# FANCY NUMBER PLATE IDENTIFICATION 

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#### Abstract

The Identification of Indian vehicles by their number plates is a very challenging research topic for a long time. The number plate recognition technology is used to identify the model and shape of the number plate of a vehicle. The license plate contains information about the Vehicles trajectory and the vehicle's unique identification. The license number plate is used for numerous motives like tracking of number plates by traffic police, for the analysis of theft cars, parking management of vehicles, and toll nakas, etc. Optical Character Recognition (OCR) is the technique that is used for the recognition of the character of vehicle number plate. As technology is getting advanced day by day, there are many aspects of designing the vehicle number plates. Fancy Number Plate Recognition (FNPR) is the technique that use in the recognition of fancy number plates of vehicles and identifies the Registration Number Formats set by the RTO and the Government. We captured an image of a vehicle number plate by using a camera and by processing the image and predicting whether the number plate of the vehicle is fancy or not. If a fancy number plate is detected then send the complaint to the RTO Section. There are also several ranges for reducing criminal activity like stolen vehicles, the black market of vehicles, illegal number plate style as well as the system will be implemented on the entrance of security control at government areas, military zone.


Keywords: Fancy Numbers, Image Processing, Number Plate Recognition, Segmentation.

## I. INTRODUCTION

Fancy Number Plate Recognition (FNPR) is an advanced image processing technology that uses efficient algorithms to recognize the number plate of a vehicle from real-time images. The main objective is to design an efficient and cost effectual system to detect fancy number plates and to register complaints of the vehicles
which have fancy number plates. Firstly, the system detects the type of vehicle and then captured the image of the front view of the vehicle by a camera.

The plate containing characters is segmented. The purpose of the system is designed for gray-scale images conversion so it detects the number plate regardless of its color.

Characters are segmented from the vehicle number plate by using template matching. The incoming image trim of all white spaces and edges is done on the image. The comparison between the resulting numbers which are available in the database and gives information about the vehicle number plate type. And also give them information about passing time, the passing date, and stores information in the database to maintain the records of the vehicle.

The automatic Number Plate Recognition System (ANPR) was innovated in 1976. Vehicle Number Plate Recognition is an image processing that describes the extraction of vehicle license numbers plate from digital images. It consists camera which takes the images of a vehicle, finds the location of the number plate in the image, and then segmentation the characters by using the template matching method. The system translates the pixel value of the license number into numerical or string. Vehicle Number Plate Recognition (NPR) system can be used in many areas like speed enforcement and motorways, automation of parking lots, toll plaza, etc. The earlier method is used for plate color information which detects only single-color number plates or uses a selected color search algorithm that's computationally expensive or uses a man-made neural network that involves complex mathematics. The proposed Vehicle Number Plate Recognition System is efficient color independent so that it can run in real-time employing a normal desktop PC and may recognize various standard number plates such as Transport Vehicles (Yellow), Non-Transport Vehicles (Green and White), and Electric Vehicles (Green) under acceptable lighting conditions.

## II. LITERATURE SURVEY

## - Detection and Recognition of Multiple License Number Plate Of Vehicle From Still Images

License Plate Recognition (LPR) is the highly efficient and cost effectual technique applied for the identification of vehicle number plates. These techniques are supported by conditions like the quality of image, car at a fixed position, lights condition, single captured image, extraction of multiple vehicle plates, etc. It could be ready to deal with variability in multiple license plates from many states. This strategy is ready to work classically with numbers and characters variation in plates or the dimensions of the plates within the captured images. We mostly focus on specializing in the detection license plate and recognition license plates of multiple cars from only a single frame. Three non-identical license plates vary from each other in shape and size. This system contains two steps: number plate detection and recognition. Within the detection step, the car place is detected from the image which is captured by a camera. We detect both Spanish and Indian license number plates. In the second step, the segmented plate is passed to plate recognition that creates to determines the numbers and characters of a plate of a vehicle. The domain of the proposed system gave a high accuracy rate in the plate recognize part. The proposed system detects multiple number plates in one frame of camera performed correctly and obtained the best result. [1]

## - Detection Of Automatic Number Plate In Vehicles using a Faster Region-Convolutional Neural Network

The paper is studied about locating the number plate in vehicles during abstract conditions like high/low effect of light, distorted and situation of dusty. This paper recommended detecting the number plate of a vehicle from a monitoring camera by using Faster-R-CNN. The invented system has captured the video of the vehicle and detected the number plate from the input video using segmentation, interpolation of image for better results. The resulted image technique is known as optical character recognition (OCR). It is applied to that image for number and character recognition. These are given input to the database to restore data like vehicle name, owner name, owner mobile number, owner address, etc. The achievement of the system is calculated using a graphtype model. This system can gain an accurate rate of about $99.1 \%$ to detection of the vehicle number plate and show the information of the vehicle's owner. [2]

## - Automatic Authorized Vehicle Recognition System

Auto Recognition License Plate is the type of processing on an image for recognizing the number plate from videos or images which is captured by a camera. The image of the detected plate is normally in low light effect and suffers a loss of edge data, unbelievable test to detection and recognition patterns of existing vehicle number plate. The method of recognition of license plates requisite a high level of accuracy when various vehicles are traversed in a brief span then number plate abstraction difficult task because of the impact of environmental work and number arrangement. This step influences the accuracy of the character separation and acknowledgment framework. These systems utilize different approaches and techniques in the paper. Auto Recognition of license plate method contains three segments: Segment of characters, Recognize of optical characters, and Matching the template. The proposed framework presents the identification system of automatic vehicle number plates utilizing an extraction of the number plate of a vehicle. Another method is Gabor filtering utilized for recognition of character in the grayscale. Components are separated directly from gray-scale images by Gabor filters which are exceptionally intended for measurable data of character structures. Template matching is a system that is exploited to find a sub-image of a target image that coordinates a template image. Experiment result outcomes to show the superiority of our proposed approach as far as effectiveness.[3]

## - Recognition Of Smart License Plate System Based On Image Processing Using Neural Network

The main objective of the system is to monitor the incoming and outgoing vehicles at the institution. The motive of the paper is to evaluate the possibility of an automatic recognition license plate of a vehicle. All vehicles have their own individual license number plate, so the abstraction of plate numbers plays a vital role in this system. The number plate is taken by a camera which is placed at the front of the institution. Then captured image is computed by the Automatic Number Plate Recognition (ANPR) system. The ANPR system is an efficient way of recognizing the vehicle number plate and strengthening the security system. A database is created with the various vehicle number plate. Then recognize number plate is compared with the available database and checks whether the vehicle part of the institution if not then it register as an unknown vehicle. Then the entry and exit date and time of vehicles are maintained in PC. The centralized receiver all the entrance records are stored in the database and if any unfamiliar vehicle entering into the institute is noticed then the details are monitored by the central controller.[4]

## - License Plate Recognition Algorithm for Pakistani License Plates

Automatic Number Plate Recognition (ANPR) is an image processing technique that uses to identify the number containing license plates of the vehicle. This system firstly captures an image of the vehicle and detects the type of vehicle. The region of the vehicle number plate is extracted using the image segmentation in an image. Optical Character Recognition (OCR) technology is used for the recognition of the character of vehicle number plates. Then resulting image is computed with available records stored in the database to come out with specific information like the vehicle owner name, registration place, registration date and time, place address, etc. The system is simulated and implemented in MATLAB, and its performance is tested on a real-time image. It is noticed from the system experiment that the developed system successfully recognizes the vehicle number plate on real images.[5]

## III. MOTIVATION

The vehicle contains a number plate having different fonts, styles, colors which are known as fancy number plates. Identifying the characters of those number plates is difficult at the time of traffic monitoring. We aim to make a digital Fancy Number Plate Identification system that will be less time-consuming and detects fancy number plates using an image processing system. Our system sends the notification of a fancy number plate to the RTO panel.

## IV. EXISTING SYSTEM

Tag acknowledgment is the most proficient and financially survey strategy utilized for vehicle recognizable proof purposes. Programmed tag acknowledgment is utilized for tracking down the shape of the number plate These methodologies and strategies change depending on situations like picture quality, a vehicle at fixed positions, states of lights, a single picture, and so forth It ought to likewise have the option to adapt to the varieties in permit plates from various countries and states. The methodology ought to likewise have the option to work consistently with some characters fluctuating in the plate or size of the plate in caught pictures. We for the most part center around location and acknowledgment of various vehicle tags from a solitary edge. The proposed framework comprises two stages: number plate location and acknowledgment. In the plate location part, we apply Spanish what's more Indian tags. In an experiment, we will be working with the number plate of a vehicle from Spain and India. Three distinctive tags vary from each other in shapes and sizes. In the plate number recognition stage the tag is distinguished from the caught picture and afterward in the second stage sectioned plate is passed to plate acknowledgment that makes to decide the characters and numbers.

## V. PROBLEM DEFINITION

Fancy Number Plate Recognition System (FNPR) is a picture handling innovation that utilizes proficient calculations to
recognize the vehicle number from constant pictures. The goal is to plan a proficient Fancy Number Plate Recognition System and to execute it for cost charge assortment. First, the framework identifies the vehicle and afterward catches the picture of the front view perspective on the vehicle. A vehicle number plate is confined and characters are portioned. The framework is intended for gray-scale pictures hence it recognizes the number plate. After identifying the fancy number plate notification goes to the RTO panel. RTO takes action against the vehicle owner.

## VI. PROPOSED SYSTEM

This study aims to review legal provisions relating to registration and number plates of vehicles in the country, to proffer recommendations for simple implementation of the provisions under the Motor Vehicles Act 1988 to create public awareness about the system through which identification of Fancy number plates can be monitored by the RTO Section. The Fancy Number Plate Identification System is an automatic system that identifies the vehicle number plates at high speed, effortlessly. The Fancy Number Plate Identification System not only recognizes number plates accurately but can also identify unknown type number plates with different fonts, sizes, colors, and styles. The system is based on a PC that has a full database of the number plates (including fonts and styles).

## VII. SYSTEM ARCHITECTURE

We are creating a Fancy Number Plate Recognition System (FNPR) is a picture handling innovation that utilizes proficient calculations to recognize the vehicle number from constant pictures. We are capturing the image of a fancy number plate and store in the database.


Fig 1. System Architecture
Fig 1 shows the proposed structure of the Fancy Number Plate Identification System. Firstly, the camera captured the image of the vehicle number plate. Store it in the database. The system converts that image into Gray Code. After that, the Gray Code is compared with the Train and Test sets. The system identifies the characters with the help of the ROC Curve and AUC Method. Finally, the characters of the vehicle number plate were identified. If the number plate is fancy, then the complaint is shown in RTO Panel.

## VIII. ADVANTAGES

i. Innovative.
ii. Centralised Database.
iii. Easy to use.
iv. Efficient cost.

## IX. APPLICATION

1. To identify the characters of number plates having different fonts, styles, and sizes.
2. To recognize the number plate of moving vehicles at the highway.
3. Able to provide security to user data.
4. Smart Parking.

## X. METHODOLOGY

SVM (Support Vector Machine) represents the cutting edge of ranking algorithms for image analysis, character recognition. We used the SVM algorithm for image processing and character recognition. We understood the SVM algorithm with the following example, which we have applied in the KNN classifier method. Suppose we saw different font styles, sizes of characters, so we used the SVM algorithm model to identify the characters accurately. First, we will train our model with lots of images that contain different numbers and characters in various shape, style, and size so that it can compare with the dataset. So a support vector marks a decision boundary between data and chooses extreme cases (support vectors) which are near matches. On basis of the support vectors model, it will be predicted that it is a character like this character.

Consider a following diagram:


Fig 2. SVM Example
SVM classifier is often regarded as one of the greatest linear and non-linear binary classifiers:


Fig 3. Optimal hyperplane in Support Vector Machine

## 1. The Linear model

SVM Training model. The vectors hyperplane is called the support vectors. Further more, to defined an optimal hyperplain we need used to a maximize width of the margin (W),
which represented as: $\max 2$ ||W|

Where:

$$
\begin{aligned}
& (\mathrm{W} x+b)>1, \forall \mathrm{x} \text { of dataset } 1 \\
& (\mathrm{Wx}+\mathrm{b})>-1, \forall \mathrm{x} \text { of dataset } 2
\end{aligned}
$$

The optimization hyperplain problem is defined by the following system:

$$
\left\{\begin{array}{c}
\min 11\|w\| \\
2 \\
y_{i}\left(w x_{i}+b\right)>1, \forall x_{i}
\end{array}\right.
$$

## 2. The Non - Linear model

To separate two groups, the simplest way to use is a straight line -1 dimension, flat plane -2 dimensions, N dimensional hyperplain. However, in several cases, a non-linear region can be separate data more efficiently. Hence a linear hyperplain can't be used to separate these two groups, the SVM algorithm uses two solutions which are "Mapping Data to a High-Dimensional Space", "kernel function". They make possible data to perform the linear hyperplain separation.
XI. UML DIAGRAM


Fig - 4: Data Flow Diagram

## II. CLASS DIAGRAM



Fig - 5: Class Diagram

## III. USE CASE DIAGRAM



Fig - 6: Use Case Diagram

## CONCLUSION

We recommended a real-time and efficient system for recognition of vehicle number plates \& implementation of the system for traffic monitoring. The system has been captured images of fancy number plates and sent the notification to the RTO panel.

This proposed system identifies the fancy number plate and automatically sends the notification to the RTO panel after detection. These systems evaluate different images of the various light situation like high-low resolution and blur images. The system should be implemented on highways for automatic number plate detection of any vehicle.

The system reduces the efforts of the police department. Also, it can provide owner information using the number plate of a vehicle.

## REFERENCES

[1] "Detection and Recognition of Multiple License Plate From Still Images" by Omman Bini , Menon Aiswarya (2018). [IEEE 2018 International Conference on Circuits and Systems in Digital Enterprise Technology 2018 International Conference on Circuits and Systems in Digital Enterprise Technology (ICCSDET) (ICCSDET) - Kottayam, India (2018.12.21-2018.12.22)].
[2] "Automatic Number Plate Detection of Vehicles using Faster R-CNN algorithm" Arappradhan M. S. , Ap , Madhanraj, R. , N. P. , Vigneshwaran T. , (2020). 2020 International Conference on System, Computation, Automation and Networking (ICSCAN).
[3] "Automatic Authorized Vehicle Recognition System" Sandeep D. R., Swetha V. (2011). [IET International Conference on Sustainable Energy and Intelligent Systems (SEISCON 2011) - Chennai, India (20-22 July 2011)] International Conference on Sustainable Energy and Intelligent Systems (SEISCON 2011), 789-790. doi:10.1049/cp.2011.0471
[4] "Smart License Plate Recognition System Based on Image Processing Using Neural Network" Koval V. , Kochan V. , Sachenko A., Turchenko V., Markowsky G. (2003). [IEEE Second IEEE International Workshop on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications, 2003. - Lviv, Ukraine (Sept. 8-10, 2003)] Second IEEE International Workshop on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications, 2003. Proceedings Smart license plate recognition system based on image processing using neural network. , (), 123-127.
[5] "License Plate Recognition Algorithm for Pakistani License Plates" by Habib Adnan H. , Tahir A. , Khan Fahad M. , Vol. 1, No. 2, pp 30-36, April 2010 Canadian Journal on Image Processing and Computer Vision.


