

AI LAB EXP – 2

DEVELOPING AGENT PROGRAMS FOR REAL WORLD

Graph Coloring Problem

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CODE: (Vertex Colouring)

```
class Graph:
    def __init__(self, edges, n):
self.adjList = [[] for _ in range(n)]
for (src, dest)
in edges:

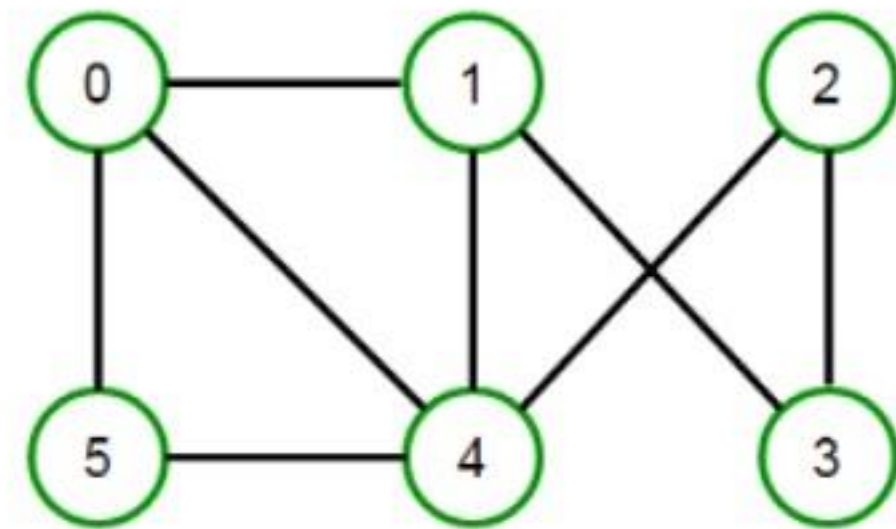
self.adjList[src].append(dest)
self.adjList[dest].append(src)

    def colorGraph(graph, n):
        result = {}
for u in range(n):
assigned = set([result.get(i) for i in
graph.adjList[u] if i in resul
t])
color = 1

        for c in assigned:
            if color != c:
break

                color = color + 1
            result[u] = color
for v in range(n):
print(f'Color assigned to vertex {v} is
'BLACK', 'BROWN', 'WHITE', 'PURPLE', 'VOILET']
edges = [(0, 1), (0, 4), (0, 5), (4, 5), (1, 4), (1,
3), (2, 3), (2, 4)] n=6
graph = Graph(edges, n)
```

Graph before Vertex Colouring:



```
Graph Coloring Exp 2
File Edit View Insert Runtime Tools Help All changes saved
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# Greedy coloring of graph
if __name__ == '__main__':
    # Add more colors for graphs with many more vertices
    colors = ["", "BLUE", "GREEN", "RED", "YELLOW", "ORANGE", "PINK",
              "BLACK", "BROWN", "WHITE", "PURPLE", "VIOLET"]

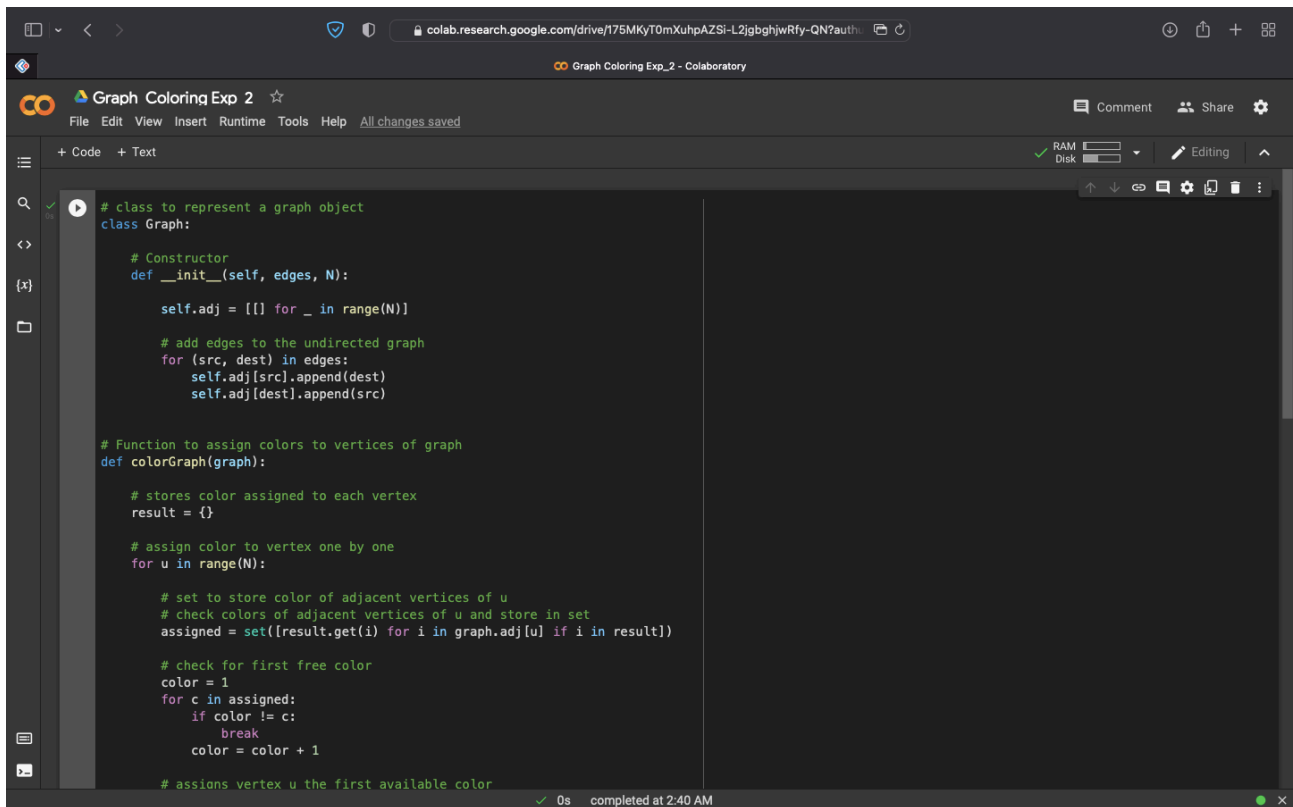
    # of graph edges as per above diagram
    edges = [(0, 1), (0, 4), (0, 5), (4, 5), (1, 4), (1, 3), (2, 3), (2, 4)]

    # Set number of vertices in the graph
    N = 6

    # create a graph from edges
    graph = Graph(edges, N)

    # color graph using greedy algorithm
    colorGraph(graph)

Color assigned to vertex 0 is BLUE
Color assigned to vertex 1 is GREEN
Color assigned to vertex 2 is BLUE
Color assigned to vertex 3 is RED
Color assigned to vertex 4 is RED
Color assigned to vertex 5 is GREEN
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```



```
# class to represent a graph object
class Graph:

    # Constructor
    def __init__(self, edges, N):

        self.adj = [[] for _ in range(N)]

        # add edges to the undirected graph
        for (src, dest) in edges:
            self.adj[src].append(dest)
            self.adj[dest].append(src)

    # Function to assign colors to vertices of graph
    def colorGraph(graph):

        # stores color assigned to each vertex
        result = {}

        # assign color to vertex one by one
        for u in range(N):

            # set to store color of adjacent vertices of u
            # check colors of adjacent vertices of u and store in set
            assigned = set([result.get(i) for i in graph.adj[u] if i in result])

            # check for first free color
            color = 1
            for c in assigned:
                if color != c:
                    break
            color = color + 1

            # assigns vertex u the first available color
```

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```
Color assigned to vertex 0 is BLUE
Color assigned to vertex 1 is GREEN
Color assigned to vertex 2 is BLUE
Color assigned to vertex 3 is RED
Color assigned to vertex 4 is RED
Color assigned to vertex 5 is GREEN
```

Graph after Vertex Colouring:

