EE527: Programming Assignments

TSP-SS-PSO

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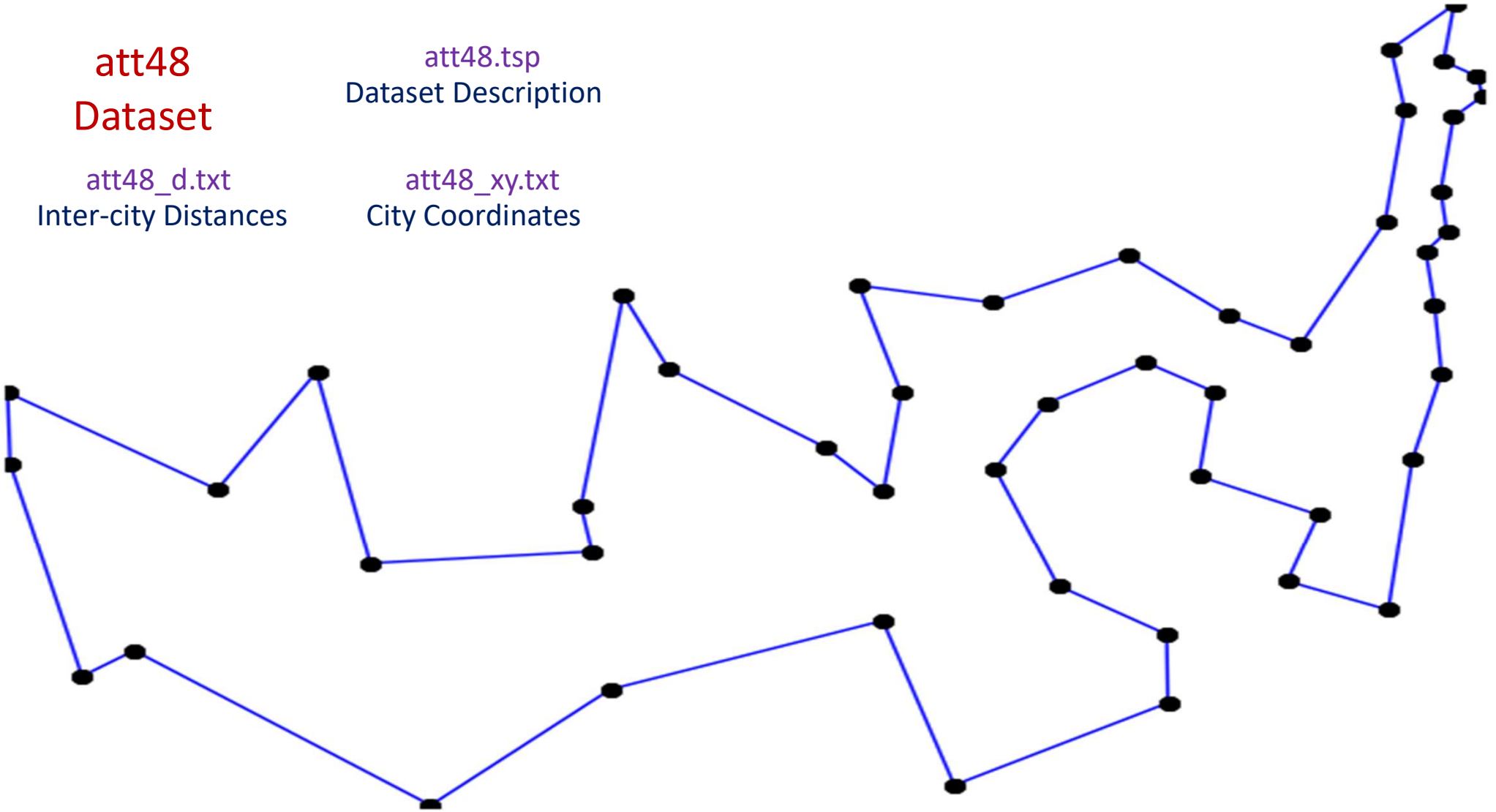
att48 Dataset

att48.tsp
Dataset Description

att48_d.txt
Inter-city Distances

att48_xy.txt
City Coordinates



TSP Solution using Stochastic Search

Consider the 48 city problem described by the *att48.tsp* dataset. Consider a Tour starting from city 1 and ending at city 1. Search for an appropriate travel itinerary involving visits to all the remaining 47 cities in a certain sequence while minimizing the total tour length. Solve this problem using stochastic search. Choose appropriate stochastic search parameters. (a) Plot the algorithm progress i.e. best distance value in each iteration. (b) Plot the best tour (path connecting city sequence) obtained after each K (user choice for plotting) iterations.

Maximization using PSO

$$f(x,y) = 1.7exp\left[-\left\{\frac{(x-3)^2}{10}+\frac{(y-3)^2}{10}\right\}\right] + exp\left[-\left\{\frac{(x+5)^2}{8}+\frac{(y+5)^2}{8}\right\}\right] + 2exp\left[-\left\{\frac{x^2}{4}+\frac{y^2}{5}\right\}\right]$$

$$+1.5exp\left[-\left\{\frac{(x-4)^2}{18}+\frac{(y+4)^2}{16}\right\}\right] + 1.2exp\left[-\left\{\frac{(x+4)^2}{18}+\frac{(y-4)^2}{16}\right\}\right]$$

Find the maxima $maxF = f(\,bestX\,, bestY\,)$ using PSO with a solution population size of $popSize$ and $maxItr$ Iterations. The solution search space is given by the search space bounds $X_{min} = [-10, -10]^T$ and $X_{max} = [10,10]^T$. Write the following function in Python.

$$[bestX, bestY, maxF] = PSO(\,X_{min}\,, X_{max}\,, popSize\,, maxItr, psoParams)$$

Display the scatter plot of the solutions in each iteration on the contour plot of $f(x,y)$ to visualize the trajectories of the solutions in the population. Experiment with different values of PSO parameters ($psoParams$), $popSize$ and $maxItr$ and report the best solution.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Thank You