CS561/571 - Executive Assignment

ASSIGNMENT-2: Uniform Cost Search and Iterative Deepening Search

Date: August 21, 2023 **Deadline:August 27, 2023**

Total Credit: 30

- Markings will be based on the correctness and soundness of the outputs.
- Marks will be deducted in case of plagiarism.
- Proper indentation and appropriate comments are mandatory.
- *All code needs to be submitted in '.py' format.* Even if you code it in '.IPYNB' format, download it in '.py' format and then submit
- You should zip all the required files and name the zip file as:
    - <roll_no>_assignment_<#>.zip, eg. 1501cs11_assignment_01.zip.
- Upload your assignment (the zip file) in the following link: https://www.dropbox.com/request/O6LuL9TIbLNeGPj16E4G
- **Note: Do not send your zip files to us in email**

Problem Statement:

- The assignment targets to implement Uniform Cost Search and Iterative Deepening Search for 8-puzzle problem

Question:

The task is to check if we can reach from any random start grid to the mentioned target grid by moving the Blank space ('B').
In one step, the Blank space can move either top or down or left or right.

Input:

Generate a random grid of 3x3 shape containing numbers from 1 to 8 and a blank space.

A sample grid is as follows:

3 2 1
4 5 6
8 7 B

The target grid is fixed.

1 2 3
4 5 6
7 8 B

1. Write a program for find the goal state from the given starting state using Uniform Cost Search (UCS) and Iterative Deepening Search (IDS)
2. Assume the cost of the edge between any two nodes at a given level are identical and equal to 1 (eg., the cost of edge between node at level n and node at level n+1 is 1 but the cost of edge between node at level n and n+2 is 2 as the node at level n+2 can be reached by traversing nodes at n+ level)
3. Compare the UCS and IDS with BFS and DFS (from Assignment-1). Report the no. of steps each algorithm took to reach the goal node and which algorithm is optimal.

Documents to submit:

- Model code
- Write a report (doc or pdf format) on how you are solving the problems as well as the discussion on optimality of the algorithms.

For any queries regarding this assignment, contact:

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