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Automatic License Plate Recognition for Real Time Vehicle Identification Using Neural Network

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Abstract: ***License Plate Recognition (LPR) plays a vital role in the development of Intelligent Traffic System (ITS). License plate recognition has been widely studied, and the advance in image capture technology helps enhance or create new methods to achieve this objective. Over the previous few years, the good importance of finding the exact accurate location of the license plate in an automatic manner has largely increased. We have used Artificial Neural Network, it has a remarkable capability of deriving meaning from complicated or imprecise data. The Grey Level Co-occurrence Matrix algorithm is used in our system for feature extraction. We've collected vast and extremely comprehensive data sets of license plates for evaluations, comparisons, and improvement of assorted concerned algorithms. The Grey Level Co-occurrence Matrix algorithm is used in our system for feature extraction.The data sets contain pictures that were captured in day and night, numerous climate, and completely different plate clarities. Our proposed system achieves 97% overall accuracy. The simulation of the proposed system was implemented using MATLAB software package. This method can eliminate any environmental interference during the license plate detection and improve the rate of accuracy of license plate detection and recognition.***

Key terms: - LPR, Artificial neural network, GLCM, ROI

I. INTRODUCTION

License Plate Recognition is a mass surveillance method which is used to identify the vehicle. Since every vehicle have a unique number plate so if we need to recognize a particular vehicle we can use the License Plate.License Plate Recognition (LPR) system may be aComputer vision and image process technology commonlywon't toestablish vehicles by their distinctive license plates. Over the previous few years, the nice importance of finding the precisecorrect location of the car place in Associate in Nursing automatic manner has mostlyenhanced. This work primarily aims to styleAssociate in Nursing automatic variety plate recognition (ANPR) system for the new Iraqi license plates victimization back propagation neural network. The simulation of the planned system was enforcedexecuted in MATLAB code package.

Automatic Number Plate Recognition (ANPR) is an image processing technique which is used to recognize a vehicle without human intervention directly. Using this, user can track, identify the vehicles automatically. To read the license plate character, the system uses "Optical Character Recognition" method. For vehicle surveillance, Automatic Number Plate recognition plays a very important role in the last few years because of the unlimited increase of the car which make it difficult to manage and monitor by human.

II. RELATED WORK

In [4] character Segmentation is done using vertical projection method. The horizontal projection calculation, horizontal frame of license plate removal, vertical projection calculation and fining the edge of character all are under Segmentation process. Before applying the vertical projection to find the top and bottom edge of license plate character, all interferences are removed from the license plate. Then using the horizontal projection, top and bottom edge of the license plate are found. The vertical projection is used to analyse the intensity change pattern of the plate region. After this operation, the 2D image information is turned into sum of 1D row pixels. After determining the row of character boundary, left and right boundaries are found. Finally, normalized method is used and then to recognize the characters, templates matching or neural network methods are used.

The proposal in [3] is an efficient automatic VLPR system for Vietnamese license plates. Three steps are discussed and solved for this system (detection, segmentation, and recognition process). This system shows great performance when dealing with scratched license plates and even it can deal with different types of vehicles. This system advantage is that it can deals with multiple license plates found in the same image.

For the extraction of positioning in license plate recognition system, the authors propose a new algorithm which is based on improved Robert's edge detection and morphology in [5]. In traditional Robert operation, to find the edge operator, Robert's operator has been used. Robert operator, 2*2 operator template, is a Partial differential operator. In improved Roberts algorithm, the

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original image is converted into gray-scale image. Then to reduce the false fringes, mean

In [6] Proposed an approach for localization and recognition different license plates. A proposed method is designed to control the opening of door gate according to the recognition of the Iraqi license plates

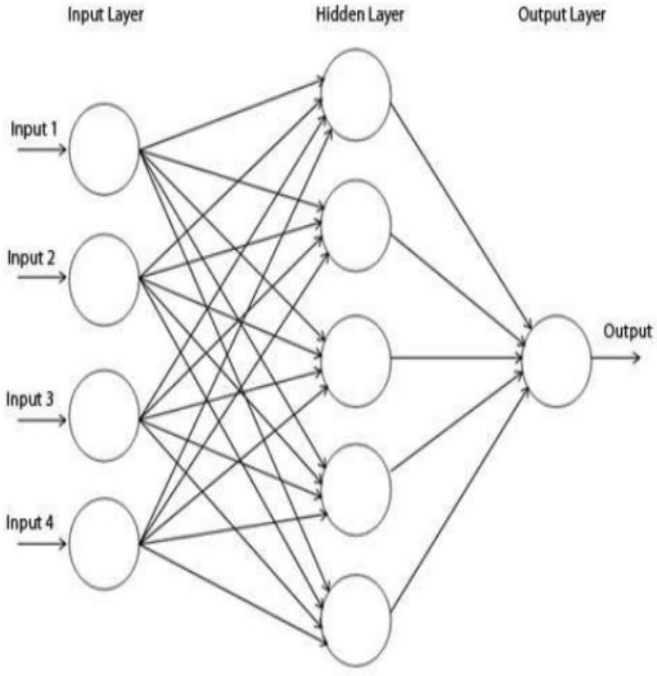
The work proposed in [7] is an approach for vehicle license plates with optimum accuracy using back propagation neural network (BPNN) and Haar wavelet. BPNN and Haar wavelet are used for detection and segmentation process. Different conditions and measures are taken for the process of detecting license plates using Haar wavelet. Then, these conditions and measures are taken and used to be the input to BPNN. The system performance is evaluated by using different number of training and testing images. Increase the number of training images will also increase the time taken for training of BPNN. This proposed system can successfully be locating text region from complex environment

The paper [9] Proposed a new efficient method for Iraqi license plate recognition using ELMAN Neural network. Different conditions were taken in study when capture the test image and 21 samples are used. The overall recognition rate for segmentation process is 85% and for recognition process is 76%.

In [12] Proposed a Libyan vehicle license plate recognition system. The template matching method is implemented, which is simple, accurate, and fast for real time applications. Two steps are discussed and solved for this system. First step, detection and extraction the region from background and vehicle license plate segmentation. Second step, character recognition process where the number, letter, or words are individually identified. The overall OCR recognition rate is 81.4%.

III. VEHICLE PLATE RECOGNITION USING NEURAL NETWORK

Neural networks, it resembles the neurons in brain which is why it is called as neural network. In image processing pixels play a role of neurons.ANN has several advantages but one of the most recognized of these is the fact that it can actually learn from observing data sets. In this way, ANN is used as a random function approximation tool. These types of tools help estimate the most cost-effective and ideal methods for arriving at solutions while defining computing functions or distributions. ANN takes data samples rather than entire data sets to arrive at solutions, which saves both time and money. ANNs are considered fairly simple mathematical models to enhance existing data analysis technologies.



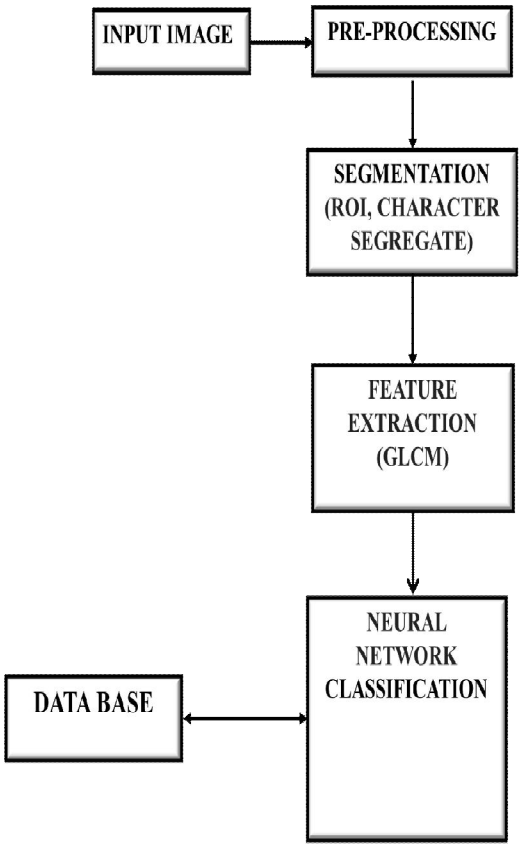
Fig(a) Block of Neural Network

Character recognition is the main part of the system where segmented characters are recognized. In this work, one of the most popular neural network methods called Artificial Neural Network is used. This method shows efficient ability to recognize the vehicle license plate number and get information about the vehicle from a database

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IV. PROPOSED SYSTEM

The Indian License plates contains different font types with different background by using neural network we can recognize the characters in the plate without errors. Our proposed system consists of few steps with Artificial neural network as a classifier. The block diagram of our proposed system is given below



Fig(b) Proposed system

A. Input:



Fig(c) Input image

The system tries to capture the image of the car in front and to process instant vehicle license plate detection and recognition. We input an image of a car that goes through the image pre-processing stages that enhances the image quality leads to better results in later stages.

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The input can be of a image or a video. Whatever be the input either it is a image or a video it takes as a set of frames. The process is done in offline so that the already captured image or a prerecorded video can be taken as a input.

B. Preprocessing

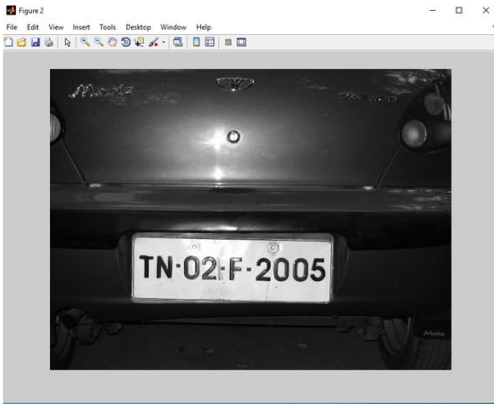


Fig (d) resized image after preprocessing

Image pre-processing is a vital step in any image analyzing system. while nota correct pre-processing, the popularityis ineffective or couldprovide improper ends up in later stages. the most motive of pre-processing is to reinforcethe standard of the image which will be processed for recognition

Various processes that we tend toarea unitprogressing to apply area unitchanging RGB image to Gray scale, noise reduction and binarization of image.

The input image is preprocessed by resizing the source image by using Imresize,

C. Segmentation



Fig(e) ROI

Character segmentation is carried on the binary image of the extracted registration number plate. The algorithmic program used for a similar is horizontal scanning that makes use of a scanning line that finds the conditions satisfying the beginning and end position of the character



Fig(f) Segmented image

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D. Features Extraction

GLCM (Grey Level Co-occurrence Matrix) algorithm is used for feature extraction. Image is being converted by grey images. Here the images level is extracted based on the parameters and the matrix values.

E. Plate Recognition

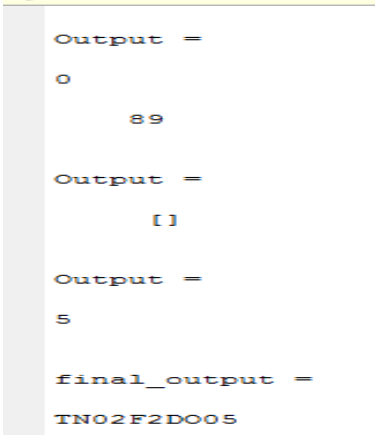
In vehicle plate recognition, where the characters are recognized is an important step. This can be called as Optical Character Recognition where the segmented characters from previous step are recognized. Neural network is an intelligence good engine that gain greater accuracy recognition rates and with faster in time recognition speed.

F. Classification using ANN.

To recognize the segmented characters efficiently, we used artificial neural network training to train our system over a dataset downloaded. After this training, we used the same neural moel to recognize the characters.



Fig(g) Output



Fig(h) Recognized numbers

V. CONCLUSION

In this proposed work, we have proposed a instant vehicle plate recognizing system irrespective of dusty environment (dirty plates).as for the characters whatever be the font type and background the classification is done accurately. The samples are taken and the plate is recognised. Proposed work is executed in offline but as a future enhancement the same algorithm it can also be performed online. The efficiency of this system is high.

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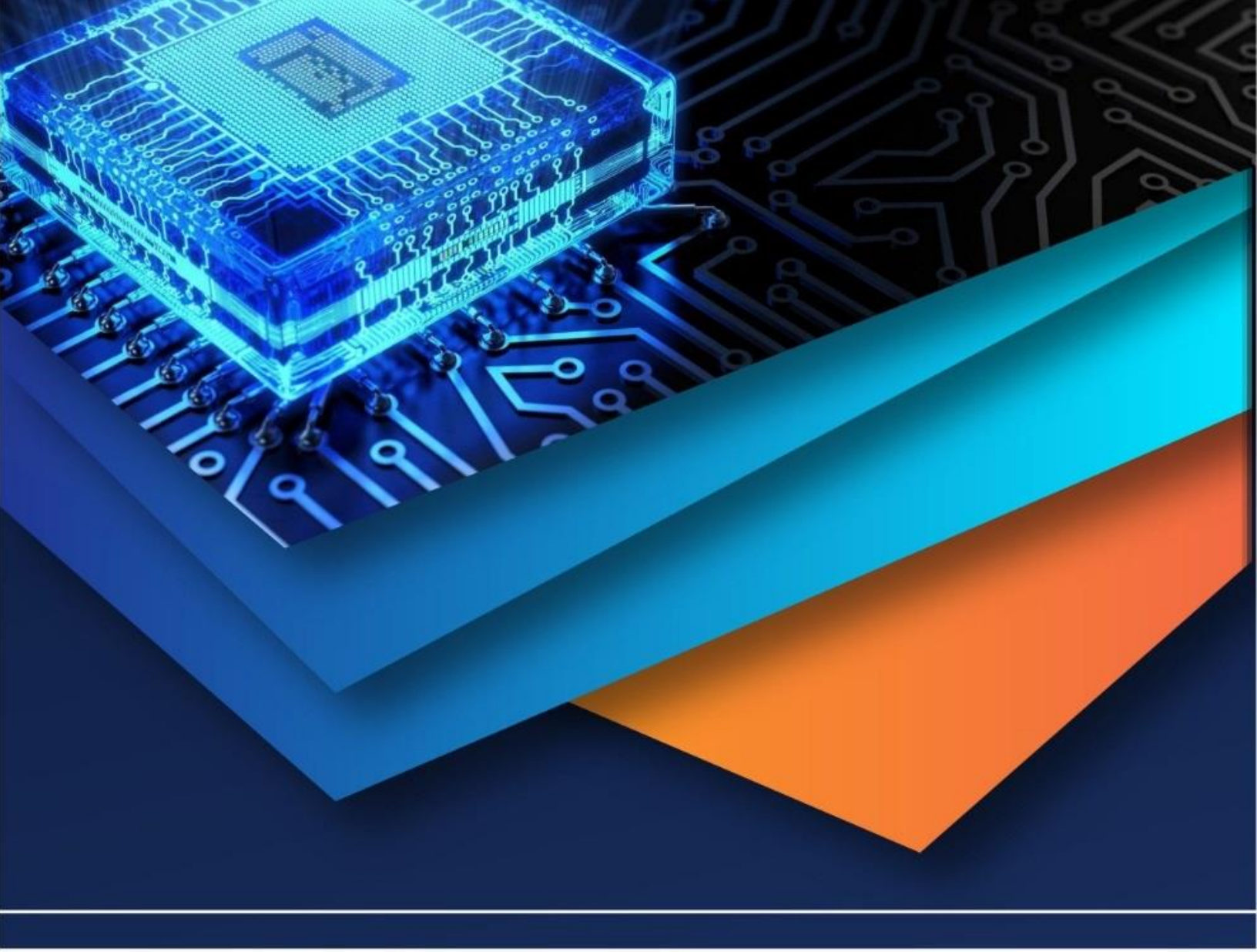
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