Vehicle Detection using OCR

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Abstract - Millions The specifications for an automated license plate recognition device vary by country due to the various types of number plates in use. A number plate localization and recognition system for Indian vehicles is described in this paper. This system is based on digital images and can be easily extended to car park systems for the purposes of tracking parking service entry, safe parking house use, and preventing car theft. The aim of an automatic license plate recognition system is to extract a vehicle's license plate from video. For number plate localization, the paper uses a combination of Image Processing filling up the holes approach method and region requirements test. The horizontal and vertical scanning methods were used to segment the plate characters. The method of Template matching was used to recognize characters with the aid of optical characters. We primarily focus on three steps: locating the number plate, segmenting all of the numbers and identifying each number separately, and recognizing each character.

Key Words: Preprocessing, Feature Extraction, Machine Learning, OCR Classification.

1. INTRODUCTION

In real-world applications such as automated toll collection, traffic law enforcement, parking lot   access control, and road traffic monitoring, automatic license plate recognition systems play an   important role. The VLPR system uses a digital camera to identify a vehicle's plate number. It is   accomplished by a combination of techniques such as image capture, which entails capturing a real- time image of the plate, license plate character segmentation, which entails finding and identifying   individual characters on the plate, and optical character recognition. Picture capture, i.e. capturing   the image of the license plate, pre-processing, i.e. localising the license plate, character   segmentation, i.e. finding and defining the individual symbol image on the plate, and optical character recognition are the four parts of the recognition issue. Country-specific traffic norms and structure are a leading parameter in this regard. This allows the device to be fine- tuned, such as the number of characters on the license plate, the text luminance level (relative index, i.e. dark te xt on light background or light text on dark background), and so on.

2. Literature Survey

Debkumar Chowdhury ,Souraneel Mandal , Dona Das , Soumya Banerjee ," Development of New Anpr Dataset for Automatic Number Plate Detection and Recognition in North of Iraq"[1], Systems for detecting and identifying vehicle number plates, such as automatic number plate detection (ANPD) and automatic number plate recognition (ANPR), are reliable technologies. This paper presents a new dataset for vehicle images called North Iraq -Vehicle Images (NI-VI)

from three provinces (Duhok, Erbil, and Sulaimani). This dataset contains 1500 files. They were collected in real time with t reated cameras to create a practical dataset of vehicle photographs. The work's key contribution is the development of a new dataset for license plates of vehicles in northern Iraq with Arabic fonts in various and difficult conditions.

Naaman Omar, Yaseen Salim ,Gan im Saeed Al-Ali "An Efficient Model for Automatic Number Plate Detection using HOG Feature from New North Iraq Vehicle Images Dataset"[2], With the growing number of vehicles on the road around the world, traffic management has become a serious and major issue. It can be difficult to identify the license plate number of a car that is breaking traffic laws at times. In this paper, an efficient model for detecting and locating a vehicle's number license plate in color images is proposed. To boost its performance based on multi descriptors, the model is built using multiple features rather than a single feature (texture features).

Khin Pa PaAung, KhinHtarNwe l," Number-plate recognition and e xa mination of requirements for public Romanian roads usage"[3] The growing number of cars necessitates the need to verify the legality of drivers more frequently. When driving, a driver has a number of legal responsibilities that must be met. When being subjected to a regular monitoring in Romania, the authorities enforce the existence of legal documents such as vignette, RCA (civil liability), and PTI/ITP (periodic technical inspection).

Wang Dong, Zhou Yang , Wu Ling, Zhang Yonghui , Li Ting, QiaoXiaoliang," Modeling of Electromagnetic Processes in a Plate with Infinite Number of Cuts"[4], In a nonmagnetic conductive plate with an in fin ite number of cuts, this paper provides a mathematical and computer model for calculating eddy current, energy losses, and electromagnetic force. The plate travels at a constant pace in an external electromagnetic field. The cuts are placed in a direction that is orthogonal to the movement. It was discovered that the presence of cuts reduces levitation an d brake force at speeds less than 50 m/s, as well as Joule losses at a cyclic frequency of 50 rad/s.

Sizhe Huang, HuoshengXu, Xuezhi Xia, Yi Zhang ," End-To-End Vessel Plate NumberDetection and Recognition Using Deep Convolutional Neural Networks and LSTMs"[5], This paper introduces a new method for detecting and recognizing vessel plate numbers in natural scene images. Many current methods treat the detection and identification of vessel plate numbers as two separate tasks. This paper describes a single end-to-end trainable deep network that can locate and identify the vessel plate number at the same time. Between identification and recognition, computational and visual knowledge has been shared.

Table -1: Sample Table format

Preparation of Manuscript			
Margins : Top	0.5"	Bottom	0.5"
Left	0.5"	Right	0.5"
Margin : Narrow	Font	Cambria / 10 pt	
Title of paper : 16 Point	Heading	13 Point	
Sub Heading :12 Point	Spacing	Single line spacing	

3. Analysis and Design

System Architecture
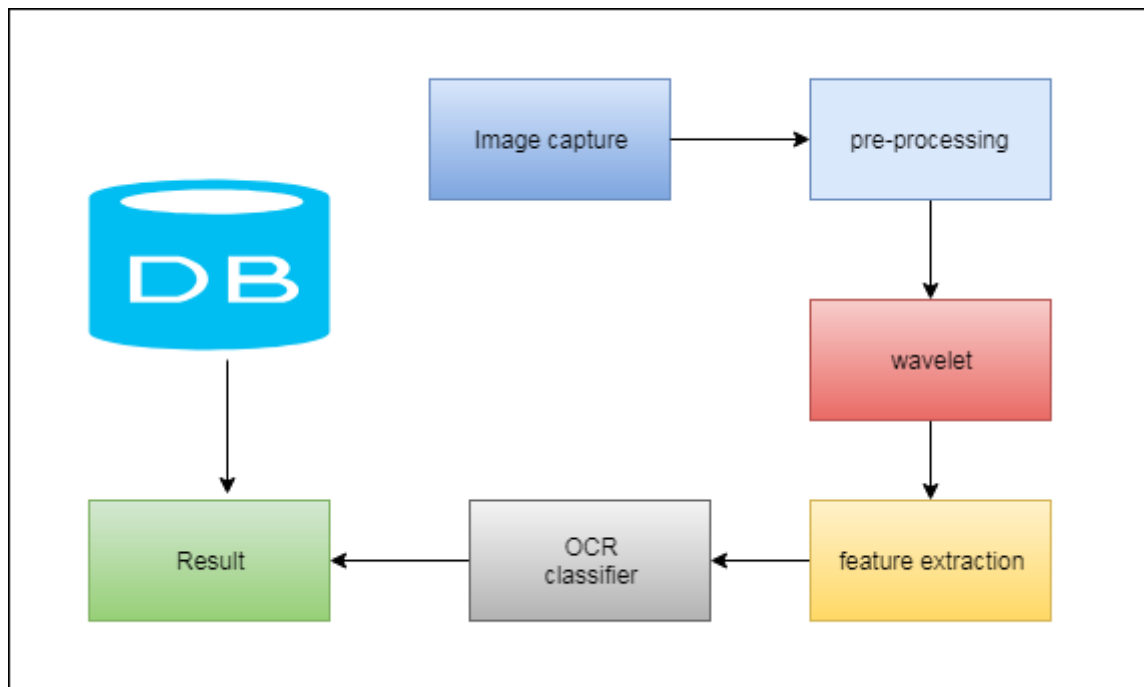
Models and Methodologies

User Module

Preprocessing-While image geometric transformations (such as rotation, scaling, and translation) are known as pre - processing methods, the goal of pre -processing is to enhance image data by suppressing unwanted distortions or improving certain image features required for further processing. - Possessiveness The use of a digital computer to run an algorithm to process digital images is known as image processing. As a subcategory or sector of digital signal processing, digital image processing has a range of advantages over analogue image processing.

Read the Image - Image Resized (220,220, 3)/ Image Resized (220,220, 3)/Image Resized (220,220, 3)/Image Resized (220,220, 3)/Image Resized (220,220, 3)/Image Resized (220,220, 3)/Image Resized (220,220, 3)/ (width, height, no. RGB channels)

RGB to Grayscale Conversion - After segmentation, noise reduction with a Gaussian filter. The method of segmenting a visual input into segments to make image processing easier is known as segmentation. For example, we can use segmentation to remove or distinguish something from the rest of the image. We can divide the image into segments after detecting an object against a background and perform additional processing on them.

Segmentation-Segmentation is the term for this. Segments are made up of "super-pixels," which are collections of pixels that represent objects or portions of objects.

Feature Extraction-In an image, features are distinct structures such as points, edges, or objects. Feature extraction's aim is to reduce the number of features in a dataset by creating new ones from old ones (and then discarding the original features). The bulk of the data in the new reduced set of features should be able to be summarized by the original set of features. Feature e xtract ion starts with a set of measured data and generates derived values (features) that are meant to be informative and non-redundant, making understanding and generalization easier and, in some cases, resulting in better human interpretations. Feature extraction is related to dimensionality reduction.

Classification -Optical character recognition (OCR) algorithms allow computers to analyze typed or handwritten documents and transform text data into editable formats that computers can quickly process. It's yet another way to extract and use business-critical information.

Algorithms Used-

Image Acquisition: The first step is to acquire images of paper documents with the help of optical scanners. This way, an original image can be captured and stored. Most of the paper documents are black and white, and an OCR scanner should be able to threshold images. In other words, it should replace each pixel in an image with a black or a white pixel. It is a method of image segmentation.

Preprocessing: The goal of preprocessing is to make raw data usable by computers. The noise level on an image should be optimized and areas outside the text removed. Preprocessing is especially vital for recognizing handwritten documents that are more sensitive to noise. Preprocessing allows obtaining a clean character image to yield better results of image recognition.
Segmentation The process of segmentation is aimed at grouping characters into meaningful chunks.

There can be predefined classes for characters. So, images can be scanned for patterns that match the classes.

Feature Extraction: This step means splitting the input data into a set of features, that is, to find essential characteristics that make one or another pattern recognizable. As a result, each character gets classified in a particular class.

Training a Neural Network: Once all the features are extracted, they can be fetched to a neural network (NN) to train it to recognize characters. A training dataset and the methods applied to achieve the best output will depend on a problem that requires an OCR-based solution.

Post-Processing: This stage is the process of refinement as an OCR model can require some corrections. However, it isn't possible to achieve 100 percent recognition accuracy. The identification of characters heavily depends on the context. The verification of the output requires a human-in-the-loop approach.

4. CONCLUSIONS

The license plate extraction, character segmentation, and optical character recognition modules of the car number plate recognition program were developed and implemented. To round out the scheme, a suitable database with hypothetical user data was included. When tested on 100 of the 108 images, the ANPR had a success rate of 68 percent, with recognition rates for simple visible plates nearing 80 percent. The recognition stage can be fine -tuned, and other classifiers can be tested to boost the results. For such refinement of the recognition level, different character models could be used.

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