Automated Toll Fee Collection using License Plate Number Recognition

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Abstract: *In this paper, we inspect the picture and prepare toll accumulation framework. This method works more proficient and great compared to existing methods like manual toll collection, RFID tag, Barcode method, etc. In the proposed technique, the vehicle is not needed to stop for paying the toll. We are attempting to develop a framework that would pay the toll consequently and diminish the line at the toll stall. In this framework camera is utilized for catching the picture of the vehicle number plate. The caught picture would be changed over into the content utilizing proposed image processing algorithm and the toll would cut from the client's record and afterward open the door. In addition in our framework if a vehicle is stolen and a passage is being made in the focal database by the police then if the vehicle goes through the toll both then quiet alert would buzz which would demonstrate the administrator at the toll corner that the vehicle is a stolen vehicle. For the distinguishing proof of the vehicles, the data of the vehicles is now put away on the focal database. So caught number will be sent to the server gotten a the toll. Once the toll fee is deducted from owner's account, a notification message will be sent to the concerned person using GSM. The message includes details like amount deducted, toll gate location and time of toll gate crossing.*

Keywords: *Toll gate, pattern recognition, character identification, GSM*

I. INTRODUCTION

This project is intented to gather the toll concurring to vehicles and assembling the constant application which perceives vehicles licenses number plate at passage door. Automatic toll accumulation is considered as one of the canny transport frameworks. It is gone for making toll tax collection more proficient, dependable, and safe and environment well disposed. Before, client would need to hold up at the toll corner to pay the collector, making movement blockage, contamination and obviously of a great deal of dissatisfaction. Today Programmed toll accumulation effectively evacuates pointless movement delays; watch out for any auto that won't not be accurately enrolled. Computerized toll accumulation is quick turning into an all around acknowledged of toll accumulation. This is conceivable as the vehicles going through the toll court don't have to stop to pay toll and the payment naturally takes place from the record of the client.

II. Proposed Method

In our framework, in which different picture handling algorithm were plan in Matlab 6.0 and implemented on the advanced sign processor. When vehicle enters an info door, a front picture is catch by camera and prepared utilizing different Algorithms. Number plate area is localised by morphological operation. This Algorithm remove all background noise and save only the number plate area in the image .The number plate range are divided into individual character utilizing calculation. There are different number of character

acknowledgment techniques .The proposed algorithm differentiates light vehicle and heavy vehicle. Based on the classification, toll fee will be charged. This project also includes a security system, which alerts the police control room when any vehicle with no proper database enters the toll gate.

Block Diagram

The block diagram of the proposed methodology is given in figure (Fig.1) below,
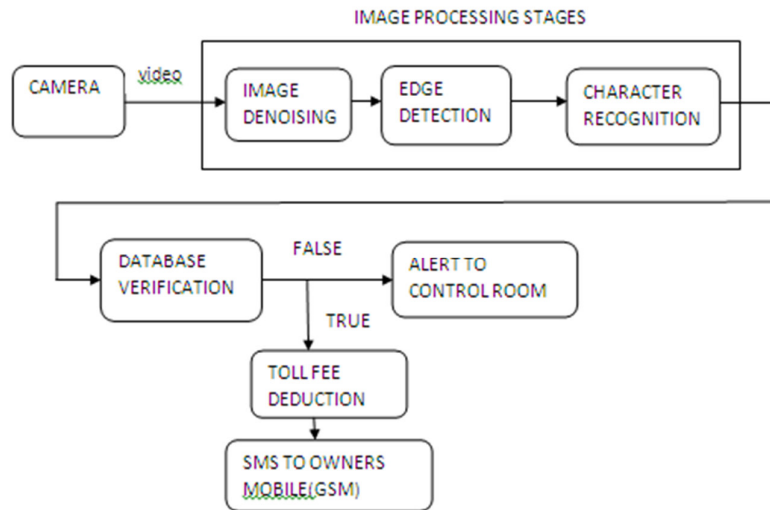
ALGORITHM

Image processing includes the following sequence of operations followed by other operations. Programming is done with Matlab 7.4.
  a) Get the input image ,taken from the front view of the vehicle
  b) Remove the background noise
  c) Edge detection algorithm like canny or sobel edge detection algorithms are applied to classify the vehicle as heavy/light vehicle
  d) Extraction of vehicle number plate from the denoised image
  e) Text recognition. Character set of 10 digits and 26 alphabets of different styles can be identified
  f) Compare the extracted vehicle number with database and deduct toll fee from owners account. Amount deduction details will be sent to the owner's contact using GSM.
  g) Incase of illegal entry, police control room will be alarmed.

Image Processing Methodology

a. Character Identification

Images are collected from parking lots and roadside. A front side Image of the vehicle is captured and processing using various algorithms. Using preprocessing step gray scale image is converted to binary image. After converting the image into gray scale the number plate detection is to locate number plate. For further processing in character recognition character segmentation is used to perform character segmentation. Segmented character is recognized using character recognition.

b. Plate Number Detection

The next step is the detection of number plate is the segmentation of plate. The number plate can be segmented based on rectangular projection. The segmentation is one of the most important processes in number plate recognition, because all further steps reliable on it. Character isolation from the number plate region is important step in number plate recognition system. The number plate system is scanning in rectangular in this algorithm.

c. Character Region Enhancement

Segmented characters are extracted from input gray scale image. To enhance the character region, if gray level scaling is used to enhance the noise. Then each character is adaptive binaries using Otsu's method. After binary character is sored centered.

Cite this article as: Srinivasavikram H, Sarathkumar V, Saravanan C, Saravanamuthu N. "Automated Toll Fee Collection using License Plate Number Recognition". *International Conference on Systems, Science, Control, Communication, Engineering and Technology 2016*: 826-828. Print.

d. Character Recognition

Fig1.Sample Image

This is most difficult stage of the number plate recognition system to identify character template technique is used. This technique compares portion of images against one of another.

Results and Discussion

In this paper, the number plate recognition system was tested on MS Window-7 OS, inter core is processing unit and 2GB RAM. The software implementation was realized using MATLAB 7.4.0.System was tested on 8 images. Character recognition work is done on 10 digit and 26 alphabets.

Fig2: Output GUI for proposed methodology

Conclusion

The system operates on image frames acquired with ordinary video equipment without any additional sensor input. The high act of the system allows for compensating the low image resolution by considering the sorting results of subsequent frames. Due to the complete integration on an embedded device, the system operates separately, reporting only the final sorting results to connected operators. Self-evidently, all advantages and capabilities of dispersed systems apply here as well. We are currently functioning on an optimization to the finding algorithm implementation; our objective is to acclimatize the algorithm to better fit to the architectural personality of our platform. In the future we will also have a look at unique region segmentation methods as the one proposed in and scan their applicability on our hardware.

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