Evtek 2022 Summer Computer Science Internship

Round 2 Application Assignment Report

For this assignment, I successfully implemented the method to find the shortest route in total distance of 164.174 km.

1. I implemented the function called find\_lat\_lng() to find the latitude and longitude data from each locations listed in the route.csv file, in there I used the mapquestapi to obtain the data. And saved the lat\_lng data into a new csv file in Routeplus.csv.
2. In the googlecsv.py the create\_date\_for\_google\_map() function will generate the data format that can be feed into the googlemap api from the Routeplus.csv file and save the generated data into the googleresults.csv file
3. In the googleway.py I implemented the way to calculate out the distance matrix from each location points to every other location points. Then we can get the distance matrix for all the location points. In here I used the googlemaps.distance\_matrix to generate the distance data and save the distance matrix to the googledistance.csv file.
4. Once we got the distance matrix, in the googleshortest.py file I used the routing\_enums\_pb2 and pywrapcp from ortools.constraint\_solver to find the shortest route for our ‘travelling salesman approximation’ problem. Then we got the routing patterns and the total distance of 164.174 km. And we save the route sequence into the finalroute.csv and finalrouteforjson.csv files,

Text

Description automatically generated with low confidence

1. In the finalroutevisual.py I used the googlemap.directions api to display the routes on the static map. In here the maximum number of node for googlemap api is 25, so I split the route into 3 part node1 🡪 node 24, node 24 🡪 node 46, node 46 🡪 node 55 (we have total of 55 nodes). Then we can put all the markers and routes together onto one single map, and I saved the static map into the driving\_route\_map.jpg file.
2. In the getfinalroutewaypoints.py I printed out the waypoints in the format required in index.js file and saved the three segments of waypoints into waypoints1.txt, waypoints2.txt and waypoints3.txt files.
3. Implement the index.js, sample.html and style.css files to visual our routes in a browser. You can visual the routes by open the sample.html file. And the route in browser will shown like following picture. In here I can only show 25 node at once so I split the whole routes into three separate routes. But they are connected to each other.

Starter page:

Map

Description automatically generated

By Clicking the first button will show the first part of routes:

Map

Description automatically generated

By clicking the second button, will show the second part of routes:

Map

Description automatically generated

By clicking the third button, will show the last part of the routes:

Map

Description automatically generated

In above picture the message on the right hand size under the buttons are the detail direction for the routes.

Improvements needed if have more time:

* Generate a fully usable web application
* Find a way to display the whole routes in the browser
* Provide multiple possible routes for drivers.

Code Runing Guide:

* Python3 findroutefinal.py
* Then you will see the csv files generated and driving\_route\_map.jpg will display the whole routes in a static map.
* Copy and paste the waypoints from waypoints1.txt, waypoints2.txt, waypoints3.txt into the index.js file
* Click on the sample.html to visual the map and directions on the browser.
* I have saved all the terminal output in the ‘Terminal Saved Output’ file you can check on the outputs.