Reliable Taxi Ride Sharing System

Prof. K. K. Chhajed, Gauri Bhade, Harsha Khapre, Neha Gawande, Dhanashri Lokhande, Snehal Gawai
Department of Computer Science and Engineering
P. R. Pote College of Engineering and Management
Amravati, Maharashtra, India
Krutika.chhajed@gmail.com
bhadegauri28@gmail.com
harsha.khapre@gmail.com
gawande.neha@gmail.com
dhanashrilokhande@gmail.com
snehal.gawai2012@gmail.com

***Abstract*—**Now a day's everyone is using taxi for riding but when there is a need of taxi we have to wait for a long time so for reducing the efforts a taxi-sharing system is developed that accepts taxi passenger's real-time ride requests sent from browser and schedules proper taxis to pick up them via ridesharing and monetary constraints. The monetary constraints provide benefits for both passengers and taxi drivers: passengers will not pay more compared with ride and distance and driver will get more profit from this. While this system is beneficial in case of environment such as saving energy consumption. Taxi riders and taxi drivers use the taxi-sharing service provided by the system via browser. In this rider will send request and driver will get acknowledgment. A scheduling process is then performed to select a taxi that satisfies the request with minimum increase in travel distance. A ride request generator is developed in terms of the stochastic process modeling real ride requests learned from the data set. Tested on this platform with extensive experiments, this system demonstrates its efficiency and effectiveness.

Keywords: *Spatial databases and GIS, taxi sharing, ridesharing, urban computing, intelligent transportation systems, latitude and longitude.*

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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 good solution. But it brings some negative effects, e.g., causing additional traffic on the road surface and more energy consumption, and decreasing taxi drivers income. And it is also harmful for environment it increases the pollution rate. To address this issue the system was proposed.

Ridesharing is a developing way for saving energy consumption and mitigating traffic congestion while satisfying people requirements. Ridesharing based on private cars, often known as carpooling or recurring ridesharing, has been studied for years to deal with people's routine commutes, e.g., from home to work. Recently it became more difficult for people to hail a taxi during rush hours in increasingly crowded urban areas e.g., from home to work. In contrast to existing ridesharing, real-time taxi-sharing is more challenging because both ride requests and positions of taxis are highly dynamic and difficult to predict. Firstly we all know that, passengers are often lazy to plan a taxi trip in advance, and usually submit a ride request shortly before the departure. Second, a taxi regularly travels on roads, picking up and dropping off passengers. Its destination depends on that of passengers, while passengers could go anywhere in a city.

This system saves energy consumption and eases traffic congestion while enhancing the capacity of commuting by taxis. Meanwhile, it reduces the taxi fare of taxi riders and increases the profit of taxi drivers. In the system, taxi drivers independently determine when to join and leave the service using browser. Passengers submit real-time ride requests using the same browser. Each ride request consists of the origin and destination of the trip. After receiving a new request, it 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. With a solid agreement, the updated schedules will be then given to the corresponding taxi drivers and passengers. After getting at destination it will generate the fare for riding the taxi.

The motivation behind designing this system is traffic congestion is a serious problem in urban areas of many countries due to the increasing amount of vehicles on surface streets and accompanies fuel-wasting and air-pollution. This problem can be alleviated by adopting a ride-sharing service. The main idea of ride-sharing service is to collect travelers whose travel destinations are nearby into one vehicle. In doing

so, it can reduce the amount of vehicles on surface streets and meantime save fuel. In this a focus on the taxi-sharing service and propose a dynamic taxi sharing system based on Intelligent Transportation Systems (ITS) technology. By designing this system we aimed the variety of constrain and objective function are used in existing literature survey, where a weighted cost function combining multiple factors such as travel distance increment, travel time increment and passenger waiting time, is the most common. Our aim to find the taxi status which satisfies the ride request with minimum increase in travel distance, formally defined as follows: given a fixed number of taxis traveling on a road network and a sequence of ride requests in ascending order of their submitted time, the aim to serve each ride request in the stream by dispatching the taxi which satisfies with minimum increase in scheduled travel distance on the road network.

The important components include taxi indexing, searching, and scheduling. By indexing the ride request, the algorithms serve a large number of real-time ride requests and decreases the travel distance of taxis compared with the case without taxi-sharing. This system considers and models monetary constraints in ridesharing. Monetary constraints will provide benefits not only for passengers but also for taxi drivers: passengers will not pay more compared with no ridesharing and get discount if their travel time is lengthened due to ridesharing; taxi drivers will make money for all the reroute distance due to ridesharing. The monetary constraints make our modeling of the taxi ridesharing problem more realistic calculated the potential.

Objectives

To minimizing total travel costs, which is an important emerging transportation headache.

- To find the taxi status which satisfies the passengers ride request with increase in travel distance and minimizing the travel cost.
- To minimizing total travel costs, which is an important consideration for the participating drivers and riders and directly related to the revenues of the ride-share provider.
- To reduce the travel time and satisfies more number of passengers.
- To minimize passenger waiting time and detours caused by a ride sharing.
- To maximize system profit from accepting passengers selectively based on the current schedule.

II. LITERATURE SURVEY

Related work

A taxi or cab is a type of vehicle for hire with a driver, used by single passengers or small group of passengers, often for a non-shared ride. A taxi conveys passenger between locations of their choices. This is differ from other modes of public transport where the pick-up and drop-off locations are determined by service provider, not by the passengers, although demand responsive transport and share taxis provide a hybrid taxi mode. Data mining is the process of sorting through large data sets to identify patterns and establish relationships to solve problems through data analysis. Web mining a type of data mining used in customer relationship management, integrates information gathered by traditional data mining methods and techniques over the web. Web mining aims to understand customer behavior and to evaluate how effective a particular website is? All the basic data which related to ride schedule is gathered using web mining technique and identify the different patterns.

In 2010, Y. Chen, J.-W. Liu, and W.-T. Chen proposed the taxi-sharing service and propose a dynamic taxi-sharing system based on Intelligent Transportation Systems (ITS) technology. But the drawback was Communication cost of driving information is not analyzed. In 2012, P. M. d'Orey, R. Fernandes, and M. Ferreira propose the shared taxi service is assessed in a real-city scenario using a highly realistic simulation platform but they could not define a fair tariff system for both passenger and taxi driver. The paper proposed by R. Baldacci,V. Maniezzo, and A. Mingozzi they gives the original approach to solve the CP problem but could not resolve that problem. In 2013, S. Ma, Y. Zheng, and O. Wolfson they defines the dynamic ride sharing problem, taxi searching algorithm using a spatio-temporal index but they could define the computation cost for getting travel time of the quickest paths does not specified.

III. PROPOSED SYSTEM ANALYSIS AND DESIGN

Problem Definition

In this project, given a ride request, the aim to find the taxi status which satisfies the ride request with minimum increase in travel distance, formally defined as follows:

A fixed number of taxis traveling on a road network and sequence of ride requests in ascending order of their submitted time. The aim is to serve each ride request in the stream by dispatching the taxi which satisfies with minimum increase in scheduled travel distance on the road network. This is obviously a greedy strategy and it does not guarantee that the total travel distance of all taxis for all ride requests is minimized. However, still option for this definition due to two major reasons. The real-time taxi sharing problem inherently resembles a greedy problem. In practice, taxi riders usually expect that their requests can be served shortly after the submission. Given the rigid reliable-time context, the taxi-sharing system only has information of currently available ride requests and thus can hardly make optimized schedules based on a global scope, i.e. over a long time span.

Proposed System

It is web browser that is designed to reduce the boringness of the ride and reduce the use of RAM. In this system admin, driver and rider login independently. Admin perform various operations and he can schedule the ride request and decide fare of each ride. Rider can search for taxies and after that he can book his ride and if he want to cancel the ride then he can cancel his booking. Also rider can give the feedback of his ride. When driver login to system he will get his today's ride and he have to tick mark of drop spot when he reach to that drop spot, by this admin will track the taxi approximately. And when ride will get complete it will get flush out from admin, drivers, rider's page.

System Design

Flowchart

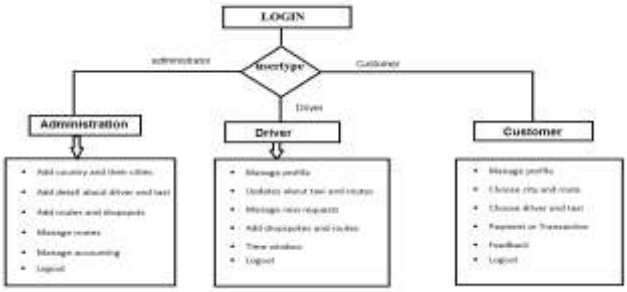

Figure 1: Flowchart

DFD

The basic design of the system is as follows.

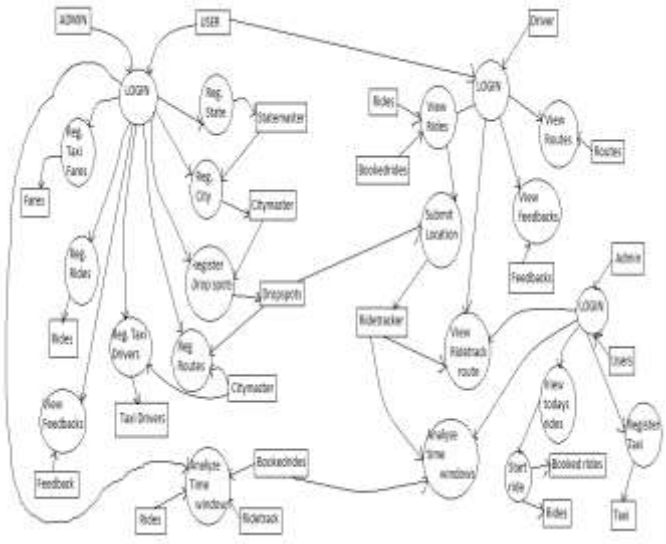

Figure 2: Admin and driver side activity diagram

Admin is the main module of this system. When admin login to the system then he can perform operations in system like registering states, cities and drop spots. And registering routes to the cities also register drivers, taxies and schedule rides. When rides are schedule then the admin will assign routes, date and time of the particular ride. When admin register driver to the system he will register all information about drivers like name phone number, address, which type of vehicle he can drive, etc, Admin can manage the fares of taxies according to type of taxies. Admin can view the feedback of system and of taxi drivers. Now comes to the driver module. When ride is booked by rider then driver can view his all rides. And when admin started particular ride then he has to submit each drop spots which he will going to cover. By submitting the drop spots admin can track the approximate location of taxies. Also driver can view his feedback given by rider.

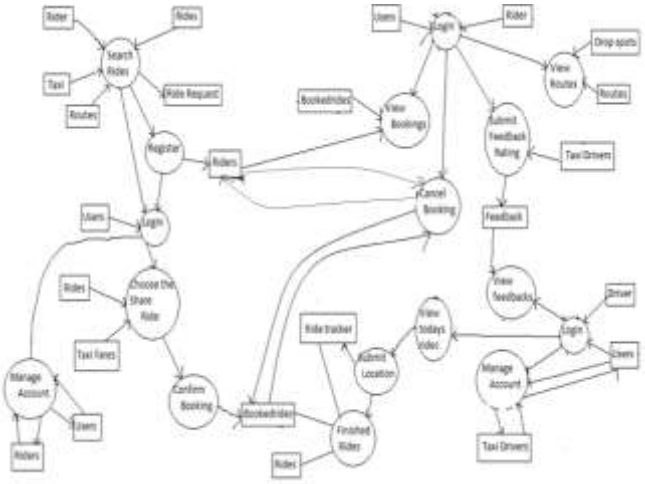

Figure 3: User side activity diagra

When rider comes to this system then he can search for taxies for particular route and if he didn't get the taxi then he can manage his particular route by his own. After getting taxi rider will login to the system as regular customer or new customer. When rider book taxies he will get all information about his ride like time, date, booking id, driver name, etc, If there is another rider for the same route then system will ask to new rider that he want to share his ride or not. If he wants to share the ride then he will get some percentage of discounts in his ride. And this is known as taxi sharing. By this concept of taxi sharing there is profit of admin, driver as well as rider. And after completing ride rider will give feedback of his ride which is beneficial in future.

Result Analysis

Parameters for performance measurement

For the comparison of taxi rates, the following parameters are used:

1. Fuel consumption.
2. Rates of driver/km

Here calculation of ride cost per kilometer is done. Consider a car named as swift dezire which is having mileage 24kmpl that means this car run 24km in 1lit. So, it requires 0.041 lit for

1km.And cost of 1litre petrol is 63rs. From this values cost of ride for 1km is 2.58rs. According to cars, maintenance will be changed. And maintenance cost per km of this car is 2rs.

Services	Fuel Consumption	Driver	Ride cost/Km
OLA	0.041 lit	20Rs	8.00 Rs
Uber	0.041 lit	15 Rs	6.36 Rs
Smart Taxi	0.041 lit	15 Rs	4.58 Rs

Table 2: Ride cost/km of OLA, Uber and Smart Taxi

IV. Result

This system gives satisfaction to customer and provides better services especially for the non-Android users who are not able to install the applications. This system is economically beneficial for the user because as the ride is getting shared 40% discount is provided for the particular ride. Because of the ride sharing fuel and time both are getting saved. Because of the reduction of the taxi, pollution is also getting reduced. Using the feedback function after the rating is given to particular driver, system can know if the rider is satisfied with services provided.

Kilometer	OLA	Uber	Smart Taxi
2	56	42.72	39.16
4	112	85.44	78.32
6	168	128.16	117.48
8	224	170.88	156.64
10	280	213	195.8

Table 3: Comparison between OLA, Uber and Smart Taxi costing without ride sharing

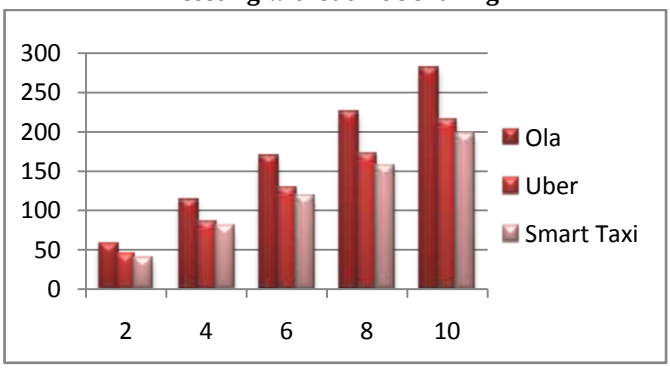

Figure 4.1: Comparison of cost between OLA, Uber and Smart Taxi before sharing

Kilometer	OLA	Uber	Smart Taxi
2	56	42.72	24.16
4	112	85.44	47
6	168	128.16	70.49
8	224	170.88	93.99
10	280	213.6	117.48

Table 4.4.2: Comparison between OLA, Uber and Smart Taxi costing without ride sharing

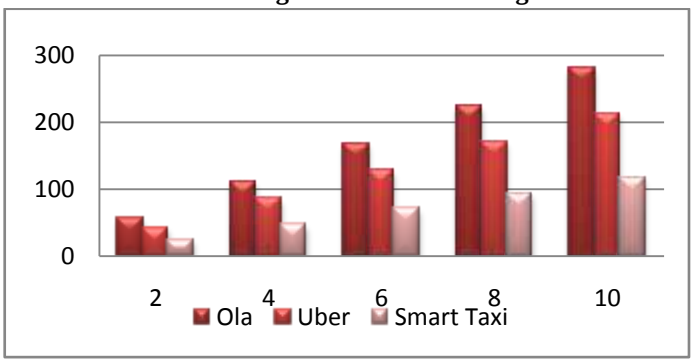

Figure 4.2: Comparison between OLA, Uber and Smart Taxi after ride sharing

From the above graph it is observed that rate of other sharing system like OLA, Uber has huge difference than Smart taxi. The rate of Uber and OLA are more than Smart taxi. Rider will get more benefits if they use the smart taxi. Right now Uber gives taxi sharing facilities but it does not gives any type of discount. System should be beneficial for rider and driver after giving the facility of sharing but Uber is not beneficial for rider. Smart Taxi gives facility of ride sharing and rider will get 40% discount if they share their ride. From the above graph i.e. cost after sharing it is observed that Smart Taxi is beneficial for both rider and driver and this system is more efficient.

Advantages of reliable taxi-ride sharing system:

- This system is safe and secure and also it is door to door.
- It kills the boredom and saves the time as all know time is money and also it the saves money.
- This system is more environments friendly because it reduces number of taxis so it saves use of fuel.
- The lower level of pollutants in the air and less stress of driving and traffic-jams ensure a healthier life to us.
- This helps you to socialize, interact and learn more about others. Thus, broadens the thought process.

V. Conclusion

This project proposes a browser based real-time taxi-sharing system. Detail interactions between end users i.e. taxi riders and drivers were given. The experimental result demonstrates the effectiveness and efficiency of the system in serving reliable-time ride requests. Firstly, the system can enhance the delivery capability of taxis in a city so as to satisfy the commute of more people. Secondly, the system saves the total

travel distance of taxis when delivering riders. Thirdly, the system can also save the taxi fare for each individual rider while the profit of taxi drivers does not decrease compared with the case where no taxi-sharing is conducted. The system guarantees that any rider that participates in taxi-sharing saves fare on average.

VI. Future Scope

- This system is online system in future offline system can be made.
- This system is not available in rural area. It can be available in future.
- In future this system can be made more efficient.
- Requests and positions of taxi are highly dynamic and difficult to predict, in future we will make it easy.
- Decrease in taxi drivers income, with growth of this application income will increase with rides.

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