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A Novel Method of Real Time City Scale Taxi Trip Distribution

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ABSTRACT

A taxi-sharing system that accepts taxi passengers' real-time ride requests sent from passenger and schedules proper taxis to pick up them via taxi-sharing with time, capacity, and monetary constraints.This system saves energy consumption and eases traffic congestion while enhancing the capacity of commuting by taxis.It reduces the taxi fare of taxi riders and increases the profit of taxi drivers.Taxi drivers independently determine when to join and leave the service.Passengers submit real-time ride requests using the interface.Each ride request consists of the origin and destination of the trip, time windows constraining when the passengers want to be picked up and dropped off. On receiving a new request, the system will first search for the taxi which minimizes the travel distance increased for the ride request and satisfies both the new request and the trips of existing passengers who are already assigned to the taxi, subject to time, capacity and monetary constraints.The existing passengers assigned to the taxi will be inquired whether they agree to pick up the new passenger given the possible decrease in fare and increase in travel time.With a unanimous agreement, the updated schedules will be then given to the corresponding taxi drivers and passengers.Work proposes efficient searching and scheduling algorithms.

Keyword: Taxi, Scheduling, Passengers, High Occupancy Vehicle (HOV)

I.INTRODUCTION

TAXI is an important transportation mode between public and private transportations, delivering millions of passengers to different locations in urban areas. However, taxi demands are usually much higher than the number of taxis in peak hours of major cities, resulting in that many people spend a long time on roadsides before getting a taxi. Increasing the number of taxis seems an obvious solution. But it brings some negative effects, e.g., causing additional traffic on the road surface and more energy consumption, and decreasing taxi driver's income (considering that demands of taxis would be lower than number of taxis during off-peak hours). To address this issue, we propose a taxi-sharing sys- tem that accepts taxi passengers' real-time ride requests sent from smartphones and schedules proper taxis to pick up them via taxi-sharing with time, capacity, and monetary constraints (the monetary constraints guarantee that passengers pay less and drivers earn more com- pared with no taxi-sharing is used). Our system saves energy consumption and eases traffic congestion while enhancing the capacity of commuting by taxis. Mean- while, it reduces the taxi fare of taxi riders and increases the profit of taxi drivers.

II. RELATED WORKS

In [1] author considered challenges with coordination among self-interested people aimed at minimizing the cost of transportation and the impact of travel on the environment. We present planning, optimization, and payment mechanisms that provide fair and efficient solutions to the ride share collaboration challenge. We evaluate different VCG-based payment schemes in terms of their computational efficiency, budget balance, incentive compatibility, and strategy proof. We present the behaviour and analyses provided by the ABC ridesharing prototype system. The system learns about destinations and preferences from GPS traces and calendars, and considers time, fuel, environmental, and cognitive costs.

In [2] author described efficient ridesharing solutions could help mitigate congestion. Some of the actions government agencies have taken encourage ridesharing include the availability of High Occupancy Vehicle (HOV) lanes and existing policies of discounted toll rates on HOVs. These measures encourage ridesharing by reducing costs or travel times of such trips. To study how the optimal routes change as a function of incentives for ridesharing, we modified existing pickup and delivery problems with time windows to consider changes in passenger travel time and toll cost due to vehicle load. Our computational results explore how the total route cost and time are affected by the use of HOV lanes and toll savings. In addition, our results show it is beneficial from a time and cost perspective to take detours to pick up additional passengers and use HOV lanes when the time savings on HOV lanes is significant.

In [3] author described mine smart driving directions from the historical GPS trajectories of a large number of taxis, and provide a user with the practically fastest route to a given destination at a given departure time. In our approach, we propose a time-dependent landmark graph, where a node (landmark) is a road segment frequently traversed by taxis, to model the intelligence of taxi drivers and the properties of dynamic road networks. Then, a Variance-Entropy-Based Clustering approach is devised to estimate the distribution of travel time between two landmarks in different time slots. Based on this graph, we design a two-stage routing algorithm to compute the practically fastest route. We build our system based on a real- world trajectory dataset generated by over 33,000 taxis in a period of 3 months, and evaluate the system by conducting both synthetic experiments and in evaluations.

III.PROPOSED WORK CLASS DIAGRAM

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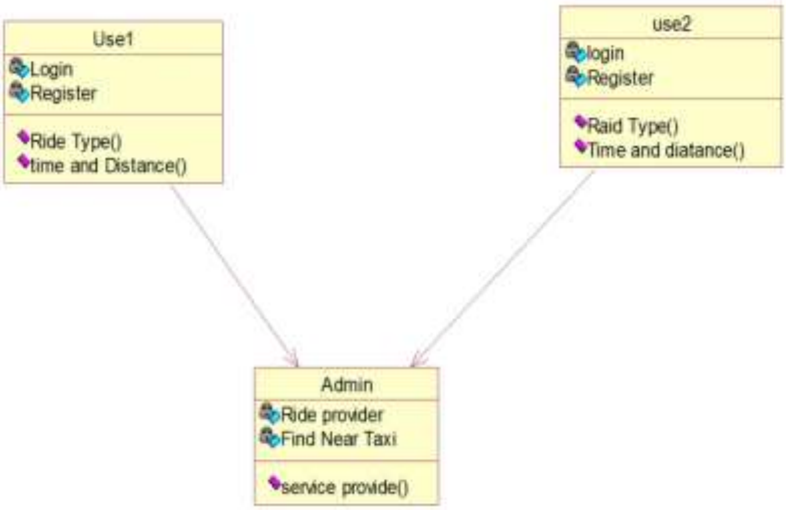

Fig1. Class diagram for proposed method

To connect with server user must give their username and password then only they can able to connect the server. If the user already exits directly can login into the server else user must register their details such as username, password, Email id,City and Country into the server. Database will create the account for the entire user to maintain upload and download rate. Name will be set as user id. Logging in is usually used to enter a specific page. It will search the query and display the query. This module is used to help the passengers to choose their needs. Here we need to select the destination where we need to go and we need to select their timings.After choosing the destination and timings the request will be forwarded to the admin. The admin only have rights to provide taxi. In this module admin is going to search the nearby taxi consider with of passengers starting point. Then admin selecting the taxi and the riding request will forward to the driver. After getting the admin request the taxi driver providing the services to the passengers. Driver needs to manage all the needs of the co-passengers.

IV. PROPOSED ALGORITHM

Single and dual side searching algorithm

- The taxi searching module quickly selects a small set of candidate taxis with the help of the spatio-temporal index.
- It partitions the road network using a grid.
- Within each grid cell, we choose the road network node which is closest to the geographical centre of the grid cell as the anchor node of the cell.
- The anchor node of a grid cell gi is thereafter denoted by ci.

- We compute the distance, denoted by dij, and travel time, denoted by tij, of the fastest path on the road network for each anchor node pair ci and cj.
- Each grid cell gi maintains three lists:
- a temporally-ordered grid cell list (gi.ltc),
- a spatially-order grid cell list (gi.lsc),
- a taxi list (gi.lv)
- gi.ltc is a list of other grid cells sorted in ascending order of the travel time from these grid cells to gi (temporal closeness).
- gi.lsc is a list of other grid cells sorted in ascending order of the travel distance from these grid cells to gi (spatial closeness).
- The spatial and temporal closeness between each pair of grid cells are measured by the values saved in the grid distance matrix shown in Fig.
- The taxi list gi.lv of grid cell gi records the IDs of all taxis which are scheduled to enter gi in near future
- Each taxi ID is also tagged with a timestamp ta indicating when the taxi will enter the grid cell. All taxis in the taxi list are sorted in ascending order of the associated timestamp ta.gi.lv is updated dynamically
- Specifically, taxi Vj is removed from the list when Vj leaves gi taxi Vk is inserted into the list when Vk is newly scheduled to enter gi.

V. CONCLUSIONS

The experimental results demonstrated the effectiveness and efficiency of our system in serving real-time ride requests. Our system can enhance the delivery capability of taxis in a city so as to satisfy the commute of more people. For instance, when the ratio between the number of taxi ride requests and the number of taxis is 6, our proposed system served three times as many ride requests as that with no taxi-sharing.

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