Bu-Ali Sina University – Evolutionary Computing Course

Comparative Analysis of Evolutionary Algorithm Techniques for Solving the Traveling Salesman Problem

SEMESTER I Assignmnet 3

Fall 1403 Assignment Deadline: 1403.10.10

Problem Definition

The attached file **TSPDATA.txt** contains the coordinates of 127 different cities on a map. Assuming that a direct (Euclidean) path exists between these cities, write an evolutionary algorithm to solve the traveling salesman problem (TSP). The algorithm should start from one city, pass through all cities, and return to the starting point while minimizing the total distance. Finally, report the best route and its distance, as well as the number of iterations the algorithm required to achieve this solution.

Write a report for this task and repeat it using two crossover methods (Edge Recombination and PMX) and two mutation methods (Swap and Insert). Additionally, use two different selection methods for the next generation: Roulette Wheel proportional to fitness and Linear Rank. This will result in 8 different scenarios. Compare the results and determine which methods yield better outcomes. The comparisons should be based on results achieved within a fixed number of iterations, e.g., 1000 iterations. In other words, evaluate which combination achieves the best result in n iterations. The remaining parameters are left to your discretion.

Note that you are free to use any programming language.