CS250 - ARTIFICIAL INTELLIGENCE LAB

ASSIGNMENT-8: Simulated Annealing & Random Walk

Date: March 13, 2024

Total Credit: 10

- 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.

Problem Statement:

Simulated annealing (SA) is a generic probabilistic metaheuristic for the global optimization problem of applied mathematics, namely locating a good approximation to the global minimum of a given function in a large search space.

A. Implement **Simulated Annealing Search Algorithm** for solving the **8-puzzle problem**. Choose any desirable Start and Goal states.
B. **Input:** Input should be taken from an input file and processed as a matrix. Other inputs are **Temperature variable T**, heuristic function, neighborhood generating function, a probability function to decide state change, and a cooling function.
C. **Output:** All the following results should be stored in an output file:
    a. The success or failure message,
    b. Heuristics chosen, Temperature chosen, cooling function chosen, Start state, and Goal state.
    c. (Sub)Optimal Path (on success),
    d. Total number of states explored.
    e. Total amount of time taken.
    f. Check whether **Random Walk** scenario occurs
D. Heuristics to be checked:
    a. h1 (n)= Number of displaced titles.
    b. h2 (n)= Total Manhattan distance.

E. Constraints to be checked:

a. Check whether the heuristics are admissible.
b. What happens if we make a new heuristics h3 (n)= h1 (n) * h2 (n).
c. What happens if you consider the blank tile as another tile?
d. What if the search algorithm got stuck into Local optimum? Is there any way to get out of this?

For any queries regarding this assignment, contact:

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