Smart Traveler- Proficient Taxi Business Application

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Abstract: For productive taxi business based on GPS has turned into an imperative instrument, the taxi fleet management system. It can be utilized giving helpful information to cab drivers to acquire more benefit by mining the authentic GPS directions furthermore for the purpose of armada administration. For next cruising area which could be a worth included module of the armada administration framework, we proposed a taxi recommender framework. To give the comparative target we researched, three variables considered in various works, which are separation between the ebb and flow area and the prescribed area, for next travelers holding up time, and expected toll for the trek. Notwithstanding these variables, taking into account drivers experience which is the doubtlessly area we think of one as more component to get travelers given the flow traveler drop off area. To catch the connection between the traveler get-off area and the following traveler get-on area, an area to-area chart model, alluded to as OFF-ON model, received. To assess the normal admission for a trek began at a prescribed area we likewise adjusted an ON-OFF model, to assess the proposed framework. A test system recreates cruising conduct of taxies in the dataset a true dataset from CRAWDAD is utilized and one virtual taxi which travels in view of our recommender framework.

Keywords: CRAWDAD, Recommender, trajectory, Fleet.

1. Introduction

Taxi armada administration framework, because of the sensational expense down of Global Positioning System (GPS) gadgets, in light of GPS has turned out to be extremely prevalent for taxi organizations. A taxi organization can follow along time-stamped GPS directions of its taxi by utilizing this framework. Besides, extra data, for example, the status of a taxi, incorporate holding up at a stand, cruising, involved, off movement, can likewise be followed. The GPS taxi armada administration utilized not just for the purpose of armada administration and security, additionally to give valuable data to cabbies to procure more benefit by mining the recorded GPS directions and status of taxies. As a result, heaps of scientists dedicated to the examination on effective taxi business, particularly the recommender framework for cab drivers under various conditions and goals. For a cab driver, the most concerned subject is prone to be the way to boost his benefit. A day by day routine of a cabbie might comprise a few sets of cruising time and involved time. That is, a cab driver might voyage the street system hunting down travelers for some time (which might incorporate holding up at some taxi stands), and after that get travelers and drive to the assigned destination (possessed time). As the travelers get off the taxi, it begins cruising the street arrange once more. It is as of now that a recommender framework used to help the cabbie know where to journey such that his benefit can be expanded. The reason for this work is to prescribe a decent area for the cab driver to voyage to such that he can acquire more benefit than journey taking into account his own experience. A few elements considered for managing a cab driver cruising to a more gainful area. To start with, separation between current area and the prescribed area ought to be short to spare time and vitality. Besides, when the taxi arrives the suggested area, the sitting tight time for next travelers ought to additionally be short. Thirdly, if the cabbie can get travelers at the prescribed area, the toll for the trek is wanted to be substantial. A large portion of the works have considered two of these three elements with various ways to deal with use the verifiable information. In this venture, we consider these components. Likewise, by mining the connection between the traveler get-off and get on areas, we additionally consider a fourth component, to catch the connection between the travelers get-off area An area to-area chart, canceled ON model is proposed and the following traveler get-on area. With this model which is figured in light of the chronicled information, to get travelers when the cab driver drop off travelers at an area, our recommender framework can know which areas are with high likelihood. Along these lines,
investigate these four elements such that the proposed recommender framework is compelling. In extra, which one are more essential than others, we likewise break down, among these four variables.

1. Literature Survey

2.1. Finder: A Recommender System for Finding Passengers and Vacant Taxis

This paper presents prescribed framework for a both cabbie and individuals anticipating to take a taxi utilizing the information of traveler portability example and cab drivers grabbing what's more, dropping-off practices learns structure GPS direction of taxi. This taxi will report on their present area to a server farm in a specific recurrence for instance 2 min. This recommendation lessens the cruising (without a reasonable) time of taxi. Along these lines, spares vitality utilization and facilitates the fumes contamination and additionally helps the driver to make more benefit.

2.2. UNTS: A Trajectory Recommendation System for Effective and Efficient Hunting of Taxi Passengers

This paper speak to new issue on worldwide ideal direction recovering (GOTR), as finding an associated direction of high benefit and the high likelihood to get a passenger inside of a given time period continuously. Firstly, it proposes a dynamic scoring framework to assess every street section in various time periods by considering both get rate what's more, benefit variable. Present a novel strategy called direction sewing, taking into account a heuristic method and the horizon system to create a suitable ideal direction continuously. This framework likewise maintains a strategic distance from blockage and other constant circumstance.

2.3. An online recommendation system for the taxi stand choice problem (poster)

This paper speaks to an online proposal model to help the driver to choose about the best remain ahead in every minute minimizing the holding up time. This methodology utilizes time arrangement estimating procedure to anticipate the spatio-worldly appropriation in genuine at that point join this data with the live current system status to deliver on yield. This test likewise highlighted that an armada furnished with such structure surpassed an armada that is not: they encountered a normal holding up time to get a traveler 5% lower than its rival.

2. Existing System

For getting of traveler which builds wastage of fuel, time and there will be production of more superfluous activity in city, the empty Taxi driver need to move from point to point. Where and how he gets more wage time to time for the cab driver needs to keep himself his own record into psyche. Travelers additionally require taxi on time i.e. for long time for discovering taxi for achieving their destination on time, they need to hold up. In some cases issue of misguidance of course for new travelers likewise emerges. Before achieving destination Passengers additionally don't know normal passage of trek.

3.1. Easy Taxi framework Summary:

In this application, we can book a taxi and also track it continuously. On the off chance that any traveler lost any things in taxi then likewise to find their effects, traveler can track taxi. On booking a taxi, no additional charges will be pertinent. This likewise gives installment. To get in touch with one another, both cabbies and travelers need to make account in this application.

Favorable circumstances:
1. Installment however charge card.
2. Ongoing following of taxi.
3. Traveler will likewise encounter lower holding up time to get the taxi.

Impediments:
1. Absence of exactness in deciding the area if poor GPS and web association.
2. Requires a record.
3. Holding up time not indicated.
4. Prescribing gainful cruising area can't break down by this framework.

3.2. CMS Mobile (Cab Management framework) Summary:

For taxicab drivers, this framework is easy to understand. To a cab driver nearest to get point, this application relegates employments. This application likewise furnishes driver with occupation points of interest and bearing at tap of his hand. GPS helps in following armada constantly. Travelers can pay utilizing MasterCard. In this application Passenger and cab driver both have account, so that clients and cabbie can contact to one another.

Points of interest:
1. following precise to inside of 5 min.
2. On the off chance that driver has not satisfied any of the lawful prerequisite, it Automatic log off
3. To send data of new or every now and again went to puts, Suggest position of interest (POI) alternative help driver.

Disservices:
1. For the client (traveler) advantage this application is not suitable.
2. Visit alternative is not given to correspondence in the middle of traveler and driver.

3. Proposed System

The best client interface between the cab driver and the travelers given by Taxi recommender framework. For expanding the income of taxi drives, this framework is more valuable. This give the investigation report to cabbie because of that cab driver will know how he gets more benefit on the specific time and specific course. Both need to necessary fill enrollment points of interest i.e. 1. Cabbie 2. Traveler. Interface: Through the Central Server, the correspondence happens between the Taxi Driver and the Passenger. The introduction of this correspondence happens from the traveler side dependably who needs to affirm the taxi.

4. Modules in Proposed System

The proposed system makes efficient use of the technology for making the taxi business and taxi usage convenient to both the driver as well as the passengers.

The major modules in the proposed system are as follows:

a. TAXI DRIVER MODULE:
This modules encloses the features and facilities for the Taxi driver being attached for the taxi business. The major thing the driver has in addition is the most profitable location found in the entire city. The server part analyzes the number of trips and the sources of the trips from which the business was maximum, so the location which gives maximum number of trips is suggested to the drivers to aid them in getting maximum number of trips in the city. Also, the driver need not calculate the cost of the trip, instead server provides the driver with the trip cost with the help of the source and destination coordinate distance and the per KM cost decided for the vehicle.

b. USER MODULE:
In this user module the user (passenger) is add the trip from his/her location using android application and send location data to the server side. server side send passenger location info to the nearest taxies.

c. SERVER MODULE:
The server module is the most important module of the proposed system as the major role of analysis and supporting the Driver and passenger app is controlled by the server. Server is the module which works on the analytical aspects of the proposed system and thereby covers major part of the proposed system. The server part uses JSON parser for fetching the location coordinates of the taxi driver and the trip source and destination so as to compute the distance and cost for the trip.

5. Features in Proposed System:

The proposed provide few additional features mentioned below:
1. Panic option for passengers making the trip safe in terms of making the journey traceable. If the passenger feels any sort of insecurity at the trip, he/she may press the panic button so that the current location of the passenger and the panic message will be sent to the three contact numbers being saved at the android part of the passenger.
2. The passenger when searching the taxi, will be able to see only the taxis currently available in the cluster of 5kms which are clustered based on k means algorithm, in short only those taxis which lie within the 5km circle of the passengers’ center will be visible to the passenger for the trip.
3. The Spatio-temporal analysis which makes the drivers aware about at what time of the day which location should be preferred for waiting for the passengers so that the maximum business is achieved for the day.
4. The driver is also provided with the current location change feature so that if in case he has dropped a passenger and now moved to some other place, so in order to be seen in passengers list who is placing taxi request, he has to update his current location.

Spatio-temporal analysis.
A. Temporal analysis
From our analysis, the daily total profit on weekdays and weekends are significantly different. Thus, we partition our GPS data into two categories (i.e., weekdays and weekends) so that the properties of taxi requirement can be reasonably observed. For instance, requests for taxies are high around office buildings on weekdays. On the other hand, demand for taxies is high around the entertainment centers on weekends. Furthermore, there is great demand for taxies around
department stores or business zones during the daytime and around bars at night. As a result, the number of passengers who request taxi services varies with the time and the categories of place. In this paper, we divide a day into 24 time slots of equal length (i.e., the length of a time slot is an hour). The number of divisions affects the performance (i.e., total revenue). In our experiments, we conclude that a higher number of divisions (for example, hourly time slots rather than morning, noon, or afternoon sections) will achieve better performance. Furthermore, we analyze the average waiting time in every place recorded in the historical GPS data. The average waiting time of a place is obtained by dividing the total waiting time by the number of times that passengers get on a taxi in that place. The average waiting time is an important factor that impacts the decision of going to the next pick-up location for taxi drivers.

\[ T_{AW} = \frac{(t_1 + t_2)}{2} \]

- **TAW**: Total average waiting time total decision of going to next pick-up location.
- **t1**: Time analysis during without traffic to reach destination.
- **t2**: Time analysis during with traffic to reach destination.
- Select time from taxi. Trips Count = \(\max (\text{source}, \text{time}, \text{between} (A, B))\)
- Where A and B are the range specified for temporal analysis.

B. Spatial analysis

The first step of the spatial analysis is to conduct the data clustering process on a set of GPS points on the historical GPS trajectories. As aforementioned, we adapt a grid clustering approach and divide the map into fixed square areas. For the positions of GPS trajectories in the San Francisco area, we set 0.2 miles as the diagonal distance for each cluster to ensure that taxi drivers would be in an appropriate cluster for finding potential passengers. After completing the clustering of the GPS data, the distance between two clusters can be obtained. The impact of the distance factor is profound, since fuel costs are directly proportional to the distance driven. We observe that the patterns of the taxi service demand from our historical GPS data can be discovered. For instance, many people go to commercial hotel B after leaving office A. Hence, taxi drivers can go there to wait for the next passenger if they are around office A. The taxi fares which are the source of revenue are charged based on travelling distance.

Consider these are 50 trips done by four drivers in last 7 days. So spatio analysis will give maximum profitable location as follow.

(For each source in trips)
Select count (source) from taxi. Trips where source =source(i)
The max count of source will give the spatio-analysis.
6. Comparative Study

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<tr>
<th>Sr.no</th>
<th>Parameter</th>
<th>Existing System</th>
<th>Proposed System</th>
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<tbody>
<tr>
<td>1.</td>
<td>Panic option</td>
<td>The existing system does not provide this option in various taxi business applications.</td>
<td>Our proposed system provides the panic button facility for security purpose.</td>
</tr>
<tr>
<td>2.</td>
<td>Spatio-Temporal. And T-finder.</td>
<td>The Theoretical approach has been presented and implemented using T-Finder Spatio-temporal.</td>
<td>The Spatio-temporal analysis which makes the drivers aware about at what time of the day which location should be preferred for waiting for the passengers so that the maximum business is achieved for the day.</td>
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<td>3.</td>
<td>Algorithmic Analysis.</td>
<td>The Existing system does not provide the list of taxis to the customer by doing clustering.</td>
<td>The Spatio-temporal analysis which makes the drivers aware about at what time of the day which location should be preferred for waiting for the passengers so that the maximum business is achieved for the day.</td>
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7. Algorithm Analysis
K-means algorithm
1. K-means algorithm is implemented among the other clustering algorithm.
2. In this algorithm it clusters pseudo keywords according to its TF-IDF values.
3. We assign initially number of clusters as three.

4. Take all the records to be clustered.
5. Create empty clusters for given K.
6. For initial K values from records place them in K1 K2.........respectively.
   For loop (till EOF).
   Compare mean value with each record place the record in closer Mean cluster.
8. Results Analysis

According to the analysis of taxi trips in week days some taxies get maximum revenue in particular area or location using spatio-analysis. Maximum revenue in day wise graph analysis as follow.

Fig. 5.1 Spatio-temporal Analysis Chart

Fig. 5.2 User and Taxi registration

Fig. 5.3 Taxi activation

Fig. 5.4 Homepage

Fig. 5.5 Passenger request for Taxi

Fig. 5.6 Taxi confirmation
9. Future Scope

In Taxi fleet management we can add the rating at the passenger side for the best taxi condition, drive safely, reliable services. Using camera at taxi driver registration on the spot we can set the driver profile photo. We can add taxi driver's license number verification from RTO database. Passenger can fix a particular taxi driver for daily routine through wish list. Real time tracking of passenger and taxi driver. While booking a taxi, passenger should make 30 percent advance payment of actual trip to avoid fake passenger request.

10. Conclusion

In this framework, Spatio-fleeting investigation is the primary favorable position which is not existing at all in any taxi booking framework. In reenactment part, to see his income and through which he gets his productive area, we are plotting diagrams which are useful for cab driver. For grouping maps and k-implies calculation for spatio-worldly investigation we utilize framework based bunching calculation. Until our framework achieves ideal objective i.e. augment income, we receive voracious system that alter one and only element at once. For each one of the individuals who wish to improve this application this application will be gainful by including their perspectives.

11. References


[8] research.microsoft.com/jump/165760