Smart Traffic Monitoring using Naive Bayes Algorithm

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ABSTRACT: Now-a-days, Traffic Management is a severe issue faced by the city. Everyday there are more than thousands of traffic rule violations. To solve this problem an application is designed in Android. This application will store the data like number plate and license number of the convicted person. It works on client-server application model to map Traffic Police to RTO Server model. All this data will be stored on server side in the database. Further, the category of the crime committed is selected. This will generate an automatic amount of the fine. The main aim is to automate the traditional process. Using this system we can track the traffic police location to check whether they are present in their respective allocated areas. Since, the proposed system is digitalized and Android based, it will serve as handier tool and convenient alternative mean for Traffic Police. Thus, these error-free records could be addressed as and when needed. Further the data collected can be classified using Nave Bayes algorithm.

KEYWORDS:GPS system, wireless network, traffic management system, client-server model, Naive Bayes algorithm.

I. INTRODUCTION

The current traffic management system relies on pen and paper management of the people violating traffic rules. The new system will be automated, consisting of a real time android application which will generate particular results. The traffic management system provides Traffic Incident Detection, and real time Traffic Flow Metrics statistical analysis. Smart Traffic Monitoring can integrate traffic management and smart roadway systems.

This application will store the data like number plate and license number of the convicted person. It works on client-server application model to map Traffic Police to RTO Server model. All this data will be stored on server side in the database. Further, the category of the crime committed is selected. This will generate an automatic amount of the fine. The main aim is to automate the traditional process.

Using this system we can track the traffic police location to check whether they are present in their respective allocated areas. Since, the proposed system is digitalized and Android based, it will serve as handier tool and convenient alternative means for Traffic Police to register complaints on the server side against the people who violate the traffic rules. Thus, these error-free records could be addressed as and when needed.

The result generating from the data can be mined and traffic analysis can be done. Also, the data from the obtained datasets is classified using Naive Bayes algorithm.

II. RELATED WORK

There are few projects which have implemented traffic police assistance system. However, the system only helps to track the location of other traffic police officers. It offers no assistance regarding the violation of rules and other details. Android application is more user-oriented. It discusses a breadth of applications which range from towing vehicles, location of police station and traffic rules. However, it has no provision to generate e-receipts (notification to the user). There is GPS technology to locate the potholes and further lodge the complaint. The analogy can be seen between the location of potholes and the location of traffic police officers. The area of concern has been divided in blocks for ease of administration. The officer's location can be monitored using the GPS location technology. A feedback has also

been implemented to alert the officers regarding their positions. For this the data needs proper organizing. Hence by using the feedback from the Global Positioning System, the complaint lodged will automatically be saved in the required location. Also building an android application on eclipse and get it runs on emulator. Android has now become the most popular mobile operating system in the world. It has more users, more smart phones and more tablets worldwide than any other mobile operating system. The Google Play Store provides various applications supported by android operating system. The basic idea of building an android application on eclipse and making it available to the end users through Google Play Store has been there. The client-server architecture with the development in technology, web based system are becoming most popular in our daily lives. Moreover, the web based applications are not only limited to computers but also opened to different kind of intelligent devices like smart mobiles. The client-server architecture involves the communication among the clients and the server through some communication channel. The client is a one whose request is satisfied by the server which stores the data in its database storage system.

III.PROPOSED ALGORITHM

A. *Design Considerations:*

- Android Operating System and device having version above 2.2
- Online Server
- Java
- PHP
- Android Studio

B. *Description of Proposed System:*
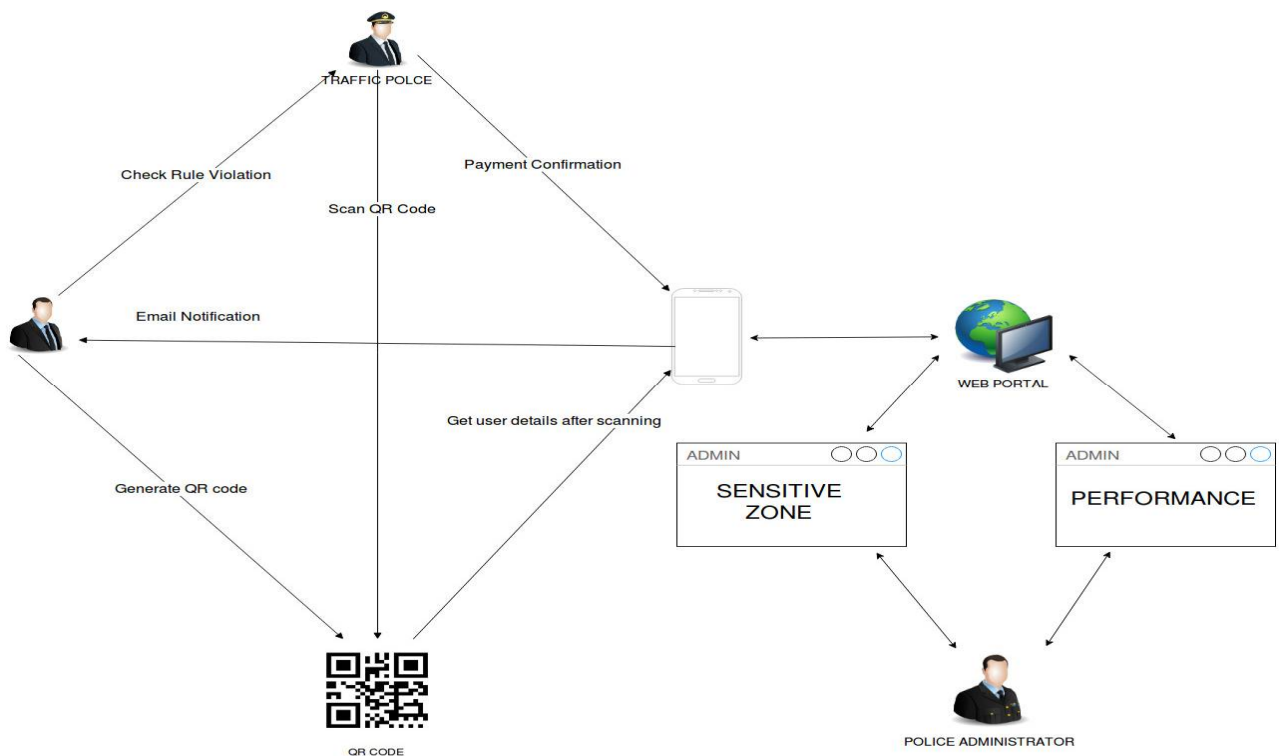
Architecture diagram of proposed system
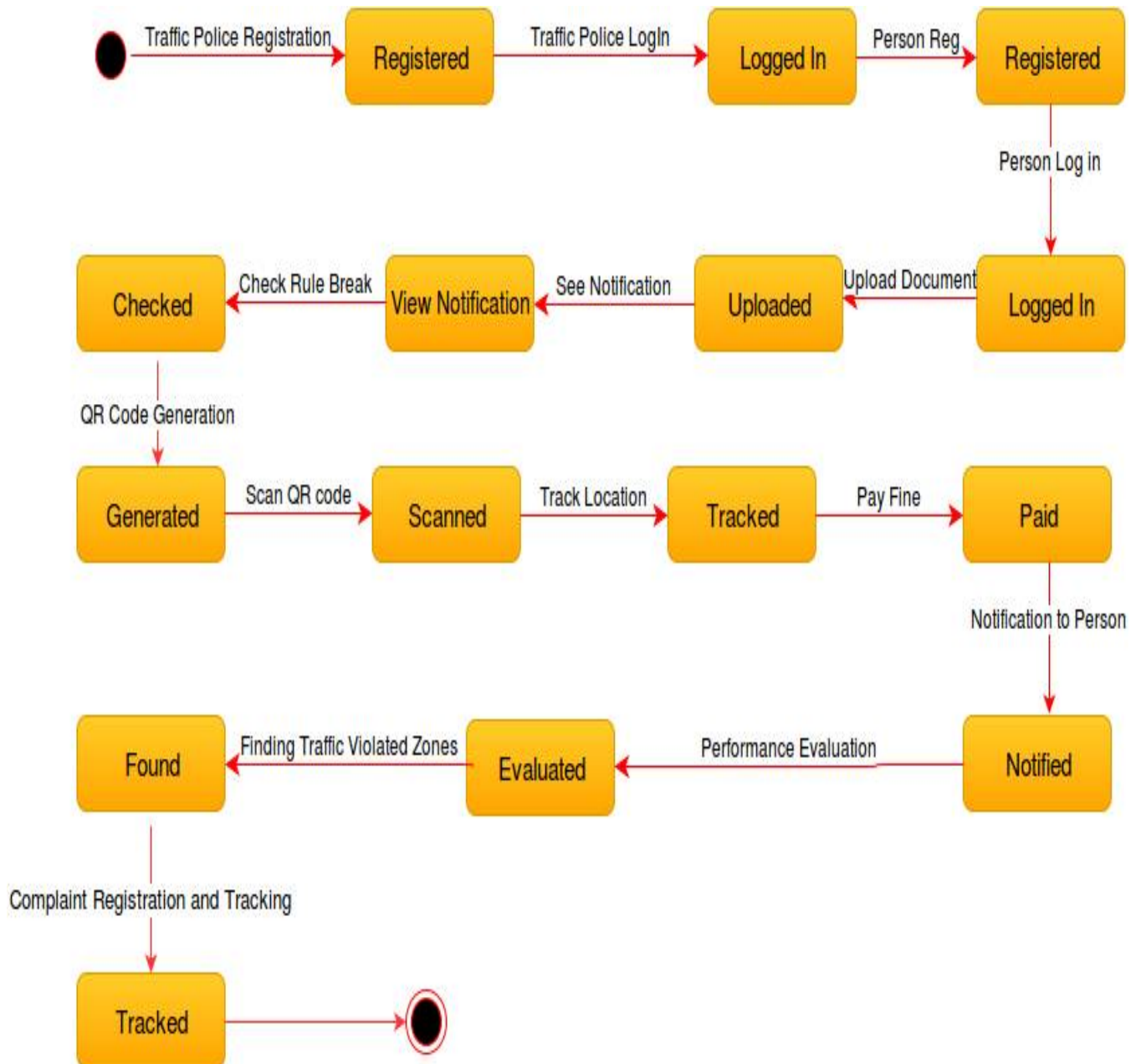
C. *Methodology:*

Figure 2. Flow diagram (Methodology) of proposed system

Every license holder will register to RTO with information including License number, Personal details consisting of name(as on license),Age, Gender, Address, Photograph and Bank account details.. All the details will be encrypted and stored in RTO database which acts as the server. Also every Traffic Police will have to register by giving his details and will be allocated an unique no. Every day the traffic police will log on from his duty location and log out after he has finished. Whenever traffic police catches the person for traffic rule violation or for checking the person has to open the application. QR code is generated which consists of his details which he has already submitted to RTO. The traffic police will open his android application and scan the QR code. On scanning a drop down menu will occur. The traffic police will select the rules violated from this drop down menu and automatic fine will be generated. The generated fine will be deducted from bank account of the person and will immediately get an email notification. Email notification will include his details the amount of fine deduced from bank, id of police, location of violation of rule, types of rule violated. Further this structured data will be classified using Naive Bayes algorithm. The area's will be divided into zones and the zones with violations above threshold will be classified as sensitive zones. Precautions and measures will be taken for sensitive zones. Also which type of rules are violated on large scale will be classified for taking necessary actions. Also tracking the traffic police location to check whether they are present in their respective allocated areas is done. The result generating from the data is used for finding the performance of police.

IV. MATHEMATICAL MODEL

$S = \{I, P, O\}$
Let S be proposed system which is represented as

Input $I=\{I1(u,pw),\ I2(l,pw)\}$

u=user email
l=admin login
pw=password

Processing $P=\{P1,P2,P3,P4,P5,P6,P7\}$

where,
P1=Check license no of user
P2=Upload documents (P1 U P2)
P3=QR code generation Q(Q U P1)
P4=Fine collection FC
P5=Email notification to user
P6=Upload documents by admin
P7=Check sensitive zone and police performance(P7 U P4)

$P=((I\cap (F\ U\ P1))\ U((I\cap (Q\ U\ P3))U((I\cap(P7\ U\ P4))$

Output O =$\{O1,O2\}$

where,
O1=Sensitive zone (O1 $\in$ P4)
O2=Police performance (O2 $\in$ P4)

V. RESULTS

A. *FINE COLLECTION :*

On scanning the QR code the police officer will receive license no and then further select the rules violated and on entering the vehicle details the police will collect the fine and user will receive an email notification of it. The fine collected will be directly reduced form users bank account.
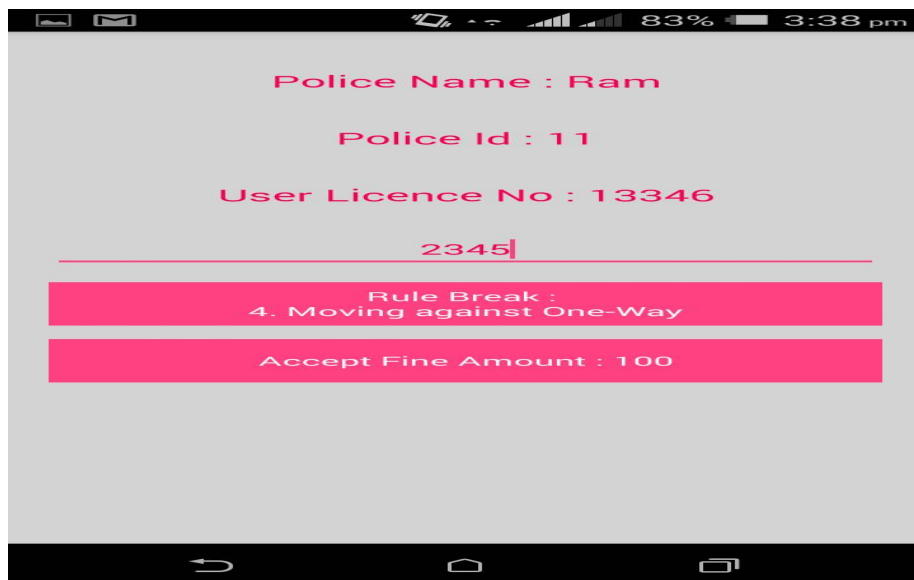

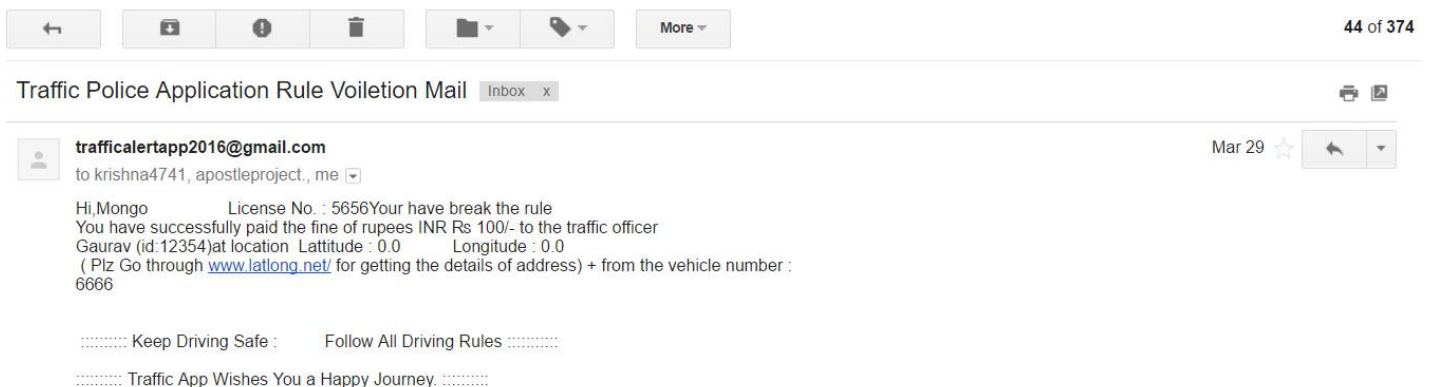Figure 3.1 Traffic Police accepting fine amount

Figure 3.2 Email Notification

B.   *SENSITIVE ZONE IDENTIFICATION:*

Naive Bayes classification is applied on collected data The police administrator checks which zone is highly sensitive and classifies them under most fine collected zone and most rules violated zone.

Figure 3.3 Sensitive area amount wise in latitude longitude form

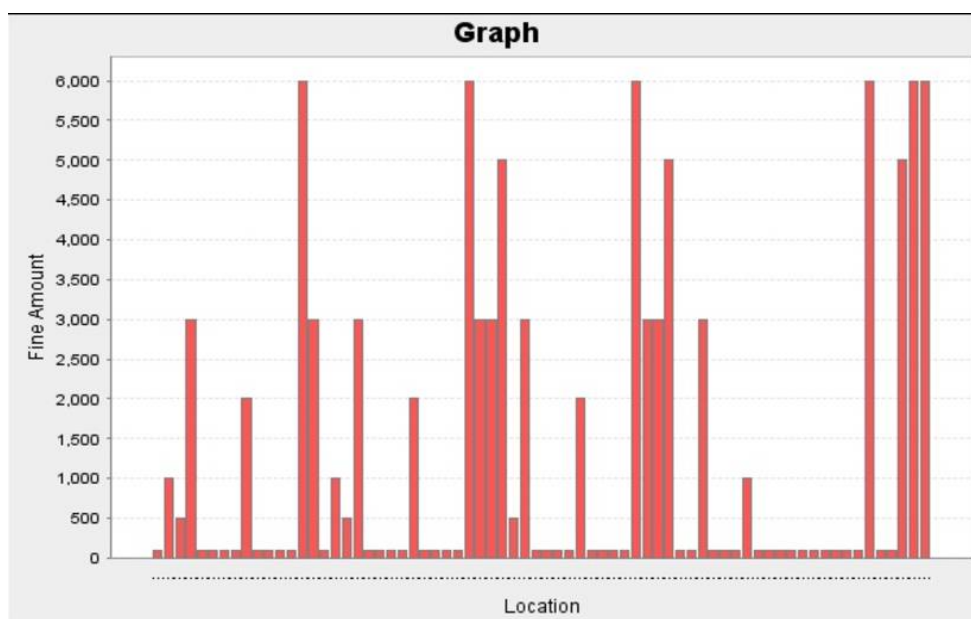Figure 3.4 Sensitive area rule wise in latitude longitude form

Figure 3.5 Graphical representation of sensitive area

C. *POLICE PERFORMANCE ANALYSIS :*

Police performance will give the details for traffic police including the no of actions taken and the area where it was taken denoted by latitude and longitude. This will tell the police administrator the performance of every traffic police officer on all locations.

Location Wise			
Action Taken	Police Id	Latitude	Longitude
12	12354	0.0	0.0
42	12354	18.6709655	73.8295923

Figure 3.6 Performance of police for an allocated area

VI. COCLUSION AND FUTURE WORK

This paper will definitely help the police system in making the police work more efficient through equipping the police with modern solutions aiming to ensure solutions and means for the police officers that support their main activity and it will be interesting for audience in the context of law and order situation in our country. The main intent of this project is to upgrade police administration to the world standard by using modern information and communication technologies. This project has also provided facilities of RTI act, link verification and encryption algorithm that will help validate users identity as well as secure document given by user. This system developed is a miniature of what can be done with the usage of GPS technology, since cost being a constraint for further advancement, it provides the users a wide variety of applications by using a basic GPS receiver which is costing less. Thus the implemented system can pave way for developing other systems using high end GPS receivers with lot of new features and advancements, so that applications such as vehicle tracking..

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