Introduction to Intelligent Systems

Assignment 1

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September 13, 2018

1 Introduction

We have been given a program which uses the Metropolis algorithm to solve the Traveling Salesperson Problem (TSP). The Metropolis algorithm gives an approximation to the solution of the TSP. In this report, we do research on the performance of the algorithm, by inspecting the means and variances of the lengths of the paths.

2 Results and Analysis

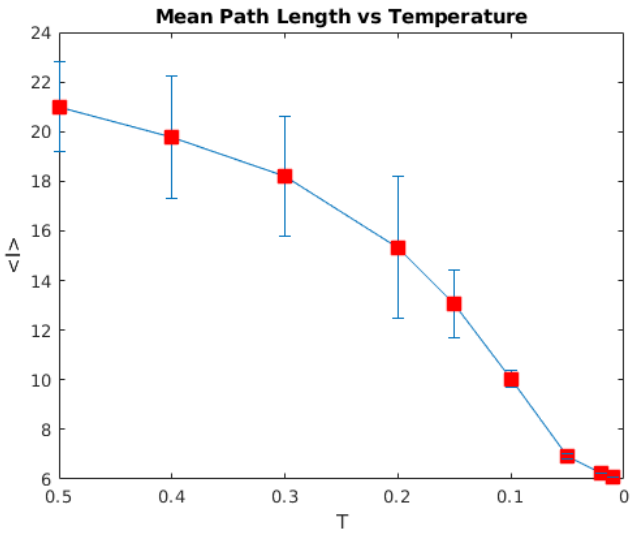

Figure 1: The mean path lengths after annealing, plotted against temperature. Each point is represented by red box and surrounded with a range that shows the variance of those path lengths.

As we can see, the lower the temperature, the lower the path length. The higher the temperature, the higher the probability to accept a path that is longer than we currently have which allows the algorithm to better avoid getting stuck in a local minimum. If you run the simulation with a relatively high temperature, you might notice that the steps the algorithm take do not make much sense, i.e. do not contribute to a shorter path. The annealing algorithm when applied requires a temperature specific to the problem being solved for optimal performance. We happened to find that for the travelling salesperson problem (TSP) that the closer to zero we tried, the more optimal the result. To conclude, we have found that the landscape for applying annealing in TSP is best suited to a temperature close to zero when the temperature is to remain constant.