Advanced Analysis of Algorithms – COMS3005A
Laboratory 2
AI Searching Approaches

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1 Aim

This laboratory covers uninformed search and informed search. The aim of the laboratory is for the students to gain a better understanding of the approaches by implementing and running them on some test data.

2 Questions

1. Implement the breadth first search algorithm (the tree search version) as per the lecture slides. Or use the Python implementation that was uploaded on the course Moodle site.

   Then use the search tree in Figure 1 as input to your program. Use different nodes as the *goal* node.

   Note: I do not mind what programming lanaguage you implement the search in. The point is to understand the approach. I don't even mind if you download and run code that someone else has written but you must make sure you understand the code and the algorithm. This understanding will potentially be assessed in the class test and the final examination.
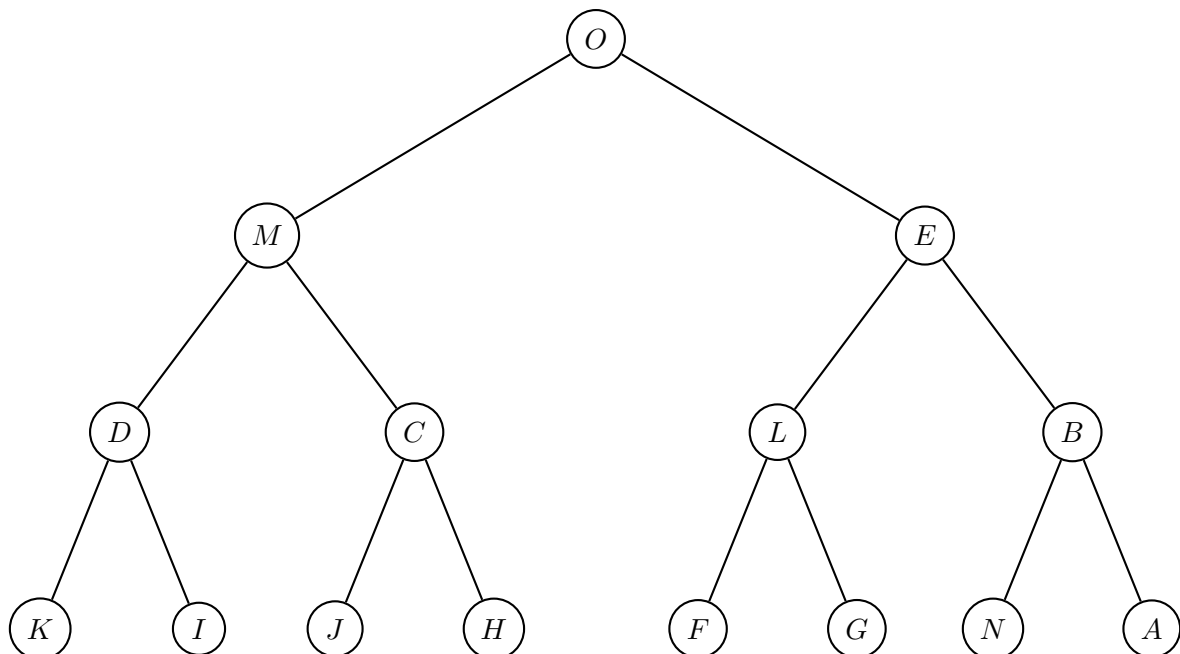

Figure 1: Search Tree

2. Repeat question 1 using depth first search. Again you can do your own implementation or you can use the provided one.

3. Now use the BFS and DFS graph search approaches to search the graph in Figure 2. Use different nodes as the goal node.
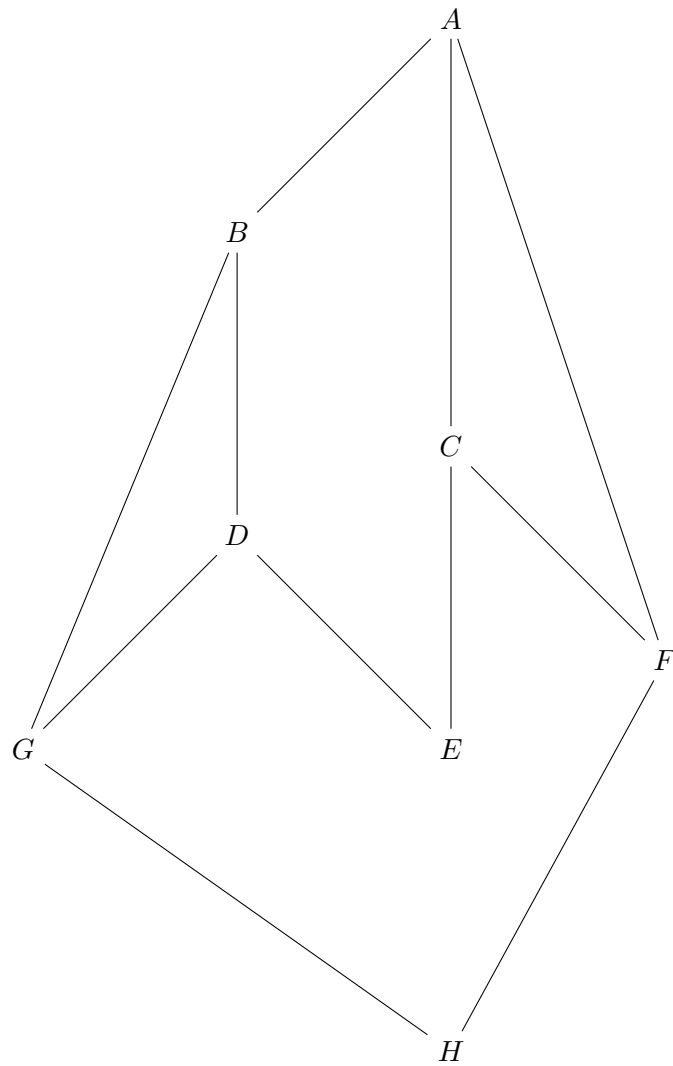

Figure 2: Search Graph

4. Implement the Uniform Cost Search method and test it on the graph in Figure 3. Try using different goal states.
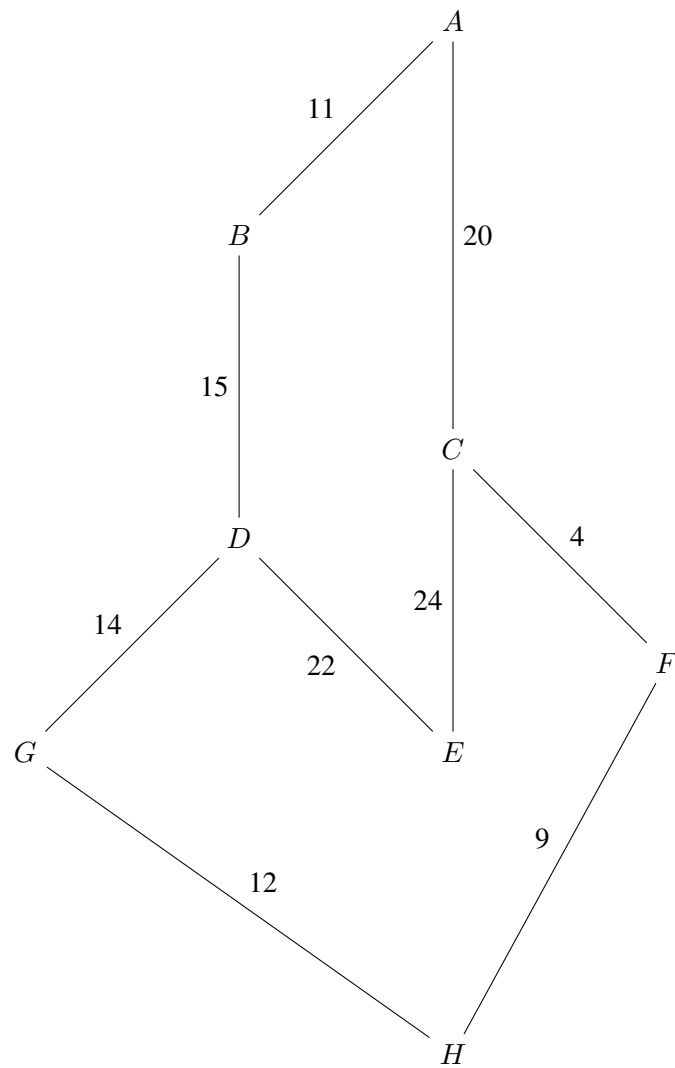

Figure 3: Search Graph (Uniform Cost Search (UCS))

5. Implement A* search and and test it on the graph in Figure 4. Use A as the start and H as the goal states.
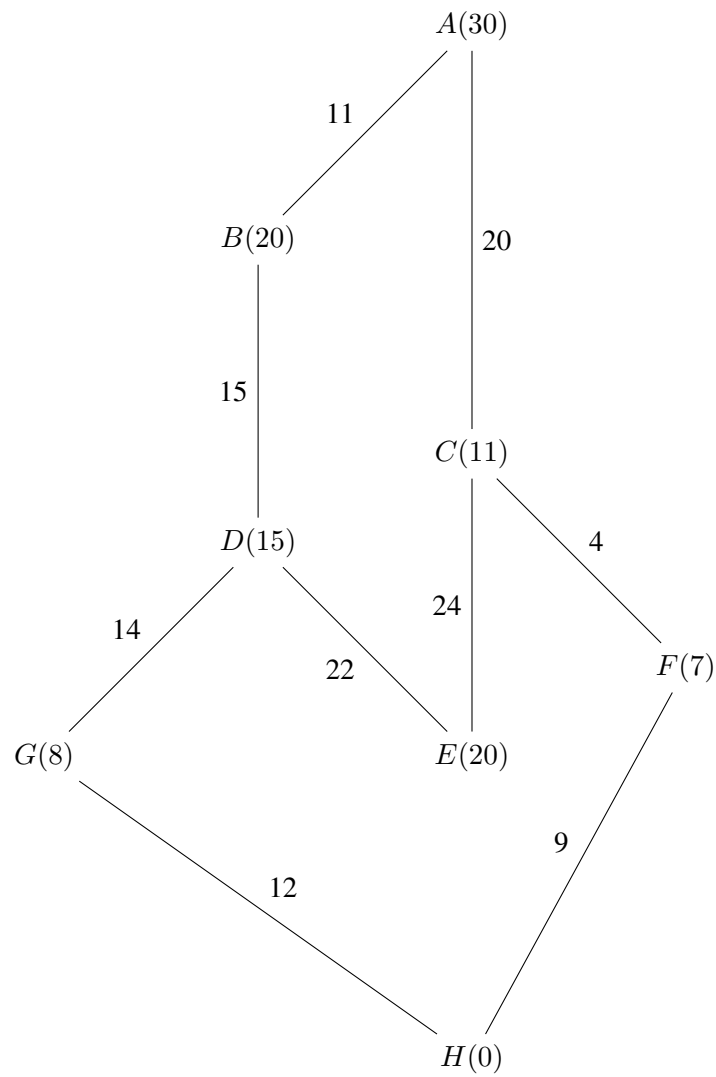

Figure 4: Search Graph (UCS)

Change the heuristic values $(h(n))$ for the nodes in the graph and see what effect that has on the search.