Applications of Graph Theory and Combinatorics in Computer Science

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1 The Travelling Salesman Problem

To define the Travelling Salesman Problem , first the concept of a Hamiltonian Cycle must be defined.

Definition 1.1 (Hamiltonian Cycle) *Given a graph G(V,E), a Hamiltonian Cycle in G is a cycle in G such that* $\forall\ v \in V$*, v is in the cycle and is visited only once . A graph that contains a Hamiltonian cycle is called a Hamiltonian Graph [1].*

The Travelling Salesmann Problem can now be defined as follows.

Definition 1.2 (Travelling Salesman Problem) *Given simple graph G(V,E) were V is the list of vertices(cities) in G and E is the set of weighted edges between every 2 vertices of G , the problem is to find a minimum weight Hamiltonian Cycle in G [2].*

References

[1] E. Weisstein, "Hamiltonian cycle," Oct 2018. [Online]. Available: http://mathworld.wolfram.com/HamiltonianCycle.html

[2] "Travelling salesman problem — set 1 (naive and dynamic programming)," Sep 2018. [Online]. Available: https://www.geeksforgeeks.org/travelling-salesman-problem-set-1/