

AUTOMATIC VEHICLE NUMBER PLATE DETECTION SYSTEM USING CNN

Kavitha Prashanth N ^a, Bhavana A ^b, Haripriya M ^b, ^a-Assistant professor, ECE, Dayananda sagar academy of technology and management, ^b-Student, ECE, Dayananda sagar academy of technology and management.

ABSTRACT

Increasing population has also increased the traffic graph. India was ranked number 1 among 199 countries for the most number of road accidents by world road statistics in 2018. So, a system is required to maintain and detect traffic rule violations.

An automatic traffic rule violation detection and number plate recognition is an effective method and a step ahead in controlling traffic. ANPR is used to trap traffic violations and detect the vehicle number plate so that it

decomposition, image processing and template algorithm, spatial/frequency domain filtering and neural networks and DELP-DAR system.

In this paper, we have used CNN - Convolutional neural networks. This is an efficient method to overcome the issue.

The proposed system first captures the image of the license plate of the vehicle and the image undergoes several refining processes to produce a clear image of the number plate; these extracted characters are verified using CNN classification.

CNN is preferred because of its higher accuracy which is related to 99.43% in terms of localisation and 98.6% in

KEYWORDS

Convolutional neural network (CNN), License plate recognition, Automatic license plate recognition (ANPR).

number plate recognition is a method which uses optical character recognition to identify the characters and also read them from vehicle number plate. It uses cameras which are specifically designed for this task.

ANPR is mainly used by traffic police to detect the vehicles which violate traffic rules to know the vehicle is

legally registered to collect toll at electronic toll collection and also to obtain a database of the vehicle owners.

This system was invented in 1976 at The Police scientific development branch in Britain.

ANPR mechanisms are generally divided into four stages:

- 1) Vehicle image capture
- 2) Number plate detection
- 3) Character segmentation
- 4) Character recognition

In this paper, we have used CNN for the system.

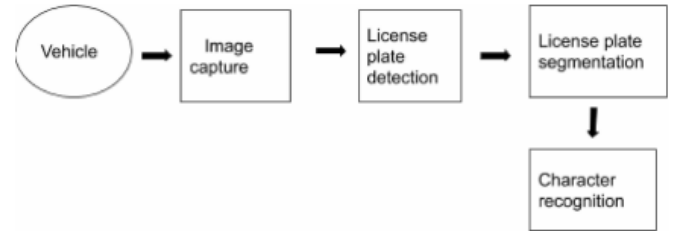
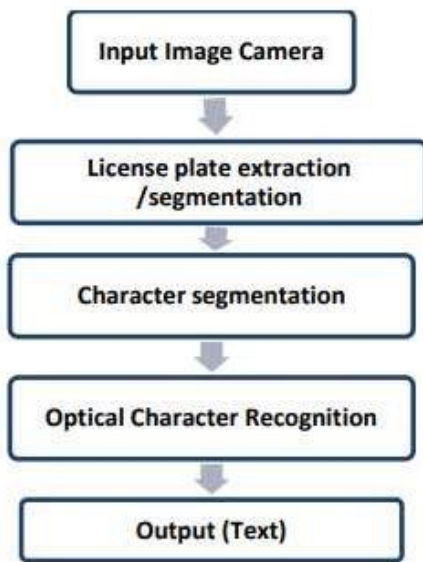
CNN is a special architecture of artificial neural networks and the best referring model to classify images.

The camera seizes the images of the vehicle which violate the traffic rule then from the captured image number plate is detected from different image processing technologies from the recognised number plate all the characters are segmented and the CNN identifies the segmented character and compares the vehicle number with the already present database.

This system covers components such as, to find out vehicle violating traffic rules and for automatic vehicle concerned person.

number plate detection. For each method restrictions like speed, accuracy performance and image size are reported. But, CNN method is more accurate and is reliable for implementation.

The system will be more reliable and vehicle detection



LITERATURE SURVEY

In this section, we study ALPR work in literature and also work about deep learning in this area.

(1) Vehicle Image capture and License plate detection

License plate detection is a very important step in the proposed method, where its efficiency plays a big role in the detection and recognition of license plate characters [2]. It is a location of an LP in an image or a video stream. In the literature, researchers have used a lot of techniques of computer vision and image processing. Yet, there have been other authors who have opted for using machine-learning and classification methods. For that, we can categorize these methods into: edge-based, color-based, texture-based and character based methods [10]. All these methods are efficient in identifying the vehicle license plate.

Using a camera placed at a point image of the vehicle violating traffic rules are captured [1]. Then the captured images are identified by training a CNN classifier [2].



NUMBER PLATE DETECTION

There are more number plate detection algorithms but for the effective recognition all the possible factors have to be considered.

1) Overspeed: Due to overspeed of vehicles, the image may not be captured clearly.

2) High Traffic: Sometimes due to more number of vehicles it becomes difficult to identify that one vehicle which violates the traffic rules.

3) External atmosphere: External atmosphere which includes rain, heavy wind may also affect the efficiency.

4) Plate size: Different vehicles may have different plate sizes.

5) Plate background and language: A Plate can have different background color or design. The language in which the numbers are written also may be a factor.

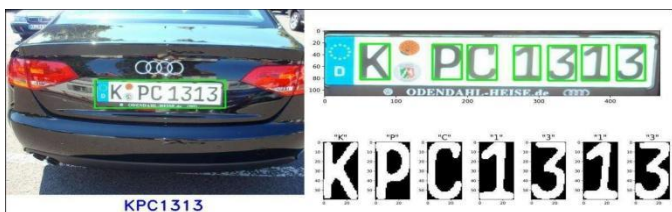
To overcome all these challenging factors, we propose a license plate recognition system that detects license plates and then we apply CNN to improve character recognition. This is also identified as "Virtual Police". The proposed method gives more efficiency and accuracy when compared to other traditional methods.



(i) Vehicle license plate detection

(2) License plate segmentation

Once the license plate is detected, the character segmentation is the second stage in the ALPR. Segmentation is applied to implicate the image into a more specific distribution of pixels[4]. The license plate characters are generally separated and each character is far from the other character by the same distance. Based on this separation space, the characters have been segmented[2]. The detected license plate is scanned and the number of black pixels are computed. If the number of black pixels in the column exceed that of the predefined value, that is considered as the part of a character. Segmentation clips off such that only the numbers of the vehicle license plate are extracted and also filters the noise level in the image[5]. Several methods for blurring technique include Gaussian, Median, Kalman etc. All characters that are segmented are printed.



(ii) License plate segmentation from the vehicle number plate.

(3) Character recognition

After segmentation the characters are cropped from license plate image by using separating columns. To recognise and identify the characters of the image another 42 class CNN classifier is trained, 10 digits, 26 upper letters plus 6 arabic letters. In this proposed system we have used moroccan license plates to test performance of the system and for this reason arabic characters are also treated in moroccan license. The CNN model is used to classify the characters, which is open source, pretrained inception-V3 model[2]. These recognised characters are then identified and compared with the stored database.



(i) License plate recognition

CONCLUSION

Traffic is a major problem in metropolitan cities. Traffic police find it difficult to identify the vehicle which violates traffic rules. This system can be a solution for growing traffic. In this paper we have discussed about CNN model for license plate detection which can elegantly solve the traffic rule violation problem and this model can be deployed in real-time circumstances. This model can also help in controlling Car park usage, Pedestrian crossing usage, Identifying number of vehicles along a road, areas of low and high congestion frequency, identifying location and cause of road works. Cameras installed for this model allows for traffic management decisions to be made in real-time.

Further enhancement to this model can improve the efficiency and accuracy and also overcome all possible complex cases which include high speed, language and different color of the number plate. Further implemented for location tracking and to send back an SMS to the vehicle owner making it easier to pay a penalty.

REFERENCES

- 1)Parul Agarwala, Kritika Chopraa, Mohd Kashifa, Vinita Kumari”Implementing Automatic license plate recognition for detection of traffic violations : A step towards sustainability”,International Conference on Computational Intelligence and Data Science (ICCIDS 2018)
- 2)Ibtissam Slimani , Abdelmoghith Zaarane, Wahban Al Okaishi, Issam Atouf, Abdellatif Hamdoun (2020)”An automated license plate detection and recognition system based on wavelet decomposition and CNN “,LTI Lab, Department of Physics, Faculty of Sciences Ben M’Sik, Hassan II University Of Casablanca, Morocco
- 3)Prabhu, B. Sachin, Kalambur Subramaniam, and Sitara Dinkar (2017) “Recognition of Indian license plate number from live stream videos” in the proceedings of 2017 International Conference on Advances in Computing, Communications and Informatics: 2359-2365.
- 4)K.Yogheedha,A.S.A.Nasir ,H.Jaafar (2018) ”Automatic Vehicle license plate recognition system based on Image processing and template matching approach”,Faculty of Engineering Technology Universiti Malaysia Perlis UniCITI Alam Campus Sungai Chuchuh, 02100 Padang Besar Perlis, Malaysia.
- 5)R Shreyas, Pradeep Kumar B V, Adithya H B, Padmaja B, Sunil M P ”Dynamic traffic rule violation monitoring system using automatic number plate recognition with SMS feedback”, 2nd International Conference on Telecommunication and Networks (TEL-NET 2017).
- 6)Lihong Zheng and Xiangjian He”Number plate recognition based on Support vector machines “(2006),Proceedings of the IEEE International Conference on Video and Signal Based Surveillance (AVSS’06).
- 7)Lele Xie, Tasweer Ahmad, Lianwen Jin,Member, IEEE, Yuliang Liu, and Sheng Zhang”A new CNN-based method for multi-directional car license plate detection “,IEEE Transactions on intelligent transportation systems(2018).
- 8) Ayodeji Olalekan Salaua , Thomas Kokumo Yesufu,Babatunde Sunday Ogundare(2019),”Vehicle plate number localization using a modified Grabcut Algorithm “,Journal of King Saud University-Computer and information services.
- 9)Mu-Liang Wang, Yi-Hua Liu, Bin-Yih Liao, Yi-Siu Lin, and Mong-Fong Horng, “A vehicle license plate recognition system based on Spatial/frequency domain filtering and neural networks “,ICCCI 2010, Part III, LNAI 6423, pp. 63–70, 2010.
- 10)Zied Selmi , Mohamed Ben Halimaa, Umapada Pal, M. Adel Alimi ”DELP-DAR system for license plate detection and recognition “,Pattern recognition letters 129(2020)213-223 Published by Elsevier B.V.