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An Enhancement of Number Plate Recognition based on Artificial Neural Network

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Abstract - The increasing rate of traffic volume in road transportations needs automatic traffic controls system. The automatic traffic control mange the security of road side and accidental event in road transportation. Number plate recognition plays an important role in automatic traffic control system. The diversity of number plate deceases the recognition rate of automatic system. For the improvement of number plate recognition various technique are used in current research trend. Some researcher used feature based technique, some are used basic image processing technique and now days used neural network and machine learning technique for number plate recognition. In this paper proposed an optimized feature based number plate recognition. The proposed algorithm is combination of wavelet transform function and BP neural network model. The proposed algorithm gives the better recognition rate in compression of neural network and other technique. The proposed method for number plate recognition implemented in MATLAB7.8.0 software using function and script file and module code of artificial neural network. For the process of experimental used some standard number plate used local and standard Indian number plate.

Keyword: - ANPR, LPR, ALPR, OCR, BP, Feature based.

I. INTRODUCTION

Automatic Number Plate Recognition (ANPR) is a powerful automated system which can have immense applications in our today's modern world where number of vehicles are increasing exponentially day by day and to control such immense traffic effectively this system can be of utmost importance. ANPR can perform vehicle surveillance by scrutinizing vehicle theft, automation at toll booths, parking management and many others. This paper will explore and elaborate the proposed algorithm for ANPR [3]. Automated license plate recognition has many applications. It can facilitate access to secure premises and improve security by detecting unauthorized vehicles and alerting security personnel. Police cars fitted with a system for the detection and recognition of license plate can pull relevant history about a moving vehicle (e.g, repeated speed violations, expired registration, or the like). The input to the system is a digital image, taken by the high speed rotor cameras or digital cameras in our case, of a car and converted to gray scale using NTSC standard [23]. The illumination condition which is a main bottleneck is improved first by enhancing the image by finding the variance, and performs contrast stretching or equalization of histogram.

The localization of license plates using edge finding algorithms is another approach used mainly in object detection in edge maps of images. The edge based methods pertaining to plate localization are based on the principle that the plates appearing in the image of the vehicle have some distinct features that make it distinguishable easily from the rest of the image such as high contrast of license plate as compared to the rest of the image of the vehicle [18].

Figure 1: Different types of license plates of various counties.

Plate features: the color of the plate was used as a feature, the image was fed to a color filter, and the output was tested in terms of whether the candidate area had the plate's shape or not [12]. Wang et al. used a special filter instead of a color filter. The filter was convolved with the gray image, as the output would be the character-shaped objects, and the candidate regions were scanned to verify the nominated region. In, a threshold-based method was used. All the color-based algorithms suffer from the illumination condition, because colors can be seen differently under different illuminations, also, plates have various colors and sizes [6]. A threshold based method will accordingly not guarantee that the plate region will be among the candidate regions.

License Plate Detection and Recognition System is an image-processing technique used to identify a vehicle by its license plate. In fact this system is one kind of automatic inspection of transport, traffic and security systems and is of considerable interest because of its potential applications to areas such as automatic toll collection, traffic law enforcement and security control of restricted areas. License plate location is an important stage in vehicle license plate recognition for automated transport system [14]. Automatic License Plate Identification is an essential stage in intelligent traffic systems. Nowadays vehicles play vital role in transportation. Also the use of vehicles has been increasing because of population growth and human needs in recent years. Therefore, control of vehicles is becoming a big problem and much more difficult to solve. Automatic vehicle identification systems are used for the purpose of effective control. Automatic License Plate Identification (ALPI) is a form of automatic vehicle identification. It is an image processing technology used to identify vehicles by only their license plates [20]. Real time LPR plays a major role in automatic monitoring of traffic rules and maintaining law enforcement on public roads. Since every vehicle carries a unique license plate, no external cards, tags or transmitters need to be recognizable, only license plate.
Section-II gives the information about literature review. In section III discuss the problem statement in brief, in section IV discuss the proposed method. In section V discuss comparative result finally, in section-VI conclusion and future scope.

II RELATED WORK

[1] In this paper authors discuss, an Iranian vehicle license plate recognition system based on a new localization approach, which is modified to reflect the local context, is proposed, along with a hybrid classifier that recognizes license plate characters. The method presented here is based on a modified template-matching technique by the analysis of target color pixels to detect the location of a vehicle's license plate. A modified strip search enables localization of the standard color-geometric template utilized in Iran and several European countries. This approach uses periodic strip search to find the hue of each pixel on demand. In addition, when a group of target pixels is detected, it is analyzed to verify that its shape and aspect ratio match those of the standard license plate.

[2] This paper presents a technique of number-plate recognition based on neural networks. Each number-plate in color image can be correctly located by analyzing number-plate colors which are classified by neural networks. And an integrated neural network and template matching method is used to recognize characters of number-plate. Experimental results show that the correct rate of number-plate location is close to 100%, and the number-plate locating time is less than 3 seconds using proposed method. Moreover, recognition rate of characters is improved due to the known number-plate types and novel method of character recognition. It is also observed that their algorithm is not sensitive to variations of weather, illumination and vehicle speed.

[4] Author discuss here A license plate recognition system based on neural networks was designed and developed. The system used a neural network chip to recognize license plates. The chip combined video image processing module with neural network module by using equalized image processing algorithm and network classification algorithm. A set of interface circuit was developed for implementing license-plate-number recognition. Experiment results show the system can guarantee a very low error rate at an acceptable recognition time. In this study, a vehicle license recognition system with a neural network chip was designed and developed.

[5] In this paper, authors define an important tool to track stolen car, access control and monitor the traffic. The fundamental requirements of an ANPR system are image capture using an ANPR camera, and processing of the captured image. The image processing part, which is a computationally intensive task, includes two stages i.e. plate localization and character recognition. This paper presents an improved license plate localisation (LPL) algorithm based on modified Sobel vertical edge detection operator and two morphological operations suitable for FPGA implementation. The algorithm has been successfully implemented on a Xilinx Virtex-4 FPGA and tested using a database of 1000 images that contains UK number plates.

[6] Authors in this paper discuss License plate recognition (LPR) is a technology that enables computer systems to read automatically the registration number (license number) of vehicles from digital pictures. This paper deals with the recognition of Indian car license plate recognition. The LPR system consists of four steps Plate Localization, Preprocessing, Segmentation and Normalization and Optical Character Recognition (OCR). Morphological operator is applied to the image to identify the plate location. Then the plate region is then preprocessed by applying the histogram equalization technique.

[8] In this paper, they propose a method for automatic license plate detection and recognition in the city of Abu Dhabi. The proposed method starts by segmenting moving vehicles using background subtraction. Segmented vehicles are tracked using a color-based particle-filtering technique until the vehicle is in position for a high resolution image to be taken by a still camera. The license plate is detected by converting the image into the LAB color space and using level set methods to locate its contour. Regularity and size are used to filter erroneous blobs. Geometric features are extracted from the blobs of license plate numbers and are passed to trained neural networks for classification.

[10] Author discuss In this paper, a general approach for international vehicle license plate localization and recognition is proposed. A hybrid solution is presented with combining basic machine vision techniques and neural networks. The proposed model consists of three main parts, including localization, segmentation and recognition. In the license plate localization, after some essential preprocessing and finding edges, the 8-connectivity of image background eliminates which helps more appropriately separating of main image objects from the cluttered backgrounds. Then, it is tried to find connected objects with 8-connectivity of the differentiated binary image. The binarization of license plate is based on local binarizing.

III PROBLEM STATEMENT

Privacy preservation is major issue in current scenario of data security. In traditional privacy preservation used cryptography and Steganography technique. Now a day's used various methods for privacy preservation such as data mining, neural network and some other hybrid approach. Confidentiality and authentication of data is major issue in current scenario. For the confidentiality and authentication of data various technique are used such as cryptography, data Romanization, third party access control and many more method [1,2]. The conventional technique such as cryptography and other technique faced a problem of security issue in privacy preservation. Now a day's data mining technique play an important role for the privacy preservation [3,4]. For the purpose of this used rule mining technique, classification technique and clustering technique. The rule mining technique is very important role in terms of transformation. The process of transformation changes the value of minimum support and confidence. And change the order of data associated with this range and hide the information [5, 6, 7]. Instead of these technique used clustering and classification for the process of privacy preservation. The process of clustering and classification such as decision tree and KNN are used for this purpose. Now a day's principle of component analysis is used. The process of data privacy preservation proceeds in two different ways [8]. First act as sensitive raw data such as name, indemnifiers and some other important record. And other is sensitive information mined from database using data mining algorithm [9]. The process of data mining facilities the process of algorithms for modifying the original data in some way, so that the private data and private knowledge remain private even after the mining process. The problem that arises when confidential data can be derived from released data by unauthorized users is also commonly called the data duplication problem. Now a day's SMC play an important role in privacy preservation in concern of third party communication [10]. They believe of all parties justify by the common factor of data analysis. The protocols of SMC ensure that the communication party involve in proper manner [10]. In other words, unless proper incentives are set, current SMC techniques cannot prevent input modification by participating parties. The problem of privacy preservation in the process of data evaluation in real time scenario, the inability of algorithm the process of data transformation faced a problem of extraction of data. The lacking of extraction most of data part is lost. The major issue in the form of social community data such as health sector data, statics data, and social website data[14]. In some case the organization develop the parallel lines of data for the purpose of communication.

IV PROPOSED WORK

In this paper we proposed an optimized feature based license plate recognition based wavelet transform and BP neural network algorithm. Feature based number plate recognition is current research trend. In feature based number plate recognition feature extraction is an important task. For the feature extraction used transform function such ad wavelet transforms function. Wavelet is frequency domain function that function play important role in texture extraction. The extracted texture feature passes through BP neural network model for the processing of training of number plate alphabet. After the selection of feature the template of character and number passes through recognition. The recognition process done by the neural network the process of neural network, artificial neural network creates a trained pattern for the processing of number plate recognition. In the process of proposed methodology discuss the following sub section. Wavelet transforms function, BP neural network.

Steps of Proposed Model

Input image: - in this section number plate image is loaded as input. The type of image is any standard format.

Gaussian Filter: - it is category of low pass filter for removal of noise in input image.

Wavelet transform: - it is frequency based transform function used decomposition of image in different layers**.** The decomposed layers forms in details and approximate, the details part is reserved and approximate part process as feature matrix for creation of template.

Low frequency: - the process of transform value is only low frequency value high frequency value is preserved.

Image binary: - in that process image feature data is converted into binary formats used in the method of outs.

Vector generation: - vector generation is the process of single input fashion of neural network.

Input vector: - input vector is input neurons of BP neural network.

Learning rate: - it is probability based parameter for the training of template.

Recognition: - it is point based method for template recognition.

V. EXPERIMENTAL RESULT AND ANALYSIS

Automated License Plate Recognition (ALPR) is a technology that uses optical character recognition (OCR) to automatically read license plate characters. There are two types of ALPR: stationary, which uses infrared (IR) cameras at high fixed points, and mobile, which uses vehicle-mounted IR cameras. Stationary cameras can be mounted on signs, street lights, highway overpasses or buildings as a cost-effective way to monitor moving and parked vehicles twenty-four hours a day. Camera software is able to identify the pixel patterns that make up a license plate and translate the letters and numbers on the plate to a digital format. The plate data is then sent to a database where it is compared in real-time to a list of plate numbers that belong to "vehicles of interest".

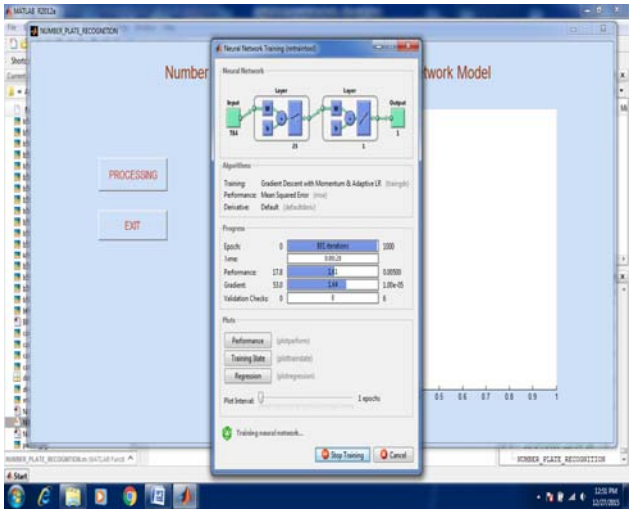

Figure 2: Shows that the Car 1 Trained Number plate image for the BP method.

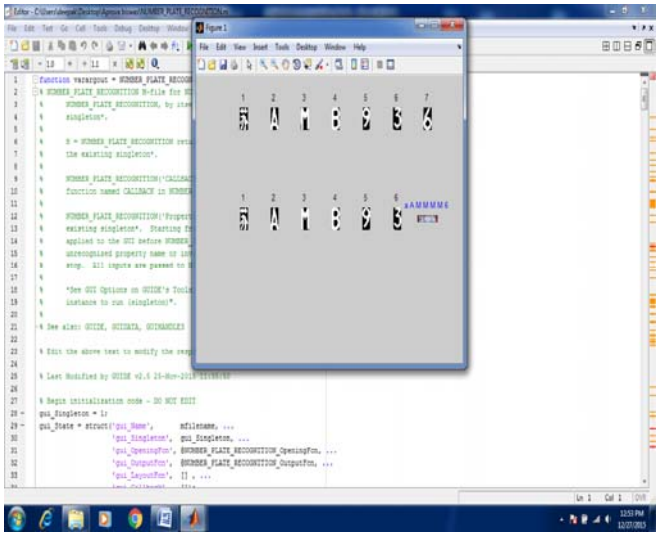

Figure 3: Shows that the Extracted Number plate image Car 1 for the BP and FEATRE BASED method.

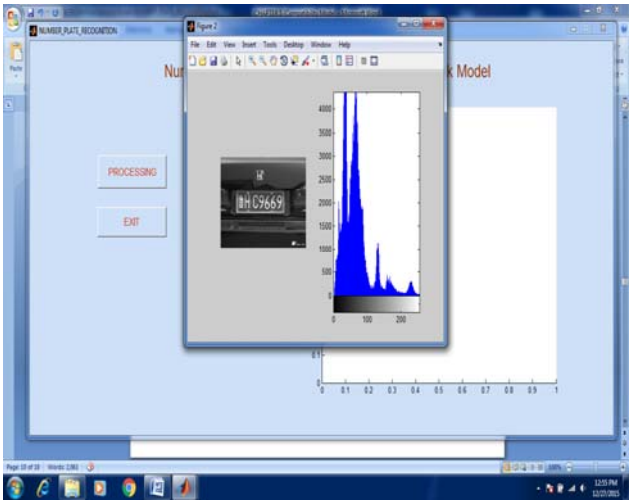

Figure 4: Shows that the Car 2 Inserted image for the BP and FEATURE BASED.

Number plate	Method	Recognition time (ms)	Training time (ms)	Recognition rate (%)
Car 1	BP	5.4287	21.5436	89.39
	Feature Based	3.6662	29.5604	91.28

Table 1: Shows that the comparative result for car 1 number plate image for the method BP and Feature based, and finds the value of Recognition rate, time and training time.

Number plate	Method	Recognition time (ms)	Training time (ms)	Recognition rate (%)
Car 2	BP	7.7466	21.30	90.61
	Feature Based	4.6986	26.47	94.86

Table 2: Shows that the comparative result for car 2 number plate image for the method BP and Feature based, and finds the value of Recognition rate, time and training time.

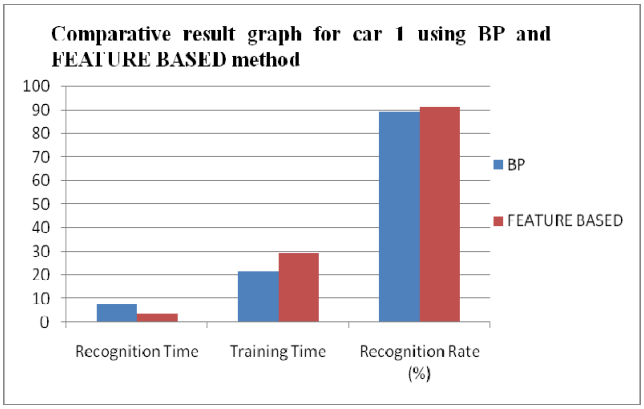

Figure 5: shows that comparative result analysis of BP method and Feature based method for Car 1 image.

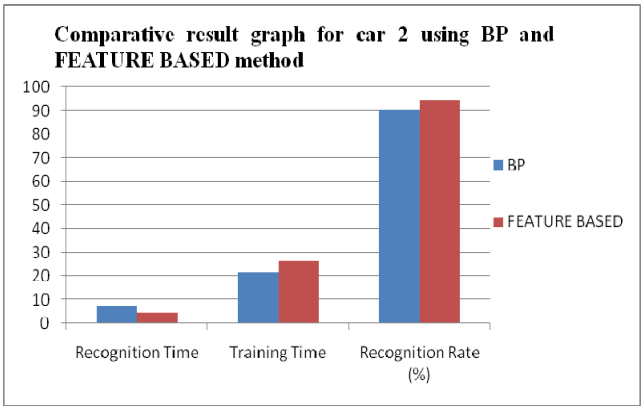

Figure 6: shows that comparative result analysis of BP method and Feature based method for Car 2 image.

CONCLUSION AND FUTURE WORK

In this paper proposed a feature based number plate recognition. The feature based number plate recognition improves the performance of number plate recognition. The process of feature extraction performs by wavelet transform function. Wavelet transforms function gives a better texture feature. The extracted texture feature goes through quantization process. The vector quantization gives the binary format of number plate. For the optimsation of vector used BP neural network model. BP neural network is novel algorithm for data optimization. Fitting approach is necessary for template matching. For matching the characters with the database, input images must be equal-sized with the database characters. Here the characters are fit to 24x42. The extracted characters cut from plate and the characters on database are now equal-sized. The next step is template matching. Template matching is an effective algorithm for recognition of characters. The character image is compared with the ones in the database and the best similarity is measured. In the final module, each segmented character from the previous module will be matched with the stored templates of the character pixel by pixel. In future reduces the training time and computational time of template generation.

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