Math 307 Project - The Traveling Salesman Problem.

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April 26, 2017

1 Beginning

Project: The TSP problem is defined as follows: Given a set of cities and distances between every pair of cities, find the shortest way of visiting all the cities exactly once. You can imagine the cities as nodes in a completely connected graph and distances as edge cost between the cities. This is a well known NP-Complete problem and there are many different heuristics available to obtain approximate solutions.

2 Abstract Introduction

The Traveling Salesperson (project) problem is when a person wants to travel to every city on a grid and return to the city they started their journey from without revisiting any already traversed city. The next city to travel to on the grid is logically calculated by finding the shortest distance from the current city's location to all cities on the grid. Once the city with the shortest path is determined then the salesperson travels to said city. When the salesperson traverses to the last city, they will then travel back to the starting city from the grid, as a direct path would be the shortest path instead of traveling through previous cities. The process simplified is calculating the minimum spanning tree of the grid by adding paths between cities.

3 BackGround

The Traveling Salesperson Problem (TSP) is speculated to originate in 1832 for a tour between Germany and Switzerland. TSP was later formulated by mathematicians W.R. Hamilton and Thomas Kirkman in the 1800s.TSP elevated around 1930 as one of the most thoroughly studied problems in optimization. TSP is still used for benchmarking many optimization methods being developed today. Even though the problem is computationally expensive, a large number of algorithms are known, to where instances with thousands of cities can be solved completely, the algorithms in the most extreme cases can approximate within one percent of the exact minimal spanning tree. //A complete graph Kn is a graph with N vertices and an edge between every vertice