End Semester Examination

Course Name: Artificial Intelligence **Code:** CS 571/561

Marks: 20 **Duration:** Nov 24, 10:00-Nov 25, 9:30

Make reasonable assumptions as and whenever necessary. Carefully read the instructions circulated in the group on Nov 23, 2021.

Q1. (a). Assignment **15 points**

A local search algorithm tries to find the optimal solution by exploring the states in the local region. Hill climbing is a local search technique which always looks for a better solution in its neighborhood.

a. Implement Hill Climbing Search Algorithm for solving the 8-puzzle problem. Your start state can be anything and the goal state will be

{123;456;78B}, where B is blank tile.

b. **Input:** Input should be taken from an input file and processed as a matrix.

c. **Output**: All the following results should be stored in an output file (*for each of the heuristics as mentioned in d*)

i. The success or failure message

ii. Heuristics chosen, Start state and Goal state

iii. (Sub)Optimal Path (on success)

iv. Total number of states explored

v. Total amount of time taken

d. **Heuristics to be checked**:

i. h1 (n)= Number of displaced titles

ii. h2 (n)= Total Manhattan distance

e. **Constraints to be checked**:

i. Check whether the heuristics are admissible

ii. What happens if we make a new heuristics h3(n)= h1 (n) + h2 (n)?

iii. What happens if you consider the blank tile as another tile? (*for each heuristics as mentioned in d*)

iv. What if the search algorithm got stuck into Local maximum? Is there any way to get out of this?

v. What happens when all the neighbours of the current state have the same value? How to get rid of this situation?

Documents to submit:

i. Codes with appropriate documentation;

ii. Outputs as mentioned in (c) above for each of the heuristics referred in (d) above;

iii. Detailed outputs with proper explanations for (i)-(v) of e above.

iv. Any other explanation.

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Best of Luck