**CSC-462 ARTIFICIAL INTELLIGENCE**

**LAB 04**

**Graph Theory and Path Searches in Python**

**Manaal Waseem**

**FA18-BCE-074**

**BCE-7B**

**Activities:**

**Activity 1:**

Consider a toy problem that can be represented as a following graph. How would you represent this graph in python?

Change initial state to D and set goal state as C. What will be resulting path of BFS search?

Text

Description automatically generated

Text

Description automatically generated

Text

Description automatically generated

In this lab task, we were to implement BFS on graphs or trees to find the goal state. The algorithm’s action sequence works in a way that it starts from the child state. It checks whether the child state has a parent state or not if not the child state is appended into the frontier state, else ‘yes’ the child state is appended to the explored array and the parent node becomes the current node. Now the algorithm checks whether the current node is the required goal state or not. If yes it is appended to explored else the program goes to the parent node of the previous parent node. The solution is reversed in the order from parent to child and then is displayed. In this lab we performed BFS , it takes initial as current node and checks its child if it has child and is not in the explored and frontier list it takes current node as parent node and checks whether child node is goal state or not. If yes action sequence takes place else it places it in the frontier lists. Now it pops the 0th element of the frontier and places it as current node and repeats the process until the child state is the goal state.

**Post Activities:**

Imagine going from Arad to Bucharest in the following map. Implement a BFS to find the corresponding path.

Text

Description automatically generated

Text

Description automatically generated

In this post lab task, we are to go from Arad to Bucharest. The program is not providing optimal solution. It uses breadth first search to reach Bucharest.

**Critical Analysis:**

This lab was to get an introduction on python language. In this lab we implemented breadth first analysis on graphs. In breadth first search the nodes are searched in form of levels of the node. Example, the root or parent node would be checked (the first level), then the level 2 nodes would be checked then third level nodes and so on until goal node is reached.