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Mobile App for Predicting Mobility Patterns of Local Commute in IoT based Cloud

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Abstract

In recent years, public and private transportation has become a very important aspect. Transportation vehicles like bus, train are mostly recommended by local commute people on metropolitan areas. Now a days, the people to travel farther and expand their control over larger areas, but at the same time there are many limitation like providing the vehicles only in shortest region without payment preference. Public transport can be inherently slower due to strongly enforced speed limits during peak hours. In existing system, crowd sensing is difficult to schedule the transportation vehicles during peak hours, in turn the accuracy is very less to analyze the mobility patterns of bus travelers. There are many new innovations and discoveries have been evolved to solve such issues. To overcome the above issues, in our proposed system we are developing mobile application for predicting mobility patterns of local commute. The system is integrated in IoT based Cloud environment to analyze the mobility patterns during real time accessibility. Infrared (IR) Sensor is used for crowd sensing which QR code is scanned and mode of payment will be done through the Android mobile application. In proposed system, crowd-sensing is done through data mining technique such as SVM (Support Vector Machine) prediction algorithm.This classification algorithm enhances the proposed system through online access to analyze the availability of transport more accurately. The system uses the Fire-Base Public cloud platform for data storage and retrieval of data during transportation analysis. The proposed system with real-time technology concept increases performance metrics like reliability, more accurate detection of crowd and reduces the time consumption of the passenger. Finally, this mobile application is achievable in all around the cities.

Keywords – *Prediction; Crowd Sensing; SVM; IR Sensor; Public Cloud; IoT;*

1.INTRODUCTION

Due to the digital trend, in our generation the mobile applications have become a global phenomenon as there is an application for every single activity drives a huge impact of our day to day lives. Public transportation [1] is very important for middle class people in Urban cities [2]. Amongst all the mobile applications present in our vast technological field, the transportation also plays an important role which will help us to reach the mentioned destination efficiently without the hindrance of time and knowledge of the travel pattern. Due to the rising population of our country the technical aspect towards transportation has not been fully introduced. In a new commute management many difficulties are faced by commuters to overcome all these issues ,IoT has been developed for giving efficient solution during normal and peak hours. Technology in the management system includeInfrared sensor for counting the passengers. In an application and database management system QR is used for generating the permitwhere the overall data that has been generated are controlled and stored.

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1.1 Public Cloud

Public cloud computing represents a major fundamental change from the contemporary standards of a corporate data centre to a parameterized network accessible to all the adversaries. Like any new information technology field, cloud computing should be confronted carefully with proper consideration to the sensibility of data. Preparation helps to ensure that the computing system is as safe as possible and in accordance with all applicable corporate practices, privacy is maintained. It also ensures that the department takes full advantage of spending on information technology.

Public cloud has the following four basic characteristics:

Setup cost is Affordable: There are several data center with the most advanced hardware and software in public clouds such as Google App Server or Amazon's elastic cloud computing. This gives you the ability to set up and operate your own cloud infrastructure, which saves you a considerable operating expense.

Independence to Self Service:Public cloud providers have their APIs that allow users to create the cloud on their own by taking their needs into consideration. The only thing companies that want to opt for the public cloud have to do is to access and get acquainted with public cloud portals. You don't want to rely on any support from third parties to build or manage this sort of cloud. You will control and manage it as you will always be the primary proprietor.

Interoperability & High Capability: Public clouds operate on' enough for all ' theory. They enable you to import a big item as you want, and you can always optimize or scale down your storage according to the requirements you set. So, you don't have to think about hikes in price anymore and you're accessible across the board effortlessly.

Firebase public cloud

Cloud storage from Firebase is an efficient, quick, and pay-performing Google scale object storage solution. The Firebase Cloud Storage SDKs apply Google authentication to file uploads and updates for your Firebase software, regardless of the quality of the network. The SDKs can be used for the storage of photographs, sound, video or any other user generated content. You can use Google Cloud Storage to access the same files in the cloud.

Key characteristics of the Firebase cloud

Stable operations: Firebase cloud SDKs handle uploads and updates without considering the capacity of the network. The downloads and updates are stable, which ensures they start where they ended, saving time and energy for your customers.

Solid protection: Firebase cloud SDKs connect with Firebase Authentication to provide developers with powerful and flexible authentication. The declarative protection model can be used to allow access based on the filename, length, type of data, and other parameters.

Scalability is high: If the application goes viral and data size increases, it can be handled in Firebase as it is designed for the exabyte volume. Effortlessly develop from concept to manufacture using the same technology that is used in Spotify and Google Photos.

1.2 Cloud Storage

The data is transmitted and stored on remote storage system using cloud storage which is defined as the service model, in this storage, data is maintained and managed and the data is available to the group of users on the network. Based on the monthly rate and per-consumption the users pay for their cloud data storage. This is the way to save the data for consumer and business people on online so that the users can access anytime and from any location and thus it is easily shared. On the business premises this storage eliminates the need for storage infrastructure necessary hardware and software is

maintained and owned by cloud storage provider. The cloud generally provides services on demand basis which helps the customers to expand their infrastructure efficiently and cost effectively. The technology remains to be an absolute profit to those who need to expand their servers and services. The data storage helps the business people using the cloud storage saves the amount of space and money significantly.

1.2 Internet of Things

This domain refers to the many number of devices that are connected around the world by using Internet for the purpose of sharing and collecting the data. It makes the world smarter and responsive and it also used for merging the physical and digital universe. IOT usually don't need internet and that can independently communicate with the network with the help of human action. Planners will get a better idea by spreading various numbers of sensors around a city or town. By using IOT devices many technology devices use the projects of smart cities including networking companies and mobile operators as a potentially huge area. The data that is in limited amount sends the small devices which includes the existing technologies such as Narrowband IOT and LTE-M that is aimed larger.

1.4 Machine learning

Machine learning is the empirical analysis of computer system's mathematical models and also algorithm for a particular machine. It is considered an artificial intelligence type. These algorithms create a reference that the data is trained to make different predictions or decisions from being specially programmed to do the work. For other systems such as e-mail and computer vision machine learning algorithms are used. Machine learning concentrates more on predicting with computers that is closely related to statistics. The analysis of numerical automation provides the area of machine learning techniques and applications. Data mining also use the same approach but machine leaning mainly focuses on prediction given by the observed principles acquired from training data while data mining focus on discoverer of unknown property.

1.5 Data Mining

In statistics and database systems large data sets is intersected to find the pattern by the process of data mining. In Data Mining ,the raw data is converted into useful information. It depends on warehousing, computer processing and effective data collection. Data Mining involves analyzing large blocks of information to form the patterns. Data Mining predicts the mobility pattern based on the trend and the behavior analysis.

1.6 SQLYog-database

SQL is a graphical user interface tool used for the relational database management system MySql it is been used by more number of commuters worldwide. This SqlYog provides support to the number of commuters through the permit based support system. The records are added, data structure are viewed and the data is exported to the variety of useful formats. Therefore this database adds the Microsoft access to the MySql environment.

1.7 Crowd Sensing

Crowd Sensing [3] is term which refers to group of individuals has such android and computing device which helps to share and collect the data which is analyzed. Most of android devices such as smart phone use sensors for collecting vast amount of data which is mainly used for generating mobility pattern of an individual user. Sensing is mainly equipped for future prediction and present data to be gathered accurately. From the gathered data and bookings of customer the requirements of commute is

sensed accordingly. In our proposed system, from the sensed data commute is allotted for passenger according to their bookings.

1.8 Transportation Analysis

Factors such as safety, speed and comfort decide the appeal of a transportation facility to its customers. Often the cumulative effect of all these variables can be expressed in one specific measure of progress which we will call service quality. A service that offers a high level of customer service is a facility that is accessible easily, efficiently and safely and is viewed by the customers as secure. If theservice levels can be converted into monetary units, instead one determines a generic price (or generalized cost) that can be used for purposes of economic assessment and feasibility assessments. Most of the focus is on estimating the time for transportation it takes for a customer to use a transport service, as one of the key components of the total expense is travel time. Although you cannot reliably calculate the value of travel time by individuals. A fair idea is necessary so one can equate travel time to a standardized amount. The potential to turning travel time into generalized cost and estimate travel time helps one to conduct cost-effectiveness analysis in the design of transport infrastructure by comparing travel time against maintenance and operating costs. This handout provides a number of critical analytical tools to estimate travel time at transport facilities. Both travel services are subjected to stressful rush hours, seasonal changes and long-term patterns. Providing services to meet the peak load is not necessarily cost-effective, because that last increase in space which one would provide to serve the peak would be used for basically zero duration. In this case, one will get practically zero gain per investment unit. In this type of situations, many theory like queuing theory aids analysts by helping them to forecast customer disruptions at transportation services as demand sometimes exceeds capacity.

1.9 Mobility Patterns

Mobility patterns shows us the coverage of crowd in many places which occurs because of the daily happening incidents. Sometimes these patterns are generated in cities and states. They are economically categorized as mono centric and also called as the polycentric. They are also categorized majorly as flows which might be organized or disorganized. Flows can also be classed as key, reflecting main road and transit passageways converging to main work and density areas, and often linking sub-centre as minor ones. Towns with a greater level of public transportation dependence tend to be mono centric with a higher level of coordinated flows, whereas cities that are moredependent on the car tend to be polycentric with a more disorganized flow system.

1.10 Prediction

A prediction is a comment on a potential event. A forecast is always based on experience. The precise distinction between the two concepts is not generally agreed. Various authors and background signify differently. While future events are inherently unpredictable, it can be useful to prepare on proposed changes and reliable details in certain cases. The prediction is a part of the predictive interference of statistics. Each unique technique to certain observations is called predictive interference. However, it may be carried out within one of many statistical interference approaches. Perhaps it offers a way of transmitting information of a statistical sample to the entire population and to other related groups. A theoretical explanation of the results that is not exactly the same as predicted throughout duration.

Crowd prediction [4] is used if the information is collected and aggregated amongst a number of people. This approach is becoming even more beneficial to organisations in a disruptive future. This is machine learning recommendation method. IoT has a lot of work in different algorithms. In this paper we discussed the SVM algorithm, used for the time classification (supporting vector machine).Time for local commuting assignment is graded.

2. RELATED WORK

Geqi Qi Ailing Huang Wei Guan Lingling Fanet. al., [5] "Analysis and Prediction of Regional Mobility Pattern of Bus Travellers Using Smart Card Data and Points of Interest data". This paper discusses about traditional location-based application for commute by using hypertext transfer protocol (HTTP) uploaded to database with fixed-frequency. With the pattern generated from the region has an knowledge on how people gather and depart. In sense of using this open end- credit data (SCD) technology and POI data for a various methodologieswhich also combines the restricted fuzzy logic clustering data and has a simplified generalization factor and artificial neural network for proposed and implemented. The analysis on proposed methodology features an honest performance on estimating the travel patterns supported by the properties associated with. The IFCM would justify it with larger computation probably with time than other advance methods. The system has many advantages like strong interoperability and tiny space for storing. The paper has quite demerits such as no exact accuracy in detecting location and no payment mode is available.

Mohamed K. El Mahrsiet. al., [6] "Clustering Smart Card Data for Urban Mobility Analysis". This paper discusses about the Smart-phones are widely combined with signal receiver it could provide appropriate location of commute. The assorted traces are collected through variety of sources like GPS track, booking database of commute. The provisioning of such suggestions which leads to the arrival of brand recent field in research which is related to modern computing and it also defined earlier. From variety of sources huge amount of details are gathered, combined and analyzed. In urban areas fare collection is made automatic system and adopted universally for managing transaction in all local commute networks. This paper implements new and insensible system for commute location matrix which may new application supported other sensing systems. However, it can also carry out sensing operation without user. We can able to employed mechanism understand employment like bus commute location systemmajorly this system consists of a device and a smart-phone application and cloud database. This paper contain certain constraints such as no particular or relevant to the exposed main work.

Gabriel et. al., [7] "Measuring Regularity of Individual Travel Patterns". This paper discusses about utilization of algorithms for commute complex networks. In earlier proposed travel network uses a variety of Optimization algorithm aims to avoid and reduce link overload. Our concept is balancing the traffic on a particular network by minimizing the most note between us with the tiny path length with the possible routes which is useful in such cases when traffic jamming and when network of jamming into nodecongestion patterns or measured regularly and mentioned as travel pattern. This term travel events which refer to the identical concept into behaviour with the wide connotation. Traveller could be a replaceable unit explaining everyone's travel behaviour which is denoted with variety of notations like unique location and timing wishing onunique space-duration concept, as they modelled mean of point duration in differentiating a individual partand thanks for changes in duration constraints. Individual mobility pattern is characterized into following events which are compared with time and reoffered to a systematic calendar. The demerits are mentioned here as regularity and periodicity which indicates the sequence of events are regularly repeated.

SanamKaziMurtuzaBagasrawalaet. al., [8] "Smart E-Ticketing System for Public Transport Bus". This paper discusses about the final conveyance of buses which are providing services, there is a necessity for reliable system. The foremost important problems that passenger describes are undue, time delay, refunding of balance is not available, negotiating to provide seat-space to the passengers to resolve all these mentioned issues. We proposed an up-to-date system for all the cities it also gives us online booking and seat allocation facilities for the passengers. The wastage of paper could be stopped in-sense it is replaced with modern solution e-booking where the cash usage s reduced. One altogether the challenges faced by today's (IoT) is to perform machine-to-machine communication is based on condition that develops sensors and end devices connected to low signal and trusty for scattered wireless

connections. The disadvantage is it consume much resources and no detailed information is required for participating node and centralized node.

Le Minh Kieuet.al., [9] "Passenger Segmentation Using Smart Card Data" this paper discusses about the travelers who plays a vital role for commute authorities to satisfy the passengers requirements and preference for the commute research board have been published a special handbook for segmentation and also for increasing. For earlier service improvement on existing projects and for the impacts released on the basis of customers within the variance between divisions of passengers with different opinions and behaviors. This paper describes the mobility patterns of passenger by the characterization and segmented using the oscillatory consumer information. This aims to join all the passengers to compare their pattern of travel and for analyzing the results which are being fetched out and it has specific demerits where public transport are not considered as major transportation for people.

Hansi et. al., [10] "Urban Mobility Analysis with Mobile Network Data a Visual Analytics Approach". Earlier the planning of transportation faced a major challenge for allocation of commute in today's world. The sorted out data facilitates various tasks like deriving patterns for characterizing the working of particular city. As we define a special matrix formation for representing a quite good knowledge which might have been analyzed and to navigate interactively. This approach combines data and allows for visualizing with perfect data's and algorithms, further the patterns are analyzed in daily basis regularly across all regions in which user travels. The internet usage of particular data set which is collected and stored as backup. It is vital to enhance the prediction and trustable model which might attract passengers, it also decreases the anxieties of passenger and extremely reduces waiting time at bus stations develops their satisfaction after analyzing the components of commute point systematically, the commute point and time delay at earlier stops are selected because the main input attributes of the model which is predicted. The statistical sample model which supports the historical data of particular time duration. The historical information based model which is in terms of prediction accuracy improvises the arrival time of commute by predicting the travel pattern. The algorithm used in this paper has specific parameters which is hard to set a priority.

3. BACKGROUND

In recent years, public transport can be inherently slower due to which a strongly enforced speed limits. And the same time, crowd sensing is difficult to schedule the vehicles during peak hours which would be a strain to the passengers as they would find it difficult to calculate the time their vehicle will come to our stop. The prediction of mobility patterns in real-time technology concept increases performance such as reliability, more accurate detection of crowd. It is implemented to give a ticketing experience to commuters as well as contribute a cashless economy. The transition is changed from a manual to digital system for accessing the public transport. Thus by implementing the mentioned system, a greater complexity of the transportation and accessibility issues faced by common people are often reduced and people will get benefited out of the proposed system.

4. EXISTING SYSTEM

In existing system, the open end-credit data(SCD) and POI data, has a methodology which combines the fuzzy logic clustering data and artificial neural network. It overcomes the issues in travel pattern, regional separation and prediction. The Travel pattern of commuters derived from 1110 regions, 34 time slots and 7 days of week. The analysis and results predicts the outcome as best performance on predicting the geographical travel patterns. Taking in account of both geographical pattern and travel patterns, the divination of geographical pattern can also be implemented. These achievements are not only for specific divination also for human travel patterns, it supports the proof and trust in planning the best commute management board.

4.1 Issues in existing system

In existing system, as compared to the individual travel pattern we pay less attention on the travel patterns of local areas. However the travel patterns at geographical areas can provide more wider and best knowledge about the commuters gather or depart from the region, which is essential to the planners and managers to conduct regional arrangement and control. In the future time, the travel patterns of passengers from urban areas can also be changed. An effective travel pattern divination method is required for accessing the long term effect of land and structure of geographical region.

4.2 Limitation of existing system

The limitations in existing system are as follows:

- No Accuracy of mobility pattern.
- As it is local mobility, there will be many drop zones for the members as compared to national mobility pattern.
- In the existing pattern they would have used Cloud server to save/load the history of mobility pattern and passenger count.

5. PROPOSED SYSTEM

The proposed setup focuses on analyzing the mobility patterns for real time accessibility then we are developing mobile application for predicting mobility patterns of local commute and integrated in IoT based Cloud environment. It helps in accessing the service provided by the cloud service provider efficiently and it also helps to identify the best services so that the user can be able to access the proposed system efficiently.

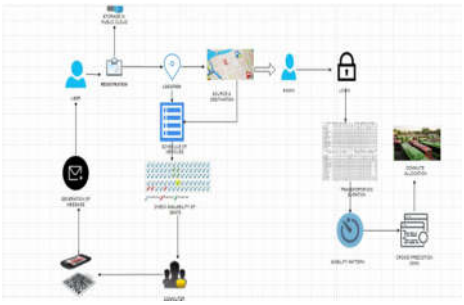

Fig. 5.1 Architecture Diagram

The Figure 5.1shows the architecture diagram of the proposed system. The overall process involved in developing a mobile application in order to access the storage and computation services. The user will upload all the personal information to the allotted storage space. The storage services help in identifying the best services for processing the application. The analysis enables to perceive the performance of the proposed system over the existing system. This system architecture helps any user to identify the overall process that has been carried out in the system. The storage space provides data integrity. The proposed system comprises of the following modules namely:

- Creation of Public Cloud
- Creation of Data Storage in Public Cloud
- Crowd Sensing using SVM
- Transportation Analysis using Mobility Patterns
- Prediction using Transportation Analysis
- Accessibility and Performance analysis

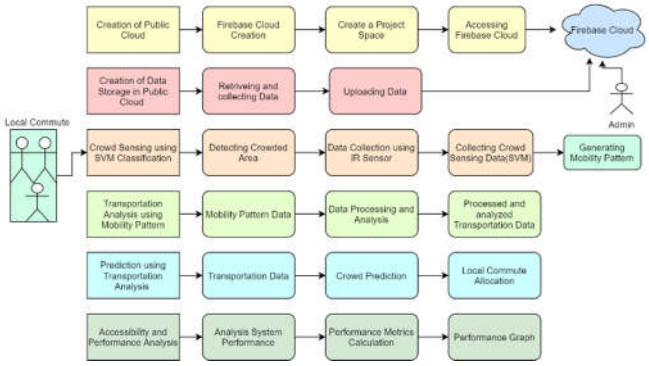

Fig 5.2 Block Diagram

The above Figure 5.2 depicts the proposed system which indicates the different structure involved in the working system. The first block is the creation of public cloud which creates the firebase and the project space for accessing the firebase cloud. The second block is the creation of data storage in public cloud which retrieves and collects the data of the user and uploads the data in the firebase cloud. The third set of block is the crowd sensing using SVM classification which detects the crowded area. The fourth set of block is the transportation analysis using mobility pattern which forms the mobility pattern data then data will be processed and analyzed. The fifth set of block is the prediction using transportation analysis. Once the services are accessed, the users can access reliable via internet services. This block diagram helps the user to analyze the process involved in the application efficiently.

Operational Workflow Diagram

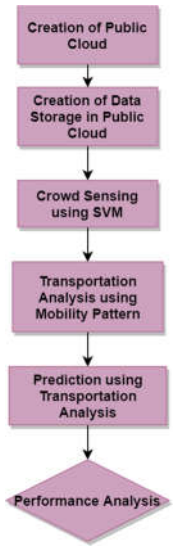

Fig 5.3 Operational Workflow of Mobility Pattern

In the following Workflow diagram, it explains the detailed description about the application and its process. Public cloud for the creation of data is conducted to retrieve data from the user database the data is collected and stored on the cloud according to the information in the first level. Thirdly, the collected data can be submitted to the firebase cloud for long term access. For each fixed time period, the data will be analyzed. The data would later be stored in the primary database and then it is transferred for permanent storage and convenience to the firebase cloud server. SVM algorithm for crowd sensing displays a phase in which the collected data passes through IR sensor. When using this sensor, the number of passengers in the vehicle can be acquired after all the seats are filled and passengers will

receive the route pattern to reach their trip on their smart phones before starting on a journey. Transportation process using mobility pattern means the process in which users can obtain details like journey path, vehicles information, ticket price, travel times and passenger headcount travelling along with the user. Analysis is done from the database and the mobility pattern is created for each individual user. The data for transportation analysis is finally processed. Crowd prediction is done from the analysis and time slots, commute is allotted accordingly. This system is feasible easy to access for all the user, performance is good.

Sequence Diagram

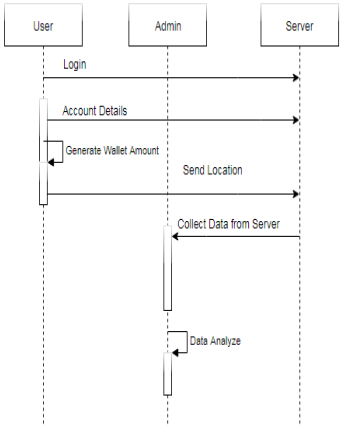

Fig 5.4 Sequence Diagram for Booking Local Commute

Sequence diagram is a diagram of how to work which messages are sent and when. The artifacts involved in the process are mentioned in the sequence of messages from left to right. According to the diagram given below, It has 3 objects namely user, admin and server. The user has to login to admin and server by giving account details as a request to admin and user. The user generates wallet amount and the sends the location to the server. Admin collects the data from the server as a response. Finally the admin analyze the data.

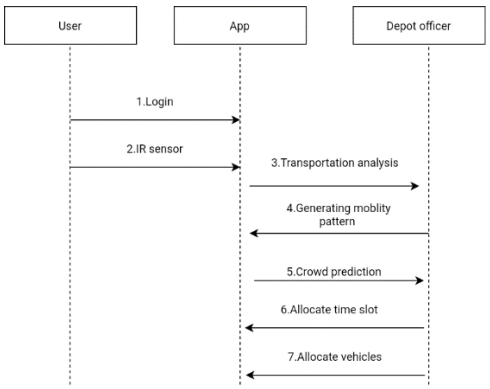

Fig 5.5 Sequence Diagram for Transportation Analysis

According to the sequence diagram given above, It has 3 objects namely user, Application and Depot officer. Initially, the user has to login to the application. User will be scanned by IR sensor and sends a request. Then the application generates a transportation analysis to Depot officer and sends a

response to the application that the mobility pattern is generated. Further the application predicts the crowd and sends to Depot officer and allocation of time slots and vehicles is sent as response.

5.1 Creation of Public Cloud

The Figure 5.2 depicts the creation of public cloud. It start with default settings of goggle analytics to create a project. To start a project database is primary resource which is much needed for storage. This is to be implemented as it can be remembered. As this is based on "Firebase" Cloud unit, it is deemed to be useful in helping both mobile and web app based area. Once finished the portal towards firebase cloud is created and we can access it and utilize its full capacity thereby ending the procedure of creating a public cloud.

Fig. 5.6 Creation of Public Cloud

5.2 Creation of Data Storage in Public Cloud

The Figure 5.6 illustrates Creation of Database in Public Cloud is done as a process for retrieving the data from the user database based on timings, bank details, user ID's, travelling history, priority bookings list, permits generated for the travel and field access restriction scales. Then all the data based on their details from the first step are collected and saved on the cloud. Thirdly these data collected are then uploaded on to the Firebase Cloud for access it in the long run. The data's will be reviewed for every particular time period which is fixed. The data will be stored in primary database later it will uploaded to the firebase cloud server for permanent storage as well as for convenience.

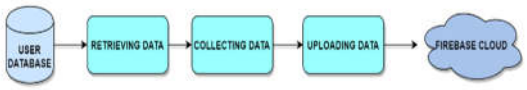

Fig. 5.7 Creation of Data Storage in Public Cloud

The Figure 5.8 shows data storage in SQLYog-database.

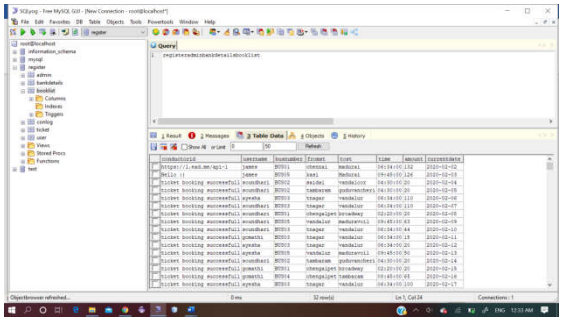

Fig. 5.8 Data Storage in SQLYog-database

5.3 Crowd Sensingusing SVM

In Figure 5.9shows Crowd Sensing using SVM. The process explains where the data being collected goes through IR Sensor. With the use of the sensor, we will be able to acquire the number of passengers in the vehicle. Once all the seats are filled and before starting towards the journey ahead, the passengers

will receive the route pattern taken to reach their journey in their smart phones. Once the total data has been processed, the head count will be then intimated to the Chief Officer. The above process also supports time classification which is to allot the vehicles according to their respective time slots in case more buses are required then, it is deployed to the spots where more than one vehicle is required.

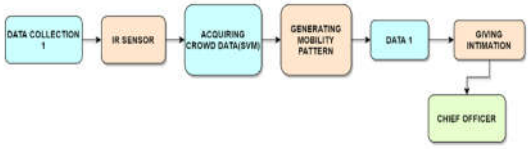

Fig. 5.9 Crowd Sensing (Using SVM)

Algorithm 1 –Crowd Sensing using SVM

Input: n (number of commuters), max_iter (maximum number of iterations)
Output: Local best solution for commute
Steps
1.Defines the function f(x)
x= $(x_1, .., x_d)^t$; // d is position dimension
2. Initialize parameters n, max_iter;
3. Initialize a population of commuters x, (i = 1, 2,…, n)
4. Calculate the intensity for each x by f(x)
5. Set t→0; // t - transportation entity
6. while (t <max_iter) do
6.1. for i=1 to n //All n source commuters
for j=1 to m // All m destination commuters
if($I_i > I_j$)
-Move commuter I towards j; in all d dimensions;
-Evaluate new solutions
6.1.1 for z = 1 to p // p duration
if ($z(p_1)$ == hh:mm:ss&& $z(p_n)$ == hh:mm:ss)
Allocate buses
end if
end if
end for j
end for i
6.2. Rank the commuters and find the current best
6.3. Set t ←t+1
end while
7. Repeat the steps 5 & 6
8. Return the local best solution for commute

5.4 Transportation Analysis using Mobility Patterns

In Figures5.10 (a) &5.10 (b) describes the transportation analysis using mobility patterns is the process where the user will get all the details such as travel route, Vehicle details, price of the ticket, commute timings and headcount of passengers travelling along with the user. Once the passenger enters the vehicle the IR sensors will sense the headcount and it will be intimated through the application to the chief officer and updated to the database. From the database, the analysis is made and the mobility

pattern of every individual user is generated. Finally, the data is being processed for the transportation analysis.

Fig. 5.10 (a) Transportation Analysis using Mobility Patterns

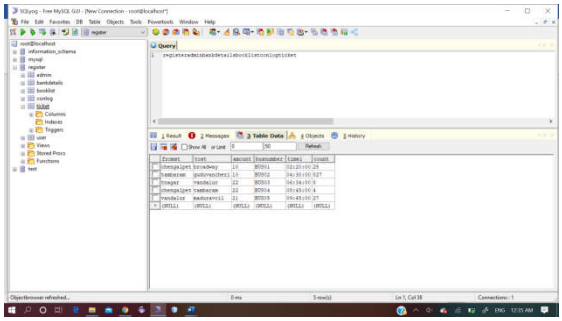

Fig. 5.10 (b) Mobility Patterns

Algorithm 2–Transportation Analysis

Step 1: Setting of goals - Analyze the mobility pattern to give a result for transportation.
Step 2: Setting priorities for measurement - Classified pattern is taken and priority for measurement of transportation is set.
Step 3: Data Gathering - Data are gathered from the prioritized data for cleaning.
Step 4: Data cleaning – Find amends or remove any incorrect or superfluous data in the gathered crowd data.
Step 5: Analysis of data - Cleaned data is taken and analyzed data are taken place for transportation.
Step 6: Result interpretation - The data are interpreted and will be useful for future prediction.

5.5 Prediction using Transportation Analysis

The Figure 5.11 depicts the Prediction using Transportation Analysis process is about when the user books the ticket, the booked ticket data is one among the many in the booked list of transportation analysis which is deemed to be the crowd prediction. From the database, the transportation analysis is made for the future prediction of crowd the acquired data from the analysis is used for commute allocation.When the commuter travels to the same place for 1 week or about 1 month it is indicated in the crowd prediction. After analyzing the numbers based on the prediction, extra buses will be provided after 1 month.

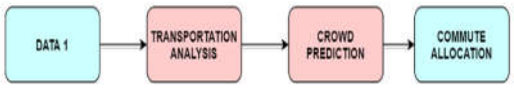

Fig. 5.11 Prediction using Transportation Analysis

Algorithm 3 - Process of Crowd Prediction using Transportation Analysis

Inputs: n (number of commuters), i (Number of days)

Output: Local best solution for commute
Steps:
Procedure taskgraph(V,E)
i←1 to 30
whileI_i←30 do
graph ←taskVertex(i)
n ←count(commuters)
whilen==0 do
ifcommutervertex(n)==graph then
graph ←commutervertex(n)
end if
graph ←addedge(commutervertex(n),
dayvertex(i))
end while
end while
end procedure

5.6 Accessibility and Performance analysis

The Figure 5.12 shows the accessibility and performance analysis metrics such as data integrity, detectionaccuracy and storage analysis of proposed system. The performance of different modules are defined and analyzed to provide effective results by comparing with the existing and the proposed algorithm in the application. The following performance metrics is used for accessing the proposed setup with prevailing techniques. The analysis of the process involved in creating and providing the services to the customer.

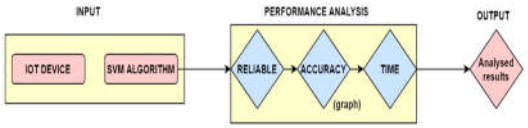

Fig. 5.12 Accessibility and Performance analysis

Data Integrity-The data which is stored in the cloud storage is highly secured.
DetectionAccuracy-The mobility pattern of commuters will be predicted accurately.
Time complexity (Time allocation)- The time required for processing the data in the database and thus storage services are identified.

6. EXPERIMENTAL RESULTS AND DISCUSSIONS

6.1 Experimental Setup

The proposed system framework has been implemented by utilizing the software like, Eclipse (ADT-Bundle) for creating android application , Net Beans IDE- creating webpage backend design is made by using JDK , My SQL interconnecting database and performed in SQL-yog, The connection between the database, application is performed with WIFI module, IP configuration. The complete setup is deployed in windows 10, smart-phone, 64-bit operating system with 4GB RAM high end hardware configurations implemented using IR sensor.

The proposed system mainly focuses on allocating local commute by developing an android application which helps in accessing the best services for the users. The data gets stored-in, it can be

accessed through all the networks. Thus the proposed system is implemented with high secured storage, theft free and providing good solution. The following figure 5.13, 5.14, 5.15, 5.16 illustrates the proposed working system.

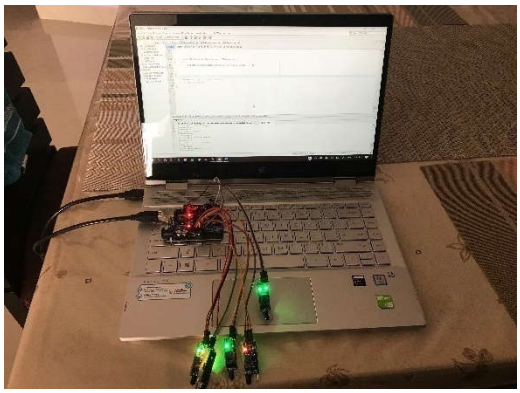

Fig. 5.13 Working Model

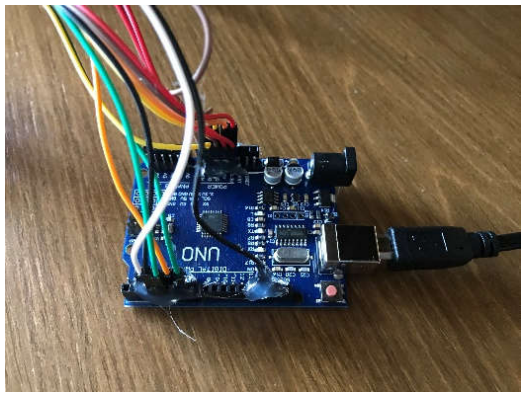

Fig. 5.14 Arduino UNO Board

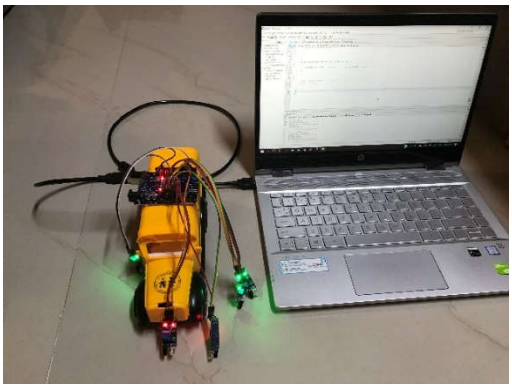

Fig. 5.15 Experimental Setup

Fig. 5.16 Infrared (IR) Sensors

6.2 Experimental Results and Discussions

The performance of various parameters such as data integrity, detection accuracy and storage analysis have been refined and analyzed to provide effective results as compared with the existing system.

6.2.1 Detection Accuracy (%)

The Figure 5.17 illustrates the accuracy in detecting the crowd (passing ers) based on the accessibility (bookings) of the user as compared with existing local commute and proposed local commute mobile app prediction. X-axis indicates number of accessibility (bookings) and Y-axis indicates detection accuracy of the proposed system. The availability of the commute which is on increasing rate. The accuracy rate depends on the crowd detection and the travel pattern is taken in account for deriving the transportation analysis. On the basis of analyzing the routes and bookings a graph is generated. The SVM classifier algorithm is used for classifying the data and for allocation of commute. The x-axis explains about the detection accuracy of crowd on daily basis and the comparison may be get hike or reduced based on the no of working days and vacation. The y-axis depicts the no of accessibility of the user. Compare to the existing local commute system, in proposed system the detection accuracy is more by analyzing transportation and mobility patterns using SVM classification algorithms.

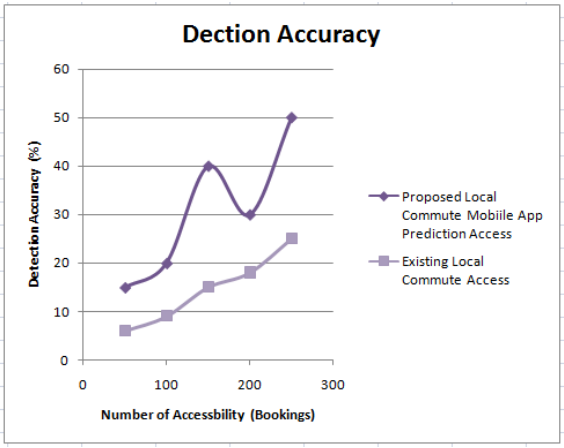

Fig. 5.17 No. of accessibility Vs Detection Accuracy (%)

6.2.2 Prediction Accuracy (%)

The Figure 5.18 shows the graph for Mobility Patterns (number of routes travelled) Vs Prediction Accuracy percentage as compared with existing local commute and proposed local commute mobile app prediction.. It describes the accuracy in predicting the crowd (passengers) based on the mobility

pattern (Noofroutes travelled) by the user. The X-axis indicates mobility pattern of the user who travels in the route on regular basis (the preference of user may be changed accordingly). The Y-axis explains the about the travel pattern of user and prediction is derived for the future analysis. When the user books the ticket, the booked ticket data is one among the many in the booked list of transportation analysis which is deemed to be crowd prediction.

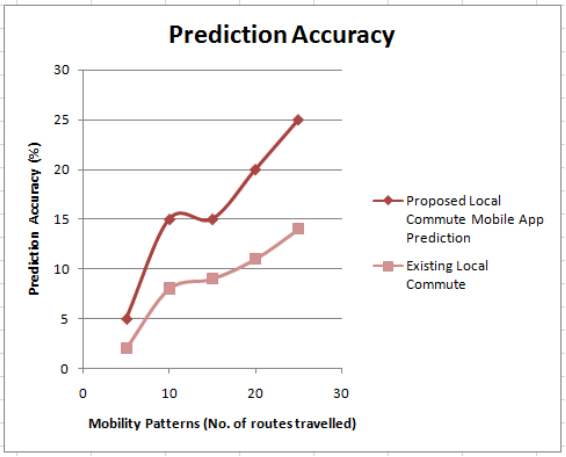

Fig. 5.18 Mobility Patterns Vs Prediction Accuracy

6.2.3 Time Allocation (mins)

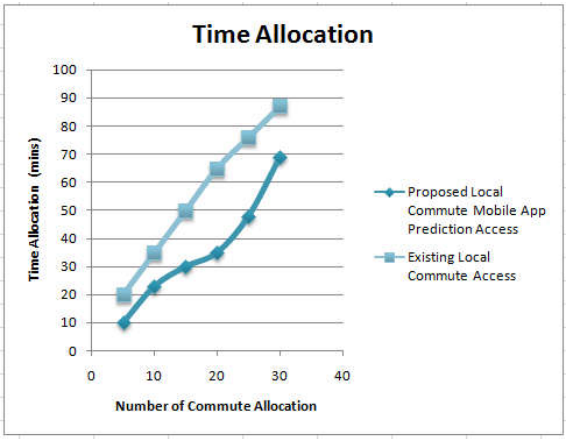

Fig. 5.19 No. of Commute allocation Vs Time Allocation

The Figure 5.19 shows the graph forNo. of Commute allocation Vs Time Allocation as compared with existing local commute and proposed local commute mobile app prediction.. Here, time allocation indirectly references to time complexity of the proposed system. It explains the time classification which is to allot the vehicles according to their respective time slots. The time allocation process is done by using SVM classification algorithms. In case more commutes are needed to be deployed to the spots where more than one vehicle is required.

6.2.4 Number of Accessibility Vs Growth Rate

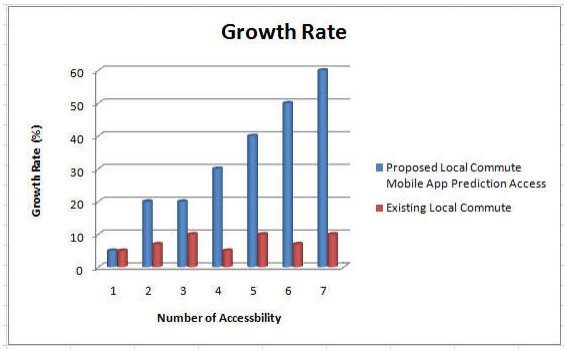

Fig. 5.20 Growth Rate

The above Figure 5.20 shows that system growth rate of existing and proposed system. The growth rate is compared with number of accessibility of transportation analysis. Compared with exiting local commute access the growth rate is increased by implementing transportation and mobility patterns accessibility using support vector machine classification algorithms.

6.3 Experimental Results – Mobile App

The Figure 5.21, 5.22, 5.23, 5.24, 5.25, 5.26 and 5.27 shows the mobile application experimental results.

Fig. 5.21 User Login and Registration

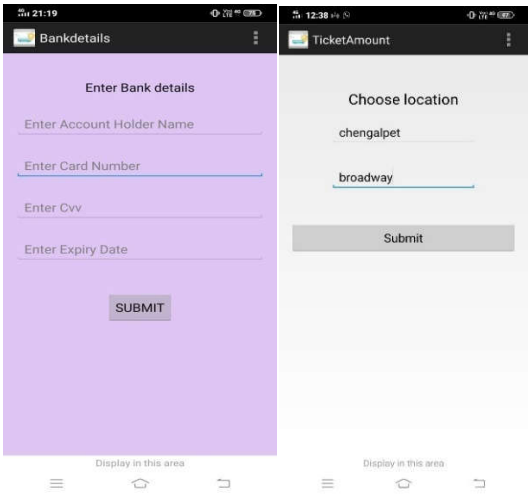

Fig. 5.22 Transation Details

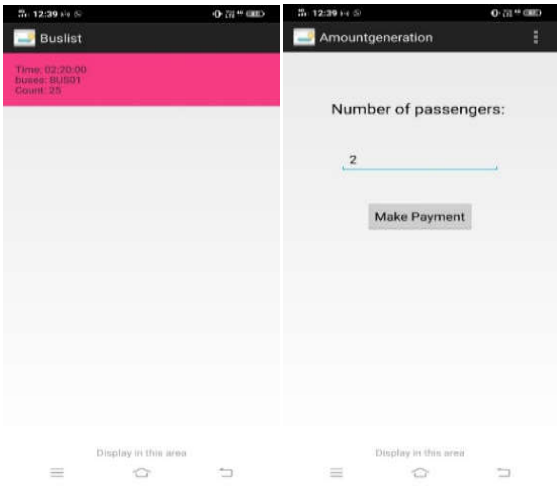

Fig. 5.23 Transportation Analysis

Fig. 5.24 Local Commute Access

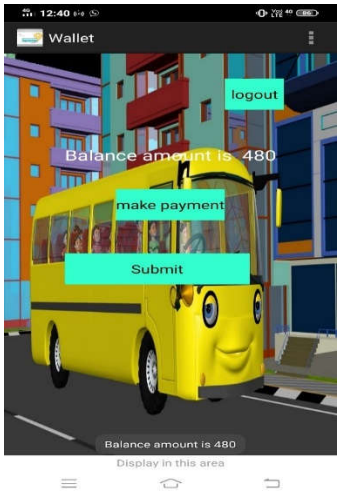

Fig. 5.25 Digital Payment

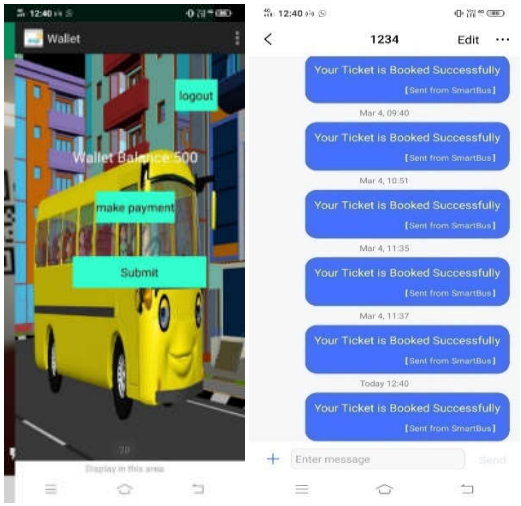

Fig. 5.26 Message Notification

6. CONCLUSION AND FUTURE WORK

6.1 Conclusion

Cloud storage is the technology which is based on the demands as per the user's requirements. In cloud storage, the digital data will be stored in logical tools which is defined as model of computer data storage. The role of cloud storage provider keep the data accessible and available to the environment. From on premises location to cloud the virtual machines images are copied using cloud storage. In the existing system the mobility pattern of regional areas are compared individually. The proposed work will help us to change the mobility pattern for the urban commuters. This system helps to achieve the data integrity, accuracy and time which is compared with the algorithms. Our proposed system is to develop the android application and focus on analyzing the mobility patterns in real time accessibility for predicting the local commute. The services of cloud storage are selected accordingly that helps in identifying various optimization techniques between them. The overall system helps in providing the android application to the user which is to make use of the services efficiently.

6.2 Future Works

The future workswill be implementing the following advancements in mobile application:

- Currently, we have generated fewer travel patterns for this prototype beta version further we plan on updating it in real time local commute.
- In current work, the proposed system have initiated a ticketing system using the basic gadget, which is user friendly, and it can be accessed by all the users in future and live tracking []of commute on the regular basis.

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