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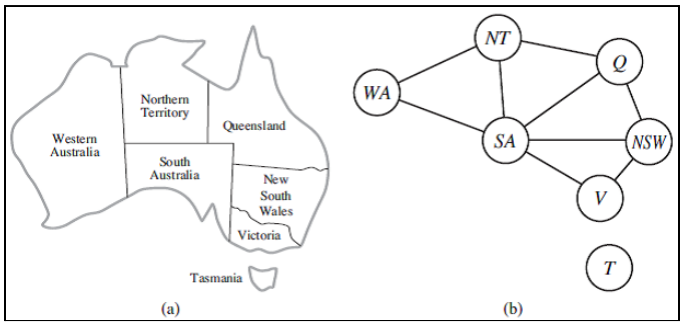
Batch-D2

Lab-2 Map-Colouring Problem (CSP)

Problem : To color the regions of the given map such that no two adjacent states have the same color. The states are the variables and the colors are the domains.



We will convert this CSP to a graph coloring problem. Depth first search is apt as the path by which solution should be reached is irrelevant.

Source Code:

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

states = ['wa', 'nt', 'sa', 'q', 'nsw', 'v']

neighbors = {}                          #adjacent pairing neighbors of different states
neighbors['wa'] = ['nt', 'sa']
neighbors['nt'] = ['wa', 'sa', 'q']
neighbors['sa'] = ['wa', 'nt', 'q', 'nsw', 'v']
neighbors['q'] = ['nt', 'sa', 'snw']
neighbors['nsw'] = ['q', 'sa', 'v']
neighbors['v'] = ['sa', 'nsw']


colors_of_states = {}
```

```
def promising(state, color):     #function to check a promising color - returns a promising color
  for neighbor in neighbors.get(state):
    color_of_neighbor = colors_of_states.get(neighbor)
    if color_of_neighbor == color:     #same color (of neighbor and state) -> rejected
      return False

  return True                  #if not same -> color accepted


def get_color_for_state(state):    #promising color is assigned to the 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()
```

Result :

```
{'wa': 'Red', 'nt': 'Blue', 'sa': 'Green', 'q': 'Red', 'nsw': 'Blue', 'v': 'Red'}
```

Output Screenshot