# Objectives: Lab 10

The purpose of this lab of BTP500 is to familiarize yourself with **NP Complete problem**.

# **Travelling Salesperson Implementation**

# Objective:

# The objective is to find the shortest route that visits each city exactly once and returns to the starting city (Toronto) while minimizing the total distance traveled.

# Write a C++ program to implement Traveling Salesperson Problem involving five cities in the vicinity of Toronto. We will represent the distances between each pair of cities in the form of a matrix:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Toronto** | **Mississauga** | **Markham** | **Brampton** | **Etobicoke** |
| **Toronto** | 0 | 25 | 30 | 20 | 35 |
| **Mississauga** | 25 | 0 | 40 | 15 | 30 |
| **Markham** | 30 | 40 | 0 | 45 | 20 |
| **Brampton** | 20 | 15 | 45 | 0 | 40 |
| **Etobicoke** | 35 | 30 | 20 | 40 | 0 |

# In this matrix:

# Each row and column represent a city.

# The values in the matrix represent the distances (in kilometers, for example) between pairs of cities.

# For instance, the distance from Toronto to Mississauga is 25 kilometers.

# This matrix serves as input data for the Traveling Salesperson Problem, where the objective is to find the shortest route that visits each city exactly once and returns to the starting city (Toronto) while minimizing the total distance traveled.

A screenshot of a computer

Description automatically generated

# **LAB 10 – SUBMISSION 2 files.**

# **1.   Word document BTP500-LAB10-NAME.DOCX filled with screenshots of listing all permutations from Toronto and selecting the shortest path among the lists.**

# **2.   BTP500-LAB10-STUDENTNAME-TSP.cpp**

Do not submit a .zip or RAR file.