

Lab Exercise-2: Developing agent programs for real world problems

- A **toy problem** is intended to illustrate or exercise various problem solving methods. It can be given a concise, exact description.
- A **real world problem** is one whose solutions people actually care about. Such problems tend not to have a single agreed-upon description, but we can give the general flavor of their formulations.

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Graph Coloring Problem using Greedy Approach

Greedy Algorithm

- Algorithms that follow the idea that the best possible path/ answer at all intermediate steps
- Eventually results in **the answer of the overall problem**.
- Closest solution that seems to provide an optimum solution is chosen
- This idea does not work for all problems but when it is applicable, it improves the **time complexity** greatly.
- Examples
 - Kruskal's algorithm
 - Prim's algorithm for finding minimum spanning trees
 - the algorithm for finding optimum Huffman trees. in network routing as well.

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Graph Coloring Problem using Greedy Approach

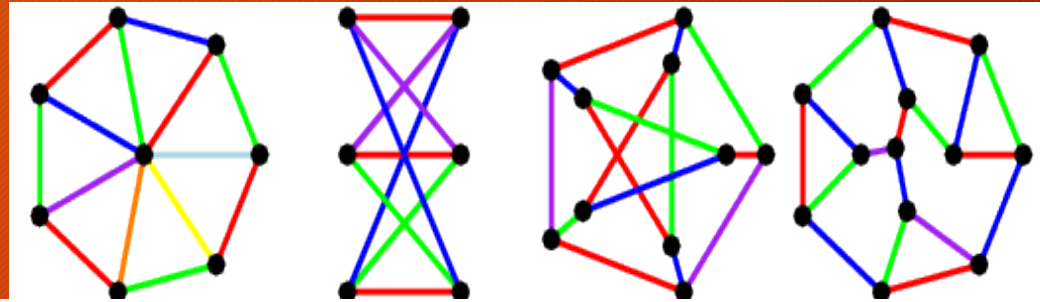
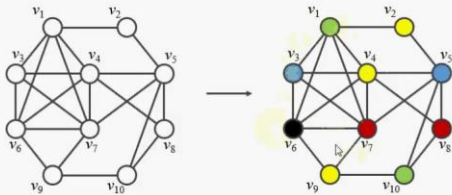
Graph coloring

- A special case of graph labeling ; it is an assignment of labels traditionally called "colors" to elements of a graph subject to certain constraints.
 - a) Vertex coloring** -It is a way of coloring the vertices of a graph such that no two adjacent vertices share the same color
 - b) Edge coloring** assigns a color to each edge so that no two adjacent edges share the same color,
 - c) Face/Map coloring** of a planar graph assigns a color to each face or region so that no two faces that share a boundary have the same color -**network routing** as well.

Graph Coloring using Greedy Approach

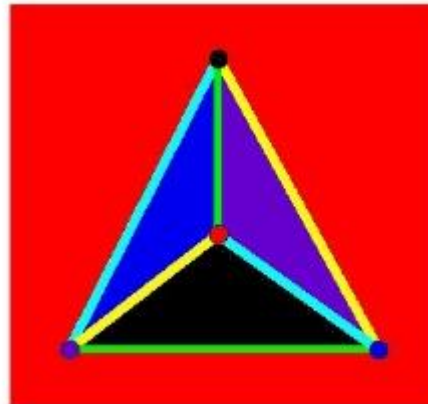
Now colour the vertices of the graph so that:

- No adjacent vertices are allocated the same colour
- The number of colours used is minimised



An edge coloring of a graph, is a coloring of the edges of such that adjacent edges (or the edges bounding different regions) receive different colors. An edge coloring containing the smallest possible number of colors for a given graph is known as a minimum edge coloring.

• Face Coloring/ Map Coloring:



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Graph coloring

- **Chromatic Number:** The smallest number of colors needed to color a graph G is called its chromatic number. For example, the following can be colored minimum 3 colors.