

# Forecasting Traffic Congestion and Traffic Reduction using Big Data Analytics



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**Abstract:** *Traffic Jam has been one of the worst problems in the Country. Traffic Jams are leading consumption of enormous amount of Time, Energy and Money. Even though various traffic avoiding techniques are implemented, we are not able to reduce the traffic due to growing intensity of vehicles. Hence, there is a requirement for alternate method to overcome this traffic congestion. In this paper, we are implementing a separate lane for public transport by allotting a separate lane for them and to monitor the traffic we are using Artificial Number Plate Recognition camera which can capture the vehicles number plates and can store in database which can also be used as Real Time monitoring of traffic. The public will also be notified by sending them a message to use public transport so that they can save their time and money.*

**Keywords:-**ANPR, Bigdata, Congestion.

## I. INTRODUCTION

Traffic now has become a major problem in almost all the countries. In the Countries like India and U.S. at least, approximately more than 5-6 billion hours are wasted, more than 3 billion gallons of fuel are wasted which costs billions. [1]. Situation in other big countries across the globe is not very much different. There is a very much need to avoid these growing intensity of traffic. The countries are implementing enormous efforts to overcome this problem by Building additional Highways, Deviating to other roads etc[10]. As the Growth of Metropolitan cities have been increasing day by day the growth of vehicles in these metropolitan cities are also increasing. So, there is a need to monitor the traffic management. The present traffic management is of signal based which is not dynamic and yields poor result. The existing timer based traffic systems are not able to control traffic congestion effectively. Nowadays the management of traffic is really inefficient. The major reason for this is because of the poor traffic prioritization. , There is a need to reduce the time consumed is traffic by finding alternate means of solution. Allocating separate lane for public transport. Installing ANPR cameras in each and every traffic signal. Gathering information of each user of private transport with the help of ANPR camera in all signals.[2].

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Storing the details of the user of which all the signals the user is passing repetitively on regular basis. Notifying the user through an SMS informing him that he can save time, energy and fuel if they use public transport

In this paper we are developing an alternate approach to overcome the traffic congestion First,

we will be allotting a separate lane for public transport. then, gathering the information of the vehicles by tracking the vehicles based on their number plates by using Automated Number plate Recognition camera(ANPR) which is capable identifying number plates on the signals by using Optical Character Recognition(OCR) Technique which is technically artificial vision mechanism. , When car approaches the signals these camera will identify the numbers on car plates and stores in database. So, from the database we will be able to retrieve the car owners information .In each signal in the similar way vehicles will be tracked and their information will be stored in the database if vehicles pass through the same signals regularly we will find their source and destination and we will notify them with an alert message informing that the user can reduce an particular amount of time if he/she is using the public transport.

## II. SYSTEM DESIGN

The First thing this paper focuses on allotting a separate lane for public transport it is the main focus to monitor the traffic in real time Mechanism we will be using Artificial Number Plate Recognition Camera.

### 2.1 ANPR Software Design

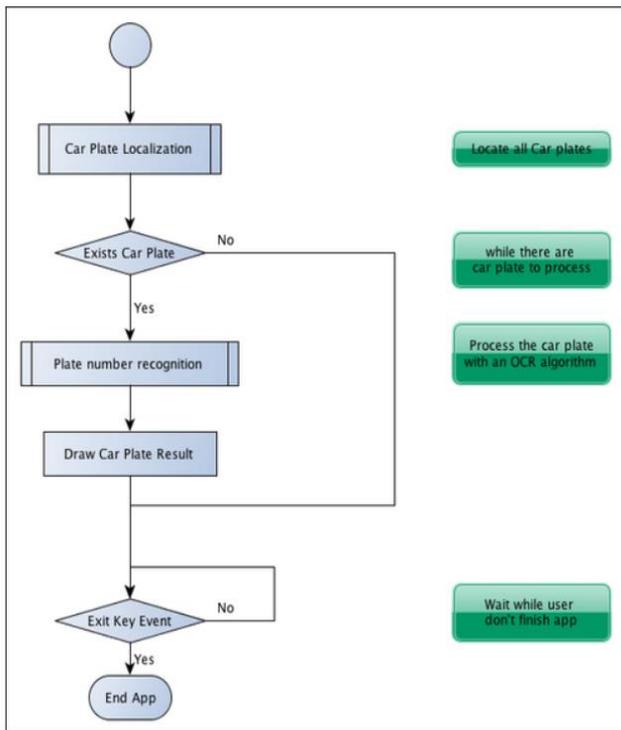
The following Fig.1 contains ANPR Camera, which is specifically built to work in Real Time Conditions. It has the capability to capture, store and identify specific number plates based on user instructions. ANPR software not only identifies the number plate but it is also having the capability of locating time, date and place of the black listed car it also helps to identify quickly in case of theft, kidnap or rules violation of black listed car. A good graphical user interface will be designed efficiently for use of Database of number plate [3].



**Fig 1: ANPR System Architecture**

## 2.2 Algorithm Design

The ANPR has 2 different phases they are Plate detection and Plate recognition. Plate detection means it has to detect the exact plate location in the whole car within its camera frame. Automated Number plate Recognition camera (ANPR) which is capable of identifying number plates on the signals by using Optical Character Recognition (OCR) Technique which is technically an artificial vision mechanism which determines the alphanumeric characters present on number plate [4].



**Fig 2: ANPR algorithm.**

## 2.3 Plate Detection

In Plate Detection we have to detect the characters on the number plate within its camera frame. So we have two steps to do this task, we divide the tasks into two main steps they are segmentation and classification of segments.

In the segmentation process we need to perform morphological functions, applying of contour algorithms and finally validations to get image parts that have a plate. [4]

In Classification, we have to use Support Vector Machine (SVM) classifier for each and every image. Next thing is we have to train so that it has to identify the vehicles with number plate and vehicles without number plate then we can create application. We use parallel front view color images which are of 800 pixels wide and which is taken 20–40 meters from a car. These things are very much important to ensure the quality of true valued segmentations. Detection is performed by using multiscale image algorithm.

## 2.4 Plate Recognition

Next step is number plate recognition which focuses on retrieving the characters from the number plate with optical character recognition technique.

When the number plate is detected for each character in number plate segmentation will be done for this process we will be using Artificial Neural Network (ANN) which is a machine-learning algorithm [5].

Steps involved in algorithm.

- A. **Preprocessing:** In this phase the RGB image matrix will be converted into gray scale image in order to lower its color levels. This entire thing should be done before segmentation after this the result which we get will be having noise and it should be removed using Gaussian blur filter [5].
- B. **Segmentation for Number Plate:** Since it is a very long process [6] the system does the work here, the image will be divided into different parts. Next, the horizontal edge of number plate is detected then the image is thresholded using Otsu algorithm [7]. Finally, image is converted into binary image.
- C. **Morphological Processing:** Here the operations like close and open are performed which fill all the disjoint spaces which is the process of dilation and erosion.
- D. **Contour Analysis of Number Plate:** There is a minimum rectangle for each contour which is calculated then this obtained rectangle that is number plate size is passed through the aspect ratio if any rectangle exceeds that aspect ratio will be discarded.
- E. **SVM (Support Vector Machines):** This is responsible for detecting and recognizing of Indian vehicle number [11]. SVM will be trained by giving more than 540 positive and 350 negative samples of number plate of different types and colors and these trained data will be safely stored for future access and analysis [8].

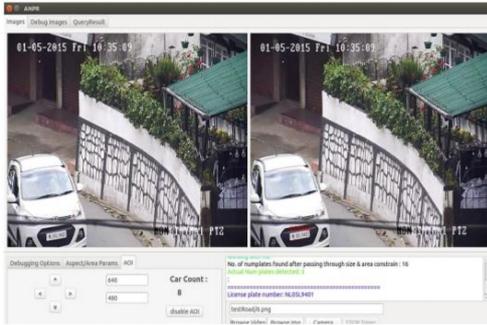


Fig 3: Detecting Indian number plates by using SVM.

- F. **Character Segmentation** :- Once the SVM fetches Indian vehicle number plate the image is undergone histogram equalization and next the image is thrush holded. Next, it will give binary image of black color with characters written on it with white color.
- G. **Contour Analysis for Characters**:-Here, We will analyze the characters which are present inside the aspect ratio[13]. The characters which are present outside the aspect ratio will be rejected and the remaining left over is cropped from the image of number plate. The number plate will contain company logos, screws those will be discarded and gives the require results.
- H. **ANN (Artificial Neural Networks)**:-These are used to estimate the functions which depend on large number of inputs which are generally unknown. This ANN is mainly used for prediction of characters on number plate [9].

### III. SOFTWARE FEATURES

The code used in ANPR camera can be mostly python which is the efficient programming language for this implementation. The software has real time data analyzing capability which can detect the specific car based on the user input and will provide real time status of the traffic. The camera recognizes and immediately stores the data in the database so the information can be retrieved any time when user needs and messages can be sent directly to the vehicle owners directly.

### IV. IMPLEMENTATION OF COMBINING THE FEATURES

In this system we will be gathering the information of the vehicles by tracking the vehicles based on their number plates by using Automated Number plate Recognition camera(ANPR) which is capable identifying number plates on the signals by using Optical Character Recognition(OCR) Technique which is technically artificial vision mechanism. When car approaches the signals these camera will identify the numbers on car plates and stores in database. So, from the database we will be able to retrieve the car owners information .In each signal in the similar way vehicles will be tracked and their information will be stored in the database if vehicles pass through the same signals regularly we will find their source and destination and we will notify them with an alert message informing that the user can reduce an particular amount of time if he/she is using the public transport. We can also deviate with the help of these camera by measuring the traffic density in particular

locations and we can deviate the further incoming vehicles to other routes containing less traffic.[12]

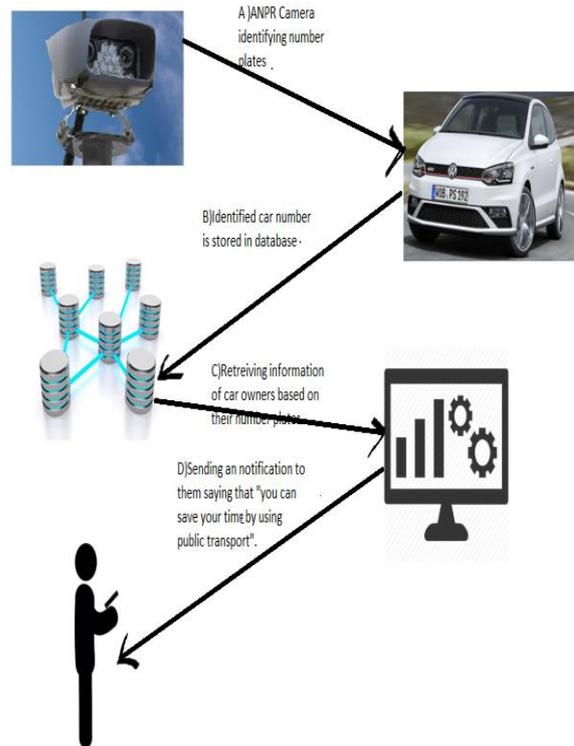


Fig 4: System Architecture

### V. CONCLUSION

The traffic density can be reduced by allotting a separate lane for the public. To monitor the density of traffic ANPR camera will play a prominent role. It helps in identifying vehicle and their owners based on its functions it also helps in real time monitoring ANPR Camera provides High quality videos also so that It will be helpful in identification of theft, kidnap Traffic rules violations etc. So, by notifying the public, if public uses public transport the traffic problem will be reduced. Not only this in case of theft, Kidnap, Traffic rules violations, the ANPR camera helps in detecting the blacklisted vehicle is real time.

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