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AUTOMATIC VEHICLE NUMBER PLATE RECOGNITION USING OPTIMAL K-MEANS WITH CNN

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ABSTRACT

Automatic number plate recognition is an image processing technology which uses number 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 is 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. Vehicle number plate region is extracted using the image segmentation in an image. Optical character recognition technique is used for the character recognition. The resulting data is then used to compare with the records on a database.

Keywords: Automatic no plate recognition, image processing, computer vision.

1. INTRODUCTION

Automatic vehicle number plate recognition is a computer vision practice that allows devices to read number plates on vehicles quickly and automatically, without any human interaction.

When a vehicle enters the gate, license plate is automatically recognized and stored in database.

On leaving, the license plate is recognized again and compared with the stored numbers in the database.

Automatic vehicle number plate recognition is used to capture and identify any number plate accurately through the use of video or photo footage from cameras.

Automatic vehicle number plate recognition is used by police forces around the world for law enforcement purposes, including to check if a vehicle is registered or licensed.

It is also used for electronic toll collection on pay-per-use roads and as a method of cataloguing the movements of traffic, for example by highways agencies.

Automatic vehicle number plate recognition is one of the most accurate applications of computer vision systems.

Systems for automated number plate recognition use optical character recognition (OCR) to read vehicle registration plates.

Cameras capture high-speed images of number plates, and software for image processing is used to detect characters, verify the sequence of those characters, and convert the number plate image to text.

2. PROBLEM DEFINITION

Automatic vehicle Number plate detection system is commonly used in field of safety and security.

Vehicle Number Plate Recognition process is a challenging process because of variations in viewpoint, shape, color, multiple formats and non-uniform illumination conditions at the time of image acquisition.

The system represents an effective deep learning-based model using optimal K-means (OKM) clustering-based segmentation and Convolutional Neural Net- work (CNN) based recognition called OKM-CNN model.

The proposed OKM- CNN model operates on three main stages namely Number Plate (NP) detection, segmentation using OKM clustering technique and number plate recognition using CNN model.

During first stage, NP localization and detection process take place using Improved Bernsen Algorithm (IBA) and Connected Component Analysis (CCA) models.

Then, OKM clustering with Krill Herd (KH) algorithm get executed to segment the NP image. Finally, the characters in NP get recognized with the help of CNN model.

3.   LITERATURE SURVEY

In 2016 Ihsan Ullah, Hyo Jong Lee, presented a paper Title "An Approach of Locating Korean Vehicle License Plate Based on Mathematical Morphology and Geometrical Features" this system for finding license plate location.

Images we used in our system are complex and differ in size, background, camera angle, distance etc. Considering all of these, the proposed method has the correct location rate of 78 Moreover; the license plates consist of characters of variable size.

The system is focused on license plate detection, the system is based on mathematical morphology and considers features like license plate width, height, ratio and angle.

The advantage of proposed system is that it works for all types of license plates which differs in size and shapes and archived promising results

In 2016, Mahesh Babu K, M.V. Raghunadh, presented a paper Titled as "Vehicle Number Plate Detection and Recognition using Bounding Box Method".

The system has four major steps as follows: Preprocessing of captured image, Extracting license number plate region, Segmentation and Character Recognition of license plate.

First, we select the image, remove noise and find the interested area of image, and then the license plate location is extracted using edge detection then segmentation of each character individually.

At-last the template matching method is used with the use of correlation for recognition of each character in the number plate.

Title:

An Algorithm for License Plate Recognition Applied to Intelligent Transportation System presented by Ying Wen, Yue Lu, Member, IEEE, Jingqi Yan, Zhenyu Zhou, Karen M. von Deneen, and Pengfei Shi, Senior Member, IEEE in 2011 This Paper Consist of two major contribution is a new binary method and character recognition algorithm known as support vector machine (SVM) integration.

The optical character recognition system is the SVM in- tegration with different character features, whose performance for numerals, Kana, and address recognition reached 99.5 percent, 98.6 percent, and 97.8 percent, respectively.

Combining the preceding tests, the overall performance of success for the license plate achieves 93.54 percent when the system is used for LPR in various complex conditions.

Title:

Automatic Number Plate Recognition System for Vehicle Identification Using Optical Character Recognition presented by Muhammad Tahir Qadri ,Muhammad Asif in 2009.

The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate.

The system is implemented on the entrance for security control of a highly restricted area like military zones or area around top government of- fices e.g. Parliament, Supreme Court etc.

The camera used in this project is sensitive to vibration and fast changing targets due to the long shutter time.

The system robustness and speed can be increase if high resolution camera is used.

The statistical analysis can also be used to define the probability of detection and recognition of the vehicle number plate.
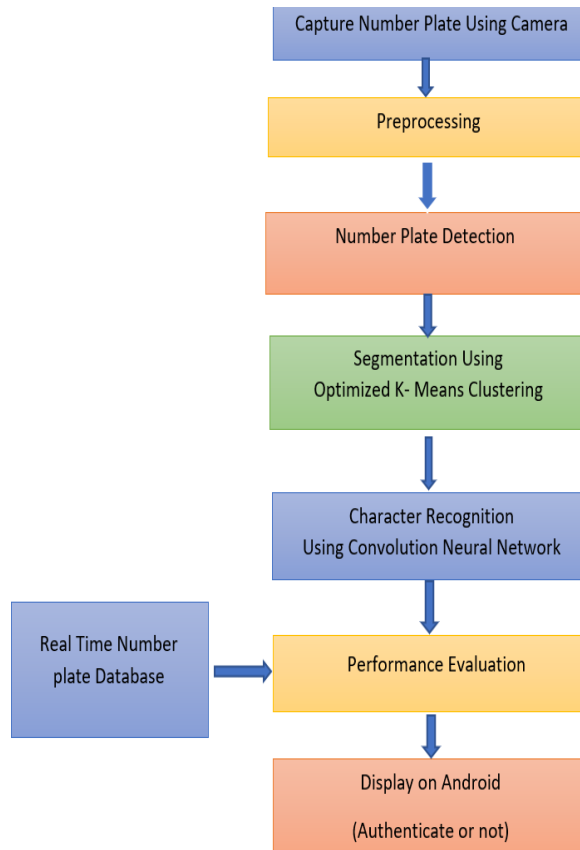
4. SYSTEM ARCHITECTURE

Figure 1:- System Architecture

1. Pre-processing:

In pre-processing module, image of vehicle is captured using camera, whose vehicle number plate is to be identified.

During pre-processing, the images were gathered from cameras, modified for proper brightness, noise was eliminated and transformed to a gray scale image.

Then, the edges in the image were used to extract the NP location.

2. Number Plate Detection:

NP localization and detection process take place using Improved Bernsen Algorithm (IBA) and Connected Components Analysis (CCA) models.

Two detection models were used: initially, the recognition of a white frame using CCA, and second one is the detection of black characters by applying CCA.

The binary model with global threshold is not capable of producing convincible outcome from adaptive local binary technique that has been employed.

The local binary techniques are referred as an image that would be classified into m × n blocks, and every block is computed using binary model.

In this study, two local binary methodologies were applied namely local Otsu and enhanced BA which is one of the conventional binary approaches that can be employed on all sub-blocks.

3. Character Segmentation:

OKM clustering with Krill Herd (KH) algorithm get executed to segment the NP image.

Neutrosophy analysis is applied to evaluate in-determinacy or uncertainty of an image dataset.

A membership set is comprised of certain degree of falsity (F), indeterminacy (I), and truth (TR).

The Membership Functions (MF) are applied for mapping the input images to (NS) form that tends to produce (NS) image (ANS).

The optimum value of () is used to compute by applying KH algorithm.

KH algorithm is stimulated from the herding nature krills, which depends upon the individual outcome of krill's.

K-means is defined as the clustering method that consolidates the objects into K groups.

4. Character Recognition:

After segmenting the characters, the next step is character recognition.

Almost all NPR systems are using different types of Convolutional Neural Network (CNN).

In that Module Execute License Plate character recognition process using CNN model.

The CNN is a familiar DL model used to recognize the characters present in segmented NP's.

CNN in- clues a set of conv, pooling and Fully Connected (FC) layers.

These layers are employed in construction of CNN model with diverse number of blocks, addition or deletion of blocks.

5. CONCLUSION

The System presented a new OKM-CNN technique for effective detection and recognition of NPs.

The proposed OKM-CNN model has three main stages.

In the first stage, NP localization and detection process take place using IBA and CCA models.

Subsequently, OKM-based clustering technique gets executed to segment the NP image and finally, the characters in NP get recognized using CNN model.

The proposed OKM CNN model can be employed as the major element of intelligent infrastructure like toll fee collection, parking management and traffic surveillance.

6. RESULT

Automatic no plate detection is registere backend in CSV file.

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