



Automatic Number Plate Recognition System

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Abstract—Automatic number plate recognition (ANPR) is use of image processing technology which uses number (license) plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. The system is implemented on the entrance for security control of a highly restricted area like military zones or area around top government offices e.g. Parliament, Supreme Court etc. The developed system first detects the vehicle and then captures the vehicle image. Vehicle number plate region is extracted using the image segmentation in an image. Optical character recognition technique is used for the character recognition. The resulting data is then used to compare with the records on a database so as to come up with the specific information like the vehicle's owner, place of registration, address, etc. It is observed from the experiment that the developed system successfully detects and recognize the vehicle number plate on real images.

Index Terms—Automatic Number Plate Recognition System (ANPR), Tensorflow Object Detection, Character Segmentation, Image Segmentation, Optical Character Recognition (OCR),

I. INTRODUCTION

In previous couple of years, ANPR or registration number plate recognition (LPR) has been one amongst the helpful approaches for vehicle police work. It is may be applied at range of public places for fulfilling some of the needs like traffic safety social control, automatic toll text collection, parking lot system and Automatic vehicle parking system. ANPR algorithms are generally divided in 6 steps: (1) **Vehicle image capture** (2) **pre-processing** (3) **plate region extraction** (4) **Character segmentation** (5) **Character Recognition** (6) **Display output** as it is shown in Fig.1, the primary step i.e. to capture image of vehicle appears very straightforward however it's quite exigent task because it is incredibly troublesome to capture image of moving vehicle in real time in such a way that none of the component of vehicle particularly the vehicle range plate should be lost. Presently license plate detection and recognition time interval is a smaller amount than 50 ms [4] in several systems. The success of fourth step depends on however second and third step are ready to find vehicle number plate and separate every character.

II. SCOPE OF THE PAPER

As it isn't attainable to evaluate that approach is best, different papers, that are supported steps Fig.1, are surveyed and classified based on the methodologies in each approach.

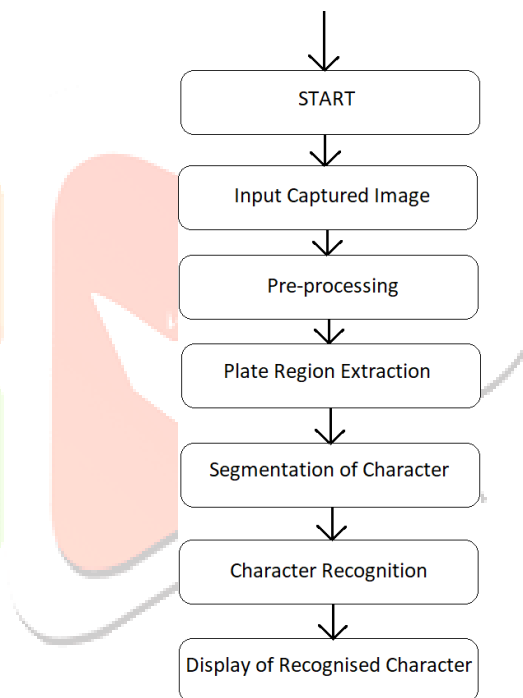
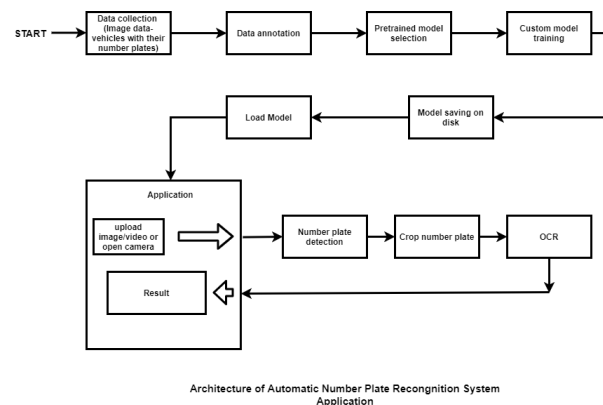


Fig. 1. block diagram of ANPR System



Architecture of Automatic Number Plate Recognition System Application

Fig. 2. Methodological Overview of ANPR System

for every approach whenever obtainable parameters like size of image, accuracy, speed, performance and platform are reported. business product survey is on the far side the scope of this paper as generally these product claims more accuracy than actual for promotional functions.

III. TENSORFLOW OBJECT DETECTION

Object Detection using Tensorflow may be a pc vision technique. because the name suggests, it helps us in detection, locating, associated tracing an object from a picture or a video. Lets gain a deeper understanding regarding however object detection works, what's Tensorflow.

A. How Object Detection Works

Generally, object detection works in 3 steps:

- It generates the segments in the given picture. The full image is spanned by large bounding boxes.
- Feature extraction is done for each given segmented rectangular area to predict whether the rectangle contains a valid object or not.
- The overlapping boxes are combined together into a single bounding rectangle.

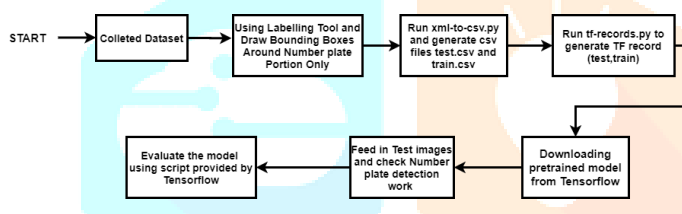


Fig. 3. Object detection using pre trained model



Fig. 4. Real time object detection

B. About Tensorflow

Tensorflow is an open-source library for numerical computation and large-scale machine learning that ease Google Brain TensorFlow, the process of acquiring data, training models, serving predictions, and refining future results.

- Tensorflow bundles along Machine Learning and Deep Learning models and algorithms.
- It uses Python as a convenient front-end and runs it with efficiency.

- Tensorflow permits developers to form a graph of computations to perform.
- Each node within the graph represents a calculation and every association represents information. Hence, rather than coping with low-details like determining correct ways that to hitch the output function perform to the input of another, the developer will specialize in the general logic of the application.

IV. DATA COLLECTION

A. Vehicle image capture

In this project we have worked on how automatic number plate recognition system works. In this Tensorflow object detection and easy OCR is used. for this system images are taken from different datasets. this datasets consist of pre trained model and test models.

1) *Pre trained models* : Pre trained model are the model which consist of data which are generated with bounding boxes and proper segmentation. this models are directly used for detection of the objects.

2) *Test models*: In this images are placed which are taken from real time and previously captured. this images are not segmented images. This images are used for training .

V. PLATE REGION EXTRACTION

By using Tensor-Flow Object Detection Method localize vehicle number plate area from the input given to our system through digital camera.

In this licence plate extraction is done by concept of connected components in an image. The captured image is segmented using bounded box . A bounded box crops the required number plate part by this the unwanted part of vehicle plate gets removed. for this transfer learning algorithm is used



Fig. 5. Object detection using pre trained model

VI. CHARACTER SEGMENTATION

Explanation for various levels of Segmentation used by the Easy OCR system. Meaning of segmentation is nothing but break the entire image into sub-parts, to process them further. Segmentation of image is done in the following sequence : There are few steps in segmentation are as follows:

1. Line level Segmentation

To separate text lines, the horizontal projection profile of the text document image is found

2. Word level Segmentation

The spacing between the words is used for word segmentation

3. Character level Segmentation

Character segmentation is an operation that seeks to decompose a picture of a sequence of characters into sub images of individual symbols. it's one of the choice processes in a system for optical character recognition (OCR). Its call, that a pattern isolated from the image is that of a character , may be right or wrong. it's wrong sufficiently typically to form a serious contribution to the error rate of the system. segmentation is that the initial step during a three-step procedure:

- realize subsequent character image.
- Extract distinctive attributes of the character image.
- find the member of a given image set whose attributes best match those of the input, and output its identity.

This sequence is continual till no extra character pictures are found.

VII. CHARACTER RECOGNITION

Optical recognition of character or optical character reader is the electronic or mechanical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a digital camera input, a photo of a vehicle, a scene-photo or from subtitle text superimposed on an image.



Fig. 6. Object detection using pre trained model

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