Building an Easy-to-use Ride-sharing App for HK

In recent years, ride-sharing has been an alternative to public transportation or private car rental for commuters in countries around the world. It is believed that ride-sharing is a way to alleviate traffic congestion and reduce air pollution caused by vehicles. However, Hong Kong, as a world-class city which is suffering from traffic congestion, has not exploited the benefits of ride-sharing. One possible reason for this is the absence of an extensively used ride-sharing mobile application in Hong Kong up to this date.

In an effort to increase the popularity of ride-sharing in Hong Kong, this project aimed to design and implement a fully-featured handy ride sharing mobile application for Android and IOS platform and related web services which adapted matching algorithms from cutting-edge research. Two algorithms were implemented and evaluated using real-world test cases and a virtual grid world simulator in this project.

Methodology

System Architecture

Algorithm 1: Simple Greedy Algorithm

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Input:
- Requests R
- Vehicles V
- Co-ordinates Z

Output:
- Request 'r' that cannot be matched
- where R' ∉ R
- Match results M = [m1, m2, ..., mR]
- where m = (r, v)

Steps:
1. C = { (r, v) | r ∈ R, v ∈ V } 
2. Sort C in no order by distinct(eight, origin, v, location) 
3. M = { (r, v) ∈ C and satisfy 2 where r = (o, v) } 
4. R' = { v ∉ R | (r, v) ∈ M } 
5. Renew M, R'
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Algorithm 2: Dynamic Algorithm

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A Real World Case Study

Greedy Algorithm:
R1->D1

Dynamic Algorithm:
R1->D2
R3->D1
```

Technology Used

Frontend:
- React Native
- Expo

Backend:
- node
- Express
- JS
- python

Database:
- redis
- mongoDB

Screenshots of Our Mobile App

Experiments and Results

A Real World Case Study

Conclusion and Future Works

The results show that the dynamic algorithm has a better performance in general compared to the greedy algorithm. This project has created a free-of-change and usable ride-sharing app.

In the future, the mobile application can be fine-tuned to production ready and be published to iOS App Store and Android Play Store. In addition, the UI/UX of the mobile application and the time efficiency of the matching algorithm can also be improved.

References