Vehicle Number Plate Detection

Anagha Jayakumar TN[*1], S.K.Manju Bargavi[*2]

[1,2]Department of MCA, Jain University, Bangalore, Karnataka, India.

[1]anaghajayakumar20@gmail.com

Abstract*—*This paper will describe about the literature of detecting the number plate of vehicles which are implemented using different methods and techniques. The use of this paper is that it helped to come across information about many vehicle number plate detection systems. To overcome all fraud activities in traffic and other vehicle related fraud, this system clearly helps. Accuracy of this system is increasing because this system is created in many different ways by different people. It is essential because it is very important for the police as well as for traffic toll places, for paid parking ,checking of vehicles and also for retrieving vehicle information in day to day life.

Keywords: *Vehicle Number Plate Detection, Overcome fraud activities.*

I. INTRODUCTION

Automatically detecting number plates is necessary in order to help the police force to reduce the threats and varieties of cheating activities that happen. This helps them to get hold of the people who violate rules, to find out stolen vehicles, if the vehicle is registered or not, for electronic toll collections. Not only for the police force but also to help in parking of vehicles in a well-mannered way it can be used. Which vehicle is parked for too long, if the vehicle is parked after paying the parking fee or not and then get the details of the detected number plate.

This process of detection is carried out by performing manly four major steps. First one is getting the source image, then comes detection of the number plate, next is segmentation of the character present on the detected number plate and

finally recognizing the character that is detected from the process. So first the image is preprocessed here. This is a name that is given to all the operations that is associated with images.

This model proposed here, can also detect images shown using the webcam and also the license plate of different countries can be detected easily. This model is user-friendly, image just need to be added manually or even using webcam you just need show the image it will capture the image and detect the number plate. Broken and dirty license plates also exist in real time, even those can be detected using this model.

II. LITERATURE SURVEY

[1] The author proposed a model for the android phone users to identify the number plates automatically. The problem was that the system was only for Malaysian vehicle number plates. The algorithm used was ANN and the environment was provided which was allowing changes to be made easily, high accuracy and also less complexity. [2] The model only used pre-processing as the main source hence it became more complex and also time consuming. The work used CNN and the metric of original image was considered as the criteria for pre-processing and recognition algorithms. [3] This model concentrated on capturing the image of the vehicle and then recognizing it and retrieving the details of the owner along with it. The accuracy and correctness of the model was low because it was not possible to do it for all the users. The model created GUI interface to display the results. [4] The author proposed here a Digital Image Processing algorithm. This model was limited only to Nigerian vehicles. [5] The proposed system was developed using MATLAB where the image was captured and then it was converted to grayscale in-order to be pre-processed. Because of Image pre-processing and also of other hardware requirements there were some limitations to the method that was proposed. Mainly implemented to recognize the plate of a car parked at the gate in parking area. [6] The author proposed this one in-order to compare the accuracy to approaches used to detect the license plates under Indian conditions. Different approaches included Open ALPR, k-NN and CNN. It proved then the CNN approach was better among the three. [7] Proposed BPNN (Back Propagation Neural Network) and also Haar Wavelet for detection and segmentation. Recognition limited to only Iraqi vehicles. [8] This system recognizes number plate using neural network and can perceive the plates with better acknowledgement rate. [9]

The proposed system uses MATLAB tool to extract the image and in turn it helps in representation. It is a unique algorithmic procedure for recognizing the number plate using mathematical morphology. It is efficient and simple. [10] The author implemented this methods which allows input as still images, and it extracts a string corresponding to the number plate. Then later this string data is used to get details of the user from the database. [11] This is a method mainly concentrates on camera more, hence it provides more accuracy than the rest of the methods. DNN(Deep Neural Networks can be used when there is a large amount of training data is provided. It also used YOLO which is better in real-time performance and better detection accuracy. It takes Iranian vehicle number plates that are collected by the authors, hence it is only for the Iranian vehicles and that is the drawback of one such efficient model. [12] This proposed model concentrates on detecting a vehicles number plate and retrieve the respected data related to the vehicle. It detects both the vehicle and the license plate. It takes video as an input and then then segmentation of the frame is done. When the vehicle is moving at high speed it cannot detect the data and hence for future work this can be fixed to make it more better. [13] The authors introduced a system DL architecture.The main aim was for better accuracy and easy segmentation. It can be expanded for checking license plate of different regions.

III. ARCHITECTURE

Architecture diagram is basically a diagram of the proposed system that is created by the author which will give the details of the proposed system. It shows the physical development of the system. Also it becomes easy for someone who wants to know about the method and work done.

Fig.1 mainly explains how the ANPR ,that is the proposed system works.[5] This system is proposed to make it easier for paid parking, pay to the toll places, to detect fraud activities and also for traffic management.

ANPR simply means Automatic Number Plate Recognition and this was proposed by the authors because it was found that ANPR became necessary in the new emerging technical world. In order to resolve the traffic issues that happened day by day this system became a helping hand. It is really easy to use this system. Vehicle images are identified by seeing the number plate of the vehicle, this process is image pre-processing. At first the vehicle is stopped at the gate, and the camera will turn on and the image of the vehicle will be captured. A certain kind of algorithm is used to analyse the image that is captured. This is actually done to see that if the vehicle should be allowed inside the gate. So first the vehicle image that is captured is checked with the images in the database. If the image exists in the database that is if it matches the license plate which is stored in the database the access will be granted to the vehicle. The image here processed is by using MATLAB image pre-processing. After the image is processed, it will produce a result based on the detection, a data. The details of the vehicle as well as the owner can be extracted from this. Hence if the owner has broken some rules or any mischief is done it becomes easy to catch hold of the one.

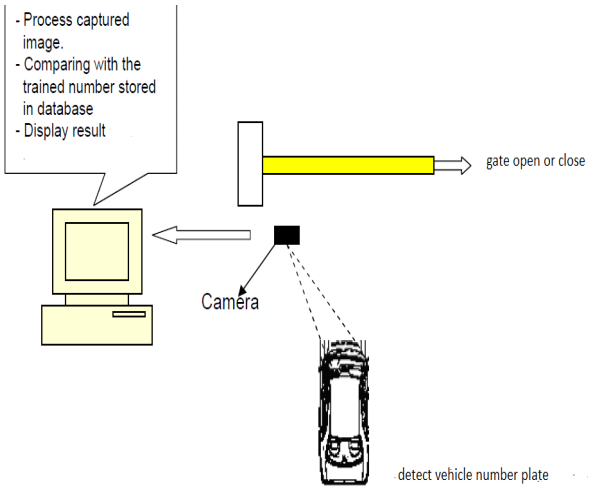

Fig.1: Diagram of ANPR system

In fig.2 the model of the [6] proposed system is shown. It is actually a high level block diagram of the license plate detection system. The figure describes that there are mainly two components of the system, they are the recognizer and the development of the model. Video that is captured will be split into different frames for recognition, then the license plates are undergone for training. With the help of the trained model the system recognises the detected plates. Now after the detection the character of the number plate is retrieved. If the license plate is not clear in the given video it will not detect. Also sunlight, brightness and other features also matters, this may be a small limitation to the proposed system, because we need to be careful about the video that is given for testing. This is created for Indian vehicles only. The architecture diagram of the proposed system is also shown in Fig.3.

It describes the complete working of the system. First the data is retrieved or taken from the camera. This can be also called as data acquisition. Then the video is split into different frames and then the background images are generated for training. Each number plate maybe different in font type so multiple font acquisition is performed. As soon as this step is over then the license

plate is differentiated based on the country format. The model is trained , that is how the system recognises the digits in the number plate. Then the video is undergone through detecting module. Each letter is again detected and then the license plate characters are displayed from the license plate. This is to detect the number plates from live video only for the Indian number plates.

The CNN approach was used to propose this and has proved that CNN is better than k-NN and open ANPR.

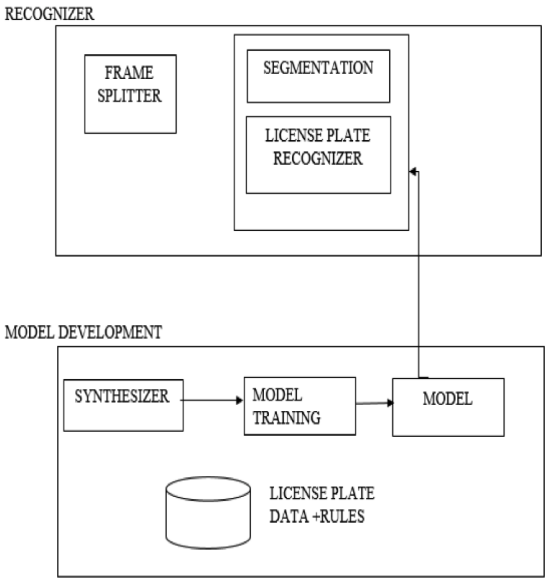

Fig.2 Block diagram of the proposed system

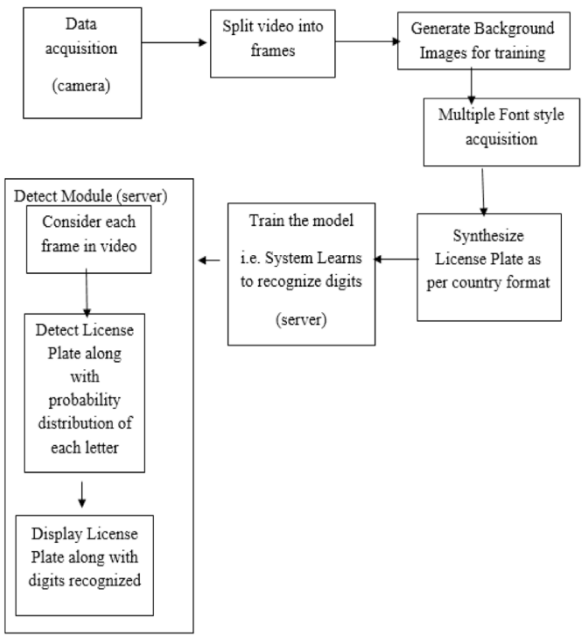

Fig 3: Architecture diagram

CNN has more character recognition compared to other algorithms. The system proves to be more accurate and feasible to use compared to other systems. From the video detecting the vehicle and recognising the number plate is considerably a difficult task, the model here does it for the Indian vehicles using three methods k-NN, CNN and openALPRI as time taken for these three methods differ in time. Image or video, both can be used to take the input to the system. It also proved CNN has more accuracy and has HD video quality. It is also more adaptable to use.

IV. CONCLUSION

It has always been a difficult task to identify vehicles on a busy road, as the number of vehicles is increasing day by day. It can monitor vehicles that exceed the speed limit, also other cheating and fraud issues can be solved. Automatic License Plate Recognition system allows to detect the number plate, this will help the cops to solve problems regarding to road. This model proposed here has been efficient to recognise the license plates that were broken, of different countries and also the images shown using webcam. This provides high accuracy, low computational cost and also an efficient system to detect the vehicles. The model here is also able to detect plates of different sizes and colours, conditions like sunlight, darkness and shadows, bad weather conditions and broken ones.

REFERENCES

[1] A. Mutholib, T. Gunawan, J. Chebil and M. Kartiwi, "Optimization of ANPR algorithm on Android mobile phone," *IEEE,* 2013.

[2] Tlebaldinova, A. Denissova, N. Kassymkhanova and Dana, "Application of a scenario approach in development of a recognition system of vehicle identification numbers," *IEEE,* 2015.

[3] Sulaiman, N. Razali, A. Jadin, M. Hadi, A. A. Mustafa, M. Ghazali and KH, "Development of Online Vehicle Plate Recognition System," 2015.

[4] Attah, A. ADEDIGBA, A. Aibinu and AM, "Development of Nigerian vehicles license plate recognition and classification system," *Journal of Science, Technology, Mathematics and Education,* 2016.

[5] Tiwari, B. Sharma, A. Singh, M. Gautam, Rathi and Bhawana, "Automatic Vehicle Number Plate Recognition System using Matlab," *IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN,* 2016.

[6] Prabhu, B. Sachin, Kalambur, Subramaniam, Sitaram and Dinkar, "Recognition of Indian license plate number from live stream videos," *nternational Conference on Advances in Computing, Communications and Informatics (ICACCI),* 2017.

[7] Barnouti, N. Hazim, Naser, M. A. Sahib, Al-Dabbagh and S. S. Mahmood, "Automatic Iraqi license plate recognition system using back propagation neural network (BPNN)," *Annual*

Conference on New Trends in Information \& Communications Technology Applications (NTICT), 2017.

[8] K. Shevale and S. Gite, "Number Plate Recognition System using Artificial Neural Network," *International Journal of Pure and Applied Mathematics,* 2018.

[9] Mohanan, Neeraja, Ahmad, Afaq, Al-Busaidi, S. Samir, Khiriji, Lazhar, Abdulghani, Amir, A. Nadabi and Muhammad, "Use of Mathematical Morphology in Vehicle Plate Detection," *Oriental Journal of Computer Science and Technology,* 2018.

[10] Abdulhamid, Mohanad, Kinyua and Njagi, "Recognition for software of car number plate," *Applied Computer Science,* 2020.

[11] Khazaee, S. Tourani, A. Soroori, S. Shahbahrami, A. Suen and C. Y, "A Real-Time License Plate Detection Method Using a Deep Learning Approach," *International Conference on Pattern Recognition and Artificial Intelligence,* 2020.

[12] Sathiyabhama, B. Revathi, T. Basker, N. Vinothkumar, RB and others, "Tracing of vehicle region and number plate detection using deep learning," *International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE),* 2020.

[13] Castro-Zunti, R. D. Y{\'e}pez, J. Ko and Seok-Bum, "License plate segmentation and recognition system using deep learning and OpenVINO," *IET Intelligent Transport Systems,* 2020.