ARTIFICIAL INTELLIGENCE

LAB 2

Sahil Satyam
RA1911003010675

AIM: Graph coloring problem.

PROBLEM FORMULATION:

Given a graph, colour its edges such that no two adjacent have the same color using minimum number of colours and return the chromatic number.

PROBLEM SOLVING:

graph coloring problem is to assign colors to certain elements of a graph subject to certain constraints.

Vertex coloring; given m colors, find a way of coloring the vertices of a graph such that no two adjacent vertices are coloured using the same color.

chromatic number: the smallest number of colours needed to color a graph G is called its chromatic no.

ALGORITHM:

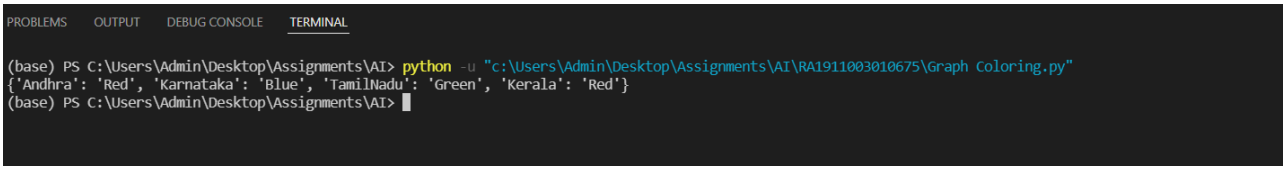
- color the first vertex with first colour.
- loop for remaining V-1 vertices:
  - consider the currently picked vertex and color it with the lowest numbered color that has not been used on any previously colored vertices adjacent to it.
  - If all previously used colors appeared on vertices adjacent to v, assign a new color to it.

- Repeat the following for all edges.
- Index of colors used is the chromatic number.

Program :

```
colors = ['Red', 'Blue', 'Green']

states = ['Andhra', 'Karnataka', 'TamilNadu', 'Kerala']

neighbors = {}
neighbors['Andhra'] = ['Karnataka', 'TamilNadu']
neighbors['Karnataka'] = ['Andhra', 'TamilNadu', 'Kerala']
neighbors['TamilNadu'] = ['Andhra', 'Karnataka', 'Kerala']
neighbors['Kerala'] = ['Karnataka', 'TamilNadu']
neighbors['Delhi'] = ['TamilNadu', 'Kerala']

colors_of_states = {}
def promising(state, color):
    for neighbor in neighbors.get(state):
        color_of_neighbor = colors_of_states.get(neighbor)
        if color_of_neighbor == color:
            return False

    return True

def get_color_for_state(state):
    for color in colors:
        if promising(state, color):
            return color
def main():
    for state in states:
        colors_of_states[state] = get_color_for_state(state)

    print(colors_of_states)
main()
```

Output:


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
(base) PS C:\Users\Admin\Desktop\Assignments\AI> python -u "c:\Users\Admin\Desktop\Assignments\AI\RA1911003010675\Graph Coloring.py"
{'Andhra': 'Red', 'Karnataka': 'Blue', 'TamilNadu': 'Green', 'Kerala': 'Red'}
(base) PS C:\Users\Admin\Desktop\Assignments\AI>