Traveling Salesman Problem

Thomas (TJ) Davies, Luke Ogburn, Dakota Scott, Deven Smara

Traveling Salesman Problem

TSP (phrased as a decision problem):

Given a weighted graph and a starting node, is there a tour that costs than C

Optimization Version:

Problem Input

The input to this program is in the following format:

n (number of nodes in the graph)

u v w (u: outgoing node, v: incoming node, w: edge weight)

This must be a complete undirected weighted graph

Reduction

TSP can be reduced to a known NP-Hard problem, the Hamiltonian Cycle problem

Convert the graph (G) from the Hamiltonian Cycle problem into a complete graph (G’)

For each edge in G, set its weight in G’ to 1.

For each edges in G’ that are not in G set its weight to 2

Sketch of Exact Solution (pseudo-code)

Worst Case Example

Test Cases

Approximation Portion

Approximation

Sources

https://www.geeksforgeeks.org/proof-that-traveling-salesman-problem-is-np-hard/