

# ARTIFICIAL INTELLIGENCE

## **ASSIGNMENT-4: Hill Climb**

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

**Date: 16 Sept 2023**

**Deadline: 1 Oct 2023**

**Total Credit: 30**

### **Instructions:**

1. The assignment should be completed and uploaded by **1 October 2023, 11:59 PM IST**.
2. Marking will depend 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.zip**.
5. Upload your assignment (**the zip file**) in the following link:  
<https://www.dropbox.com/request/RQgWlll91RzXFAEEr9vk>

For any queries regarding this assignment, you can contact:

Ratnesh Kumar Joshi ([ratneshkr.joshi@gmail.com](mailto:ratneshkr.joshi@gmail.com))

Ramakrishna Appicharla ([ramakrishnaappicharla@gmail.com](mailto:ramakrishnaappicharla@gmail.com))

---

### ----- Question -----

---

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 that constantly looks for a better solution in its neighborhood.

1. Implement the Hill Climbing Search Algorithm for solving the 8-puzzle problem.
2. Check the algorithm for the following heuristics:
  - a.  $h_1(n)$  = number of tiles displaced from their destined position.
  - b.  $h_2(n)$  = sum of the Manhattan distance of each tile from the goal position.

**Instructions:**

1. Take the input and store the information in a matrix. Configuration of the start state and the goal state can be anything. For example, T1, T2, ..., and T8 are tile numbers, and B is blank space.

Initial state:

T6	T7	T3
T8	T4	T2
T1	B	T5

Goal State:

T1	T2	T3
T4	T5	T6
T7	T8	B

2. The 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 the 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

[https://docs.google.com/document/d/1iYmeKc-X319tAtXuBTe2TGu\\_NdmpRqQH5-N-a6oMh7Y/edit?usp=sharing](https://docs.google.com/document/d/1iYmeKc-X319tAtXuBTe2TGu_NdmpRqQH5-N-a6oMh7Y/edit?usp=sharing)