**Number Plate Recognition**

**ABSTRACT:**

Automatic number plate recognition is a well-known proposal in today’s world due to the rapid growth of cars, bikes and other vehicles. This automatic number plate recognition system uses image processing technology for identification of the vehicles. This system can be used in highly populated areas and higly restricted areas to easily identify traffic rule violated vehicles and owners name, address and other information can be retrieved using this system. This system can be automated and it is used to recognize vehicles without authorization, vehicles that violated rules at populated areas like malls, universities, hospitals and other car parking lots. This can also be used in the case of car usage in terrorist activities, smuggling, invalid number plates, stolen cars and other illegal activities. It can also be used in highway electronic toll collection. Image of the car number plate is captured and detection is done by image processing ,character segmentation which locate the alpha numeric characters on a number plate. Then the segmented characters are translated into text entries using optical character recognition(OCR).ANPR systems are already available but efficiency is not gained thoroughly. These systems are developed using different methodologies but some factors like vehicle speed, different font styles font sizes, language of vehicle number and light conditions are required to be explored .These can affect a lot in the overall recognition rate. ANPR systems use (OCR) optical character recognition to scan the vehicle number plates, and it can be retrieved whenever required. The other details of the owners of the vehicles like address and mobile number can be manipulated whenever necessary by contacting the system administrative. The purpose of this paper is to recognize a car number plate using an, image segmentation. We intended to develop a system in mat lab which can perform detection as well as recognition of a car number plate

**INTRODUCTION:-**

Vehicle plate detection and recognition is used in many of the applications, including travel time estimation, car counting on highways, traffic violations detection, and surveillance applications. With the growing population, vehicles number also drastically increased .This made it difficult to find a car park these days for a large number of students and faculty at Educational Institutions. Most of the car parks are managed manually by security guards who may not keep record of the vehicles in the parking lot.

Hence, the vehicle driver have to keep wandering in the parking lot for finding a slot for car parking. The absence of the security guards may also lead to vehicle thefts and also may cause quarrels between drivers in order to get parking space. Automated Number Plate Recognition (ANPR) is also known as Automated License Plate Recognition (ALPR). Automatic Number Plate Recognition or ANPR is a technology that uses pattern recognition to 'read' vehicle number plates. In simple terms ANPR cameras 'photograph' the number plates of the vehicles that pass by violating the rules. This 'photograph' is then fed in a computer system to find out details about the driver and owner of the vehicle and details about the vehicle itself. ANPR consists of cc’s operated via a computer . As a vehicle passes, ANPR 'reads' Vehicle Registration Marks – more commonly known as number plates - from digital images, taken through cameras located either in a mobile unit, in-built in traffic monitoring vehicles. Computer vision and character recognition, algorithms for license plate recognition play an vital role in the recognition of the number plate. Therefore they form the core modules in any ANPR system. The system for automatic car license plate recognition includes a static camera, a framer , a computer, and custom designed software for image processing, analysis and recognition .

Parking lots would be benefited with this application .It would be very useful to develop this recognition system in a university so that everything goes in a sequential manner with less time consumption. Tollgates is one of the best application too. It is very difficult in a rush hours for manual toll gate ticket generation. Hence these models can be used in coordination with employees. This would be very useful in terrible weather conditions.

Number plate recognition systems have the following modules: a) Color or monochrome static camera, b) Image conversion systems, and c) the image processing board. Each section must be chosen properly for a specific application.[1] Basically, the License Plate Recognition (LPR) process isdivided into three main parts based on the thesis of S. D. Palmer and O. N. Aharoni [2] Plate Detection, Character Segmentation, and Character Recognition. Every module plays a vital role in gaining efficiency and accuracy .The challenges here are font size and style variations, angle of the picture, low contrast light effect, speed of the vehicles. Machine learning algorithms are fed through unsupervised learning .

**LITERATURE REVIEW :-**

**Muhammad Tahir Qadri** In this anticipate [2] for the recognition the OCR techniques is used which is susceptible to misalignment and to various sizes. The affine transformation can be used to advance the OCR recognition from various size and angles. The programmed vehicle identification system using vehicle license plate is exhibited. A series of image processing techniques of the system for identifying the vehicle from the database stored in the PC.

**S.Kranthi, K.Pranathi** In this paper they [3] proposed that Automatic Number Plate Recognition (ANPR) is a method that catches the vehicle image and confirmed their license number. ANPR can be used in the presentation of stolen vehicles. ANPR can be used in various manners by using to identify it stolen vehicle on the highway.

**Abd KadirMahamad** In this paper they explained [8] an automatic number plate inspection of letter sets of plate using image processing and optical character recognition. An imperative system has been created of training interface using LABVIEW software.

**Kuldeepak et al.** In this paper [1] they introduced that high level of precision has been required by the number plate recognition when streets are occupied and number of vehicles are passing through. In this paper, by optimizing different parameters, they have accomplished an exactness of 98%. It is essential that for the tracking stolen vehicles and monitoring of vehicles of an exactness of 100% can't be bargained with. Therefore to accomplish better precision streamlining is required. Additionally, the issues like stains, blurred regions, smudges with various text style and sizes ought to be remembered. This work can be further boundless to minimize the errors because of them.

**AmrBadr et al**. In this paper [8] Automatic recognition of car license plate number got to be indispensible part in our day by day life. This paper mainly explains an Automatic Number Plate Recognition System (ANPR) using Morphological operations, Histogram manipulation and Edge discovery Techniques for plate localization and characters segmentation. Artificial Neural Networks are used for Character classification and recognition.

In the literature Review many Number Plate Recognition methods have been purposed. Where the number plate recognition is the hotspot area of research now a days due to rapid development of transportation systems and from literature review we can see various existing techniques take place for number plate recognition. In [2004] Number plate recognition method here first used Colour Edge Detection and fuzzy maps then steps taken into account were (1) Pre-processing:- Consists binarization using variable thresholding technique then Connected Component algorithm was applied to binarized plate to eliminate undesired area. Huge transformed was taken into account for alignment of extracted components for further process. (2) OCR (Optical Character Recognition) here the character recognition process takes and task of character categorization accomplished by the compositional semantics of license numbers, Topological Shorting to compute the topological features of characters for further process [1]. In [2006] the method mainly consists the tasks (1) License Plate Segmentation: - binarization with Sauvola Method and use the Sliding Concentric Windows (SCWs) segmentation technique for faster detection of region of interest (ROI). (2) License Plate Processing: - Image was transformed into standard size by bicubic interpolation method. (3) Character Recognition:-Trainable OCR (Optical Character Recognition) System based on Neural Networks was taken into account which used the approach of PNN (Probabilistic Neural Network) with two individual probabilistic networks one for the alphabet and other for the number recognition [2]. In [2007] the system mainly accomplice with three major steps (1) Plate Region Extraction: - Image Captured to binary image and then Edge detection technique, smearing algorithms were used for extracting the Region of Interest (ROI). A morphological operation was performed for the dilation of Image (2). Segmentation of characters: - Character segmentation was provided by smearing algorithms, Morphological Operations and some filtering process. (3) Recognition of Characters: - Statistical based template matching provide the best match of segmented character which taken as input. And the accuracy for different step here for Plate Region Extraction tested on 332/340 achieved 97.6% for Segmentation of character over 327/340 images achieved 96.0% and for Recognition of Characters over 336/340 was achieved 98.8% [3]. In [2008] this paper mainly aims to present the various existing techniques to categorize and assess them in general the number plate recognition consist three steps (1) Extraction of a ROI: - edge statistics, morphology, Connected component analysis (CCA). (2) Segmentation of the plate characters: - Using Histogram Processing, Mathematical Morphology, Local/Adaptive Thresholding and Transformations. (3)Character recognition: - Using Statistical/Hybrid Classifiers, Pattern or Template Matching. Better Results have been achieved by using the concept of neural networks and statistical classifier approach but a large amount of learning training sample needed for the better work [4]. In [2010] the algorithm for number plate recognition composed with number of following steps (1) Pre-processing and Plate Recognition: - To improve the image Quality colour image was converted to gray level image using Standard NTSC model then median filtering was applied for noise reduction. Feature-based number plate localization method was implemented for further process. (2) Character Segmentation: - Otsu method for threshold the plate values. (3) Character Recognition: Statistical feature extraction has been implemented for the character recognition process. Performance analyzed for different part of purposed method was 85% for number plate localization, for character segmentation 95% and for character recognition it’s was 82%. [5]. In [2011] the approach mainly based on Artificial Neural network while the steps proposed was (1) Plate Localization: - Canny Edge Detector used for the image localization purpose. (2) Character segmentation: - Histogram approach was taken into account for Contrast extension while median filtering for noise reduction (3). Feature Extraction: - Artificial Neural Network (ANN) was proposed in this process. Two separate ANN used one for Character and other for character extraction because confusion was high when combined approach was applied to both character and numbers so to increase the success rate separate ANN was implemented. (4)Character Recognition: - Multi layered perceptron (MLP) model of ANN was used for the character recognition purpose. Test was taken on 259 vehicle images and out of which 247 was recognized and overall accuracy was achieved near about 95.36% [6]. In [2011] Algorithm for number plate verification mainly accomplice four steps (1). Licence Plate Location: - Local Otsu and Improved Bernsen Algorithm was implemented (2). Licence Plate Detection: - Connected Component Analysis (CCA) based on Pixel Connectivity (3). Character Segmentation: - Horizontal and Vertical Correlation approach was taken into account for segmentation of characters. (4). Character Recognition: - Feature Extraction for character Recognition, feature extraction for number recognition has been implemented using Elastic Mesh approach which use the concept of Support Vector Machine(SVM) [7]. In [2011] Automatic Number Plate Recognition system mainly use the techniques of Edge finding method and Window filtering method. Where the localization of Plate consists the step of converting the Original Colures image to the gray level image. Identification of no. plate horizontally take place in which row represents the peak value of the region and then high change region was selected and vertical approach was applied. Then combined region was selected for the further process [8]. In [2012] Number plate recognition system was composed of mainly these steps (1) Pre-processing:- Image converted to gray scale from Original was goes for further process and median filtering was applied for noise removal (2) Plate Localization: - Morphological Operations were performed for Number plate localization (3) Character Segmentation: - the process of character segmentation take place using regionprops functions which take place into MATLAB. (4) Character Recognition: - Where the character recognition task was performed by the functions of MATLAB using OCR (Optical Character Recognition) Approach [9]. In [2013] vehicle license plate recognition System was per posed which contains mainly four steps (1). Pre-processing and Edge Extraction: - firstly the simple pre-processing of image take place and then edge extraction without filtering takes place. (2). Licence Plate Localization: - Use the Micron position technology and edge image was calculated by horizontal and vertical direction. (3)Character Segmentation: - Vertical area Projection Method was implemented for the character segmentation approach. (4). Character Recognition: - Character recognition process step implement the Artificial Neural Network approach and then at last Template matching algorithm was taken into account and best matched value was returned as a result[10]. In [2013] real time vehicle plate recognition was implemented mainly in two steps which can be further divided (1). Plate Location Detection:-this paper presents the implementation view of Vertical edge techniques and then detected lines were binarized. Verification of Upper number plate area was taken into account, Horizontal border, Excluding of border lines (2). Licence Plate Recognition: - Histogram technique was implemented for localization of plate and then character recognition take place by Normal factor (NF) Calculation. RLPR Test was taken on 250 images and out of which 231 images exact was recognized with accuracy rate 92.4% 17 were unrecognised and 2 were misrecognised [11]. In [2014] License Plate Automatic Recognition System was developed which consists six steps (1) Image Acquisition: - Image was taken from Digital or anlog Camera for further process. (2) Image Pre-processing:- Edge Detection Technique used for the image processing purpose then (3). License Plate Locating: - Mathematical Morphology techniques use for the licence plate localization which use the concept of shape, size etc. features of image not work on numeric type values. (4). Character Segmentation: - Vertical and Horizontal approach was consider for Character Segmentation (5). Character Recognition: - The further process of character recognition was take place with the help of Neural Network [12]. In [2014] Vehicle License Plate Detection and Recognition System here composed of four major steps (1) Preprocessing:- where the original or RGB image is converted to Gray Scale image using NTSC Standard method. (2).Localization:- Morphological Operation were performed and huge transformation was taken into account for edge detection Process. (3). Segmentation: - Horizontal Projection was applied for segmentation process. (4). Recognition: - Template matching process take place in which the pixel values of the matrix of segmented character and the template matrix were compared and best match value was returned as output. [13]. In [2015] Automatic License Plate Recognition using Matlab was proposed by P. Sai Krishna. In this thesis work, simple colour conversion edge detection and removal of noise with the application of median filter as one of the operators is attempted. This thesis work presents an approach using simple but efficient morphological operations, filtering and finding connected components for localization of Indian number plates .It proposes the identification of stolen cars .The algorithm has been tested on 20 samples and is found to extract both alphabets and numbers from vehicle license plates images with an accuracy of 90% for four wheeler license plates [14].

**Problem Statement**

Now days there are various image processing algorithm launched but as per the literature review numbers of algorithm have lagging point of determination actual image in various conditions as well implementation cost is high due system requirements. It also lagging in the connecting to internet if we would like to for the centralize system development .

**Proposed Work**

so that we are proposed mechanism for extraction of numbers from the given number plate and to cross check it In proposed work a novel system has been proposed for de noising and for the better character reorganization using standard classifiers of neural networks and give better body detection.

**Methodology**

**FLOWCHART:-**

Start

Get Number plate Image

Image

Initialize Open CV

Image

Extract Character using OCR

Search Contact in DB

Registration

If Contact Match

**N**

**Y**

Extract Details

Finish

Show for Verification

**DFD :**

**Architecture**



Search number in database

**Details of Vehicle**

Character Recognition

**Image**

Number Extraction

**SOFTWARE REQUIREMENTS :-**

1.Python Idle(IDE)

2.Tkinter(GUI)

3.Python(As a Programming language)

**FUTURE SCOPE :-**

In this project, existing methodologies and algorithms proposed in literature for Vehicle and Number Plate recognition were reviewed. Due to the unavailability of such an ANPR system off the shelf in tune with our requirements, it is our endeavor to customize an ANPR system for educational institution. Template matching was implemented on number plates obtained from static images and an average accuracy of 80.8% was obtained. This accuracy can be improved greatly by positioning the camera suitably to capture the best frame and using two layers of neural networks. The implementation of the proposed system can be extended for the recognition of number plates of multiple vehicles in a single image frame by using multi-level genetic algorithms. Also, a more sophisticated version of this system can be implemented by taking inputs from live video feed and selecting the best vehicle frame for classification of vehicle types and recognizing the number plates using neural networks.

**CONCLUSION:-**

This Project has different recognition methodologies, their advantages and drawbacks and gives the best of all those to opt for a user friendly, efficient system that works in any climatic conditions unaffected. That system should not be effected by the factors like speed, light, font size and styles.

In this Project, the automatic number plate recognition system using vehicle license plate is introduced. The system utilizes image processing techniques for recognizing the vehicle from the database stored in the computer by user. The system works agreeably for wide variation of conditions and distinctive sorts of number plates. The system is actualized and executed in Python and performance is tried on genuine images. In the existing work, work has been done on contorted number plates. This method has an issue of commotion and image is taken from separation. In proposed work a novel system has been proposed for denoising and for the better character recoginization using standard classifiers of neural networks and give better detection.

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