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Paper Authors

MRS.J. NAGA LATHA, MRS.CH.NAVYA DEEPTHI

Sri SSET, Lankapalli, (A.P),INDIA

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A REAL-TIME VEHICLE LICENSE PLATE RECOGNITION (LPR) SYSTEM

MRS.J. NAGA LATHA, MRS.CH.NAVYA DEEPTHI M.TECH

PG Scholar, Dept of ECE (DSCE), Sri SSET, Lankapalli, (A.P),INDIA
Assistant Professor, Department of ECE, SSCET, Lankapalli,(A.P), INDIA
jarugunagalatha@gmail.com,navyabushn@gmail.com

ABSTRACT: In this paper we present a instant and real-time mobile vehicle license plate recognition system in an open environment. Using a nonfixed video camera installed in the car, the system tries to capture the image of the car in front and to process instant vehicle license plate detection and recognition. We utilize the color characteristics of the barking lights to carry out license plate detection. We first detect the location of the two barking lights in the captured image. Then set license plate detection region using the probability distribution of the license plate between the two lights. This method can eliminate any environmental interference during the license plate detection and improve the rate of accuracy of license plate detection and recognition. Moreover, we use the morphology method Black Top-Hat to enhance the level of separation of the license plate characters. Experiments show that the system can effectively and quickly capture the vehicle image, detect and recognize the license plate whether it is in daytime, nighttime, clear day, raining day or under complicated environment.

Keywords : Real-Time, Wavelet, License Plate, Black Top-Hat, LPR

I INTRODUCTION

License plate recognition (LPR) is an image-processing technology used to identify vehicles by their license plates. This technology is gaining popularity in security and traffic installations. Much research has already been done for the recognition of Korean, Chinese, European, American and other license plates, This thesis presents a license plate recognition system as an application of computer vision. Computer vision is a process of using a computer to extract high level information from a digital image. This chapter will set the scene by first presenting some applications of a license plate recognition system. Next, we discuss the elements that are commonly used in a license plate recognition system. Following this, the working of a typical LPR system is described. Next, we present the structure of proposed license plate recognition system. Finally, the objectives of the work are stated.

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II. LITERATURE SURVEY

Introduction:License plate recognition systems have received a lot of attention from the research community. Much research has been done on Korean, Chinese, Dutch and English license plates. A distinctive feature of research work in this area is being restricted to a specific region, city, or country. This is due to the lack of standardization among different license plates (i.e., the dimension and the layout of the license plates). This section gives an overview of the research carried out so far in this area and the techniques employed in developing an LPR system in lieu of the following four stages: image acquisition, license plate extraction, license plate segmentation and license plate recognition phases. In the next section various existing or novel methods for the image acquisition phase are presented.

Image Acquisition : Image Acquisition is the first step in an LPR system and there are a number of ways to acquire images, the current literature discusses different image acquisition methods used by various authors. Yan et. al. used an image acquisition card that converts video signals to digital images based on some hardware-based image preprocessing. Naito et. al.developed a sensing system, which uses two CCDs (Charge Coupled Devices) and a prism to split an incident ray into two lights with different intensities. The main feature of this sensing system is that it covers wide illumination conditions from twilight to noon under sunshine, and this system is capable of capturing images of fast moving vehicles without blurring. Salgado et. al. used a Sensor subsystem having a high resolution CCD camera supplemented with a number of new digital operation capabilities. Kim et. al. uses a video camera to acquire the image. Comelli et. al. [6] used a TV camera and a frame grabber card to acquire the image for the developed vehicle LPR system.

License Plate Extraction : License plate extraction is the most important phase in an LPR system. This section discusses some of the previous work done during the extraction phase. Hontani et. al. proposed a method for extracting characters without prior knowledge of their position and size in the image. The technique is based on scale shape analysis, which in turn is based on the assumption that, characters have line-type shapes locally and blob-type shapes globally. In the scale shape analysis, Gaussian filters at various scales blur the given image and larger size shapes appear at larger scales. To detect these scales the idea of principal curvature plane is introduced. By means of normalized principal curvatures, characteristic points are extracted from the scale space x-y-t. The position (x, y) indicates the position of the figure and the scale t indicates the inherent characteristic size of corresponding figures. All these characteristic points enable the extraction of the figure from the given image that has linetype shapes locally and

blob-type shapes globally. Kim et. al. used two Neural Networkbased filters and a post processor to combine two filtered images in order to locate the license plates. The two Neural Networks used are vertical and horizontal filters, which examine small windows of vertical and horizontal cross sections of an image and decide whether each window contains a license plate. Cross-sections have sufficient information for distinguishing a plate from the background. Lee et. al. [5] and Park et. al. devised a method to extract Korean license plate depending on the color of the plate. A Korean license plate is composed of two different colors, one for characters and other for background and depending on this they are divided into three categories. In this method a neural network is used for extracting color of a pixel by HLS (Hue, Lightness and Saturation) values of eight neighboring pixels and a node of maximum value is chosen as a representative color. After every pixel of input image is converted into one of the four groups, horizontal and vertical histogram of white, red and green (i.e. Korean plates contains white, red and green colors) are calculated to extract a plate region. To select a probable plate region horizontal to vertical ratio of plate is used. Dong et. al presented histogram based approach for the extraction phase. Kim G. M used Hough transform for the extraction of the license plate. The algorithm behind the method consists of five steps. The first step is to threshold the 14 gray scale source image, which leads to a binary image. Then in the second stage the resulting image is passed through two parallel sequences, in order to extract horizontal and vertical line segments respectively. The result is an image with edges highlighted. In the third step the resultant image is then used as input to the Hough transform, this produces a list of lines in the form of accumulator cells. In fourth step, the above cells are then analyzed and line segments are computed. Finally the list of horizontal and vertical line segments is combined and any rectangular regions matching the dimensions of a license plate are kept as candidate regions. The disadvantage is that, this method requires huge memory and is computationally expensive.

III EXISTING SYSTEM

There have been similar past projects at the Lab. including projects which implemented the whole system. The purpose of this project is first and foremost to improve the accuracy of the program, and whenever possible its time-complexity. All the past projects at the Lab. had poor accuracy according to the tests we made on the set of 45 images we used in our program and were successful only when very particular conditions were satisfied. For this reason, except from very rare cases which we will signal as we will describe the implementation, the entire program was written again.

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IV PROPOSED SYSTEM

The purpose of this project was to build a real time application which recognizes license plates from cars at a gate, for example at the entrance of a parking area. The system, based on regular PC with video camera, catches video frames which include a visible car license plate and processes them. Once a license plate is detected, its digits are recognized, displayed on the User Interface or checked against a database.Due to the lack of time, this project will focus on the design of algorithms used for extracting the license plate from a single image, isolating the characters of the plate and identifying the individual characters.

V. METHODOLOGY

Our license plate recognition system can be roughly broken down into the following block diagram.Alternatively this progression could be viewed as the reduction or suppression of unwanted information from the information carrying signal, here a video sequence containing vast amounts of irrelevant information, to abstract symbols in the form of the characters of a license place.

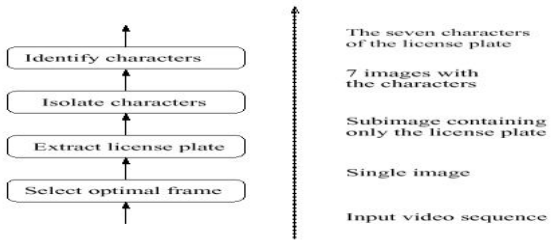

Fig 1: Block diagram of the system.

Alternatively this progression could be viewed as the reduction or suppression of unwanted information from the information carrying signal, here a video sequence containing vast amounts of irrelevant information, to abstract symbols in the form of the characters of a license place.

VI. RESULTS

This section will present the simulation results and performance analysis of our proposed scheme. The presentation focuses on the recovery performance of our scheme in various situations.

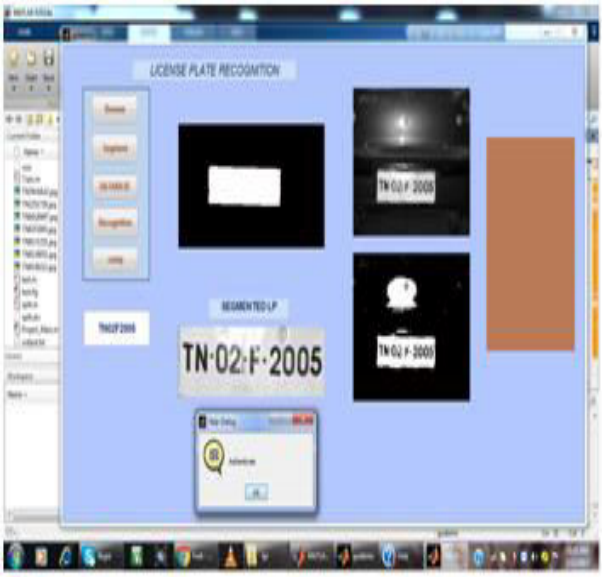

Fig 2: Out Put Results

VII. CONCLUSION AND FUTURE SCOPE

The process of vehicle number plate recognition requires a very high degree of accuracy when we are working on a very busy road or parking which may not be possible manually as a human being tends to

get fatigued due to monotonous nature of the job and they cannot keep track of the vehicles when there are multiple vehicles are passing in a very short time .To overcome this problem, many efforts have been made by the researchers across the globe for last many years. A similar effort has been made in this work to develop an accurate and automatic number plate recognition system. The setup has been tested for 100 vehicles containing different number plates from different states. In the process of final evaluation after optimizing the parameters like brightness, contrast and gamma, adjustments, optimum values for lightening and the angle from which the image is to be taken. We get an overall efficiency of 98% for this system. Though this accuracy is not acceptable in general, but still the system can be used for vehicle identification. It may be concluded that the project has been by and far successful. It can give us a relative advantage of data acquisition and online warning in case of stolen vehicles which is not possible by traditional man handled check posts. While thousands of vehicles pass in a day.Though we have achieved an accuracy of 98% by optimizing various parameters, it is required that for the task as sensitive as tracking stolen vehicles and monitoring vehicles for homeland security an accuracy of 100% cannot be compromised with. Therefore to achieve this, further optimization is required. Also, the issues like stains, smudges, blurred regions & different font style and sizes are need to be taken care of. This work can be further extended to minimize the errors due to them.

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IX AUTHORS

CH.NAVYA DEEPTHI Working as assistant professor of ECE, Sri. Sunflower College of Engineering and Technology, Lankapalli. She received the M.Tech degree in Digital electronics and communication Engineering from Dr. Samuel George College of engineering and technology. Markapuram., B.Tech degree in Electronics and Communication Engineering at sindhura college of engineering and technology. Ramagundamand, she has total Teaching Experience (UG and PG) of 6 years.

JARUGU NAGA LATHA, PG scholar Dept of ECE (DSCE), Sri Sunflower College of Engineering and Technology, **B.Tech** degree in Electronics and Communication Engineering at ASN Women's Eng. College,Tenali.

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