LICENSE NUMBER PLATE RECOGNITION SYSTEM

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ABSTRACT—This paper aims with character recognition of character of vehicle number plate .Advanced vehicle license number plate recognition system is the real time embedded system in which it automatically recognize the number of the vehicle. In this we considered the implementation of recognizing number plate. The recognized number are then transferred through network channel by using encryption & decryption technique. First recognized characters are embedded into image and that data is encrypted by using private key at sender's end. At the receiving end, the data is extracted from the image by using decryption technique.

Keywords—License plate localization, binarization, edge detection, localization, deskewing, segmentation, normalization, feature extraction, license plate character recognition.

INTRODUCTION Automatic Number Plate Recognition (ANPR) was invented in 1976 in the UK. The Automatic number plate recognition (ANPR) is the method that uses optical character recognition on images to read the license plate on vehicle. For this method can use specially designed camera i.e. closed circuit or road rule enforcement cameras. These kind of camera may used by various places by police or any other who want it, specially it is found at the electronic toll plazas. The ANPR can used to stored the images captured by cameras as well as text from the number plate, some cameras may able to store the picture of the driver. The ANPR work is generally framed into the steps: Number plate extraction, character segmentation, character recognition. From the full image, only the number plate is detected and processed to the next step of character segmentation. In character segmentation phase each and every character is isolated and segmented. Based on the selection of features of characters, each character is recognized, in the character recognition phase. Extraction of number plate is difficult task, due to: Number plates generally have a small portion of whole image; difference in number plate formats, this step affects the accuracy of character segmentation and recognition work. Basically, the Number Plate Recognition operation consists in capturing, recognizing and storing information such as images, plate numbers and location on a database for online verification or posterior analysis. The approach presented in this paper is to extract the region of the number plate from images taken from indoor parking lots, which suffer from various real world problems like lighting condition, luminance, weather conditions etc.

EXISTING SYSTEM ANPR System using OCR At the hub of the system is the OCR (Optical Character Recognition system) which is used to extract the alphanumeric characters present on the number plate. To do this it first uses a series of image manipulation techniques to detect, normalize and enhance the image of the number plate. There are two components in the system, the cameras at the front-end and the remote computers at the back-end. Usually two cameras are used at a time to increase efficiency. The cameras as shown in the Fig. 1 just perform the task of capturing the images of number

plates and sending it to the remote computers. The remote computers then perform further operations like OCR on the stored images sent by the cameras at the lane-level. In order to process the high amount of images stored, a “server farm” is used which comprises of many computers working together. An example of a server farm can be the London Congestion Charge project. The remote computers can be linked with the database which stores the details of the car owners and thus the required information can be obtained. Using this information the culprit can be caught. The ANPR system using OCR was found to have the following shortcomings /disadvantages:

1. Misidentification: In case the number is read partially, the remote computer might identify the number plate incorrectly or would not be able to decrypt at all.

2. Hazy images: Hazy images can also make the detection process erroneous or there is a possibility of no detection at all.

3. Flaws in angular detection: Angular detection is not possible in case of ANPR as the rectangulation algorithm, implemented in OCR is not possible thus characters may be misread/ overlapped.

LITERATURE REVIEW

1. Paper: License Plate Character Recognition system using KNN

Source: 2006 IEEE

Author: Yen-Ching Chang, Huai-Chun Hsu, Jen-Jieh Lee, Chin-Chen Chueh

Abstract - Since license plate character recognition plays a very important role in vehicle control, such as electronic toll collection (ETC) for highways and management for parking lots, the cost of management can be reduced and the implementing efficiency can be promoted by automatizing license plate character recognition. As the technology of image processing, classifiers, and computational speed on computer advances, we adopt Sobel operators to detect the boundaries of objects in order to extract license plate regions. After extracting license plate regions, we segment corresponding characters and then standardize these characters in order to find out the features of characters, and finally use the classifiers of support vector machine (SVM) and K-nearest neighbor (KNN) to train and then recognize characters. Experimental results show that classifiers and features are closely linked, and KNN is more appropriate than SVM, and its recognition rate is up to 98.51 % on average.

2. Paper : An Approach for Automatic Detection of Vehicle License Plate and Character Recognition Using Classification Algorithm

Source : 2013 IJETAE

Author : Pawan Wawage, Shraddha Oza (Dept of Computer Engineering, MIT, Pune, India)

Abstract : Automatic Identification of Vehicle License Plate is a real time embedded system which identifies the characters directly from the image of the vehicle license plate. Since number plate guidelines are not strictly practiced everywhere, it often becomes difficult to correctly identify the non-standard number plate characters. This paper proposes a vehicle number plate identification system, which extracts the characters features of a plate from a captured image by a digital camera. This paper deals with computing techniques from the field of Artificial Intelligence, machine vision, and neural networks in construction of an Automatic System for

Identification of Vehicle License Plate and Character Recognition.

3. Paper : An Approach for Automatic Vehicle License Plate Recognition Using Classification Algorithm

Source : 2011 IJARET

Author : M. M. Kodabagi, Mr. Vijayamahantesh S. Kanavi (Department of Computer Science and Engineering, Basaveshwar Engineering College, Bagalkot, Karnataka, India)

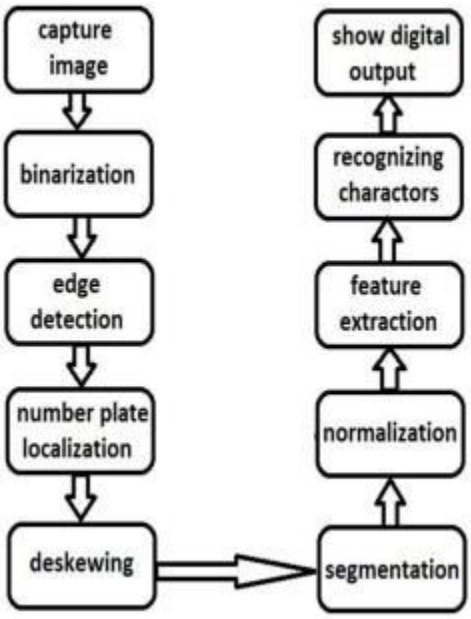
Abstract : License Plate Recognition (LPR) has been intensively studied in many countries. Due to the different types of number plates being used, the requirements of an automatic number plate recognition system are different for each country. In general, objective of any LPR system is to localize and recognize potential license plate region(s) of the vehicle images captured from handheld device/digital camera/mobile phone camera. The proposed method for License Plate Recognition (LPR) system works in three modules: localization of license plate, segmentation of the characters and recognition of the characters from the license plate. Localization of the license plate is done using morphological operations, horizontal & vertical edge processing. Character segmentation is carried out using connected component labeling. Character recognition is done by using Neural Network classifier. The method is tested on 100 samples of Indian vehicle images. The system achieves 86% accuracy in localization, 81% accuracy in segmentation and 80% accuracy in character recognition.

PROPOSED METHOD We first introduce how to locate license plates and extract their corresponding regions, then segment these characters on located license plate, and finally use K-nearest neighbor (KNN) classifiers to recognize these segmented characters. The K-nearest-neighbor (KNN) algorithm measures the distance between a query scenario and a set of scenarios in the data set. KNN is more appropriate than PNN (Probabilistic Neural Network) and its recognition rate is up to 98.51 % on average. The recognition rate on average is about 95.87 % for the PNN classifier and about 98.51 % for the KNN classifier. The highest recognition rate for all arguments and block types for PNN are 97.14 %, the highest recognition rate for all ks and block types for KNN are 100 %. The highest recognition rate for block type is block 5x5, and the second is 10x5, no matter which classifier. Their recognition rates are 96.97 % (PNN) and 99.77 % (KNN), respectively. The KNN classifier uses features of testing image returns recognized character

PROBLEM STATEMENT: Problem Definition – We considered the vehicle number plate as input image, system should extract that number from the image and should search the database for that recognized number plate. It should recognize the number plates even in the low light or shadow like conditions

PROBLEM OUTPUT - The main moto of ANPR system is to recognize the number plates gently and with higher efficiency without any human interference. The functionality of the system provides the ability to track a vehicle in any area. Input image are taken from the front camera. The images are processed and the number plate will be detected. These detected number plate is then be used to find in the database to see if it present or not.

BLOCK DIAGRAM



A. CAPTURE IMAGE In image acquisition where vehicle images are acquire using the camera, Image can be input to the system by different methods by analog camera or by digital camera, nowadays digital technology has their advantages so better input method is by digital cameras or by direct digital photos. The camera sense the vehicle moving on the road and immediately capture either front of rare view of vehicle depending on the position of the vehicle.

B. BINARIZATION The captured image is then binaries, binarization is a widely used technique, its process is to first determine a gray threshold(GT) according to some objective criteria and then assigns each pixel (Ixy) to one class, windowing on the grey threshold image is then taken place, different methods are used for binarization, binarization process is broadly classified as global or local [9],[10], [11], [12] depending on how the threshold is calculated. In [8], the authors describe and evaluate the performance of about 40 different GT determining algorithms. This 40 thresholding methods are categorized into the six classes:(1)histogram shape-based methods,(2) clustering- based methods, (3)entropy-based methods, (4)object attribute-based methods, (5)the spatial methods and (6)local methods based on the local characteristics of each pixel. Among these classes, many thresholding algorithms are based on independently defined criteria to acquire the optimal segmenting threshold, In this paper we propose a new edge based adaptive thresholding method which is capable of preserving the text region of an image robustly in real life conditions. This method uses local edge properties in a window to compute threshold which can be effectively used for text region extraction from the vehicle license plate images.

C. EDGE DETECTION After binarizing the image next step is to detect the edge of the license plate from the body of the vehicle. Let an image foreground be represented by G1 and background by G2 gray levels and let G1 > G2. Typically the gray levels between background and foreground change gradually. For binarizing such an image we should have a threshold GT such that G1≥GT ≥G2. A typical edge detection algorithm would mark edges at all or some of the locations marked by arrows in Figure 2. We exploit the edge image and use the edge pixels to identify the threshold (GT) for binarization. A computationally simple way to compute GT is to take the average gray value of the all the pixels on the edges

D. NUMBER PLATE LOCALIZATION After detecting the edges of the vehicle next step is to find

out where the number plate is located on the body of the vehicle, due to different size and shape of vehicles it is important to detect the location of the license plate area among the body of the vehicle, Let us consider the number plate as a “rectangular area with increased occurrence of horizontal and vertical edges”. This process can sometimes detect a wrong area that does not correspond to a number plate. Because of this, we often detect several candidates for the plate by different algorithms. There are several heuristics, which are used to determine the cost of selected candidates according to their properties. These heuristics have been chosen on ad-hoc basis during the practical experimentations. This recognition logic sorts candidates according to their cost from the most suitable to the least suitable. Then, the most suitable candidate is examined by a deeper heuristic analysis. The deeper analysis definitely accepts, or rejects the candidate. As there is a need to analyze individual characters, this type of analysis consumes big amount of processor time.

E. DESKEWING The captured rectangle plate can be rotated and skewed in many ways due to the positioning of vehicle towards the camera. Since the skew significantly degrades the recognition abilities, it is important to implement additional mechanisms, which are able to detect and correct skewed plates. The number plate is an object in threedimensional space, which is projected into the two dimensional snapshot during the capture. The positioning of the object can sometimes cause the skew of angles and proportions. Hough transform is special operation, which is used to extract features of specific shape within a picture. The classical Hough transform is used for the detection of lines. The Hough transform is widely used for miscellaneous purpose in the problematic of machine vision, but here it is used to detect the skew of capture plate, and also to compute an angle of skew localization. After capturing the front or rear view of the vehicle, the first step is to detect the exact area of the number plate from the captured image. Let us define the number plate as a “rectangular area with increased occurrence of horizontal and vertical edges”. The high density of horizontal and vertical edges on a small area is in many cases caused by contrast characters of a number plate, but not in every case. This process can sometimes detect a wrong area that does not correspond to a number plate. Because of this, we often detect several candidates for the plate by different algorithms. There are several heuristics, which are used to determine the cost of selected candidates according to their properties. These heuristics have been chosen on ad-hoc basis during the practical experimentations. The recognition logic sorts candidates according to their cost from the most suitable to the least suitable. Then, the most suitable candidate is examined by a deeper heuristic analysis. The deeper analysis definitely accepts, or rejects the candidate. As there is a need to analyze individual characters, this type of analysis consumes big amount of processor time.

F. SEGMENTATION By this step characters on license plate are segmented and identify. This step is the most important step in license plate recognition because all further steps rely on it. There are many factors that cause the character segmentation task difficult, such as image noise, plate frame, rivet, space mark, plate rotation and illumination variance. We here propose the algorithm that is quite robust and gives significantly good results on images having the above mentioned problems. for the segmentation pre-processing is required by conversion to gray scale and binarization.We use the method of horizontal

projection for segmentation, If we assume only one row plate, the segmentation is the process of finding horizontal boundaries between characters. The segmented area of the plate can contain redundant space and other undesirable elements besides the characters. Since the "segment" has been processed by an adaptive thresholding filter, it contains only black and white pixels. The neighboring pixels are grouped together into larger pieces, and one of them is a character. Our goal is to divide the segment into several pieces, and identify only one piece representing the regular character. The second phase of the segmentation is an enhancement of segments. The piece chosen by the heuristic is then converted to a monochrome bitmap image. Each such image corresponds to one horizontal segment. These images are considered as an output of the segmentation phase.

CONCLUSION The aim of the paper is to raise the recognition rate of license plate characters through a combination of three main procedures. All trained and tested characters came from the following two main procedures: extracting license plate, segmenting characters. As a rule, the effectiveness of character processing will affect the effect of selected features, and then further affects the efficacy of chosen classifiers. As expected, experimental results show that our proposed combination of three main procedures does give a very high recognition rate, which can be up to 100 % for KNN The system has been tested on static snapshots of vehicles, which has divided into several sets according to difficulties. Sets of blurry and skewed snapshots give worse recognition rates than a set of snapshots, which has been captured clearly. The objective of the tests was not to find 100% recognizable set of snapshots, but to test the invariance of the algorithms on random snapshots systematically classified to the sets according to their properties. Currently there are certain restrictions on parameters like speed of the vehicle, script on the number plate, cleanliness of number plate, quality of captured image, skew in the image which can be aptly removed by enhancing the algorithm further.

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