CS561 - ARTIFICIAL INTELLIGENCE LAB

ASSIGNMENT-1: A* Search, BFS

(Read all the instructions carefully & adhere to them.)

Date: 17th August, 2021 **Deadline: 25th August, 2021**

Total Credit: 20

Instructions:

1. The assignment should be completed and uploaded by **25th Aug, 2021, 11:59 PM IST.**
2. Markings will be based on the correctness and soundness of the outputs. Marks will be deducted in case of plagiarism.
3. Proper indentation and appropriate comments are mandatory.
4. You should zip all the required files and name the zip file as: **roll_no_of_all_group_members .zip , eg. 1501cs11_1201cs03_1621cs05.zip.**
5. Upload your assignment (**the zip file**) in the following link: https://www.dropbox.com/request/Y0coc2FIkltk1d43PBh1

For any queries regarding this assignment you can contact:
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Questions

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1. In a Best First Search algorithm each state (n) maintains a function

   a. f(n) = h(n)

   In an A* search algorithm each state (n) maintains a function

   b. f(n) = g(n) + h(n)

   where

g(n) is the least cost from source state to state n found so far and

h(n) is the estimated cost of the optimal path from state n to the goal state. Implement Best First Search and A* search algorithm for solving the 8-puzzle problem with the following assumptions.

A. $g(n)$ = least cost from source state to current state so far.

B. Heuristics

a. $h_1(n)$ = number of tiles displaced from their destined position.

b. $h_2(n)$ = sum of Manhattan distance of each tile from the goal position.

Instructions:

1. Input is given in a file in the following format. Read the input and store the information in a matrix. Configuration of the start state and the goal state can be anything. For example given below T1, T2, …,T8 are tile numbers and B is blank space.

Start state		
T6	T7	T3
T8	T4	T2
T1	B	T5

Goal state		
T1	T2	T3
T4	T5	T6
T7	T8	B

2. Output should have the following information:

a. On success:

i. Success Message
ii. Start State / Goal State
iii. Total number of states explored
iv. Total number of states to optimal path
v. Optimal Path
vi. Optimal Path Cost
vii. Time taken for execution

b. On failure:

i. Failure Message

ii. Start State / Goal State

iii. Total number of states explored before termination

3. Compare and contrast between the results of the two algorithms (i.e. BFS and A*) for the two heuristics as mentioned above, and state the reasons in a document file '*Why one search technique is better than the other one?'*. While explaining, please comment on the optimality, time complexity etc.