LICENSE PLATE RECOGNITION Using MACHINE LEARNING

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Abstract: LPR (License Plate Recognition) is an image-processing technology used to recognize vehicles by their plate numbers. This technology is utilized as a part of different security and traffic applications, for example, the access-control system featured, security control, speed control, road traffic control, and parking control are some of them. The primary purpose of this work is to detect a plate number from a picture provided by a camera. A proficient algorithm is applied to recognize a license plate in different intensity of light conditions.

Index Terms **- LPR, character extraction, automatic plate number reader, segmentation.**

I. INTRODUCTION

There are plenty of vehicles in our today's world. This is directly linked to the growth of the population. It is getting hard to physically authorize laws and traffic rules for smooth traffic flow. Monitoring vehicles for law requirement and security commitments is a troublesome issue because of the number of cars on the road today. The best example is border patrol: it is tedious for an officer to physically check the plate number of each auto. Also, it is not possible to utilize various police officers to go about as full-time permit plate investigators. Police watches cannot simply drive in their autos staring at the plates of different autos. There must exist a way for recognizing and detecting plates without steady human mediation.

Every country has a unique license number, which is composed on its license plate. This number recognizes one vehicle from the other, which is valuable particularly when both are of same make and model. An automatic system can be implemented to recognize the license plate of auto and extract the characters from the district containing a license plate. The license plate number can be utilized to recover more data about the vehicle and its proprietor, which can be utilized for additionally processing. Such a computerized system ought to be portable, and small in size [1].

Different license plate detection algorithms created in recent years. Every one of these algorithms has their own points of advantages and disadvantages. This work described the techniques in which license plate is recognized utilizing certainty related predictions. As numerous detections are accessible for single license plate, post-processing techniques are connected to merge every single identified area. Also, trackers are utilized to restrict the search region to specific areas in an image. It proposes an alternate approach of recognition utilizing binarization and disposal of pointless areas from an image. In this approach, the first image handling and binarization of an image is done in view of the difference amongst characters and background in license plate. Subsequent to binarizing the image, it is partitioned into various high contrast regions. These regions are gone through disposal stage to get the last area having most likelihood of containing a number plate

Fig. 1 Typical car license plate of Jersey (UK) [2]

An image is utilized to convey valuable information in an evident format. It is only a course of action of small components in a two-dimensional plane. These small components are called pixels. A large number of pixels consolidate together to form an image, regardless of whether small or large. If so, image processing is a technique to accomplish tasks on an image, with a specific end goal to get an upgraded image or to extract some helpful data from the image. It is a kind of signal processing in which input is an image and output might be image or features/attributes related with that image. These days, image processing is the one that

quickly developing innovations. Image processing shapes core research area inside building and software engineering disciplines as well. Image processing essentially includes the following steps:

- ❖ Importing the image through image acquisition devices.
- ❖ Analyzing and manipulating the image.
- ❖ Output in which result can be adjusted image or report that is depends on image analysis.

There are two types of techniques utilized for image processing in particular, digital and analogue image processing. Digital image processing systems help in control of the digital images by utilizing computers. The three general stages that a wide range of data need to experience while utilizing digital procedure are pre-processing, enhancement and display, data extraction. Analogue image processing can be utilized for the printed versions like photographs and printouts. Image analysts utilize different fundamentals of translation while utilizing these visual strategies [3].
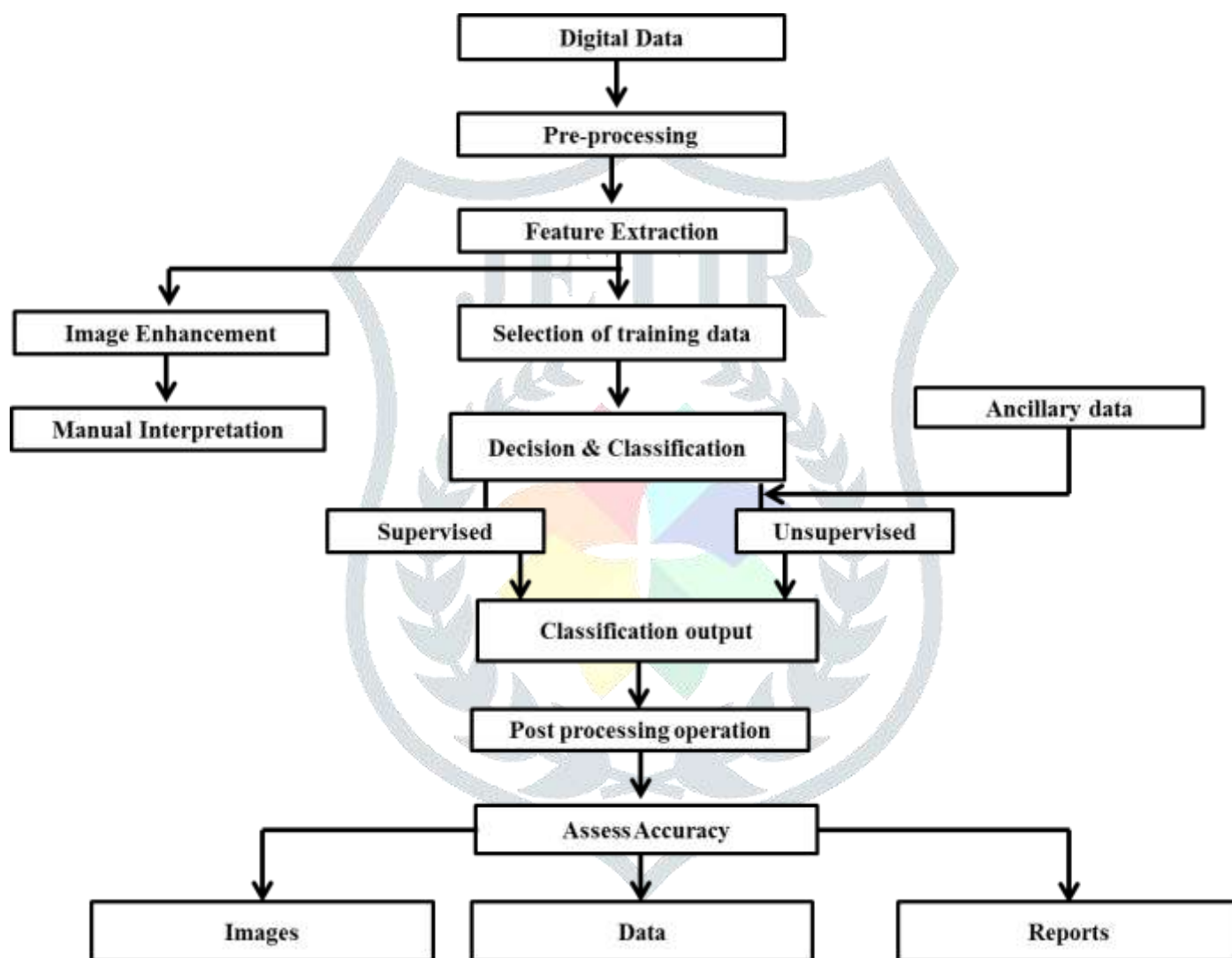

Fig. 2 Digital Image processing [3]

II. RELATED WORK

Paper 1: A Novel Approach for Car License Plate Detection Based on Vertical Edges [11]
Author- Ashwathy Dev
Conference/journal – IEEE conference, 2015

In this paper, fast technique for identifying the vehicle license plate. Initially the image is binarized using adaptive threshold. Then the image is enhanced by utilizing unwanted line elimination algorithm. VEDA is applied on vertical edges of the image to extract number of conceivable candidate license plate number is detected.

Paper 2: Automatic Bengali Number Plate Reader [4]
Authors- Md. Tanvir Shahed, Md. Rahatul Islam Udoy, Biswajit Saha, Asir Intisar Khan, Samia Subrina

Conference/journal – IEEE conference, 2017

In this paper automatic license plate number recognition system involving image pre-processing and morphological operation followed by edge detection, regional localization and character segmentation to identify and recognize Bengali characters in the number plate efficiently as well as with less computational complexity.

Paper 3: Automatic Number Plate Recognition Using CNN Based Self Synthesized Feature Learning [5]
Authors- Madhusree Mondal, Parmita Mondal, Nilendu Saha, Paramita Chattopadhyay
Conference/journal – IEEE conference, 2017

In this paper convolutional neural network (CNN) is utilized to recognize province (states) of a vehicle from the license plate number using self-generated features.

Paper 4: Automatic Car Number Plate Recognition [6]
Authors- Anumol Sasi, Swapnil Sharma, Dr. Alice N. Cheeran
Conference/journal – IEEE conference, 2017

In this paper the authors proposed to identify and recognize vehicular number plates automatically utilizing three proficient algorithms namely Ant colony optimization (ACO) utilized in plate localization for distinguishing the edges, a character segmentation and extraction algorithm and a hierarchical joined classification technique based on inductive learning and SVM for singular character recognition.

Paper 5: Number Plate Recognition And Document Verification Using Feature Extraction OCR Algorithm [7]
Authors- Bhonsale Tejas, Dhamal Omkar, Dhumal Rutuja, Khedekar Prajakta, Patil Bhakti
Conference/journal – IEEE conference, 2017

The proposed work to design a system which captures the image of the license plate number of a vehicle using a camera and the details are being extracted utilizing the character segmentation which is done by a feature extraction optical character recognition algorithm (OCR). At that point the details extracted from the number plate in text format is utilized to retrieve all the critical data of the vehicle like, the name of the proprietor, address of the proprietor, date of enlistment of the vehicle and so on from the database. The police can confirm whether the documents are genuine or not.

Paper 6: Vehicle License Plate Recognition (VLPR) [8]
Authors- K.B.Sathya, V.Vaidehi, G.Kavitha
Conference/journal – IEEE conference, 2017

The authors analyses different vehicle license plate recognition (VLPR) techniques, classifies the VLPR literature based on feature extraction and classification schemes, exhibits the review of methodologies for detection, localization and recognition of plate character and numbers and addresses the difficulties in performance improvement.

Paper 7: Vehicle Number Plate Detection and Recognition using Bounding Box Method [9]
Authors- Mahesh Babu K, M V Raghundh
Conference/journal – IEEE conference, 2016

In this work the authors used Bounding box technique to segment all characters in the image. At long last, recognition of each character is done. The template matching technique is utilized for recognizing each character in the vehicle tag.

Paper 8: VNPR system using Artificial Neural Network [10]
Authors- A. George, V. J Pillai
Conference/journal – IEEE conference, 2016

In this paper work, the authors proposed a new technique for license number plate recognition system that the performance of the system can be enhanced if it going for standard number plate and it also depends on the quality of the input image. Training the artificial neural network with more on the sample increases the performance of the system.

III. METHODOLOGY

A. Overview of proposed work

The proposed work is to detect a license plate from an image captured by a camera. An efficient machine learning algorithm is utilized to detect a license plate number in a different luminance situation. The algorithm extracts the license plate number data from an image and provides it as an input to the stage of car license plate recognition.

     i.   *Image acquisition*

Image acquisition is the formation of digital images commonly from a physical object. A digital image might be made directly from a physical scene by a camera or any other related device. On the other hand it can be acquired from another image in a simple medium, for example, photos, photographic film, or printed paper by a scanner or related devices. Numerous specialized images obtained with side-looking radar, tomographic hardware, or radio telescopes are really acquired by complex preparing of non-picture data.

ii.   Image enhancement

The process of image acquisition regularly prompts image debasement because of mechanical issues, out-of-center blur, motion, inappropriate enlightenment and noise. The main objective of image enhancement is to begin from a recorded image and to deliver the most visually satisfying image.

iii.   Image restoration

The aim of image restoration is to begin from a recorded image and to deliver the most visually satisfying image. The objective of enhancement is beauty. The objective of restoration is truth. The measure of accomplishment in restoration is generally a mistake measure between the first and the estimate image. No scientific error function is realized that compares to human perceptual assessment of mistake.

iv.   Character extraction

Characters extraction is the most important pre-processing phase for any off-line content recognition system because the characters are the smallest unit of any language content.

v.   Character recognition

The segmented characters are given as an input to the character recognition and the output is the tag number. It includes a great deal of difficulties because of the diverse size of the fragmented characters, breaks happening in certain characters and so forth. Template matching technique is one of the procedures utilized for optical character recognition. It can just perceive the character that demonstrates a similarity with the standard template made for each character in the database.
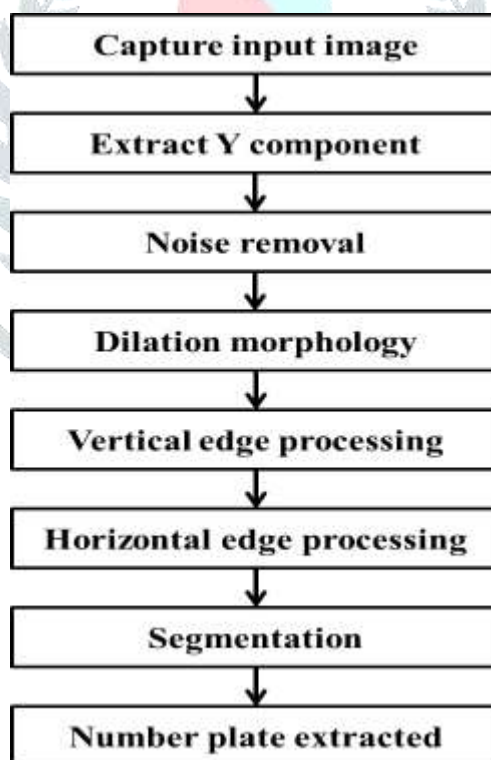
B.   Proposed workflow

Fig. 3 Flow of the proposed work

IV. RESULT AND DISCUSSION

In this work 62 characters are trained and all the characters are recognized. The extraction, segmentation and recognition of the characters are successfully implemented.
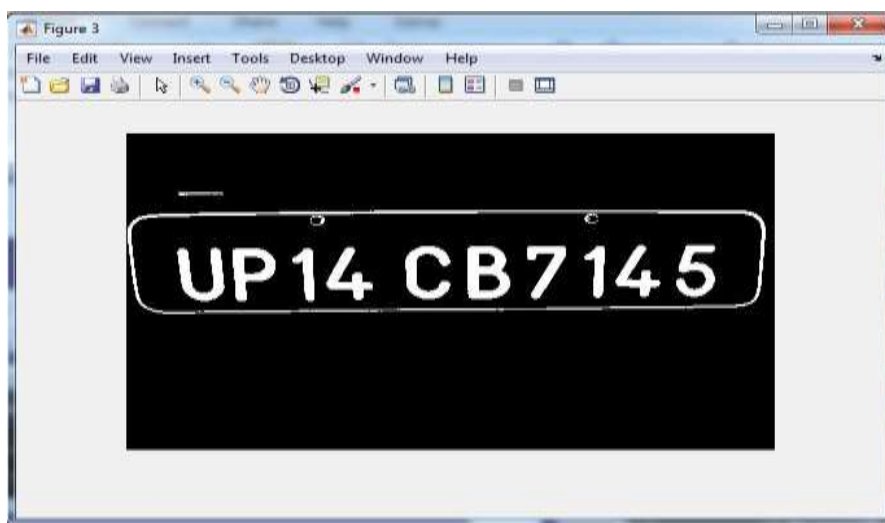
Fig. 4 RGB image

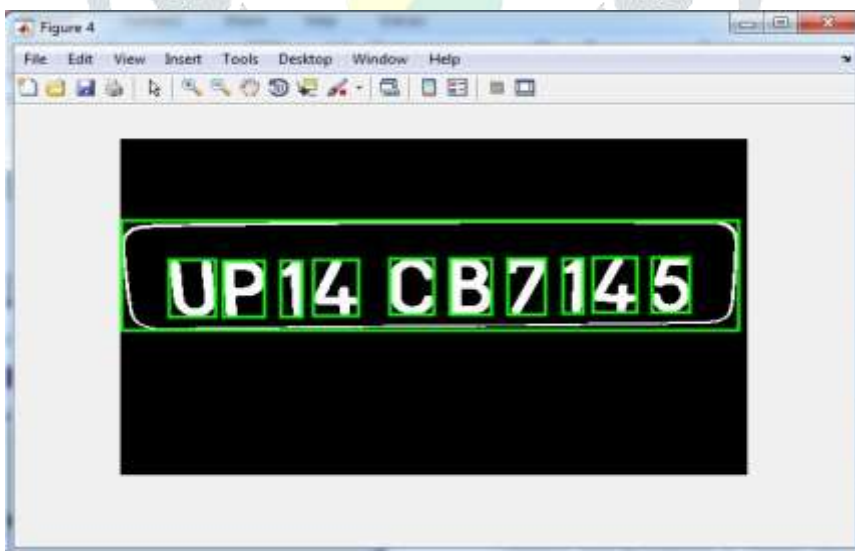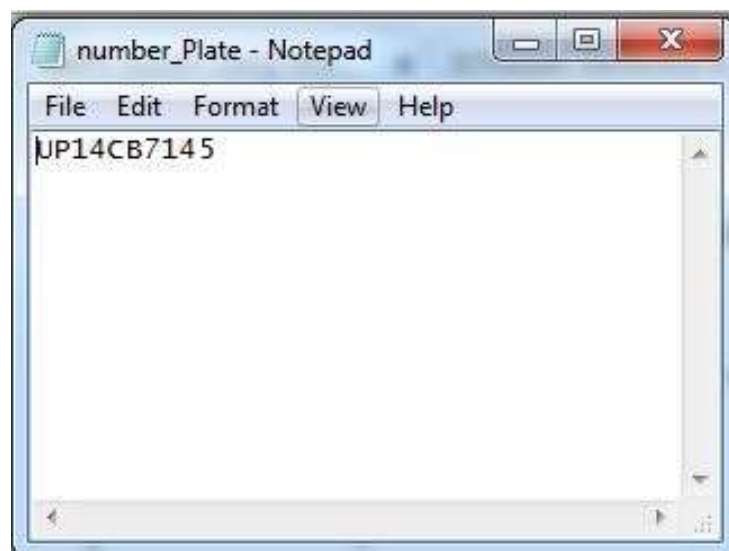**Fig. 5 Binary image after thresholding**

Fig. 6 Segmented characters

Fig. 7 Final output

V. CONCLUSION

License plate number recognition system plays a crucial role in extracting vehicle details and detecting security threat. In recent years there are numerous license plate number recognition techniques have been proposed. This work incorporates various methods to extract the license plate segment the characters and identify those characters. It can be further improved by recognizing various plate numbers in different circumstances.

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