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Number Plate Recognition and Document Verification using Feature Extraction OCR Algorithm

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Abstract: ***The police forces around the world use vehicle number plate for legal vehicle authorization purposes, to check if a vehicle is registered or licensed. Most of us keep the vehicle papers in the vehicle itself, which is not at all safe in case of theft. In today's world, it is not secure to carry our vehicle papers and wherever we go. Hence a system must be designed in which it is not necessary to carry our important documents to each and every place for verification. The aim is to design a system which captures the image of the number plate of a vehicle using a camera and the details are being retrieved using the character segmentation which is done by a feature extraction optical character recognition algorithm (OCR). Then the details retrieved from the number plate in text format is used to extract all the important information of the vehicle like, the name of the owner, address of the owner, date of registration of the vehicle etc. from the database. The police can verify whether the documents are fake or not. For us, it is useful as we do not have to carry our documents to every place with the fear of losing them.***

Keywords: Image Pre-Processing, RGB, Greyscale, Segmentation, OCR, Character Recognition.

1. Introduction

Day by day the human population is increased and use of vehicles is also increased due to increased human needs. As a result of it, the control of vehicles is becoming a big complex problem system. Number plate recognition is one of the methods that allows the extraction of number plate information without the needs of human. This system is an application of image processing technology that allows one to extract number plate information from an image. Image processing deals with the extraction of useful and meaningful information from digital images by various image processing techniques[2]. In Number Plate Recognition, the input is a colour or greyscale image and the output is a string of characters that is license plate number [2]. By using the various image processing techniques, number plate recognition system identifies the vehicles by tracking their license plate with minimum human intervention.

Figure 1.1: Sample Number Plate Image

Number plate recognition is an image processing technological solution that captures photographs of number plates of vehicles and firstly by detecting and extracting the number plate, it segments the characters from the plate area and then by using feature extraction of the character recognition technique it displays the license number plate information. Features are the visual contents that recognize the alphabets and numbers. Then the owner information is obtained from a large database of registration details. Recognition process includes submitting a query, extracting characters of the image

and obtain the owner details.

2. Purpose

The aim is to ease and facilitate the identification of the vehicle and the verification of the documents which are related to the vehicle. It will be very convenient, secure and time saving.

3. Scope

The Number Plate Recognition application incorporates the functions of reading the registration number of vehicles from digital pictures. Its primary purpose is to extract Number Plate information, log vehicle details and use a proprietary database to look up any registration numbers as the vehicle approaches and display information about the owner of the vehicle.

In Order to store information of registered vehicles, a Database must be created. The Database will be needed in order to demonstrate the effectiveness of the information retrieval and storage.

4. Literature Survey

Sr. No	Paper	Technique Used	Merits	De-merits
1.	Recognition of Vehicle Number Plates and Retrieval of Vehicle Owners Registration Details.[2]	Pattern Matching	Effective in case of any background colour	Mismatched words need to be recognized by edge detection
2.	An Automatic Number Plate Recognition System under Image Processing.[3]	Template Matching	Accuracy: 97%	Confusion between characters and numbers
3.	Review Paper on Automatic Number Plate Recognition System.[4]	General OCR Algorithm	Can recognize different fonts	Very low accuracy
4.	Number Plate Recognition Using an Improved Segmentation.[5]	Template Matching	Extraction:96% Recognition:93%	Very Slow
5.	Review of Car-License-Plate Detection Methods[6]	Template Matching	Accuracy: 95%	Can recognise only white background plates
6.	Automatic Number Plate Recognition (ANPR) through Smart Phones using Image Processing Techniques.[10]	Neural network	Accuracy:93%	Cannot recognise damaged number plate

5. System Architecture

The overall system design consists of following modules:

- Input image.
- Pre-processing
- Segmentation.
- Number plate extraction.
- Search for the record.
- Display Record.
- Apply fine (if any).

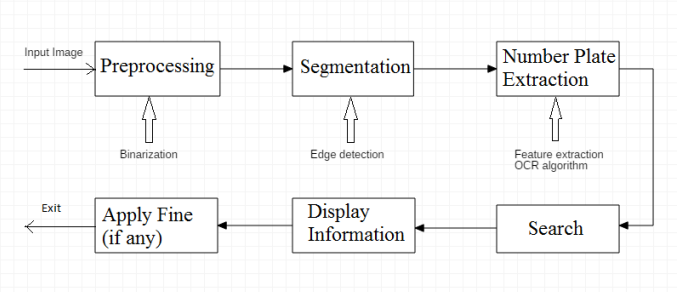

Figure 5.1: System Architecture

The NPR system works in these steps, the first step is the detection of the vehicle and capturing a vehicle image of front or back view of the vehicle, the second step is to apply pre-processing on the captured image to remove noise from the image, the third step the localization of number plate and then extraction of vehicle number plate in an image.

Segmentation is for individual character recognition. Optical character recognition (OCR) is one of the methods to recognize the each character with the help of database stored for the respective alphanumeric character.

6. System Evaluation

6.1 Advantages

- User-Friendly.
- It is a secure system
- Memory space utilized efficiently.
- OCR algorithm is working best to produce best results.

6.2 Disadvantages

- It can have trouble because of lack significant contrast between characters and the background.
- Fonts other than the standard form are difficult to recognize correctly.
- In Poor lighting and low contrast, it may be difficult to extract the image and recognize characters correctly.

6.2 Applications

- Useful in identifying vehicle's documents and getting information of vehicle's owner.
- Digitized and fast crime analyzer.

7. Conclusion

On the basis of literature survey and by analyzing the existing system, we have come to a conclusion that the proposed system will not only aid the Police but will also help to digitize the criminal database and in turn help to deploy resources efficiently to prevent crime and increase safety and security of the citizens.

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