- To apply the Travelling Salesman Problem and Haversine Formula

1.2 Field Background

The Travelling Salesman Problem (TSP) is one of the most famous problems in computer science. Back in the days when the salesman travelled door-to-door hawking vacuums and encyclopedias; they had to plan their routes, from house to house or city to city.

The TSP naturally arises as a subproblem in many transportation and logistics applications, for example the problem of arranging school bus routes to pick up the children in a school district. This bus application is of important historical significance to the TSP, since it provided motivation for Merrill Flood, one of the pioneers of TSP research in the 1940s. A second TSP application from the 1940s involved the transportation of farming equipment from one location to another to test soil, leading to mathematical studies in Bengal by P. C. Mahalanobis and in Iowa by R. J. Jessen. More recent applications involve the scheduling of service calls at cable firms, the delivery of meals to homebound persons, the scheduling of stacker cranes in warehouses, the routing of trucks for parcel post pickup, and a host of others.

The Nearest Neighbor algorithm was one of the first algorithms used to find a solution for the travelling salesman problem. With this problem, the salesman starts in a random city and repeatedly visits the nearest city until all cities have been visited. It quickly finds a short tour, but usually not the best path. The nearest neighbor algorithm is very easy to put into practice and works very fast, but sometimes this algorithm can miss smaller routes which can be easily observed with human eyes, due to its "greedy" nature

Geolocation is the identification of the real-world geographic location of an object, such as a radar source, mobile phone or Internet-connected computer terminal. Geolocation may refer to the practice of assessing the location, or to the actual assessed location. Geolocation is closely related to the use of positioning systems but may be distinguished from it by a greater emphasis on determining a meaningful location (e.g. a street address) rather than just a set of geographic coordinates.

Geospatial Analysis, requirement to compute distance between two points using latitude and longitude is quite prevalent. Haversine Formula is used to calculate distance between two points on earth using latitudes and longitudes. Haversine

Formula computes great circle distance (distance as measured along the surface of earth/sphere rather than the distance through the sphere/earth).

1.3 Overview of the System

In this system, the user can choose the pagodas that the user wants to visit and can find the nearest restaurants. Moreover, the user can view the hotel lists and can search the nearest e-bike rental lists. When the user chooses the pagodas and then the system calculates the distance from the current location to the pagodas' locations using Haversine Formula.

Then, the system finds the shortest route using Travelling Salesman Problem based on the distance. The user can view the shortest route on a Google map. If the user finds the nearest restaurants, the system provides the five nearest restaurants on a Google map. So, the user can find the shortest route using this application. In this system, the customer can obtain a shortest route with saving time and cost.

1.4 Organization of the Thesis

In this thesis, there are four chapters.

Chapter 1 describes introduction, objectives of the thesis, field background, and overview of system.

Chapter 2 discusses initial state of the Travelling Salesman Problem (TSP), steps of the TSP, special methods of the TSP, solving the TSP using Nearest Neighbor Algorithm, about distance measure and calculates the distance using Haversine Formula.

Chapter 3 presents the design and flow of the system and implementation of the system by using the Travelling Salesman Problem and the database design.

Chapter 4 addresses the conclusions of the thesis.