

ABSTRACT

In recent years the number of vehicles has increased drastically. With this increase, it is becoming difficult to keep track of each vehicle for purpose of law enforcement and traffic management. License Plate Recognition is used increasingly nowadays for automatic toll collection, maintaining traffic activities and law enforcement. Many techniques have been proposed for plate detection, each having its own advantages and disadvantages. The basic step in License Plate Detection is localization of number plate. Automatic License Plate Recognition system is a real time embedded system which automatically recognizes the license plate of vehicles. There are many applications ranging from complex security systems to common areas and from parking admission to urban traffic control. Automatic license plate recognition (ALPR) has complex characteristics due to diverse effects such as of light and speed. Most of the ALPR systems are built using proprietary tools like Matlab. This system presents an alternative method of implementing ALPR systems using Free Software including Python and the Open Computer Vision Library.

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LIST OF ABBREVIATIONS

ABBREVIATION		EXPANSION
OCR	-	Optical Character Recognition
CNN	-	Convolutional Neural Network
CV	-	Computer Vision
DL	-	Deep Learning
KNN	-	K-Nearest Neighbor
ALPR	-	Automated License Plate Recognition

CHAPTER 1

INTRODUCTION

With increasing number of vehicles on roads, it is getting difficult to manually enforce laws and traffic rules for smooth traffic flow. Toll-booths are constructed on freeways and parking structures, where the car has to stop to pay the toll or parking fees. Also, Traffic Management systems are installed on freeways to check for vehicles moving at speeds not permitted by law. All these processes have a scope of improvement. In the centre of all these systems lies a vehicle. In order to automate these processes and make them more effective, a system is required to easily identify a vehicle. The important question here is how to identify a particular vehicle? The obvious answer to this question is by using the vehicle's number plate. Vehicles in each country have a unique license number, which is written on its license plate. This number distinguishes one vehicle from the other, which is useful especially when both are of same make and model. An automated system can be implemented to identify the license plate of a vehicle and extract the characters from the region containing a license plate. The license plate number can be used to retrieve more information about the vehicle and its owner, which can be used for further processing. Such an automated system should be small in size, portable and be able to process data at sufficient rate various license plate detection algorithms have been developed in past few years. Each of these algorithms has their own advantages and disadvantages. Arth ET al. described the method in which license plate is detected using confidence related predictions. As multiple detections are available for single license plate, post –processing methods are applied to merge all detected regions. In addition, trackers are used to limit the search region to certain areas in an image. Kwasnicka et al. suggests a different approach of detection using binarization and elimination of unnecessary regions from an image. In this approach, initial image processing and binarization of an image is carried out based on the contrast between characters and background in license plate. After binarizing the image, it is divided into different black and white regions. These regions are passed through elimination stage to get the final region having most probability of containing a number plate

CHAPTER 2

Literature Survey

2.1. Title 1: Number Plate Recognition by using open CV- Python

Author: Tellapavani, DVR Mohan | Mar 2019 ,License Plate Recognition was a computer system that recognizes any digital image automatically on the number plate. This system includes various operations such as taking pictures, localizing the number pad, truncating characters and OCR from alphanumeric characters. The main idea of this system is to design and develop effective image processing techniques and algorithms to localize the license plate in the captured image, to divide the characters from that number plate and to identify each character of the segment by using the Open Computer Vision Library.

Advantages:

Machine Learning Algorithms such as KNN is very effective for vehicle number plate recognition using machine learning

Disadvantages:

The existing system to determine the details of a vehicle requires a lot of human interaction which also leads to human errors.

2.2. Title 2: Automatic Number Plate Recognition System based on Deep Learning

Author: TaheniDamaK,OussemeKriaa, AsmaBaccar, Mohamed Ali Ben Ayed April 2020, In the last few years, Automatic Number Plate Recognition (ANPR) systems have become widely used in the safety, the security, and the commercial aspects. Forethought, several methods and techniques are computing to achieve the better levels in terms of accuracy and real time execution. This paper proposed a computer vision algorithm of Number Plate Localization (NPL) and Characters Segmentation (CS). In addition, it proposed an improved method in Optical Character Recognition (OCR) based on Deep Learning (DL) techniques. In order to identify the number of detected plate after NPL and CS steps, the Convolutional Neural Network (CNN) algorithm is proposed.

Advantages:

The proposed technique measures accuracy about 96 % of the system.

Disadvantages:

This paper proposes a method of localization and recognition using MATLAB, A summary of the ANPR systems related works where the accuracy results were between 85% and 97.19% is described. But, no results are mentioned for the proposed ANPR system.

2.3. Title 3: Number Plate Recognition using Machine Learning

Author: Prasad molawade, Shrutishanbhag, Rushabh rale, Manasichoche, Number plate recognition is an image processing technology which uses number (license) plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. The system can be implemented on the entrance for security control of a highly restricted area like military zones or area around top government offices e.g. Parliament, Supreme Court etc. The developed system first detects the vehicle and then captures the vehicle image.

Advantages:

The maximum accuracy for Character recognition was achieved by tesseract OCR with 98.7% results.

Disadvantages:

The main drawback in YOLO is, it works well for the live video detection. But for processing every frame the process is very tedious.

2.4. Title 4: Vehicle Classification And License Plate Recognition

Author: AmlanKarNishant Rai Sandipan Mandal SouravAnand, The project aims at detecting and classifying relevant objects in a video stream (Surveillance Video) in real time. In case of four wheelers, detection and recognition of license plate is also desired. We discuss the important intermediate tasks required for the same. We then move on to discussing existing work in the area along with popular methods used for performing the involved steps

Advantages:

The very first classifier we tried using was HAAR cascade classifier for vehicle classification. We trained it on an external dataset.

Disadvantages:

But the result was very poor, So again the results were not satisfactory.

CHAPTER 3

3.1 Existing system:

In existing system presents a system called NPR (Number Plate Recognition) which is based on image processing and is used to detect the number plates of vehicles and process them to record the information. In a fast-growing world, it has become almost impossible to track illegal vehicles and store vehicle information. This is eventually leading to a rise in the crime rate, especially due to manual errors. The proposed system first captures the vehicle image and the vehicle number plate region is extracted using Image Segmentation in an image. The resulting data is then used to compare with the records on a database to come up with specific information like the vehicle's owner, place of registration, address, etc. Further, the system is implemented and simulated in MATLAB for studying feasibility and accuracy on a real image.

3.2PURPOSE OF THIS PROJECT:

- The main purpose of this project is to detect a license plate from an image provided by a camera. An efficient algorithm is developed to detect a license plate in various luminance conditions. This algorithm extracts the license plate data from an image and provides it as an input to the stage of Car License Plate Recognition
- Automatic Number Plate Recognition is a fairly well explored problem with many successful solutions.
- However, these solutions are typically tuned towards a particular environment due to the variations in the features of number plates across the world.
- Algorithms written for number plate recognition are based on these features and so a universal solution would be difficult to realize as the image analysis techniques that are used to build these algorithms cannot themselves boast hundred percent accuracy.

- The focus of this paper is a proposed algorithm that is optimized to work with Ghanaian vehicle number plates. The algorithm, written in C++ with the Open CV library, uses edge detection and Feature Detection techniques combined with mathematical morphology for locating the plate.
- The Tesseract OCR engine was then used to identify the detected characters on the plate.

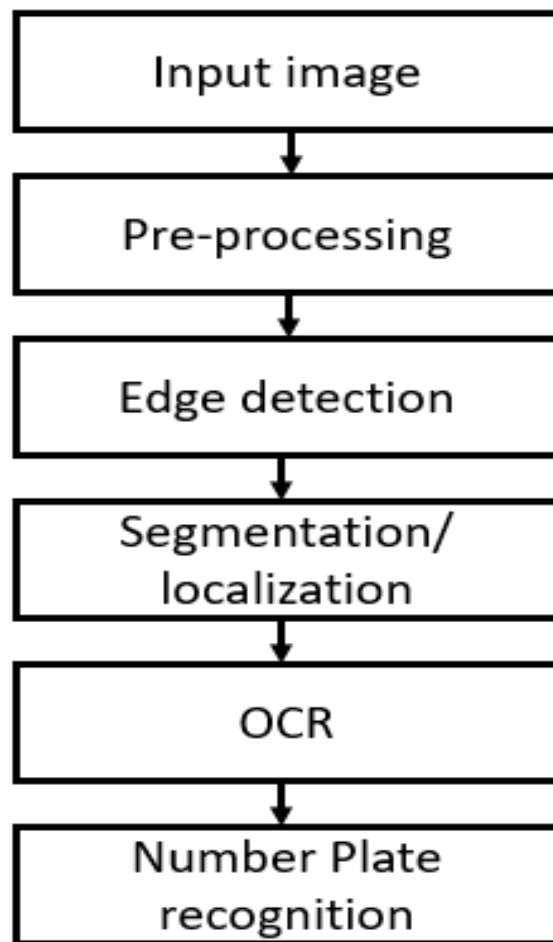


Fig.No.3.1: Block Diagram

CHAPTER 4

METHODOLOGY

In this paper the text found on the vehicle plates is detected from the input image and this requires the localization of number plate area in order to identify the characters present on it. In literature we can find many methods for number plate detection and recognition system. The major drawback is that how long it will take to compute and recognize the particular license plates. This is critical and most needed when it is applied to real time applications. However, there is always a trade-off between computational time and performance rate. In order to achieve an accurate result and increase the performance of the system more computational time is required. For number plate detection or localization, techniques based on edge statistic and mathematical morphology gives a very good result that uses vertical edge information to calculate the edge density of the image followed by morphology methods such as dilation to extract the region of interest. This technique works well due to the fact that number plates always have high density of vertical edges. But in this method as unwanted edges in the background are also detected which leads to confusion, it is difficult to apply this method for number plates with complex background. Colour based techniques are proposed in this thesis work. The draw back with this method is that it performs well when the lighting condition is constant but when there is various illumination condition its performance reduces. But in real-time application normally the images can be obtained with various lighting illumination. Furthermore, the proposed technique is country specific because each country will have different colour code for vehicle number plate. Connected Component Analysis (CCA) method is used to detect the number plate region. CCA is useful for simplifying the detection task .since it labels binary image into several components based on their connectivity. Based on the problem one can decide on the selection of finding the connected components using 4-adjacency or 8-adjacency of pixels connectivity. Spatial measurement is a measure of spatial characteristics of a connected component such as area, orientation, aspect ratio etc. and filtering is done to eliminate unrelated or unwanted components. When