



## Implementation of Real-Time Taxi Ride Sharing

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### ABSTRACT

This Project is designed to create a Real-time taxi ride Sharing Application. It works by accepting a real-time ride requests from the passengers sent through smartphones and schedules proper taxis to pick them up via ridesharing. The monetary constraints of the application are to provide benefits for both passengers and taxi drivers, passengers pay less amount compared with no ridesharing and get compensated if their travel time is lengthened due to ridesharing, taxi drivers will make money for all the detour distance due to ridesharing. This paper gives an overview of the taxi-sharing service, key algorithms for dynamic rideshare matching processes. It uses a special request called as seek and offer request, through which a rider can seek the request send by the driver and the driver can offer the request to the riders or passenger's and depend upon the distance the cost is calculated, when a particular rider or passenger reaches to a destination. It introduces the concept of seeking and offering the ride request.

**Keywords:** *Taxi-sharing, real-time taxi sharing, ride sharing*

### I. INTRODUCTION

Taxi plays a very significant role in daily basis. Taxi plays important role in transportation between public and private sectors, delivering thousands and millions of people to different locations in urban areas. However, many people spend a long time on roadsides due to much higher demands of taxi than the number of taxis in peak hours of major cities.

Increase in the amount of taxis for the people appears to be a clear solution. But it carries some non-good

effects, e.g., bringing more traffic on the surface of the road thus, resulting more energy consumption, and it also cause reduce in taxi driver's income (considering the fact that demands of taxis would be lesser than number of taxis during off-peak hours). To deal with this issue, we propose a real time taxi-sharing application that receive 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 compared with no taxi-sharing is used).

In this application, taxi drivers autonomously determine when to join and leave the service using an App installed on their smartphones. Using the same App, passengers submit their real-time ride requests. Each ride request consists of the origin and destination of the trip and based on the distance travelled by them the cost is computed. If the taxi is ridesharing then, the amount is distributed amongst the passengers.

### II. OBJECTIVE AND SCOPE

- It provides real time taxi ride sharing at low cost or reasonable cost.
- Reducing the traffic ratio i.e. minimum traffic on the road.
- Transportation facility will be available everywhere.
- Safety of Rider /person.

### III. PROBLEM DEFINATION

Taxi is an important transportation mode between commercial and private transportation, delivering thousands of millions of passengers to different locations. However, the number of taxi is much less than its demand in peak hours of major cities, due to this many people stand at roadside waiting for the taxis. Multiple taxi statues can satisfy a ride request, but the goal is usually to find the optimal taxi. A variety of functions have been used in the existing literature, where a cost function has been combined with multiple factors such as travel distance increment, travel time increment and passenger waiting time, is the most common.

### IV. AD-HOC TAXI RIDE SHARING

The problem with the earlier taxi ridesharing system was that people spend more time on road for taxi and their might be some chances of not getting a taxi for travelling. Increasing the taxi ratio seems an obvious solution but, it advances the road traffic, increase the energy consumption and creates a non-good environment. Arrival of the taxi at peak time is also a taxi sharing system problem, to address these issues we have created a real-time taxi ride sharing application that accepts 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. Though real-time taxi sharing has been studied in several previous works, our work demonstrates three major advantages. First, the problem definition is more realistic by considering the three different types of constraints. Some existing works did not consider time window constraints and none of these previous works explicitly monetary constraints. Second, we analysed the computational cost of each component of the system, proposing a spatiotemporal index and a taxi searching algorithm, which significantly improve the system efficiency. Third, simulation results presented here is more convincing as we evaluated our system based on the real data and at a much larger scale than most previous works did.

## V. IMPLEMENTATION DETAILS

### A. ALGORITHM

#### 1. Taxi Searching Algorithm

A dual-side taxi searching algorithm is used to determine the optimal list of taxis which can satisfy

the rider's request. Since the algorithm bases its approach on both origin and destination the result set returned is optimal.

The searching and the scheduling are done on the road network by partitioning the network into grids. Each grid holds a list holding a timestamp which is needed in order to determine the location of taxi and the route. The taxi searching module quickly selects a small set of candidate taxis with the help of the spatio-temporal index.

#### 1.1 Single-Side Taxi Searching

Suppose there is a query  $Q$  and the current time is  $t_{cur}$ :  $g_7$  is the grid cell in which  $Q:0$  is located.  $g_7$ 's temporally-ordered grid cell list  $g_7$  Fig. 1.  $g_7$  is the first grid cell selected by the algorithm. Any other arbitrary grid cell  $g_i$  is selected by the searching algorithm if and only if Eq. (1) holds, where  $t_{i7}$  represents the travel time from grid cell  $g_i$  to grid cell  $g_7$ . Eq. (1) indicates that any taxi currently within grid cell  $g_i$  can enter  $g_7$  before the late bound of the pickup window using the travel time between the two grid cells find all grid cells that hold Eq. (1), the single-side searching algorithm (fig1) simply tests all grid cells in the order preserved list  $g_7$  finds the first grid cell  $g_f$  which fails to hold Eq. (1).

$$t_{i7} \leq t_{cur} - Q.p.w.l \quad (1)$$

In Fig. 2, grid cell  $g_3$ ,  $g_5$  and  $g_9$  are selected by the searching algorithm.

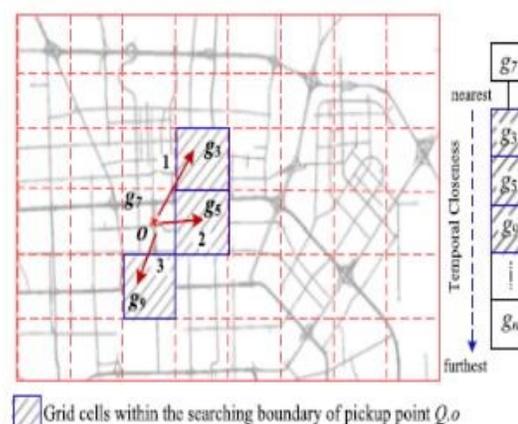


Fig1. Single side taxi searching algorithm

## 1.2 Dual Side Taxi searching Algorithm

The dual-side searching is a bi-directional searching process which selects grid cells and taxis from the origin side and the destination side of a query simultaneously.

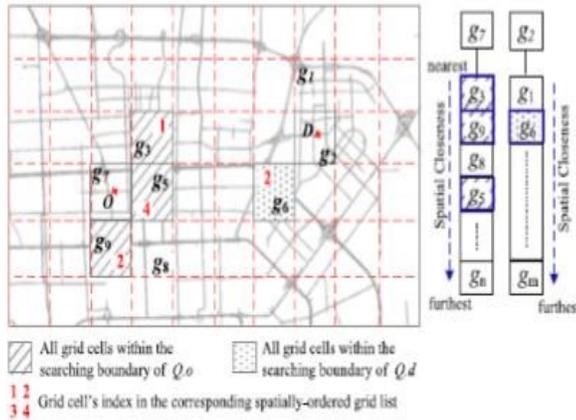


Fig 2: Dual side searching algorithm

Consider the ride request illustrated in Fig. 2 where  $g_7$  and  $g_2$  are the grid cells in which  $Q:o$  and  $Q:d$  are located respectively. Squares filled with stripes stand for all possible cells searched by the algorithm at  $Q:o$  side. These cells are determined by scanning the temporally-order grid cell list of  $g_7$  which holds Eq. (2)

is a candidate cell to be scanning the temporally-order grid cell list of  $g_7$  which holds Eq. (2) is a candidate cell to be searched at the origin side.

Eq. (2) indicates that any taxi currently within grid cell  $g_i$  can enter  $g_7$  before the late bound of the pickup window using the latest travel time between the two grid cells.

$$t_{cur} + t_{i7} \leq Q.d_w . 1 \quad (2)$$

Squares filled with dots indicate the candidate grid cells to be accessed by the searching algorithm at  $Q:d$  side select all grid cells which holds Eq. (3), which indicates that any taxi currently in  $g_j$  can enter the  $g_2$  before the late bound of the delivery window In this example,  $g_6$  is the only satisfying grid cell as shown by Fig. 2

$$t_{cur} + t_{j2} \leq Q.d_w . 1 \quad (3)$$

## 2. Taxi Scheduling Algorithm

With given set of taxi statuses retrieved for a ride request by the taxi searching algorithm, the purpose of the taxi scheduling process is to find status which

satisfies the minimum travel distance increase. All possible ways of insertion can be created by reordering the points in the current schedule, subject to the precedence rule, i.e. any origin point precedes the corresponding destination point (we refer to this step as the schedule reordering thereafter), insert origin into the schedule insert destination into the schedule.

## B. MODULES

There are three main modules in this paper and they are as follows

### 1. Module1 (Registration module)

Creation of the account is the first phase of this project. The user has to give the complete details about him/her to create an account.

### 2. Module2 (Authentication module)

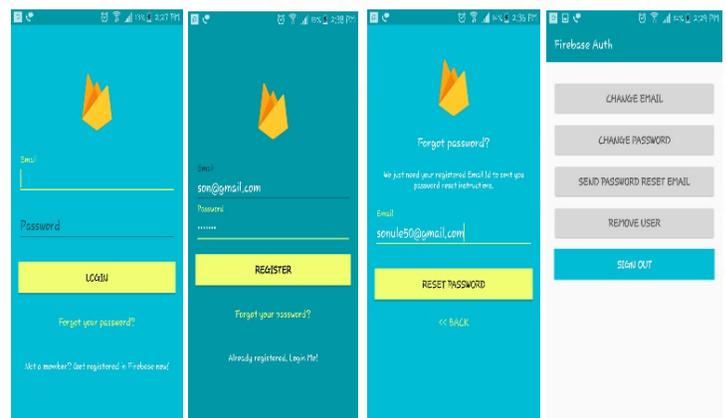
Once the user has submitted his details, his/her information is accepted and they can log-in with the valid username and password. It checks for the unauthorized person and does not allow the unauthorized person to access the data.

### 3. Module3(Accepting & Cancelling ride request)

After providing the necessary details such as name, phone number, email address, etc, the user will be able to get the ride sharing facilities. After validation, the user request will get accepted. For cancellation, the user must be login to cancel the request or ride share.

### 4. Module 4 (Payment module)

The amount paid through online must be secure and it should be provided by the authorized user. The amount can be paid through Paytm or by cash.



(a)Login form (b)Register (c)Reset (d)Options Page page password

**Fig: 3 Snapshot of modules**

In the first page fig(a) of our application, we have to insert some necessary details like our email id & password. If suppose new users are trying to log-in Firstly, they have to create the new id by clicking upon get registered option which is at bottom position, then within fraction of seconds the registration page will open into the application.

The next page fig(b) is of registration of new user's. Once the user creates his/her account by entering email id & password then only the person is allowed to log in into this application. Here user just have to enter the details & then after clicking upon register button the person will automatically registered. The next page fig(d) is of the reset password, here if in case any user forgot his/her password then by simply clicking upon forgot password button the reset page i.e. fig (c) will open, then he/she will have to enter his/her previously registered email id, then after clicking upon reset password an OTP will generate that will immediately be sent on your registered email id, then user just have to go on his/her email id then he can directly set any passwords he wants to set.

But there is one constraint i.e. previously being set, that the password should not be less than 6 characters or numbers. If user enters less than 6 number's or characters then it will through an exception that please enter the valid characters or numbers.

The next page fig.(d) is of the number of options like change email id, change password, send password or reset email, remove user & sign out So as per user need they can modify details of his account or perform his/her task to fulfil his own expectations. If user has nothing to do with this application he/she can simply sign out from this application at any time.

**CONCLUSION**

Real time taxi-ride sharing application is very effective way to minimize pollution and the congestion of vehicles in cities. Travelling can be done in eco-friendly way. It provides an opportunity to meet new people on daily basis. System saves the total travel distance of taxis when delivering passengers. Our system can enhance the capability of delivering passengers and can satisfy their needs. 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.

**FUTURE WORK**

In this system, the basic concept of taxi ride sharing through real-time request generation and its acceptance in future work involves refining the ridesharing model by introducing social constraints, such as gender preference, habits preference (e.g. some people may prefer co-passengers who do not smoke) and may also use social networking sites for real time request.

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