CS561 - ARTIFICIAL INTELLIGENCE LAB

ASSIGNMENT-5: Genetic Algorithm v/s Simulated Annealing

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

Date: 26th September, 2022 **Deadline:02nd October, 2022**

Total Credit: 30

Instructions:

1. The assignment should be completed and uploaded by **02 Oct. 2022, 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/tgAgZRgFVPq6tvqsOGot

For any queries regarding this assignment you can contact:
Deeksha Varshney (deeksha.varshney2695@gmail.com) or
Gitanjali Kumari (gitanjali.singh228@gmail.com) or
Samrat Mukherjeee (samratpisv123@gmail.com)

Questions

Genetic Algorithm:

Solve the 8 puzzle problem using a genetic algorithm. Start state (Can take any random order of numbers with B denoting a blank)

An Example:

Start state:

5	B	8
4	2	1
7	3	6

Goal State (Fixed):

5	B	8
4	2	1
7	3	6

Please use the following details as specifications for the implementations:

1) Initial Population (assume to be 10)
2) Selection (use **Roulette Wheel Selection**)
3) Crossover (high probability value to be chosen, usually above 0.6)
4) Mutation (low probability value to be chosen, usually below 0.2)
5) Fitness function:
    a) Number of misplaced tiles
    b) Manhattan distance.

Questions and instructions:

1. 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

2. Compare and contrast (with justification) the results obtained from the two different Fitness functions.
3. Compare your results obtained in the Simulated Annealing implementations (from previous assignment) with the Genetic Algorithm implementations.
    a. Take multiple examples (at least 3) of the same start state and goal state combinations and compare both algorithms.
    b. Analyze the results obtained with proper justifications.
    c. Describe your results on which algorithm performed better and why?
    d. Describe your views on what algorithm should have performed better for this particular problem and does your intuition match the results?