

Habib University- DSA Project Proposal
Instructor – Ayaz Ul Hassan Khan (L5)
Project Name – Travelling Salesperson Problem

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1 Group

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2 Project Description

The project is named after the famous NP-Hard problem, TSP or Travelling Salesperson Problem which asks:

”Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city and returns to the origin city?”

Non-deterministic polynomial-time hardness, in computational complexity theory, is the defining property of a class of problems that are, informally, ”at least as hard as the hardest problems in NP”. The specific problem commonly encountered when solving TSP is that most algorithms made for solving it have complexity $O(n!)$, which takes up massive amounts of time and space to solve.

The Algorithm used will be a brute force approach, applying recursion for the path finding process, and storing shortest sub-paths to achieve the most ideal route. The overall outcome is expected to consume a large amount of memory, but will have a time complexity more efficient than the usual factorial type methods.

3 Learned DSA techniques intended to be applied

The project is primarily aimed to improve the complexity of TSP algorithm. The graph structure used will be different from the adjacency dictionary of DSA lessons, and a list structure containing edge weights will be employed. This will help sidestepping the amortized complexity of value retrieving and key creating, associated with python dictionaries.

