School of Computer Science Engineering and Technology
Assignment-02

Course- B.Tech
Type- Core
Code-23CS301PC206
Course Name- Artificial Intelligence & Machine Learning
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Semester- Even, **Instructor:** Prof. E.L.N. Kiran
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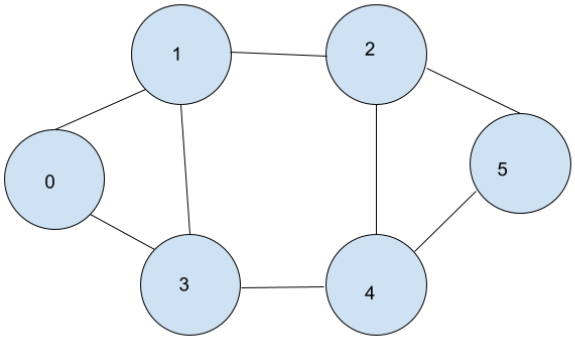
Batch- AIML-All Sections

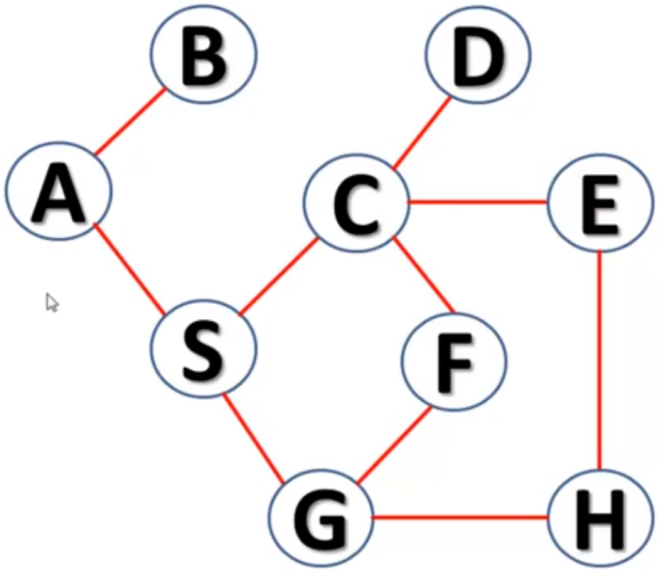
Lab Exercise - Implement Breadth First, Depth First and A* Search Algorithms

Part 1 – Implement Breadth First Search Algorithm using a Queue. [C02]



1. Given a graph with adjacency list and a starting vertex and we have to traverse the graph.
2. We will first print the value in the starting vertex,
3. Continue to print the value of neighbors of the starting vertex and
4. Next move on to the next level after completing the current level till all the vertices of the graph are printed.

Part 2 – Implement Depth First Search Algorithm using a Stack. [CO3]



DFS Stack implementations steps to be followed:

1. Start at the root node and push it onto the stack.
2. Check for any adjacent nodes of the tree and select one node.
3. Traverse the entire branch of the selected node and push all the nodes into the stack.
4. Upon reaching the end of a branch (no more adjacent nodes) ie nth leaf node, move back by a single step and look for adjacent nodes of the n-1th node.
5. If there are adjacent nodes for the n-1th node, traverse those branches and push nodes onto the stack.

Part 3 – Implement A* Algorithm using Numpy. [CO4]

1. A*Algorithm (pronounced as A-star) is a combination of 'branch and bound search algorithm' and 'best search algorithm' combined with the dynamic programming principle.
2. The A* Algorithm is well-known because it is used for locating path and graph traversals.
3. This algorithm is used in numerous online maps and games.
4. It uses a heuristic or evaluation function usually denoted by f(X) to determine the order in which the search visits nodes in the tree.

5. The heuristic function for a node N is defined as follows:

$$f(x) = g(x) + h(x) \tag{1}$$

where g(x) is the actual cost estimate, h(x) is the heuristic cost estimate for the gives

INITIAL STATE

FINAL STATE

states of the 8-puzzle problem.