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APPLICATION OF EDGE COLORING OF A FUZZY GRAPH

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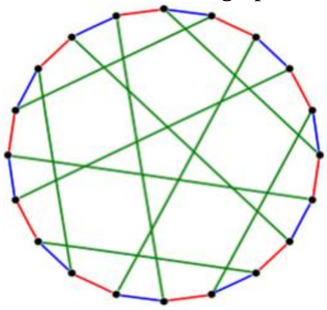
Introduction:

The construction of the time table for education institus & other wish organizations is a rich area of research with strong links to graph theory, especially to node - and edge colouring, bipartite matching, network flow problem diagrams. If significant amount of recent research has developed powerful hybrids of graph colouring meta - heuristic method. A purpose of was section is to demonstrate how graph theory play a pivotal roles in time tabling research today & to provide insight into the close relationship between graph coloring & range of time tabling problem diagrams. We concentrate on two time tabling problem Class Teacher time tabling, University course time tabling, We illustrate some of the key points that have underpinned graph-theoretical approaches to timetabling over the years.

Edge – Coloring:

In theory on graph edge-coloring method of graph was a colors can be edges of the graph view that no 2-adjacent edges has the equal colors. The figures is following view on edge - coloring of a graph by drew the colors Blue, Green, Red. Edge-coloring are one otherwise on graph - coloring.



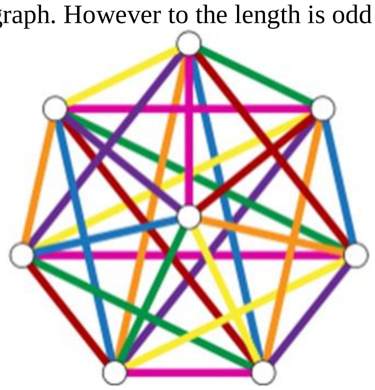
A 3-edge coloring of the Desargues graph

Chromatic Index:

The minizex required no.of colors for the edges is already viewed the graph is say to the chromatic index of the graph, $\chi'(G)$ or $\chi_1(G)$. The edges of the graph this should be the colored by 3-colors but cannot be coloring by 2-colors and the cycle graph viewed has Chromatic Index of the line 3-colors.

Examples:

If the cycle graph may be its edges colored and 3-colors in the length of the cycle are equal. Simple altment the 3-colors around the cycle graph. However to the length is odd and 3-colors is needed.



Theorem 1:

If fuzzy graph G a fuzzy bipartite iff it have no strong cycle of odd length.

Proof:

Given be fuzzy bipartite graph and fuzzy bipartition V1& V2. They are contains a strong cycle graph of odd length, tells somthing u1, u2, u3,........,un, u1 from some odd n.

Without loss of generality, given u1ϵ V1. Since (ui,ui+1) was strong for i=1,2,......,n-1. And the nodes are alternatively in V1and V2, we have un and u1 ϵV1. But this implies that (un, u1) was a strong arc in V1, which are contradiction to the fact that V1 is fuzzy independent.

Conversely, assume that G have no strong cycle of odd length. If there are exists a strong path for x to y. Between always 2-nodes of G there are exists a strong path should be need can't be unique.

Otherwise, combining odd strong path & even strong path between 2-nodes would given a strong cycle of odd length, a contradiction to the assumption. Since u be a node of G. If V1 be the set of every nodes whose strong path length from u is odd and V2 be the set of every nodes is strong path length from u is even.

Then these V1 and V2 are fuzzy independent and partition V. Suppose G is a disconnected fuzzy graph, for each component, we can use the same argument to provethe proposition.

Example 1:

We illustrate the algorithm with the fuzzy graph as shown in figure the values of the nodes can be taken in any manner, which satisfies the definition of a fuzzy graph.

Step 1:

If a adjacenc matrix of the fuzzy graph in the figure-4, making all diagonal element 0 is a following.

$$\begin{array}{c|cccccc} & 1 & 2 & 3 & 4 & 5 & 6 \\ \hline 1 & 0 & .7 & 0 & .8 & .7 & .7 \\ 2 & .7 & 0 & .8 & .5 & 0 & 0 \\ 3 & 0 & .8 & 0 & .8 & 0 & .3 \\ 4 & .8 & .5 & .8 & 0 & 1 & .9 \\ 5 & .7 & 0 & 0 & 1 & 0 & .9 \\ 6 & .7 & 0 & .3 & .9 & .9 & 0 \end{array}$$

Now assume $V_1 = V_2 = \Phi$

Step 2, 3 and 4: The maximum value is 1, which is (4,5)- element of the matrix. Now mark a square around the (4,5)-element and a circle around the (5,4)- element of the matrix, as below.

$$\begin{array}{c|cccccc} & 1 & 2 & 3 & 4 & 5 & 6 \\ \hline 1 & 0 & .7 & 0 & .8 & .7 & .7 \\ 2 & .7 & 0 & .8 & .5 & 0 & 0 \\ 3 & 0 & .8 & 0 & .8 & 0 & .3 \\ 4 & .8 & .5 & .8 & 0 & 1 & .9 \\ 5 & .7 & 0 & 0 & 1 & 0 & .9 \\ 6 & .7 & 0 & .3 & .9 & .9 & 0 \end{array}$$

Let $V_1 = \{5\}\ and\ V_2 = \{4\}$.

The next maximum value is .9 corresponding to (4,6) -element of the matrix. But the node 6 has a strong neighbour in both V_1 and V_2. Hence we delete the corresponding row and column of the matrix. The next maximum is .8 and it is (2,3) - element. So, we mark a square around the (2,3) -element and a circle around the (3,2) -element of the matrix.

$$\begin{array}{c|cccccc} & 1 & 2 & 3 & 4 & 5 & 6 \\ \hline 1 & 0 & .7 & 0 & .8 & .7 & .7 \\ 2 & .7 & 0 & .8 & .5 & 0 & 0 \\ 3 & 0 & .8 & 0 & .8 & 0 & .3 \\ 4 & .8 & .5 & .8 & 0 & 1 & .9 \\ 5 & .7 & 0 & 0 & 1 & 0 & .9 \\ 6 & .7 & 0 & .3 & .9 & .9 & 0 \end{array}$$

Now, $V_1 = \{3,5\}\ and\ V_2 = \{2,4\}$. Repeating the steps, we get the following matrix, where the iteration stops,

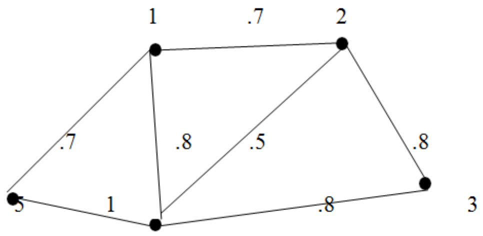


Figure shows the maximal bipartite part of the given graph and the fuzzy bipartitions are V_1={1,3,5} and V_2={2,4}. Note that the arcs (1,5) and (2,4) with weights .7 and .5 respectively are not strong arcs. In fact, this is the maximum fuzzy bipartite part with size 4.1, of the given fuzzy graph. This algorithm also test whether a given fuzzy graph is a fuzzy bipartite graph.

Conclusion:

Time table generated used to Edge coloring of a Fuzzy graph always ensures non conflicting course time table. However, it was difficult to implement certain constraints in Time table problem using edge coloring algorithm because it always starts coloring from first available color. If they are algorithm shout be modified such a way that it starts coloring the edges of a fuzzy graph by choosing the available colors randomly instead of in order, we shout be able to implement otherwise constraints too.

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