Solutions for the Travelling Salesman Problem

Author | Ishank Juneja

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1 Introduction

The aim of TSP is to complete a tour. A tour is a path that visits all cities once and only once and comes back home.
In particular we are interested in the minimum cost sub-tour.
For example in a 5 city TSP, a tour could be 1-2-3-4-5-1. Also this tour is identical to 2-3-4-5-1-2 since the starting point is not important.
Hence a N node TSP has (n-1)! feasible solutions. The TSP forms the base case for the VRP (VRP with only one vehicle)

Hamiltonian Property of Graphs

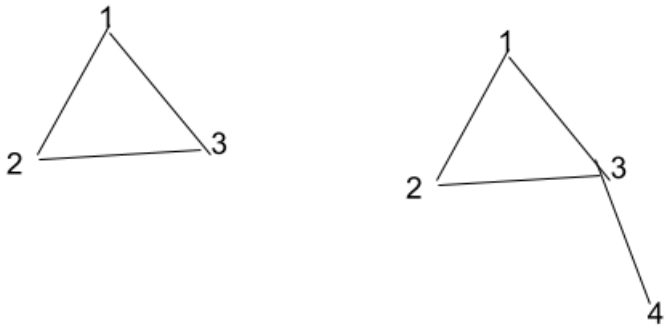

Figure 1: Left Hamiltonian and Right not Hamiltonian

A graph is Hamiltonian if it is possible to visit every node exactly once and return home. A completely connected graph is always Hamiltonian. A Hamiltonian circuit is a Hamiltonian path for a sub-set of the total nodes.
The formulation for TSP was in IP formulation notes.

2 Solving TSP

The TSP represents a class of problems that has an exponential number of constraints (The sub-tour elimination constraints).
The problem may be reformulated by introducing more variables

3 References

[1] NPTEL Lecture series : Advanced Operations Research - Prof. G Srinivasan, IIT Madras