CHAPTER 1
INTRODUCTION

The world needs a better way to travel, in particular it should be easy to plan an optimal route through multiple destinations. The Traveling Salesman Problem (TSP) is generally calculated in the field of Computer Science. The TSP was first defined around 150 years ago but emerged as a complex problem in the late 1940's. Even after half a decade of research, the TSP has not been completely solved and appeared as the interests of computer scientists and mathematicians [21].

The problem can be simply described as following: The travelling salesman problem requires that we find the shortest path visiting each of a given set of cities and returning to the starting point. The distance between cities is symmetric, i.e. the distance from city A to city B is the same as from B to A. Such a scenario is known as Symmetric TSP. Because this is symmetric, there are two optimal solutions since the route can be taken in either direction [21].

The number of possible unique routes is $(N\text{-}1)!/2$, which grows very fast as N increases. And this is, of course, the main issue for the routes with large number of cities. If the user would count the cost of each route, the user could end up waiting for the computer to give us a result for ages. In real life, there needs to have such routes solved in reasonable time – there are even able to relax on quality of found route, just to have a route, which converges to most optimal one [21].

The time required to find the best possible solution is essential for realistic application of the TSP. Matters like time required for lorry drivers to wait for their route are to be finalized to deliver the salads as the salads will only be fresh for another 24 hours. Time required for air traffic to keep controlling an airliner flying in circles around airport is studied in the theory of computational complication. For this area of study, the TSP has vital impact. It is of more interest and benefits to the scientific community even a small incremental pace in considering the nature of this problem. The main objective is to apply a TSP algorithm to solve real world problems, and deliver a web based application for visualizing the TSP. The TSP can be applied to crack many handy problems considered day after day. Thus, a way out