balance.

Theorem1: For any diagram G, $\Psi_{oit}(G)+1\le\Psi_{oitR}(G)\le 2\Psi_{oit}(G)$. A diagram $\Psi_{oit}(G)+1\le\Psi_{oitR}(G)\le 2\Psi_{oit}(G)$ is called an external free complete Roman chart (or OIT-Roman diagram for short), if $\Psi_{oitR}(G)=2\Psi_{oit}(G)$.

Problem 3:

Portray all the OIT-Roman diagrams.

In this paper, we propose dynamic programming calculations to figure the external free absolute Roman control number of an ANCPF, individually. Besides, we describe all difficult fuzzy chart calculation for OITRDF. The base load of an OITRDF on a diagram g' is known as the external free all out roman control number g' of and it is indicated by $\Psi_{OITR}(g')$. Obviously $\Psi_{OITR}(g')\le\Psi_{OITR}(g')$. An OITRDF with least weight in a chart will be alluded to as a $\Psi_{oiTR}(g')$- work on g'. Since any external free all out roman ruling capacity is a Total Roman ruling capacity, we have,

$$\Psi_{OITR}(g')\ge\Psi_{OITR}(g') \tag{1}$$

We build up different limits on the external free all out control number as far as the request, width and vertex cover number. Specifically, we give lower and upper limits on $\Psi_{OITR}(NF_{CP})$ when NF_{CP} is a Neuro Fuzzy, and we portray all limit Neuro Fuzzy valuably. Also, we give Nordhaus-Gaddum limits to $\Psi_{OITR}(g')+\Psi_{OITR}(\overline{g}')$; wher $\overline{g}'$ e is the supplement chart of g'.

2. Recent Related Reviews

Martínez *et al*. [11] have introduced an external autonomous twofold Roman ruling capacity (OIDRDF) of a chart G is a capacity h from V(G) to {0, 1, 2, 3} for which every vertex with mark 0 is adjoining a vertex with name 3 or possibly two vertices with name 2, and every vertex with name 1, is neighboring a vertex with name more prominent than 1; and all vertices named by 0 is free. The heaviness of an OIDRDF h is $\sum_{w\in V(G)}h(w)$, and the external autonomous twofold Roman control number γoidR(G) is the base load of an OIDRDF on G.

Fan *et al*. [12] have researched an external autonomous Italian mastery number and present the limits on the external free Italian control number regarding the request, breadth, and vertex cover number. Also, we set up the lower and upper limits on γoiI (T) when T is a tree and portray all extremal trees productively. We additionally give the Nordhaus–Gaddum-type disparities.

Cabrera *et al*. [13] have built up a boundary for the established item charts. In particular, we acquire shut recipes and tight limits for the absolute Roman mastery number of established item charts as far as control invariants of the factor diagrams engaged with this item. Allow G to chart with no disengaged vertex and a capacity. In the event that f fulfills that each vertex in the set is contiguous at any rate one vertex in the set, and assuming the subgraph prompted by the set has no separated vertex, we say that f is an all out Roman ruling capacity on G. The base load among all complete Roman ruling capacities f on G is the all out Roman control number of G.

Mojdeh *et al.* [14] have built up a d_h(G, i) of a chart. At last order numerous groups of charts by considering their bounce control polynomial. Jahari *et al*. [15] have introduced an autonomous ruling arrangement of the basic diagram G=(V,E) is a vertex subset that is both ruling and free in G. The free mastery polynomial of a chart G is the polynomial Di(G,x)=∑Ax|A|, added over all autonomous overwhelming subsets A⊆V. A foundation of Di(G,x) is called an autonomy control root.

3. Preliminary

In this paper, we will just think about charts without various edges or circles. For a Graph $g'_{best}=(Ver(g'_{best}),Edg(g'_{best}))$, and $Edg(g'_{best})$ are the arrangements of vertices and edges of g'_{best}, individually. For $\Delta\subseteq Ver(g'_{best})$ and $\ddot{v}\in Ver(g'_{best})$, the open neighborhood of $\ddot{v}$ in Δ is indicated by $n'_{\Delta}[\ddot{v}]$. In other words $n'_{\Delta}[\ddot{v}]=\{\dot{u}|\dot{u}\dot{v}\in Ede(g'_{best}),\dot{u}\in\Delta\}$. The shut neighborhood $n'_{\Delta}[\ddot{v}]$ of $\ddot{v}$ in Δ is characterized as $n'_{\Delta}[\ddot{v}]=\{\dot{u}\}\cup n'_{\Delta}(\dot{v})$. In the event that $\Delta=Ver(g'_{best})$, $n'_{\Delta}[\ddot{v}]$, and $n'_{\Delta}[\ddot{v}]$ are signified by

$n'[\ddot{v}]$ and $n'[\ddot{v}]$, separately. Let $\Delta \subseteq Ver(g'_{best})$, we compose $n'_{g'_{best}}[\Delta] = \cup_{X\in\Delta} n'_{g'_{best}}(X)$. The level of $\ddot{v}$ is $d'(\dot{v}) = |n'(\dot{v})|$. A bunch $\Delta \subseteq Ver(g'_{best})$ of g'_{best} is autonomous if any two vertices in Δ are not contiguous in g'_{best} . A leaf of g'_{best} is a vertex of degree one and a help vertex of g'_{best} is a vertex adjoining a leaf. The arrangement of leaves of g'_{best} is indicated by $\gamma(g'_{best})$ and the arrangement of help vertices by $\Delta(g'_{best})$.

Since external autonomous complete control and external free all out Roman mastery isn't characterized for charts having detached vertices, so every one of the diagrams considered thus have no segregated vertices [16]. Given an OIDRDF d' of a diagram g'_{best} , a vertex $\dot{v} \in d'$ is said to have a private neighbor if there exists a vertex $\dot{w} \in n'(\dot{v}) \cap \left(\frac{Ver(g'_{best})}{d'}\right)$ for which $n'(\dot{w}) \cap d' = \{\dot{v}\}$.

Suggestion 1: A chart g'_{best} is an OIT-Roman diagram if and just if there exists a Ψ_{OITR} - work f $F' = (Ver_0 , Ver_1 , Ver_2)$ of g'_{best} to such an extent that $Ver_1 = \varphi$;

As a clear result of idea 1, we have:

Outcome 1: Let g'_{best} be an OIT-Roman diagram. At that point for any Ψ_{OITR} - set d' of g'_{best} , the capacity $F' = \left(\frac{Ver(g'_{best})}{d', \phi, d'}\right)$ is a Ψ_{OITR} component of g'_{best} .

Suggestion 2: For any associated chart g'_{best} with at any rate three vertices, $\Psi_{OITR}(g'_{best}) \geq |\Delta(g'_{best})|$.

Proof: This follows promptly from the way that $\Psi_{OITR}(g'_{best}) \geq \Psi(g'_{best}) \geq |\Delta(g'_{best})|$, where $\Psi(g'_{best})$ is the control number of g'_{best} .

3.1. Inverse-4 Edge Dominating Set

An ANCPF is a polynomial which is related with the neurofuzzy shading of neurofuzzy diagrams. Along these lines, ANCPF in neurofuzzy chart is called neurofuzzy chromatic polynomial of neurofuzzy diagram. In this segment, we characterize the idea of neurofuzzy chromatic polynomial of neuro fuzzy chart dependent on backwards 4 edge ruling set and reverse 4 edge control number of a fuzzy diagram. Besides, we decide the neurofuzzy chromatic polynomials for some neuro fuzzy diagrams with fresh and neurofuzzy vertices.

Definition 1:

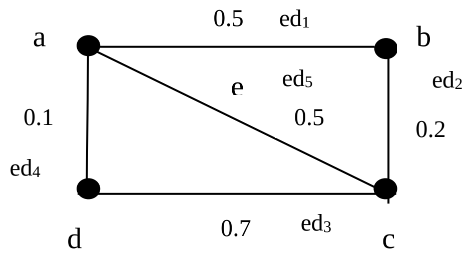
Let g'_{best} be a fuzzy chart. The fuzzy chromatic polynomial of g'_{best} is characterized as the neuro fuzzy chromatic polynomial of its participation diagrams g'_{MS} , for $g'_{MS} \in i$. It is signified by $CP^{NF}_{MS}(g', a)$.

That is, $CP^{NF}_{MS}(g', a) = CP(g'_{MS}, a), \forall MS \in i$.

Definition 2:

Let do' be a base edge overwhelming set in a neuro fuzzy chromatic polynomial of its participation chart g'_{best}. Assuming contains an edge ruling arrangement do'' of g'_{best}, do'' is called an opposite edge overwhelming set concerning do' .

Case 1:



Here, $Se=\{ed_3, ed_4, ed_5\}$.

$do'=\{ed_3, ed_4\}$ is a base edge overwhelming arrangement of g'. At that point the sets $\{ed_2, ed_4\}$, $\{ed_2, ed_5\}$ and $\{ed_4, ed_5, ed_2\}$ are inverse-4 edge ruling sets as for do' .

Likewise, $\{ed_2, ed_4\}$, $\{ed_2, ed_5\}$, $\{ed_1, ed_4\}$, $\{ed_1, ed_3\}$ are least edge ruling arrangements of g'_{best}. At that point the comparing backwards edge overwhelming sets are $\{ed_3, ed_5\}$, $\{ed_2, ed_4\}$, $\{ed_4, ed_5\}$ and $\{ed_4, ed_5, ed_2\}$ individually.

Definition 3:

The inverse-4 edge mastery number of g'_{best} is the littlest cardinality of a inverse-4 edge overwhelming arrangement of g'_{best} and it is indicated as $\frac{1}{\Psi'^4}(g'_{best})$.

Definition 4:

A converse 4 edge overwhelming set having cardinality $\frac{1}{\Psi'^4}(g'_{best})$G is known as a base inverse-4 edge ruling arrangement of the neuro fuzzy diagram g'_{best} .

Theorem 3.1.1

In the event that a neuro fuzzy chart g'_{best} has at any rate one inverse-4 edge ruling set, at that point $\Psi'(g'_{best}) \le \frac{1}{\Psi'^4}(g'_{best})$.

Confirmation:

Let be a Neuro fuzzy diagram g'_{best} having in any event one inverse-4 edge ruling set. Any inverse-4 edge overwhelming arrangement of a Neuro fuzzy chart g'_{best} is an edge ruling arrangement of g'_{best} . Likewise, $\Psi'(g'_{best})$ and $\frac{1}{\Psi'^4}(g'_{best})$ are least cardinality of edge ruling arrangement of g'_{best} and inverse-4 edge overwhelming arrangement of $\frac{1}{\Psi'^4}(g'_{best})$, individually. Henceforth $\Psi'(g'_{best}) \le \frac{1}{\Psi'^4}(g'_{best})$.

Theorem 3.1.2

On the off chance that a Neuro fuzzy chart g' has at any rate one inverse-4 edge ruling set, at that point $\Psi'(g') + \frac{1}{\Psi'^4}(g') \le |Se|$.

Confirmation:

Let do' be a base edge overwhelming arrangement of g' . Furthermore, let $do'' \subseteq Se - do'$ be a inverse 4 edge ruling arrangement of g' regarding do'.

Without loss of consensus, expect that do'' is the base opposite 4 edge overwhelming arrangement of g'.

Thus $|do''| = \frac{1}{\Psi'^4}(g')$ and $|do'| = \Psi'(g')$.

Now,

$do'' \subseteq Se - do'$,

$|do''| \leq |Se| - |do'|$,

$\frac{1}{\Psi'^4}(g') \leq |Se| - \Psi'(g')$,

$\Psi'(g') + \frac{1}{\Psi'^4}(g') \leq |Se|$.

Theorem 3.1.3

On the off chance that a Neuro fuzzy chart g' has in any event two disjoint edge ruling sets, at g' that point has an inverse 4 edge overwhelming set.

Confirmation:

Let g' be a Neuro fuzzy diagram which has in any event two disjoint edge overwhelming sets. Let do'_1 and do'_2 be two disjoint edge overwhelming arrangements of the Neuro fuzzy diagram g' and let do' be any base edge ruling arrangement of g' . We need to show that g' has a converse 4 edge ruling set.

We need to show that g' has a converse 4 edge overwhelming set.

Case (A) $do' \subseteq do'_1 \cup do'_2$.

On the off chance that $do' \subseteq do'_1$, do', and do'_2 are disjoint sets. In this way $do'_2 \subseteq Se - do'$, and it is an edge ruling arrangement of g' which is likewise a inverse-4 edge ruling arrangement of g' concerning do'. Subsequently, do' has a converse 4 edge overwhelming set.

Assuming $do' \subseteq do'_1 \cup do'_2$ however $do' \not\subseteq do'_x$, $x = 1,2$ at $Se - do'$ that point has solid curves from both do'_1 and do'_2 furthermore from $Se - (do'_1 \cup do'_2)$. Since do' is a base edge ruling arrangement of g' , $|do'| \leq |do'_x|$, $x = 1,2$.

Assume $|do'| < |do'_x|$ and $Se - do'$ has an edge overwhelming arrangement of g', at g' that point has an inverse-4 edge ruling set. If not we can pick another base edge overwhelming set (which is conceivable) $do' \subseteq do'_1 \cup do'_2$ to such an extent $Se - do''$ that has a reverse 4 edge ruling set.

Assume $|do'| = |do'_x|1$ (or $|do'_2|$), at that point do'_1 (or do'_2) is additionally a base edge overwhelming arrangement of g'. In this manner do'_2, (or do'_1) is a backwards edge overwhelming arrangement of g'. In this way, g' has a inverse-4 edge overwhelming set.

Case (B) $do' \not\subseteq do'_1 \cup do'_2$.

On the off chance $do' \not\subseteq do'_1 \cup do'_2$ that $do'_1 \subset Se - do'$ and $do'_2 \subset Se - do'$. Subsequently, $Se - do'$ has in any event two disjoint edge ruling sets which are the inverse 4 edge overwhelming arrangements of g' . In this manner g', has an inverse 4 edge ruling set.

3.2. Adaptive Neuro Fuzzy Chromatic Polynomial of neuro Fuzzy Graph with Membership Vertices

In this section, the progression of the ANFIS graph theory model is more realistic and produces a more refined result. In this article, ANFIS is used to describe a multilayer network. It incorporated the uniqueness of Sugeno-type fuzzy inference systems (FIS) among the outstanding quality of the ANNs, which are recognized as direct acting adaptive multilayer ANNs. Some of the interesting benefits of ANSIF are fast forward speed, accuracy, outstanding learning qualities, and fine modification of membership functions (MF). The organization of ANFIS comprises two preliminary and determining segments which are linked by a set of regulations. ANFIS is considered a simple data training procedure that implements a fuzzy inference system representation to modify a specified input as an intentional output. This process also contains the progression of membership functions, fuzzy logical operators, and if-then regulations. Furthermore, it includes two categories of fuzzy systems such as the Sugeno and Mamdani representation. The ANFIS task also contains five main processing steps such as input fuzzification, application of fuzzy operators, application process, output aggregation and defuzzification. The same outlet subscription function does not distribute various regulations. The amount of adjustment is sufficient for the amount of adhesion function. The current position of the cuttlefish is communicated to the regulatory body ANFIS. Here the two blurry IF-THEN rules are recognized by a first order Sugeno representation to realize the update progress which are specified in condition, The FIS system contains the rules which are given below ,

IF ω is ω_1 and η is η_1, then $Y_1 = x_1\omega + y_1\omega + z_1$

IF ω is ω_2 and η is η_2, then $Y_2 = x_2\omega + y_2\omega + z_2$

Where, $x_1, x_2, y_1, y_2, z_1, z_2$ are the direct boundaries, $\omega_1, \eta_1, \omega_2, \mu_2$ are the nonlinear boundaries wherein ω_1, η_1 are the participation capacities. In the ANFIS regulator, get the information sources are line based holding up season of the minimum weight of graph and inverse-4 edge dominating set.

A Neuro fuzzy diagram g'_{Novel} with FIS vertices and Neuro fuzzy edges, and δ - cut chart of g'_{Novel} are characterized as follows,

Definition 3.2.1:

A FIS diagram is characterized as a couple with the $g'_{Novel} = (\omega, \eta)$ end goal that

(1) ω is the fresh arrangement of vertices (that is, $\Delta(\eta) = 1, \forall \eta \in \omega$);

(2) the capacity $Y : \omega \times \omega \to [0,1]$ is characterized by $Y(\eta, \omega) \le \Delta(\eta) \wedge \Delta(\omega)$, for all $\eta, \omega \in \omega'$.

Definition 3.2.2:

Let $g'_{Novel} = (\omega, \eta)$ be a Neuro fuzzy diagram. For $\delta \in i$, cut chart of the Neuro fuzzy diagram g'_{Novel} is characterized as the FIS chart $g'_{Novel}\delta = (ver, ed_\delta)$, where $ed_\delta = \{(\omega, \eta), \omega, \eta \in \omega' | Y(\omega, \eta) \ge \delta\}$.

Example 1: Consider the fuzzy diagram g'_{Novel} with FIS vertices and Neuro fuzzy edges in Figure 2.

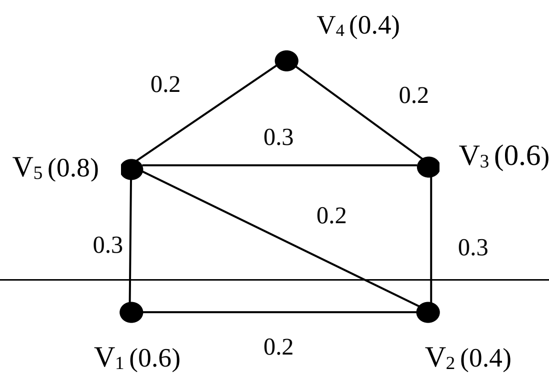


Fig.2: The fuzzy graph g'_{Novel} with FIS vertices and Neuro fuzzy edges

In g'_{Novel}, we consider $Se = \{0, 0.2, 0.3, 0.4, 0.6, 0.8\}$; for each $\delta \in Se$, we have a fresh chart $g'_{Novel}\delta$ and its chromatic polynomial which is the Neuro fuzzy chromatic polynomial of the Neuro fuzzy diagram g'_{Novel} is acquired appeared in figure 3. (The whole numbers in the sections signify the quantity of methods of shading the vertices

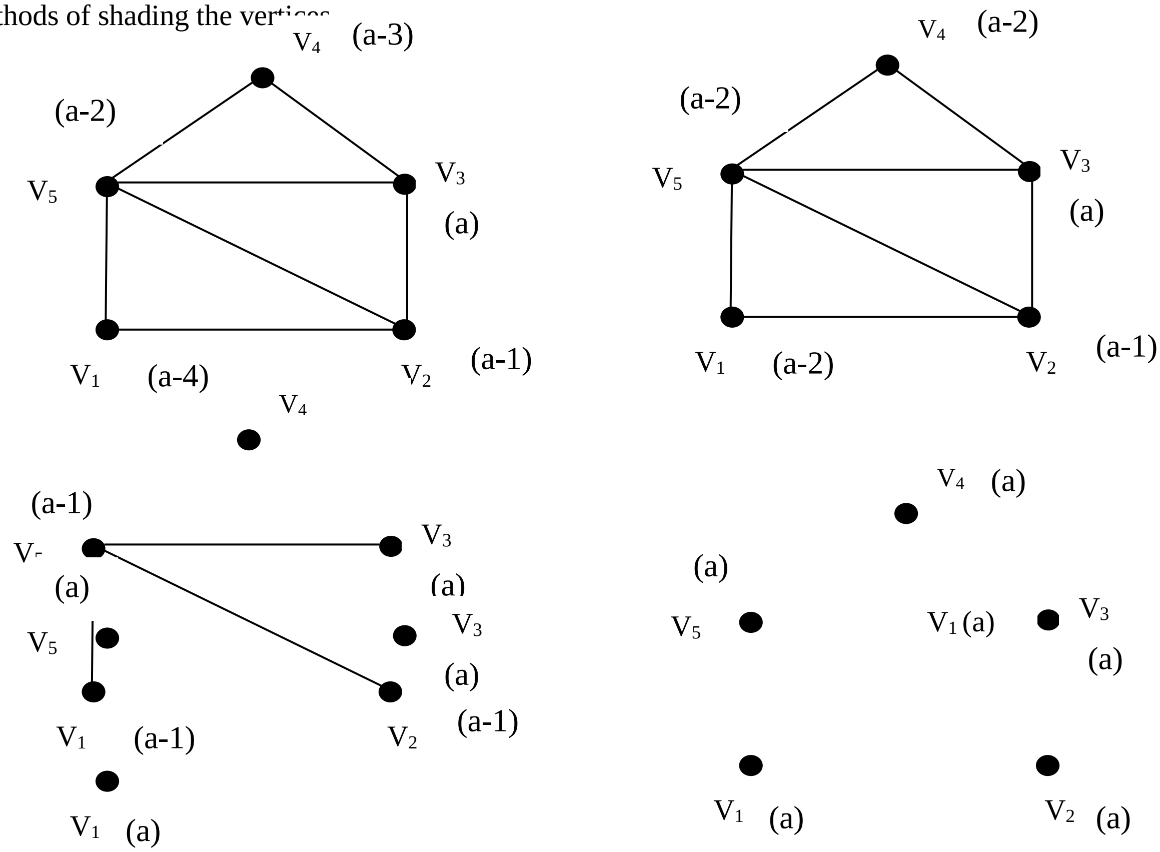


Fig.3: Different fuzzy chromatic polynomials of the fuzzy graph G in Example 1 (i) $\delta = 0; CP_{MS}^{NF}\delta(g', a) = a(a-1)(a-2)(a-3)(a-4)$ (ii) $\delta = 0.2; CP_{MS}^{NF}\delta(g', a) = a(a-1)(a-2)^3$ (iii) $\delta = 0.3; CP_{MS}^{NF}\delta(g', a) = a^2(a-1)^3$ (iv) $\delta = 0.4; CP_{MS}^{NF}\delta(g', a) = a^5$ (v) $\delta = 0.6; CP_{MS}^{NF}\delta(g', a) = a^3$ and (vi) $\delta = 0.8; CP_{MS}^{NF}\delta(g', a) = a$

Perception: The Neuro fuzzy chromatic polynomial relies upon the upsides of δ, which implies the Neuro fuzzy chromatic polynomial shifts for a similar Neuro fuzzy chart g'_{Novel} for various upsides of δ.

For the fuzzy diagram g'_{Novel} in Example 1, the fuzzy chromatic polynomial changes for various upsides of δ as demonstrated beneath:

$$CP_{MS}^{NF}\,\delta(g',a)=\begin{cases} a(a-1)(a-2)(a-3)(a-4), & \delta=0 \\ a(a-1)(a-2)^3, & \delta=0.2 \\ a^2(a-1)^3, & \delta=0.3 \\ a^5, & \delta=0.4 \\ a^3, & \delta=0.6 \\ a, & \delta=0.8 \end{cases}$$

The relations between the δ - cut diagram of a FIS chart and the worth of $\delta=0$, the Neuro fluffy chromatic polynomial of a FIS diagram, and the chromatic polynomial of comparing total FIS diagram can be resolved underneath.

Theorem 3.2.1: Let g'_{Novel}be a fuzzy diagram with n vertices and $g'_{Novel}\delta$ be δ - cut of g'_{Novel} . At that point assuming $\delta=0$, $g'_{Novel}\delta$ is a finished FIS diagram with z vertices.

Affirmation: Let $g'_{Novel}=(ver,\omega,\eta)$be a FIS diagram with z vertices and $\delta=0$. Presently $g'_0=(ver_0,ed_0)$, where $g'_0=(ver_0,ed_0)$and $ed_0=\{(\omega,\eta)|\Psi(\omega,\eta)\geq 0\}$. Here, ver_0 comprises of all the vertices in Ver of g'_{Novel} . Essentially, ed_0 comprises of the relative multitude of edges in ed and every one of the edges ed not in of g'_{Novel}. This shows that all the vertices in ver_0 of g'_0 are neighboring one another. In this way, g'_0 is a finished FIS chart of z vertices. This finishes the affirmation.

Theorem 3.2.2: For any FIS chart $CP_{MS}^{NF}(g')$ has a reverse $\frac{1}{CP_{NF}^{4}}(g')$ set, at that point a vertex $A\in\ddot{V}-\rho$ has a place with each converse $\frac{1}{CP_{NF}^{2}}(g')$ arrangement of $CP_{MS}^{NF}(g')$ if a has either a few neighbors.

Suggestion 2: Let $CP_{MS}^{NF}(g')=(\varphi,\alpha)$be any enemy of diagram has no disconnected vertex, on the off chance that inverse $\frac{1}{CP_{NF}^{4}}(g')$ exist $CP_{MS}^{NF}(g')$, contains at any rate four vertices.

Proof: Let do' be a bunch of $Max\frac{1}{CP_{NF}^{4}}(g')$ set of $CP_{MS}^{NF}(g')$, since $CP_{MS}^{NF}(g')$ has no separated vertex, so do' contains in any event two vertices. On the off chance that inverse $\frac{1}{CP_{NF}^{4}}(g')$ set exists $ver-do$, contains $\frac{1}{CP_{NF}^{4}}(g')$ set concerning do' . Along these lines $ver-do$ has at any rate two vertices. Henceforth, the outcome is gotten.

Presently we present the calculation which tracks down a reverse 4 edge overwhelming set for some random FIS chart.

<u>Algorithm 1:</u>

Let g'_{best} be the given FIS diagram. What's more, let do' be the base edge overwhelming arrangement of g'_{best}.

Stage 1:
Address the line and section of matrix $M = \lfloor m_{xy} \rfloor$, by the edges $ed_1, ed_2, ed_3, ..., ed_z$ of g'_{best}.
Stage 2: We characterize the matrix $M = \lfloor m_{xy} \rfloor$ as follows:

$$m_{xx} = \begin{cases} 1, & if \;\; a_x \;\; is\, a \;\; strong\; arc, \\ 0, & if \;\; a_x \;\; is\; not\, a \;\; strong\; arc \end{cases}$$

and

$$m_{xy} = \begin{cases} 1, \;\; if \;\; a_x \in n_{se}(a_y), \\ \quad 0, \;\; otherwise \end{cases} \quad x \neq y$$

Stage 3: Now erase the relating columns of the multitude of edges in do', we get the matrix M'.
Stage 4: In the matrix M', on the off chance that every segment has in any event one '1' section, g'_{best} has an inverse 4 edge overwhelming set regarding do'.
if not g'_{best}, doesn't have a reverse 4 edge ruling set regarding do'.

Theorem 3.2.3: Let $g'_{NF} = (\varphi, \alpha)$ be a Neuro FIS chart. At that point do' be inverse $\frac{1}{CP_{NF}^4}$ set g'_{NF} to such an extent that $|do'| = \frac{1}{CP_{NF}^4}$ is negligible if for every vertex $a \in do'$, either [17],

1. $N(a) \cap do' < \frac{1}{4}$ or

2. There exists a vertex $b \in Ver - do'$ such that $N(b) \cap do' < \frac{1}{4}$ and $b \in N(b)$.

Proof: Let do' be an inverse $\frac{1}{CP_{NF}^4}$ set of g'_{NF} such an extent that $|do'| = \frac{1}{CP_{NF}^4}$.
Expect that the above conditions are not holds, for example there exist $a \in do'$ with the end goal that $N(a) \cap do' \geq \frac{1}{4}$ and for every vertex $b \in Ver - do'$ either or $N(b) \cap do' > \frac{1}{4}$. Consider $a = do' - \{a\}$, since a has at any rate two neigphbors do' in Thus X is inverse set of $\frac{1}{CP_{NF}^4}$, which inconsistency with negligibility do'.

Conversely: On the other hand: Let do' be a reverse $\frac{1}{CP_{NF}^4}$ arrangement of g'_{NF} fulfilling the conditions (1) and (2).Consider $X = do' - \{a\}$ for any vertex $a \in do'$ If condition (1) holds at that point X isn't inverse $\frac{1}{CP_{NF}^4}$ set, and assuming (2) holds X has one neighbor of b .at that point b isn't inverse $\frac{1}{CP_{NF}^4}$ set. Henceforth, do' is negligible reverse $\frac{1}{CP_{NF}^4}$ arrangement of g'_{NF}.

4. Conclusion

In this paper, the idea of Adaptive Neuro Fuzzy chromatic polynomial of FIS diagram with participation and fuzzy vertex sets is presented. The Adaptive Neuro Fuzzy chromatic polynomial of FIS diagram is characterized dependent on δ- cuts of the FIS chart. Here consider about the properties of the outer-independent domination. We show limits relating the proposed inverse-4 edge ruling set and inverse-4 edge control number of the Neuro FIS graph g' are characterized and a few outcomes dependent on inverse-4 edge mastery number are additionally given. The proposed Neuro FIS charts without inverse-4 edge mastery number are additionally given. The given calculation works quicker than some other calculation for discovering reverse 4 edge overwhelming set. The outcomes halfway answer hypothesis 1 and 2 proposed by this work individually.

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