An-Najah National University	An-Najah National. University Master of Artificial Intelligence Special Topics: Optimization Techniques Final Project Deadline: 20-Dec-2022 Dr. Ahmed Awad	

Problem:

Back to Travelling Salesman Problem (TSP) with ***N*** cities that you have considered in Project#1 and Project#2. This project aims to conduct a comprehensive comparison between the following three optimization algorithms when they are utilized to solve the TSP problem:

I. Hill Climbing Algorithm (Implemented in Project#1).

II. Simulated Annealing Algorithm (Implemented in Project#2).

III. Genetic Algorithm (with proper selection, crossover, and mutation operators).

What is required:

1. Use the same benchmarks you have created in Project#1 and Project#23 with the sizes:

N=3, 5, 10, 15, 20, 50, 100

2. For each size, construct the topology as fully-connected unidirectional graph.
3. The distances between different cities should be provided to your program via text file.
4. Implement the GA algorithm with properly choosing the following operators:
   - **a. Initial population size.**
   - **b. Selection operator.**
   - **c. Crossover operator**
   - **d. Mutation operator.**
5. Record the runtime for each benchmark.
6. Conduct a comparison between the obtained results for GA with those obtained for hill-climbing and SA. This comparison should be done in terms of: **obtained solution, convergence, and runtime.**
7. You are required to summarize the aforementioned algorithms and the obtained results in a paper. Your paper should follow the IEEE double-column format. It should consist of the following sections:
   - a. Abstract.
   - b. Introduction (A brief summary about TSP as well as the three optimization algorithms).
   - c. Previous work (including all the literature you considered during your work).
   - d. Problem formulation.
   - e. Proposed methodology (about the three algorithms).
   - f. Experimental results and analysis.
   - g. Conclusions & Future work.
   - h. References.

Submission:

1. Your paper should be well-written and presented.
2. Submit your paper via Moodle within the deadline stated above.
3. You are required to present your work after submission. More details about presentation will be provided later.
4. No late submissions are allowed.

Good Luck