PRACTICAL 8

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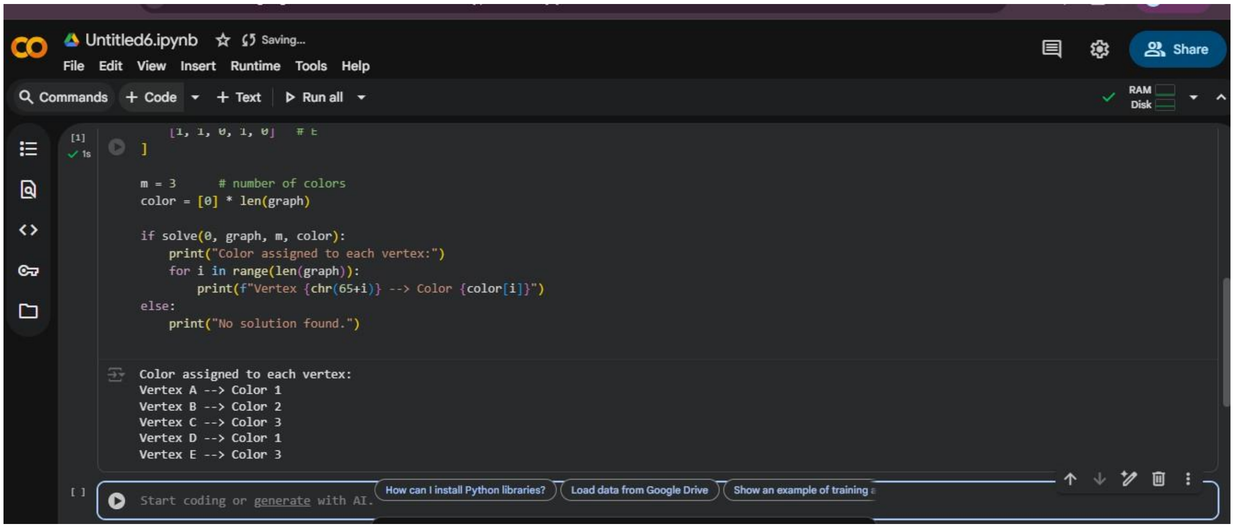
CLASS:A3 B4 60

Aim: Implement Graph Colouring algorithm use Graph colouring concept.
Problem Statement:
A GSM is a cellular network with its entire geographical range divided into hexadecimal cells. Each cell has a communication tower which connects with mobile phones within cell. Assume this GSM network operates in different frequency ranges. Allot frequencies to each cell such that no adjacent cells have same frequency range.
Consider an undirected graph G = (V, E) shown in fig. Find the colour assigned to each node using Backtracking method. Input is the adjacency matrix of a graph G(V, E), where V is the number of Vertices and E is the number of edges.

CODE:

```
def safe(node, graph, color, c):
    for i in range(len(graph)):
        if graph[node][i] == 1 and color[i] == c:
            return False
    return True

def solve(node, graph, m, color):
    if node == len(graph):
        return True

    for c in range(1, m + 1):
        if safe(node, graph, color, c):
            color[node] = c
            if solve(node + 1, graph, m, color):
                return True
            color[node] = 0
    return False

graph = [
    [0, 1, 1, 0, 1],  # A
    [1, 0, 1, 0, 1],  # B
    [1, 1, 0, 1, 0],  # C
    [0, 0, 1, 0, 1],  # D
    [1, 1, 0, 1, 0]   # E
]

m = 3      # number of colors
color = [0] * len(graph)

if solve(0, graph, m, color):
    print("Color assigned to each vertex:")
    for i in range(len(graph)):
        print(f"Vertex {chr(65+i)} --> Color {color[i]}")
else:
    print("No solution found.")
```

Output:


Untitled6.ipynb
Saving...
File
Edit
View
Insert
Runtime
Tools
Help
Share
Commands
+ Code
+ Text
Run all
RAM
Disk
[1]
1s
[ ]
Start coding or generate with AI.
How can I install Python libraries?
Load data from Google Drive
Show an example of training a

```
    [1, 1, 0, 1, 0]   # E
]

m = 3      # number of colors
color = [0] * len(graph)

if solve(0, graph, m, color):
    print("Color assigned to each vertex:")
    for i in range(len(graph)):
        print(f"Vertex {chr(65+i)} --> Color {color[i]}")
else:
    print("No solution found.")
```

```
Color assigned to each vertex:
Vertex A --> Color 1
Vertex B --> Color 2
Vertex C --> Color 3
Vertex D --> Color 1
Vertex E --> Color 3
```