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SMART TRAVELLER-EFFECTIVE AND PROFICIENT TAXI BUISNESS APPLICATION

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ABSTRACT --*Taxi administration is imperative business which focused around GPS has turned into an essential apparatus for essential and proficient Taxi business. It will utilized for the purpose of Taxi driver administration and additionally give helpful data to cabbies to win more benefit. We are proposing a Taxi recommender i.e "Smart Traveler" Framework for discovering traveler area which could be a valuable module for efficient Taxi business. In that three elements have been considered, and separated between the current area and the suggested traveler area, expected toll for the outing and holding up time for next travelers at that area. We additionally allude an ON-OFF model to gauge the normal charge for an outing began at a suggested area. A certifiable data set is utilized to assess the proposed framework. A Framework will reenact cruising conduct of taxis in the CRAWDAD data set and one virtual taxi which travels focused around our recommender framework. Our system helps to discover taxi productively and adequately. Because of utilization of this application we can encounter a normal holding up time to pick-up a traveler 5 lower than its rival. For the powerful business of Taxi we anticipate the spatial temporal dissemination continuously.*

***Keywords*:-GPS, ON-OFF model, OFF-ON model, CRAWDAD.**

1. INTRODUCTION

Due to economic cost down of Global Positioning System (GPS) gadgets, taxi administration framework focused around GPS has ended up extremely prominent for taxi organizations.

By utilizing this framework, a taxi organization has the capacity follow along time-stamped GPS trajectories of its taxi. Besides, extra data, for example, the status of a taxi, incorporate holding up at a stand, cruising, possessed, off movement, can likewise be followed. The GPS taxi administration can be utilized not just for the purpose of administration and security, additionally to give helpful data for cabbies to procure more benefit by mining the recorded GPS trajectories and status of taxies[5]-[7]. As an outcome, loads of scientists committed to the exploration on effective taxi business, particularly the recommender framework for cabbies under diverse conditions furthermore destinations[3].For a cab driver, the most concerned subject is prone to be the manner by which to expand his benefit. A day by day normal of a cab driver may comprise a few sets of cruising time and possessed time. That is, a cabbie may journey the street system scanning for travelers for some time (which may incorporate holding up at some taxi stands), and after that get travelers furthermore drive to the assigned terminus (possessed time) [1]-[4]. As the travelers get off the taxi, it begins cruising the street arrange once more. It is at this minute that a recommender framework could be utilized to help the cab driver know where to journey such that his benefit can be expanded. The motivation behind this work is to prescribe a decent area for the cabbie to journey to such that he can gain more benefit than journey focused around his own experience [4].

2. SYSTEM ANALYSIS

2.1 Existing System

The vacant Taxi driver have to move from point to point for picking up of passenger which increases wastage of fuel, time and there will be creation of more unnecessary traffic in city. The taxi driver has to keep himself his own record into mind where and how he gets more income time to time. The problem may arise like the need for taxi in another area and taxi driver is searching for passenger in another area. Passengers also require taxi on time .i.e. they have to wait for long time for finding taxi for reaching their destination on time .Sometimes problem of misguidance of route for new passengers also arises. Passengers also dent know average fare of trip before reaching destination.

2.2 Proposed System

We utilize authentic GPS information to examine and recover the residence of in habitants in an zone. Worldly and spatial issues are critical variables which the cab drivers may consider in deciding traveler dissemination.

We accentuate on effects on the development of the cabbies after the travelers are dropped off by dissecting the spatial and fleeting components [2].This proposed framework makes utilization of the cloud engineering to store and recover different telephony data utilizing SOAP convention. Worldwide Positioning System, right away known as GPS System, is the framework that empowers you to know the area of an individual or a thing [1]. It comprises of infinitesimal chip which is joined to the article to be followed. This chip will give out signs which are followed by the satellite which sends information to the earth giving the accurate area of the article. GPS following now be acknowledged on a worldwide scale. It has a number of employments around the world [6].

3. MAIN FEATURES

Our Product must satisfy following quality characteristics

i. ***Adaptability-*** Our product will be used for commercial, research and any traveler systems.
ii.Availability- Anyone can download this app from android market and once you get Registered with system then any time you can use this app.
iii ***Interoperability-*** Communication between passenger and taxi driver should be maintainable. Whenever taxi driver wants data, then server should provide appropriate data or results.
iv. ***Usability-*** It can be used as user requirements and used multi times by single user.

4. SMART TRAVELLER IMPLEMENTATION

4.1 *Design Constraints*

The proposed system requires requesting a taxi for traveler. Therefore following are the design constraints of the system.

i.Button for requesting a taxi.
ii.List of responded taxis with basic fare and waiting time.
iii.Choose appropriate taxi.

4.2 *Implementation Constraints*

The proposed system requires systematic flow of operations

1.Passenger request a taxi and this request message are broadcasted in a particular area to taxi drivers with GPS location of passenger.

2. Taxi driver response to the passengers request with basic fare and average waiting time.
3. Passenger chooses appropriate taxi among the choices.
4. Based on these trips of taxi driver, the data regarding trip is stored on server and this data is used for analysis purpose.
5. Analysis is divided into two parts

i.Spatio

ii.*Temporal*

4.3 Overview

Taxi recommender system provide the best user interface between the taxi driver and the passengers [5]. This system is more useful for increasing the revenue of taxi drives. This give the analysis report to taxi driver which helps him to know how he gets more profit on the particular route and at particular time. This System contain two types of factors

i. *Taxi driver*

ii. *Passenger.*

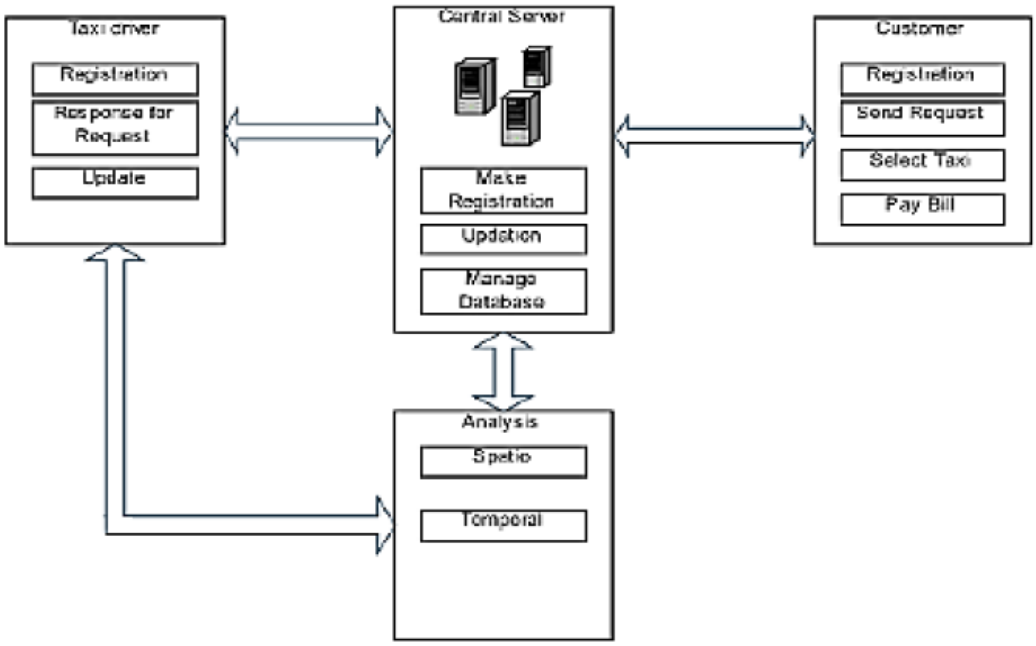

***Fig. 1.* Architecture of Smart Traveller Application**

Their interaction is taken place through the Central Server. At the time of registration of this application it is divided into two part i.e.

i. Registration of Taxi Driver
ii. Registration of Passenger.

To use the System both have to compulsory fill registration details. And the Central Server keeps their details safely into its Database.

4.4 *Actors in the System*

i. *Taxi Driver*

The Taxi Driver has to keep it record details updated daily to increase its revenue. At the time of registration he has to fill some of important details like Name, Mob. No., Taxi no., License no. and some more details about the taxi [2].

ii. *Passenger*

The passenger has to fill its some details to confirm its presence. The passengers has to insert their details like Name, Mob. No., Address and working status which show necessity of using Taxi.

iii. *Central Server*

The main part of the system which manages the Taxi driver and passenger communication along with providing the analysis part to the taxi driver. The central Server has its own Database which has every details about Taxi driver and passengers [4]. When customer send request for taxi firstly goes to central server and central server broadcast that request to taxi drivers. The central server has to keep updating it details alone with every operation performed by taxi drivers and passengers. The Central Server has important tasks like registration, communication between taxi driver and the passenger, and to give the analysis details when required to taxi driver.

4.5 Task of Central Server

4.5.1 *Registration*

The Central Server has main part of registration of both taxi driver and the passenger which can keep it details in his Database which can be updated according to his and actors need. At the time of the registration of it divides the registration into two parts i.e.

i.Registration as a taxi driver,

ii.Registration as a passenger.

This initial Registration confirms the operations of the users to be used in the application.

4.5.2 *Interface*

The communication takes place between the Taxi Driver and the Passenger through the Central Server. The initialization of this communication takes place from the passenger side always who has to confirm the taxi [5]. The communication has the following messages

i.*Request Message*

When the passenger sends the Request message from a source location then it first goes to Central Server and this request message is broadcasted into a specified source area.

ii.*Broadcast Message*

This broadcasted message is send to all the taxi drivers which are registered on the System and are located in the specified area of the passenger.

iii.*Response Message*

The Taxi drivers send the response message to the requested taxi passenger which has the details about his waiting time, fare of its trip. Due to this the passenger receives the list of repose taxi drivers and its details like waiting time and fare of trip along with it. Which helps the passenger to select taxi according to this fare.

iv.*Confirmation Message*

After selection of the particular taxi the confirmation sg is send to the Central server. And then Central Server send the confirmation msg to selected taxi driver.

v.*ACK / NACKMessage*

This message is send by Central Server to Taxi Drivers. In this Acknowledgement (ACK) message is send to the specified i.e selected taxi driver by the passenger and the Negative Acknowledgement (NACK) message are Broadcasted to the rest all taxi drivers to information about the requested passenger has got a Taxi.

4.5.*3.* *Analysis*

The central server has main part of analysis of taxi driver's trips. On the basis of GPS trajectories the Central server analysis the Spatio temporal part and give details to taxi driver to increase its revenue.

i.*Spatio*

In this the working day of taxi driver is divided into 24 parts. Which helps the

Taxi driver to specifies the profitable working time to get more income from the Smart Traveller application.

ii.Temporal

In this analysis part the central server suggest the profitable path from theirprevious GPS historical trajectory. Taxi driver can increase its revenue by visiting the suggested path by analysis factor of taxi recommender system.

4.5.4. MATHEMATICAL MODEL

A. Temporal

$$Average\ waiting\ time(AWT) = \frac{total\ waiting\ time}{No.\ of\ passengers\ geton\ taxi\ at\ that\ place}$$

B. *Spatial*

We are using Grid based clustering approach and divide map into fix squareareas.Then there are four main factors affecting total revenue

T=average waiting time in each cluster,

D=distance between two clusters,

R=average revenue from each cluster,

P=transition probability (passenger get-off/get-on location).We provide two location to location (L-L) graph models,

1. *On-Off graph*

G*on-off* is weighted directed graph used to represent moving trajectories of occupied trips of all taxi drivers.

G*on-off* consist of

$$G_{on-off} = (V, E_{on-off}, W_{on-off})$$

Where,

V = a set of nodes that represents clusters,

E*on-off*= a set of edges that represents occupied trips,

W*on-off*= a weight set of edges represents the number of transitions between clusters.

The transition probability P L *off* /L*on*

L*i*=probability that passengers get on a taxi at cluster,

L*j*=probability that passengers get off a taxi at cluster. An array P *on-off* contains each element P*ij*(*on-off*),which is given by

$$P_{ij(on-off)} = \frac{Num(L_{j-off}|L_{i-on})}{Num(L_{i-on})}$$

Where,

Num(L*i-on*)=number of occupied tripswith passengers who get on a taxi at clusterL*i*

Num(L*j-off*/L*i-on*) = the number of occupied trips with passengers who get off a taxiat cluster L*j* , after getting into the taxi at cluster L*i*. The expected revenue of cluster L*i* for a taxi driver is given by

$$r_i = \sum P_{ij(on-off)} \times r_{ij}$$

Where,

rij = the average total revenue from cluster L*i* to cluster L*j*.

ri = *r* obtained by multiplying the distance from cluster L*i* to cluster L*j* by the unit fare permile.

i. *Off-On graph*

Similar to the On-Off model G*off-on*is weighted directed graph used to represent moving trajectories of cruising trips of all taxi drivers.

G*off-on* consist of

$$G_{off-on} = (V, E_{off-on}, W_{off-on})$$

Where,

V = a set of nodes that represents clusters set,

E *off-on*= a set of edges that represents cruising trips,

W *off-on*= weight set of edges represents the number of transitions between clusters. *The transition probability* P *Lon/ L off*

Which represents the probability of passengers getting off a taxi at cluster L*i* and taxi driver going to pick up the next passenger at cluster L*j* as follows.

$$P_{ij(off-on)} = \frac{Num(L_{j-on}|L_{i-off})}{Num(L_{i-off})}$$

Where,

Num(L*i-off*) =number of cruising trips with last passengers who get off a taxi at cluster L*i*

Num(L*j-on*/L*i-off*) = the number of occupied trips with passengers who get ona taxi at cluster L*j* , given that their previous cruising trip started at cluster L*i*.

C. Simulation

To evaluate the effectiveness of our designed system we split the GPS data set into two sets

1. Training set
2. Testing set

Each data set contain one week of data. We build the recommender system using the training set and validate the precisions of our system using testing data. According to four factors we have described above, S*k* represent the score of cluster *k*, calculated by our taxi recommender, which finally find the best candidate location to seek for the next passenger.

S*k* will be

$$S_k = W_R \times G_{Ri}(k) + W_D \times G_{Di}(k) + W_T \times G_{Ti}(k) + W_P \times G_{Pi}(k)$$

Where,

W*R*= Weight of the avg revenue of each cluster W*D*= Weight of the distance

W*T*= Weight of waiting time

W*P*= Weight of pick-up probability

If these factors weights are equal to one and recommender score S*k* is close to the sum of all weights, the situation is more suitable for our hypothesis of using cluster *k*.

6. CONCULSIONAND FUTUREWORK

We will investigate four factors on recommending taxi drivers the next cruising location. The four factors will be obtained by analyzing the historical data trajectories according to spatio-temporal relation and location-to-location graph models. We can evaluate the stability and reliability of our recommender system using real world data sets. We use grid based clustering algorithm for pick-up/drop-off positions into clusters of fixed size. Specifically, we will partition the map into grid cells of fixed size. We also aim to find optimal weight percentage of those four factors to achieve an efficient recommender system. We adopt greedy strategy that adjust only one factor at a time until our system reaches optimal goal i.e. maximize revenue.

REFERENCES

[1]Yu-Ling Hsueh, Ren-Hung Hwang, and Yu-Ting Chen,"An Effective Taxi Recommender System Based on a Spatiotemporal Factor Analysis Model",

International conference on computing, Networking and communication, Mobile Computing and Vehicle Communication Symposium, 2014, pp.429-433

[2]Nicholas Jing Yuan,Yu Zheng,Liuhang Zhang, and Xing Xie,"*T-Finder: A Recommender System for Finding Passengers and Vacant Taxis*",IEEE Transactions on Knowledge And Data Engineering, VOL. 25, NO. 10, OCTOBER

2013, pp 2390-2403

[3]Ye Ding, Siyuan Liu, Jiansu Pu, Lionel M. Ni,"*HUNTS: A Trajectory Recommendation System for Effective and Efficient Hunting of Taxi Passengers*" , 2013 IEEE

14thInternational Conference on Mobile Data Management, pp 107-116

[4]L. Moreira-Matias, R. Fernandez, J. Gama, M. Ferreira, J. o. Mendes-Moreira, and L.Damas, *An online recommendation system for the taxi stand choice problem (poster)*,in VNC, 2012, pp. 173180.

[5]M. Ester, H. peter Kriegel, J. S, and X. Xu, "*A density-based algorithm for discovering clusters in large spatial databases with noise"*, in the 2nd International Conference on Knowledge Discovery and Data Mining,1996, pp. 226231.

[6] J.W. Powell, Y. Huang, F. Bastani, and M. Ji, *"Towards reducing taxicab cruising time using spatio-temporal profitability maps*", in Proceedings of the 12th international conference on Advances in *spatial* and *temporal* databases, Berlin, Heidelberg, 2011, pp. 242260.

[7]https://play.google.com/store/apps/details?id=br.com.*easytaxi*hl=en

[8]https://play.google.com/store/apps/details?id=com.al*netsystems*.cmshl=en

[9] www.*cabmanagementsystem*.com/67852902926pageNumber3D4

[10]https://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=6785373punumber3D67784 7626sortTyp3DascpSequence26filter3DAND28pISNumber3A67852902926pageNumber3 D7