APL 6

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October 2023

1 Introduction

The travelling salesman problem was attacked using the technique of Simulated Annealing. Exponential cooling was used, and the move function is swapping the order of two consecutive cities. The simulation runs from $T=10^7$*initial distance to $T=0.0001$* initial distance, with $T(n+1)=0.9999$*Tn. Simulated annealing was chosen as the problem is non polynomial time and any deterministic solution will take too much time to run for a large number of cities.

2 How To Run

The python code and the input file "tsp40.txt" have to be saved in the same folder. Then the python code tsp.py has to be run. This will generate 2 plots, the first will display a scatter plot of the distance on the nth iteration along with the best distance found till that point, the second will display the optimum solution found. Both will be stored in the same folder as the code. The best distance found will also be printed to console. The function "tsp" asked for in the problem statement is also present in the code. On running on my system, the full code takes on average 7s to run.

3 Sample Output

Source of data: tsp40.txt from moodle

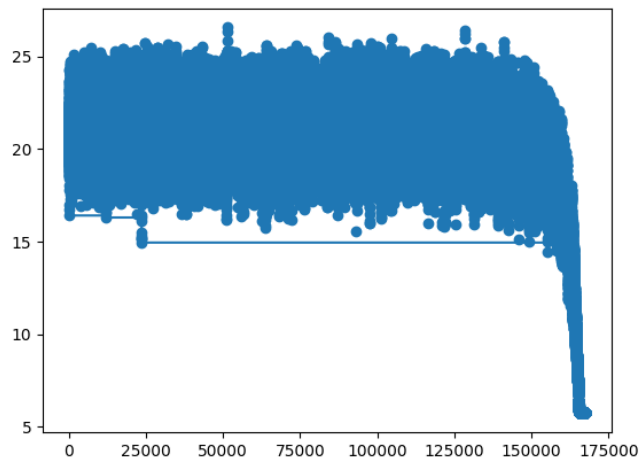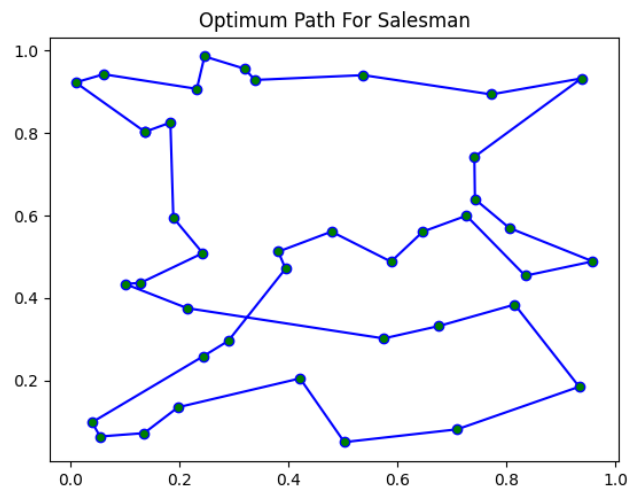The best distance found to visit all cities is 5.75, with a 72 percent improvement over the initial guess.

Figure 1: Distance vs Iteration

Figure 2: Best path found