

An Interpretation of Edge Coloring with Special Reference to web MATHEMATICA

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Abstract: The concept of edge-coloring problem clearly means that we have to color all the graphical edges with the least number of colors but it should be in consideration that no two adjacent graphical edges should be given the same color. One of the most exciting new technologies for dynamic mathematics on the World Wide Web is a web Mathematica. It makes all numerics, symbolics, and graphics computing available over the web. It provides an alternative interface via the web. Even in a web environment, the front end is extremely useful. This new technology developed by Wolfram Research that allows the generation of dynamic web content with Mathematica.

Keywords: Mathematica, Dynamic, Numerics, symbolics, Interface, Content, Computing.

Introduction

The concept of edge coloring in the field of mathematics is very new and dates back to 1970's, when the two mathematicians from the University of Illinois came with a logical and authentic proof of Four Color Conjecture. The concept of edge-coloring problem clearly means that we have to color all the graphical edges with the least number of colors but it should be in consideration that no two adjacent graphical edges should be given the same color.

Mathematica is a high-level programming language, a calculator, a composite of mathematical algorithms, and a program that is more powerful than any application that has been devised for it. It is also a system developed recently for doing mathematics by computer. Combinatorica, an extension to the popular computer algebra system Mathematica, is the most comprehensive software available for educational and research applications of discrete mathematics, particularly combinatorics and graph theory. It includes functions for constructing graphs and other combinatorial objects, computing invariants of these objects, and finally displaying them. The Combinatorial user community ranges from students to engineers to researchers in mathematics, computer science, physics, economics, and the humanities. Steven Skiena has explained the uses of Mathematica in Graph Theory, and calls it a, "part of Discrete Mathematics" (27-33). It has been perhaps the most widely used software for teaching and research in discrete mathematics since its initial release in 1990. The new Combinatorica is a substantial rewrite of the original 1990 version. It is now much faster than before, and provides improved graphics and significant additional functionality. Combinatorica is included with every copy of Mathematica as Discrete Math called as "Combinatorica" (43-58) by S. Wolfram.

One of the most exciting new technologies for dynamic mathematics on the World Wide Web is a web Mathematica. It makes all numerics, symbolics, and graphics computing available over the web. It provides an alternative interface via the web. Even in a web environment, the front end is extremely useful. This new technology developed by Wolfram Research that allows the generation of dynamic web content with Mathematica. People use the existing Internet browsers such as Internet Explorer or Netscape as an interface to webMathematica and they do not need to know Mathematica to use it. There are various important features that Mathematica can offer to a web site, including computation, an interactive programming language, connectivity, the Mathematica front end, and enhanced support for MathML. webMathematica is based on a standard Java technology called servlets. Servlets are special Java programs that run on a web server machine. Typically, they run in a separate program called a servlet container, which connects to the web server. Two popular servlet containers are Tomcat and JRun. Both of them include stand-alone web servers, as well, so they can be used as total solutions themselves without requiring an external web serves such as Apache. webMathematica allows a site to deliver HTML pages that are enhanced by the addition of Mathematica commands. When a request is made for one of these pages the Mathematica commands are evaluated and the computed result is placed in the page. This is done with the standard Java templating mechanism, Java server pages (JSPs) making use of a library of tag extensions called the JSP Taglib. The aim of webMathematica and JSP technology is reduce the amount of extra knowledge required for developing a side to a minimum. The JSP scripts require some knowledge of HTML, including FORM and INPUT elements, and Mathematica but not Java nor Java Scripts.

We use some commands in the Combinatorica package with Mathematica to color the graphs and to give web-based examples with web Mathematica.

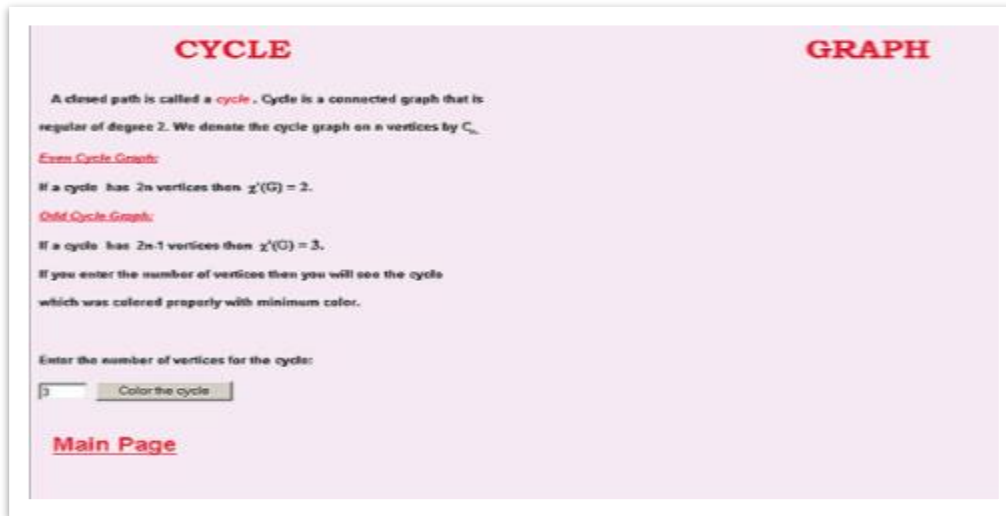


Figure 4.10: A view of the web page before running the program

So this figure exemplifies, that there exist two <INPUT> tags: among the two, one tag allows the page user to enter the vertex number in the cycle graph, and the second tag stipulates a button which when pressed will directly submit the FORM. Later when the form submission is over, the information will be sent from the INPUT elements to the uniform resource locator which is generally specified by the attributed ACTION. Thus the case delineates that the URL is the same JSP. In Mathematica session the information is directly entered by the user and a particular symbol is assigned to it in the same session. Furthermore in addition to it, the Mathlets in turn refer towards the Mathematica functions that are not used in a standard manner. Thus the example clearly states the Mathematica commands; If, ShowGraph, Edges, Table, M, Edge Coloring, Cycle, False, True, and other mathematical denotations are used by the Mathlets. The symbolic name is attributed by prepending \$\$ given the v NAME as value attribute. Here thus, MSP Value in turn gives back the variable value by default if there is existence of No value. This given example here proves the usage of the page scoped variables for the expression with MSP. Thus here MSP To Expression explains the values and retrieves the given result. MSP Show then on the server stores the input image and retrieves the necessary in the HTML format to denote the image which is clearly illustrated in Figure 4.10 and Figure 4.11) respectively. T. Wickham clarifies in his book Web Mathematica: A User Guide that, “the image by default is saved in GIF format and there is a possibility of saving the image in in other formats like jpeg, tiff, png, psd etc” (75).



Figure 4.11: A view of 2-edge colored cycle graph

But If we try to change the [n] Cycle by [n] Wheel. Complete Graph[n], Star[n] and Random Tree[n], we thus can color these graphs. In order to color the edges of complete bipartite graph (Complete K Partite Graph [n, m]), we in this process need more INPUT tag in order to retrieve the result.

When using this technique in the Edge coloring of any other graph the module Draw G sketches the meek and simple graph without shading the points that are isolated. Thus the function Draw G achieves as input edges of a graph in the mentioned list. The graph with the vertices and order n can be hailed and labelled continuously 1, 2, ... ,thus this given module should be inserted and added to the package usually called as Discrete Math`Combinatorica`. The module then becomes;

```
DrawG [elist-]: =Module [{edgelist=elist, size, vertlist, vnum},
size=Length[edgelist];
vertlist=Union[Flatten[edgelist]];
vnum=Length[vertlist];
Do[edgelist[[i]] = {edgelist[[i]], {i, size}};
vertlist=CompleteGraph[vnum] [[2]];
Graph [edgelist, vertlist
```

Here the given example sketches and draws that graph and coloring of the edges. if the vertices of the given graph be 1,2,3,4,5 with the set of edges $e = \{ \{1,2\}, \{2,3\}, \{2,5\}, \{3,4\}, \{3,5\} \}$. Then here in this function the graph can be sketched and represented by pressing the command in the function of the web mathematics application.

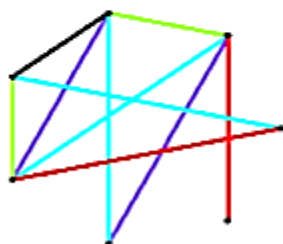
The (A) form element is a block of hypertext Mark-up Language that in the given programme may contain the essential input elements. While applying the procedure A form may be activated by giving an input command and then type submit. Here the action attribute clearly refers to a Uniform Resource Locator that accessed and while access the form is activated. The attribution method commands the browser what Hypertext Transfer Protocol method is utilized, in the given case, or a post method. Here the given example contains two input tags in which the first one permits the page user to enter in the graph the list of Edges, and the second one specifies and shows a button that, when pressed the command, will surely submit the form with ease. When the procedure of submission of form is over, it directly sends the information from already input elements to the retrieved URL clearly specified by the action attribute. Here we see that the information is easily forwarded to a Mathematica kernel and a symbol is through Mathematica symbol which is illustrated in the Figure 4.12). The symbol is denoted by \$\$ through the value of attribution called as name attribute. But it should be taken in to the consideration that when in the text field the value is entered or loaded and the <Color the graph's edges and vertices> and when the button pressed, the text field is clearly visible and displayed on the screen. U.Ufuktepe delineates with the utilization of the MSP functions and calls it,"MSPToExpression, MSPShow and MSPValue" (378).

ANY GRAPH

If you want to draw and color any graph which doesn't have to be a common graph enter the edge connections then you will see that graph drawing been colored with minimum colors. The number of the colors used in that drawing is the chromatic index of your graph.

Enter the edge connections in a sequence form as follows:

GRAPH



Now in order to color edges of the standard graphs that are wheel, tree, cycle, etc. in the complete graph format, then we need more inputs in order to retrieve and display the result. Let the user of that web selects one of the standard graphs and respectively selects the number of vertices, then in this process the user can get colored graph with ease and clarity.

Conclusion

Thus, Combinatorica package uses Brezaz's heuristic to find a best, but not essentially minimal for graph G edge coloring. Then in that process, when the user of the web enters the bulk vertices he / she might in the process get interesting and astonishing results or an error called as time out error for the edge coloring. So, we find that there emerges a link between the mathematical graphs with the web. We thus can use the web domains to complete any graphs by putting the commands in a right way. The link between mathematics and web thus clears that there emerges a relation between the web and the mathematics usually called as web Mathematica.

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