OBJECT DETECTION USING OPTICAL CHARACTER RECOGNITION FOR VEHICLE MANAGEMENT

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Abstract. Due to recent improvements within increased utilization of vehicles and the highway research, there are more issues on vehicle management. Because of lack of security, plenty of vehicles are misplaced or stolen from various areas. To overcome this problem, a self-adaptive system has been designed to trace our required vehicle. The method of finding objects from a video plays a crucial part in video processing. The Optical Character Recognition may be a challenging process due to the difficulty in capturing the images with variations in shape of the object, multiple formats in the positions, differ in color, angle viewpoint and non-uniform illumination conditions at the time of image acquisition. The proposed model operates on two main stages namely objects detection, character recognition using the OCR model. Within the first stage, the article detection process takes place using Fritz AI with an end-to-end machine learning platform. Then, it captures the image and sends it to the database using the String-Request in Android Studio. Within the second stage, it collects the image from the database for the continuing process. Finally, the characters within the image get recognized with the assistance of OCR models and stored in the database. During this Database there are major security issues, and hence there is a must enhance the safety by providing an "Authentication and Authorization" mechanism to work out some specify the access levels to the user/client rights related to system resources in the database.

Keywords. Optical Character Recognition, Object Detection, Vehicle management, Pattern Recognition, CNN

1. Introduction

1.1. Object Detection

Object detection is a mechanism that deals with detecting samples of expressive objects images and videos. The object detection includes footslogger detection and face detection. It has many applications in the areas of vision, like image retrieval and video surveillance. These methods generally fall into either deep learning or machine learning. Deep learning is based on CNN and end-to-end object detection. On the other hand, Machine Learning needs to define features, with the help of a technique such as a support vector machine to do the classification.

Machine learning methods:

- VJ on Haar features
- SIFT
- HOG

Deep learning methods:

- R-CNN, Fast R-CNN.
- SSD and YOLO.
- RefineDet.

1.2. Pattern Recognition

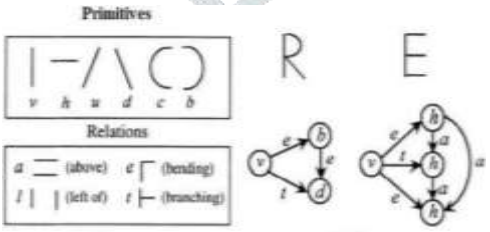

Figure 1 Letter R and E using Primitives and Relations

Structural pattern recognition is ordered to line out objects supporting a bond between its pattern and frequent structures are brought out using pattern primitives.One among the image primitives that has been employed in OCR is Chain Code Histogram. CCH effectively describes image, thus helping in separating character. The simplest condition is that the image should be in binary format.

1.3. Optical Character Recognition

Optical character recognition is a method used to extract the data from the image in an encoded format by using the optical scanner. It used to read the data and convert them into reusable data. Optical character recognition usually involves scanning a document or an image in the Optical character recognition software, recognizing the document or image in the OCR software, and then saving the data in a format of your choosing by OCR produced document. It is also an important tool for creating accessible documents, especially PDFs, for blind and visuallyimpaired persons. OCR technology can recognize all kinds of characters. Even as both hand-written and recorded documents can be identified by analysis and changed into a human readable format.

In modern years, OCR mechanism has been experimental throughout the complete spectrum of industries, reshaping the document management process. OCR is used to convert image files into more usable scanned documents that are recognized by the system using the OCR. OCR no longer needs to manually retype important documents which are needed to store in databases. The result is more accurate in less time.

1.3.1. Pre-Processing

- The pre-processing method includes these steps, the Binarization process relies on high image quality.
- There are several groups of white pixels that create the characters and black pixels that set up the background.
- After examining all the previous steps, pre-processed pictures with defects is goten as a result.

1.3.2. Character Recognition

Character recognition is an extremely important concept to understand the basics about "feature extraction". At the Initial state, the image is the raw data which are split and lower into more groups. When the data is way larger, then it must reduce a bunch of features. The features which are selected are expected to be the most important ones among the others which are ignored. While the performance can be increased by using the split set of data that is the image data which is divided into many rather than the initial single large one. For the strategy of OCR, this can be often important because the algorithm possesses to detect specific portions or shapes of a digitized image or video stream.

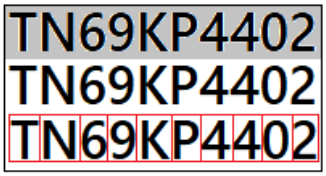

Figure 2 Character Recognition

1.3.3. Post-Processing

Post-processing is a technique of error reframing or correction that ensures the very high accuracy of the result in the OCR. For that the algorithm can get back to the storage place that is the inventory of the words collection that are allowed to enter or occur in the scanned document for several times.OCR isn't only for just identifying the proper words but also it can be read multiple numbers and various codes. By that it is useful for identifying or analyzing long strings of numbers and letters, like serial numbers utilized in many multinational industries for their working purpose. To get a better effect in differing the types of inputs in the OCR, some supply begins to develop a particular OCR system for a special task. For example, they used multinational industries rules, quality expressions, or better rich information contained in digital color images. This best strategy of combining various optimization techniques is named "application-oriented OCR" or "customized OCR". It is utilized in applications like card OCR, invoice OCR, and ID card OCR.

2. Problem Statement

Nowadays the world is bigger than our thoughts; we can't predict that it only happens all day. The Main problem is that we are developing in a nonsecured surrounding; once we buy a vehicle our details are stored in the database. And they are not fully monitoring it, they monitor only in critical situations. The problem is to identify the location of the vehicle,that is when we park the vehicle in a high crowded area. There are more chances of disappearing vehicles (Like theft and dislocation). So, by this project we can clearly prove if the vehicle is theft or dislocated. If it is theft, the camera which covers the area takes a clear shot on the number plate and enters in the database. Or if it is dislocated, then the vehicle must be somewhere in the nearest area. To avoid this situation, our proposed model helps them in a quick manner. By just fixing our model in the security camera, so when they pass the camera it takes a single shot and processed by our OCR methodology and sends the data to the cloud storage to store it. By the User control in the android application, The User can see the location of the vehicle with a best User interface (UI) and they also can see the route which their vehicle is going from place to place, by the Map which is given by us to the users.

3. Existing System

3.1. Optical Character Recognition

In the Growing world there is a huge demand for the users to make the documents into electronic data. The OCR system is a way to convert the data on papers into system process-able data, so that the data can be used for long and change when we need. The existing system of OCR is on a grid infrastructure without in the form of grid functionality. It deals with the similar character recognition of one language.

3.2. Text Recognition

Existing systems are typically based on high cost. Therefore, we need a very low-cost system that will be able to spontaneously detect and get the data from the image and it is used to recognize the text in the image and convert it into data. The text contained in the page goes on several processes like pre-processed and segmentation. The pre- processing is used for recognition of the text. The separated text is joined to form a character. It is a process of extracting the letters, resizing them and storing them in the text file.

4. Proposed System

The Below Figure 3 describes that, when a vehicle crosses the camera it takes a multi shot image on the vehicle number plate.

- And by implementing the OCR method it reads the data from the image (i.e., Number which is presented in the plate is converted into text).
- Next it just sends the data to the cloud storage, on whether there are some checking processes where this number is already stored in the database or not.
- If the number is stored in the user database, then the details are stored in the separate database for further process.
- Finally, the user can see the location of the vehicle with a best User interface (UI) and they also can see the route which their vehicle goes from place to place, by the Map which is given by us to the users.

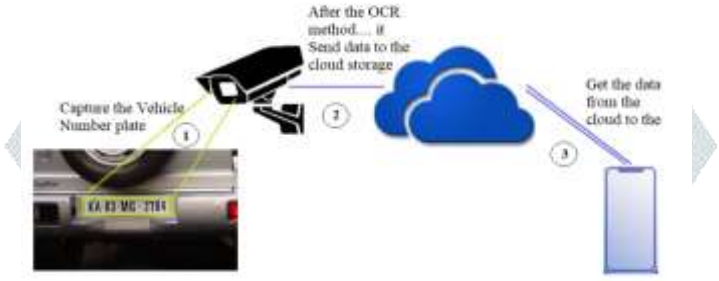

Figure 3 Block Diagram

Figure 4 describes a flow diagram to get the text from the image by using the Optical Character Recognization as follows.

- On the first stage, the camera is ready in the position to capture a multi-shot image on the vehicle, by this we can efficiently reduce the complexity of hardware implementation.
- With the help of Fritz AI, which is the API used to detect the car in the image by Object Detection process on Real Time.
- When the car crosses the camera, it takes the vehicle image of the car which is more than 10 images in 5 seconds. By this process, no vehicle can cross the area without being undetected.
- Each and Every image which is captured by the camera in the previous stage is sent to the database. And then, the images are retrieved from the database for the Verification process.
- The Optical Character Recognition is used to detect text blocks on it with the proposed patch-based strategy. Then each detected textual object is cropped from the source image and fed into a text recognizer.
- This process includes several stages, first of all converting the image into bitmap size and then by the bitmap we get multiple frames in it. From the frame box, we get the raw data which is finally converted as String format. At last the text in the data is sent to the database.
- Due to the problem of multilingual texts and limited real data, the recognizer is enhanced with the proposed concatenation structure and trained on a synthetic dataset. The output for one source image contains the localizations and contents of all detected texts.
- The proposed approach is evaluated for both text detections and recognition. The experiments are conducted on an image which has the data already stored in the database.
- After that process, there are several conditions to check whether the data matches with data which is already stored in the database at the earlier stage of all.
- With the help of the database, a user can find the location of a vehicle in an easy manner. At first, the data of a particular vehicle and the vehicle owner is collected and stored in the database. By that a user can get a clear report about the details.

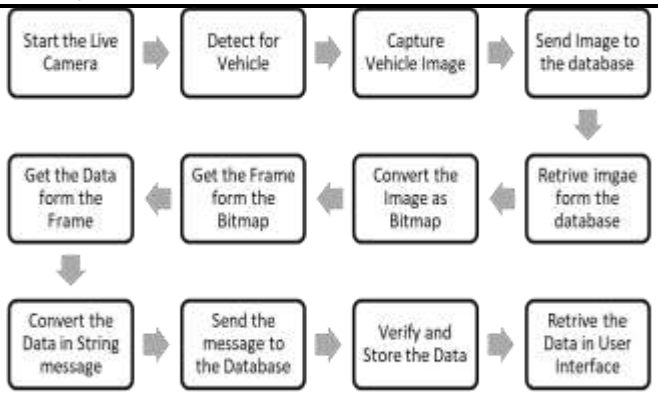

Figure 4 Flow Diagram

5. Result and Analysis

By using the Fritz AI, the live camera can detect the Object on it. On that it must have a set of similar conditions to detect the Vehicle only for lesser usage of the device.When a vehicle is detected in the screen it captures the screen and sends it to the database for the upcoming Optical Character Recognition method these are show in the Figure 5.

By the implementation of the OCR methodology, it is used to recognize the text in the Image which is obtained by the database using the Recycler View. When the application got the image from the database which has been stored in the database by the previous method. On that it must detect the text by a patch based training strategy applied to a detector that outputs a set of bounding boxes containing texts. Then a concatenation structure is inserted into a recognizer, which takes the areas of bounding boxes in source image as inputs and outputs recognized texts. By that send the data to the database for future works. At the same time parallelly store the location in the database by the image which is taken by the checkpoint.

Figure 5 Object Detection by using Fritz AI

Figure 6 Text detection by OCR methodology

6. Conclusions

By using a deep learning approach for text detection and recognition from images were completed. (i.e.,) By giving the vehicle image as input, (i) a patch based training strategy is applied to a detector that generates an output as a set of bounding boxes that contains text. (ii) Concatenation structure is inserted into a recognizer, which takes the areas of bounding boxes in source image as inputs and outputs recognized texts. The areas that need further improvement are the UI of the application, creating more checkpoints to capture the vehicle in different locations and developing an automated process for detecting the character in the image. In future the present UI of the application will be more user friendly. By comapring to the existing system, it may have a chance to be mix a data from the video. But with this method, there is no chance of mixes in the data and it have more accuracy

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