



HSRP Detection using SSD Algorithm

Mohammad kashif¹, Purnendra kumar², Dr. Sanjeev Gangwar³

¹M.TECH Scholar, Department of Computer Science & Engineering, VBSPU, Jaunpur, Uttar Pradesh, India

²Assistant Professor, Department of Information Technology, VBSPU, Jaunpur, Uttar Pradesh, India

³Assistant Professor, Computer Application Department VBSPU, Jaunpur, Uttar Pradesh, India

RECEIVED DATE: 07/06/2023 REVISED DATE : 25/07/2023 ACCEPTED DATE: 05/08/2023

Abstract- Being one of the largest automotive sector, India has produced total volume of vehicle around 22.9 million unit which cause increase in Traffic management and security issues. In order to take care of traffic it's essential to identify vehicles with their registration plates. License plate recognition technology has helped in Analysis of traffic, improved security for parking area operators and parking lot users, state border control etc. The system represented during this paper use Tensor flow object detection for HSRP plate detection and Google vision OCR API to extract what are character written within the HSRP plate.

Key Words: HSRP Detection, Google vision OCR, SSD, Python, Postman

1. INTRODUCTION

A High security registration pate is a tamper-proof plate which comes with two non-reusable locks and a hot stamped chromium-based hologram of Ashok Chakra. Also there's a 10-digit PIN (permanent identification number) that's optical maser on the reflective sheet.



Fig -1: High security registration plate

The HSRP are issued only if the valid details of a vehicles including owner name, engine number, chassis number, vehicles model, vehicles type, mobile number and etc. are given and this information get stored during a centralized database. . The stored data together with the 10 digit PIN become decisive in identifying a stolen vehicle also useful for preventing the counterfeiting and incomprehensible of vehicle plate as owner end with different font.

HSRP detection techniques are useful for the act of learning that something was there: discovering and implementing in existing system to simulation of human intelligence in machine are programmed to think like humans and mimic their actions; which reduces error also as increases efficiency, improved workflow and 24/7 availability HSRP are often thought of 2 phases:

HSRP Detection: is that the perceive of HSRP for the input image. Some methods for detecting are supported on texture, edge detection, histogram, morphological processing and transformation [1]. In [2] text and edge are considered for number plate extraction and uses projection to detect it.

Character Recognition: individual character will be recognized by using techniques like statistical classifier, ANN classifier, and pattern matching [3].

I. LITERATURE SURVEY

In this form of research has been tired in existing method and might be classified as differing on the plate detection methods and plate recognition methods.

In [4] Sober filter technique used for edge detection by calculating the gradient of image intensity at each pixel and returns edges at those point where gradient of image is maximum and uses SVM and Contour let transform were used for feature extraction which help in detection of model of vehicles.[5]OCR used with correlation approach and histogram is employed to represent the sum of differences of gray value between neighboring pixels of an image column-wise androw-wise. The same process is administered until we get region with max. Horizontal histogram value as the highest probability of containing a registration plate. In [7] the author have used Frequency domain filter for image enhancement after capturing the image so as in to finding the position of plate.[8]. Morphological operation performfor feature extraction which are pits, join and termination.[9]a replacement procedure for identification which involve pre-processing by gray scaling, image erosion remove small objects and filling further character segmentation.[10] Multi thresholding is collaborated with neural network for recognition by gray levels.[11] Mach use to trace the target in constant position and use log r-theta to make plate rotation and scale invariance while identification.[12] proposed Dilation technique for spotting no. plate. In [13] Vietnam license plate detection is done by combining 1.licence plate localization with morphological, radon transform, interpolation.2.character segmentation use peak to valley method to segment character no.3.character recognition uses multilayer perceptron and back propagation .this approach outperform in term of computational time it take 0.25s for total of 700 images. It achieve following accuracy: License plate localization: 97.1%

Character segmentation: 98.2%

Character recognition: 97.2%

II. PROPOSED METHOD

HSRP Detection requires larger Dataset for prediction purposes. So we had to make sure that finding a quality dataset is a fundamental requirement to build the foundation of any model. The performance of any model depends upon on the quantity, quality and relevancy of the dataset so we can require a lot of data to create best model with high fidelity. HSRP Custom Dataset is created by collecting data through open source, image scrapping operation and collecting real time image. Data Augmentation is too perform for increasing the amount of data from existing data by making minor changes such as flips, rotation, transformation, and etc.

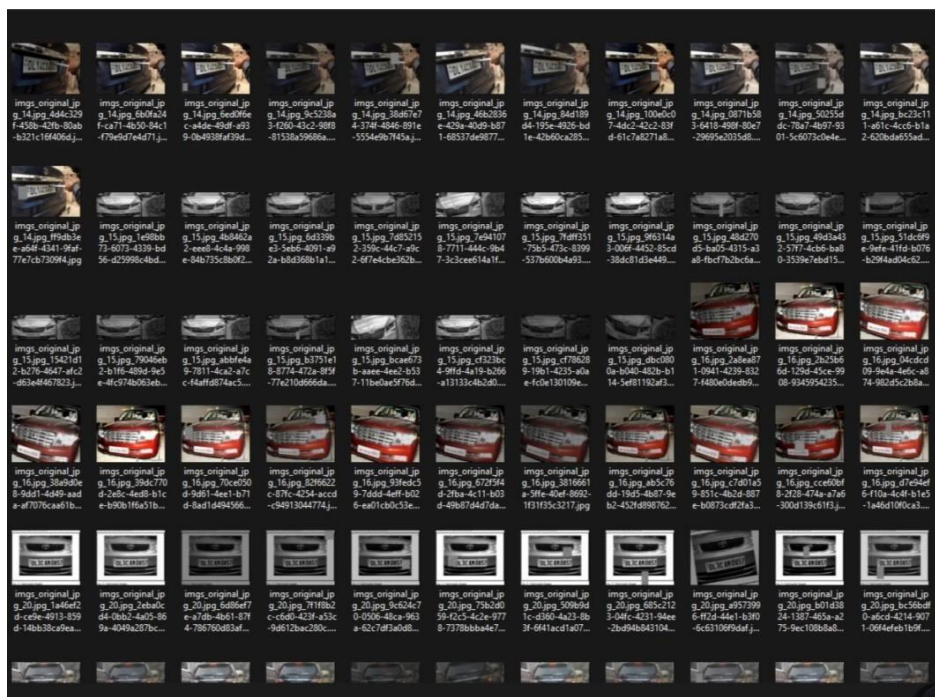


Fig – 2: Augmented HSRP images

To avoid computationally expensive operation we resize images into 514x514 using RESIZER.PY now dataset is splitted into training and testing set using Pypi split folders. Image annotation is done to annotate images with bounding boxes or to ensure that a machine learning algorithm recognizes an annotated area as a distinct object in a given image. Annotation is performing using Labeling and generate xml file for the images which further get converted into csv with the help of convertor. SSD model is used for detection as it uses fully convolutional approach to find license plate within image in one pass through Convnet. SSD has two components: a backbone which act as feature extractor and head use to predict the bounding boxes of plate. After training the model we get frozen inference graph.PY file using this particular file we do prediction. For testing POSTMAN API Platform is used. In which we upload an image by converting it into Base64 to prevent data corruption while passing through web server then decode Base64 to image which is further given as model input and our model running in local host give us prediction of bounding boxes and cropped image is fetched.

Template matching for recognition task by segmenting each no., character and sub images. In [6] Horizontal

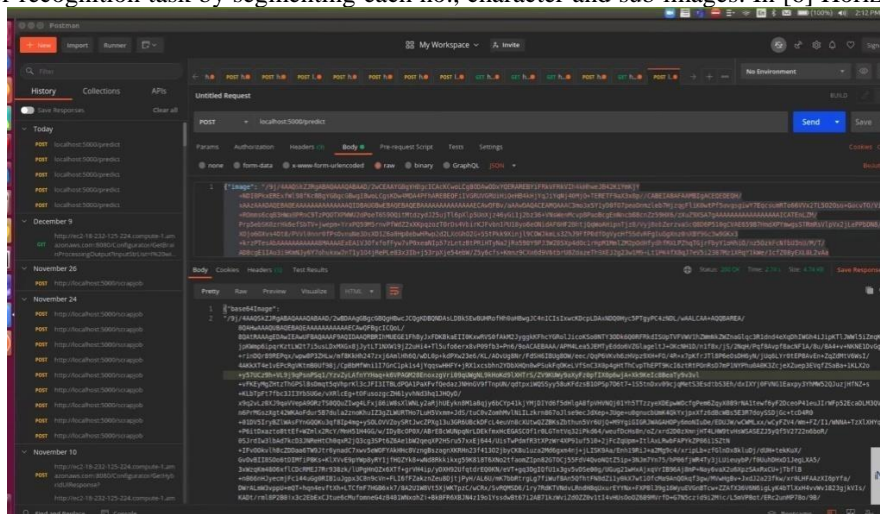


Fig- 3: Postman

OCR: Google vision APIs can extract information from cropped image by sending the contents as a base64 encodedstring in the body of POSTMAN in form of POST request. To authenticate REST calls API key is generated.

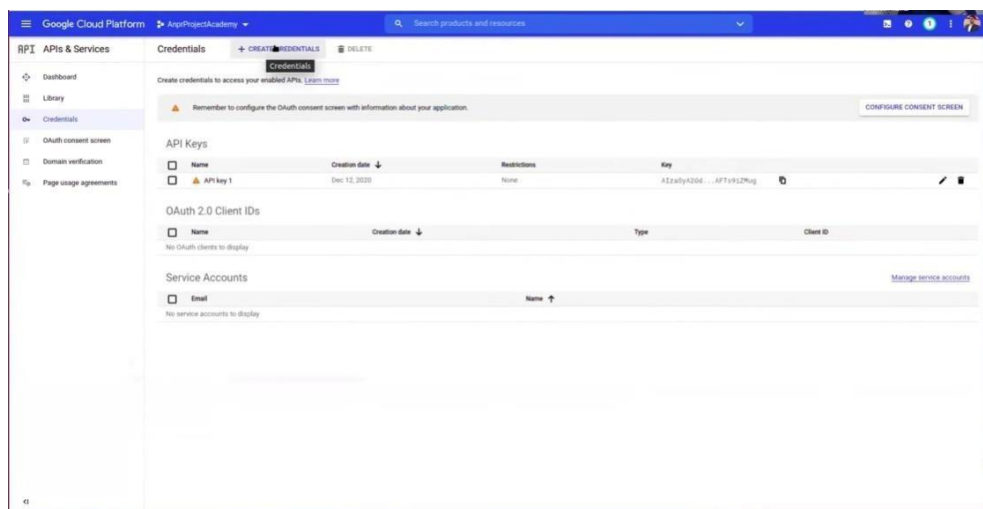


Fig- 4: Google vision API generated

Here we have few restrictions that get only Indian states code from state list as in HSRP and no. should be between 0-9 and this pattern is decided by regret object.

”[0-9]”{1,2}”\s*[A-Z]{1,2}”\s*[0-9]{1,4}”\s*””



Fig -5: Input HSRP image

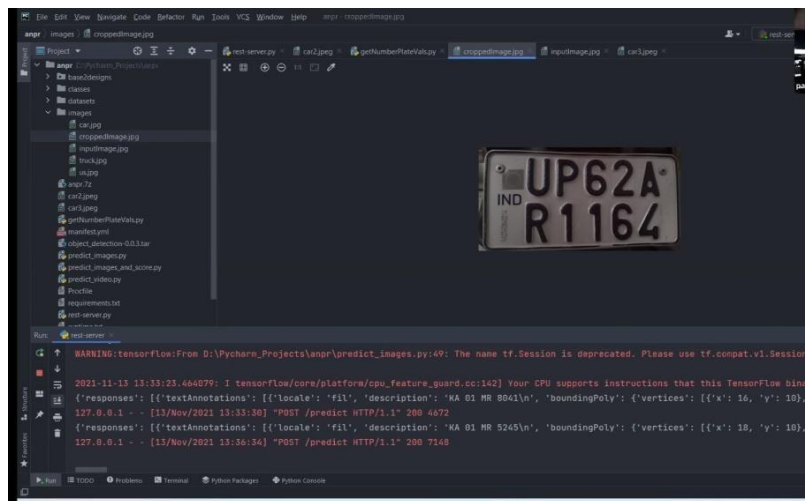


Fig.- 6:Cropped HSRP image

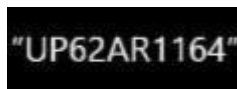


Fig-7: HSRP Character

III. RESULT

Fig.5 displays the input image while Fig. 6 depicts result of HSRP detection is done by using ssd and the character were recognized in Fig.7. It takes 2.74sec to extract one image. it achieve following accuracy:

HSRP Detection: 79.83%

Character Recognition: 98.0%

IV. CONCLUSION

This paper has represented HSRP detection and recognition technique. The proposed method has 2 stages. In first stage, HSRP detection take place using SSD model and in second stage Character get recognized. The Proposed model can be employed as the parking management, effective enforcement of traffic rules,

toll fee collection. An experimental investigation was conducted on HSRP custom dataset and achieves overall accuracy of 91%. In future, the performance can be enhanced by using YOLO for detection which increases Inference speed also.

REFERENCES

- [1] XiaojunZhai, FaycalBensaali, "Standard Definition ANPR System on FPGA and an Approach to Extend it to HD" in 2013 IEEE GCC Conference and exhibition, November 17-20, Doha, Qatar. pp.214
- [2] Hao Chen, Jisheng Ren, Huachun Tan, Jianqun Wang," A novel Method for license plate localization," 4th Proc. of ICIG, 2007, pp. 604-609.
- [3] Shen-Zheng Wang, His-Jian Lee, "Detection and recognition of License plate characters with different appearances," Proc. of 16th International Conference on Pattern Recognition, 2003, vol.3, pp. 979-983
- [4] SaeidRahati, ReihanehMorvejian, Ehsan M.Kazemi and Farhad M. Kazem "Vehicle Recognition Using Contourlet Transform and SVM," Proceedings of the Fifth International Conference on Information Technology, 2008
- [5] V.Harish, M.Swathi, CH. Deepthi and P. K Charles, "A Review on the Various Techniques used for Optical Character Recognition,"*International Journal of Engineering*, vol. 2, no. 1, pp. 659-662, January-February 2012.
- [6] Xiangjian He et al, "Segmentation of characters on car license Plates," 10th Workshop on Multimedia Signal Proctol, 2008, pp. 399-402.
- [7] M. Mandot, R. Gupta & S.S. Sarangdevot. High Security Number Plate Recognition System with Different Filtering Techniques for Image Enhancement, Proceedings of the International Conference on Computing Technology and Information Management, Dubai, pp.177–185, 2014.
- [8]K. Kaur. Character Recognition of High Security Number Plates Using Morphological Operator, *International Journal of Computer Science and Engineering Technology*, vol4, pp. 519–523, 2013.
- [9]D. Sagar, & M. Dutta, Block-Based Neural Network for Automatic Number Plate Recognition, *International Journal of Scientific and Research Publications*, vol 4, pp 1-7, 2014 .
- [10] B. Bhushan, S. Singh, & R. Singla License Plate Recognition System using Neural Networks and Multithresholding Technique, *International Journal of Computer Applications*, vol 84, pp 45-50, 2013.
- [11] Bone P, Young R, Chatwin C. "Position, rotation, scale, and orientation-invariant multiple object recognition from cluttered scenes," *Opt Eng*2006; 45:077203
- [12] S. Ozbay and E. Ercelebi, "Automatic Vehicle Identification by Plate Recognition", in *World Academy of Science, Engineering and Technology*, 2005, pp. 222-225.

- [13] V. Mai, D. Miao, & R. Wang. Vietnam License Plate Recognition System based on Edge Detection and Neural Networks. *Journal of Information and Computer Science*, vol8, pp 27-40, 2013.