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An Efficient Crowdsourcing Application for Smart Cities

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Abstract— *A crowd sourced app for citizens of Metros and other big cities like Pune. User can update traffic for current location, suggest alternate route, and check traffic updated by other users. User can set notification alert for different locations on a specific time. User can search, add nearby places such as Bus stop, Post office, parking area, later on we can add how much parking space available or some other info like that. The application will have normal question answer forum; we can think about giving some reward points for every activity under this section. IReport is to raise a complaint to PMC or electricity board or police, officials etc. through our image uploading interface. In this survey we present the technologies used in the different phases of our Application.*

Keywords— Citizen forum, Crowd Sourced App, Nearby places, Report System, Smart Cities, Smart Transportation, Traffic Updates.

I. INTRODUCTION

Government is now leaning towards making our cities smart which is the demand of time and with every aspect the definition of smart city is different . Fulfilling the demand of making cities smart deals with huge areas of application and for that multiple applications are being launched which aim to ease the life of the citizens but they just tend to make it even more difficult. Here we have presented the idea where our single application encapsulates all the modules which are required and are essential for making our cities smart. If we look at the current scenario where in India itself, with a population of 1.252 billion possessing 23.4 million motor vehicles in 2014-15 (Apr-Mar) this figure enlightens the necessity to manage the traffic with so many commuters, free flow traffic is the demand of time in densely populated cities this is the main aspect to concentrate on for our application. Various applications are available to show the optimal path but the main drawback is the efficiency, the path given by various applications are prone to lack of updating or the working is slow which leads to false results. Here our application has been proposed to have multi-layered inspection so as to deliver efficient result as fast as possible with high speed functionality.

Now towards our second module which deals with the importance of places to reach out at the time of emergency, nearby places that plays crucial role at the time of urgency where with multiple option for hospital , bus stops , petrol pumps the one which is nearest and easily reachable is our priority which is served by our application.

We deal with an important aspect stating the two way communication between the citizen and their ability to rectify and validate the traffic .The facts tell us in India there are 340.2 million android application users. We use these many people's review to validate our updates with priority given to genuine citizens.

The last thing we are incorporating in our application is how can our citizens directly interact with government bodies, how to identify if the officials are working upon it or not. For this purpose we are Developing online

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Complaint Management System for the citizens to raise their grievances. It is supported by tracking of the status and a tracking id is given at the time of lodging the complaint. This complaint can also be accompanied by picture to identify the originality of the complaint.

All these modules are binded together in our application to provide citizen a sleek and efficient highly functional with cloud servers.

II. SMART CITY DEVELOPMENT

The principle of Smart City development is to make everything perfect such that there smart and balanced coordination between environment in which citizens work, live and play. Smart city works in coordination to manage the things spread in haphazard manner. Our research focus is how to deploy an efficient transportation system which is the backbone of India according to findings, 49% of respondents in India spend at least 12 hours (half-a-day) or more than 100 minutes everyday driving their cars. It is demand of time to regulate proper flow of traffic so that it saves money, time and energy of citizens.

The smart city development pyramid in Fig. 1shows our planning for how to make our city smart the bottom layer , layer 1 emphasis is on to change our current transit system which is tedious and lacks coordination , discipline just because of so many traffic junctions , lack of patience in citizens , failure of traffic signals which ultimately lead to chaos. Here we deal with the idea to provide citizens with accurate facts and figures about the route and hence suggest the optimal path for the commuters.

The layer just above the bottom i.e. layer 2 plays crucial role in drafting the city as a smart which shows the important places which are close to your location that is something is very important in today's world of busy life where people barely have time to know there neighbors they merely explore things nearby but at the time of emergency they about help less how to reach nearby places that is the high time when we don't know whom to contact and this application is the one which serve our purpose easily by showing the nearby places just by a single click.

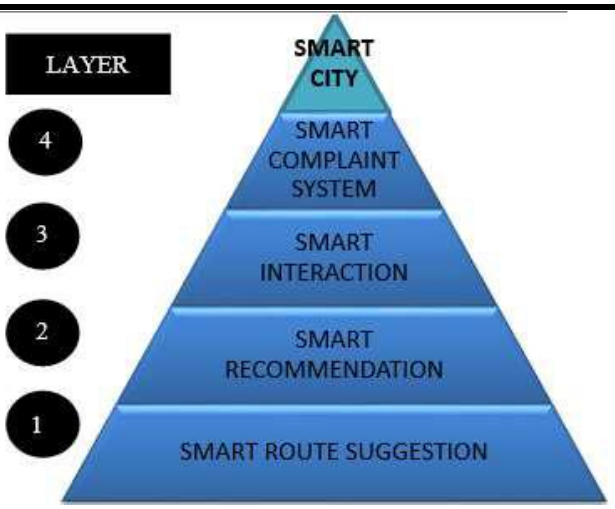

Fig. 1: Smart city Pyramid

The third layer from bottom i.e. layer 3 focuses on the way to have two way interaction many places are unreachable to suggest the optimal path and calculate traffic at the same time we can not 100% trust on the data received over internet but the citizen if updates the traffic himself we can absolutely trust them and rely upon them provided the citizen is genuine. Smart city development just not depends on the government it's the responsibility of each and every citizen to contribute to it without which the objective of making a city smart is not possible.

The next layer above citizen interaction i.e. layer 2 is very important to make a city smart that is how the citizen can communicate with the people in power , how can we tell our grievances to the official so we have drafted a complaint subsystem where the citizen can upload there complains and that complain would be directly forwarded to respective department and a tracking id will be generated so that the complainer should keep track of the processing of the complaint.

All these 4 layers are the most important aspect of our research are 4 modules which we will be discussing further and they constitute for developing a smart city.

III. COMPONENT

1. Database : Database is an organized collection of structured and unstructured Data. This is the backend. All the information will be stored in Database. In this survey we have used the following Database Management Systems:
    a. MySql :MySql is relational Data base management system.
    b. MongoDB: MongoDB is a free and open source cross-platform document-oriented database program. This database management system is used for unstructured data and also classified as

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NoSQL. MongoDB uses JSON like documents with schemas.

2. Database handler : It is on the server side which is responsible for fetching the data from database and supply the data for processing, it is basically responsible for communicating data between the server and user.
3. Cloud computing : Cloud Computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand.
4. Cloud Server: Cloud Servers are same as physical servers but the functions they provide is different. When we opt for cloud servers ,clients are rented virtual server space rather than renting or purchasing physical servers.
5. Application Development: This is the Front end. Application development uses Android Studio. This Stage consists of four modules:
   a. Traffic Updates: Updates regarding the Current traffic will be given to the users. Users can also update the traffic.
   b. NearBy Places: This module will help users in finding the nearby places within certain range of distance.
   c. Citizen Forum: This module will deals with the Questions and Answers of the users. It is like an interactive session for the citizens.
   d. Report System: This module deals with the raising Complaints of the citizens to the respective officials.

IV. SYSTEM ARCHITECTURE

Overall system is partitioned into two major design units.

- In-Device unit (Smartphone GUI)
- Processing System (Server)

4.1. In-Device unit(Smartphone GUI)

In-Device unit is nothing but this is the unit through which we can obtain the location of the device, this unit is responsible for collecting vital information i.e. Source ,Destination. This is the front end of our model which can interact with the user and user can feed their information in it. The indevice unit is complex in designing as it has to display all the features of our application providing an attractive interface to the user.

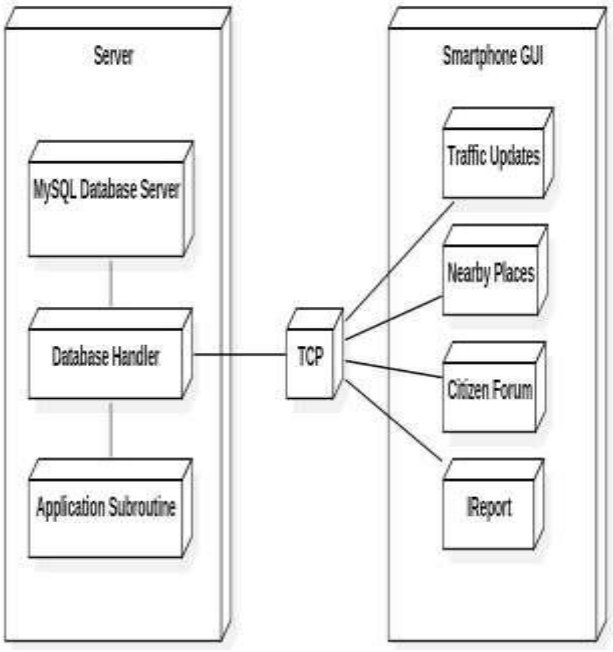

Fig. 2: System Architecture

Smartphone GUI contains traffic update unit which sends the source and destination information to the server so that server can further process this data to suggest the optimal path as shown in the fig 2.

Nearby places interaction with the user is to compare with the current location or to search for some other location and what is required if nearby hospital, police station or petrol pump etc. is required.

Citizen forum is where user can suggest the traffic update for a particular road/area or user can rate other user for their updates as per the reality if the update by user is authentic or fake.

Ireport System gives user a forum where user can feed the complaint area wise to a particular department which can be complemented with picture for authentic complaint.

4.2. Processing System (Server)

Server side processing lies on the cloud server which is highly efficient, it provides higher processing speed and ultimately leads to faster results. Server mainly fulfill two aspects which are database creation ,database management and processing of the data.

Server basically has MySQL/MongoDB Server for storing the data if the Database is MongoDB then data is stored in Collections which is to store unstructured data that is large in volume whereas when the data is structured it is stored in MySQL Database in the form of tables this data is not huge in volume.

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Then it consists of Database Handler whose prime job is to handle the database this is mainly responsible for communication with the application, it is the one which extracts the data from the application and insert the data into the application .Database handler does not work for processing of the data it rather its job is of insertion and extraction of data.

The third component Application Subroutine it is responsible for actual processing of the data where data is extracted from Database and an appropriate algorithm is applied to produce the result of each module.

V. SYSTEM DESIGN AND IMPLEMENTATION

Our research is based upon 4 modules which are 4 pillars of our model that are:

a. Traffic Updates(Finding Optimal Route)
b. Suggesting Nearby Places
c. Citizen interaction Forum
d. Report/Complain System

The actual implementation and system design of these modules has been explained further in the paper.

5.1. Traffic Updates (Finding Optimal Route)

In this module the user will first insert the source and destination of his travel. As shown in fig 3 the endpoints of the travel will be determined. The waypoints between the source and destination will be determined. Then the traffic between the waypoints will be identified using the speed of the vehicles. If the speed is low then high traffic else low traffic. Then the A* algorithm will be applied to find the optimal route. This optimal route will be displayed to the user.

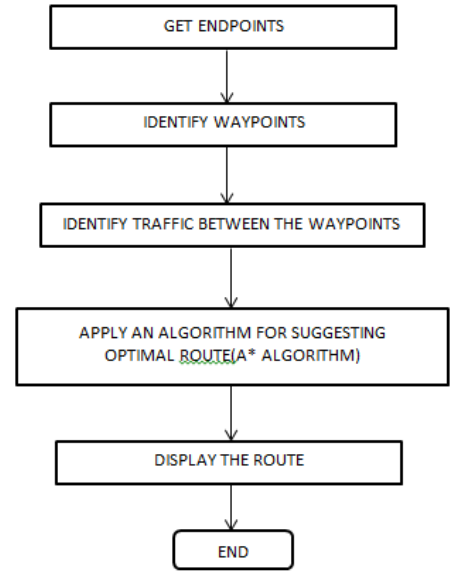

Fig. 3: Traffic flow diagram

5.2. Suggesting Nearby Places

In this module we have considered four domains for our nearby places Hospitals, Bus Stops, Police stations, Parking lots. We will be storing the locations in the form of latitude and longitude of all these four domains of nearby places in our database. Now, we will be using Haversine's formula to calculate the distance between the users location and other places. Haversine's formula is used to calculate great circle distances between two points on sphere using latitude and longitude. Once we calculate the distance between the user and the other place of interest, we will compare whether this distance is within the range of a certain given distance(say 1Km).If it is within that range that particular place will be displayed else it will be discarded. If no places lie in that particular area the next nearby places from the array will be chosen. The flow of this module is shown in fig 4.

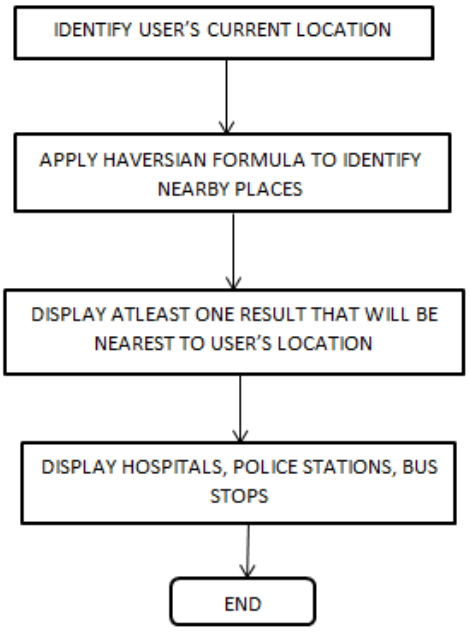

Fig. 4: NearBy Flow Diagram

5.3. Citizen Interaction Forum

In this module citizens will post questions and can answer the questions posted by other citizens. The posts that citizens will post will first be checked whether it is about traffic updates or other than traffic updates. If it is non-traffic updates post then it will be posted as it is. If the post is about traffic update then we will identify the route the user wants to update about. If the given information regarding the traffic matches with our database then we will update the information else we will check the rating given to that user, if it is greater than 4 then we shall update the traffic else discard it.The rating is basically give us information or it is the measure of authenticity of the user who tries to update the traffic at the end if we get to know

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that the user is genuine then we can make changes in our database else we will just ignore. The flow of this module is shown in the fig 5.

This module basically use NLP that is natural language processing for reading and analyzing the textual data inserted by the user. Here we process the data entered by user to distinguish between user's comment and user's traffic update after identifying we progress further to act in order to get the result.

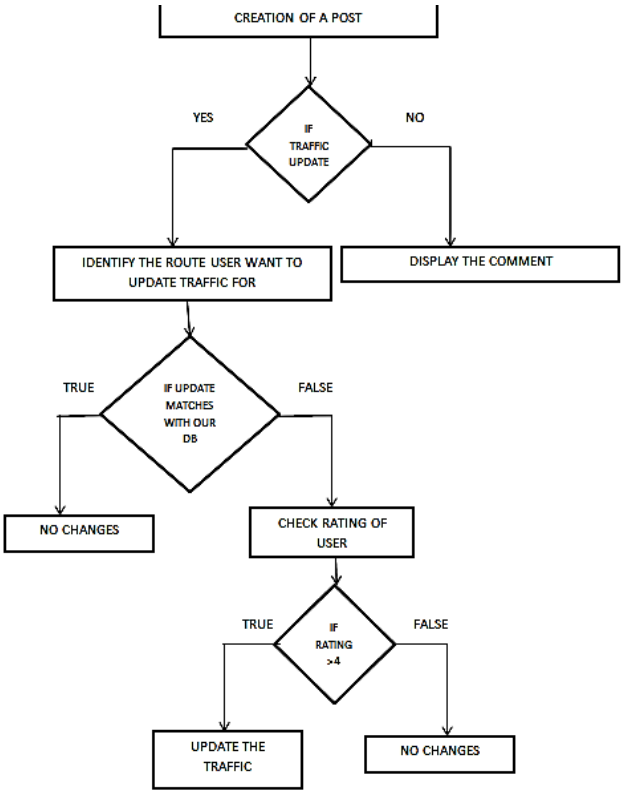

Fig. 5: ICitizen forum flow diagram

5.4. Report/Complaint System

In this module the user will lodge a complaint regarding the problems related to the city which will be divided into domains like Road and Transport, Garbage problems, Water and Sewage related problems. The user will have to enter the area name, its pin code and the department to which it has to be forwarded. The user can also upload the image if required as his complaint. The tracking number will be generated and given to the user. The user can further check the complaint raised by then has been taken into consideration or not and also they can check the status by using tracking number. The status of the complaint will be updated to the user as 'Registered' , 'Received ' and 'In Progress'. The flow of this module is shown in fig 6.

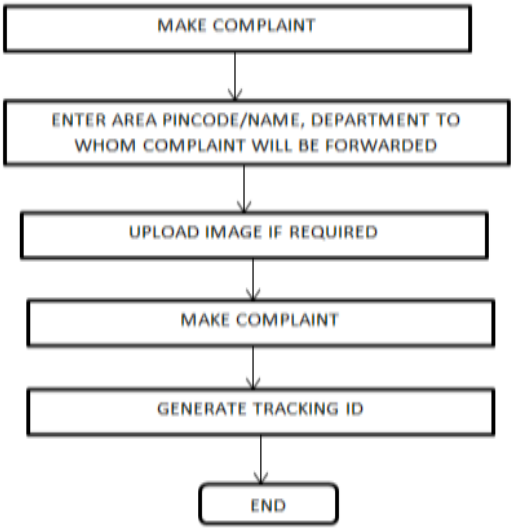

Fig. 1: Ireport flow diagram

VI. CONCLUSION

This Survey helps us to solve the problems faced by the citizens of big cities where population, traffic, searching places, lodging complaints, forum for interaction ,etc. is actually a problem. We thus create such an efficient crowd sourced app which will solve these problems to a great extent. We have thus stored all information of citizens as well as the locations in the database using MongoDB. We have also built our servers in the cloud by using amazon web services cloud platform to make use of cloud computing and cloud storage. Thus we have studied about the system design of this crowd sourced app.

REFERENCES

[1] Intelligent Traffic System: Implementing Road Networks with Time-Weighted Graphs Hatem F. Halaoui
[2] Maziyar Shariat Panahi, Peter Woods, Harold Thwaites, "Designing and Developing a Location-Based Mobile Tourism Application by Using Cloud-Based Platform".
[3] Salam Doumiati, Tarek Al Choikani, and Hassan Artail, "LPS for LBS: Location-Privacy Scheme for Location-Based Services".
[4] 2009 International Conference on Computational Intelligence, Modelling and SimulationSmart City Components Architecture Mahmoud Al-Hader
[5] Information Retrieval : Improving Question Answering
[6] Systems by Query Reformulation and Answer Validation Mohammad Reza Kangavari, Samira Ghandchi, ManakGolpour

https://dx.doi.org/10.22161/ijaers/scei.2017.5 *ISSN: 2349-6495(P) | 2456-1908(O)*

[7] 13th COTA International Conference of Transportation Professionals (CICTP 2013) A Totally Astar-based Multi-path Algorithm for the Recognition of Reasonable Route Sets in Vehicle Navigation Systems