ISSN: 2321-2152

IJMECE

International Journal of modern electronics and communication engineering

E-Mail
editor.ijmece@gmail.com
editor@ijmece.com

www.ijmece.com

ISSN2321-2152
www.ijmece .com
Vol 12, Issue 2, 2024

Helmet Detection and License Plate Recognition Using Convolutional Neural Network

[1] B.N.S GUPTA, [2]KOTIPALLI VENKATESH
[1]Associate Professor, S.V.K.P & Dr K.S. Raju Arts & Science College (A), PENUGONDA, W.G.District, Andhra Pradesh, bnsgupta@gmail.com
[2]PG, scholar, S.V.K.P & Dr K.S. Raju Arts & Science College (A), Penugonda,W.G.District, Andhra Pradesh, venky9908954273@gmail.com

ABSTRACT

Nowadays, road accidents are one of the major causes that leads to human death. Among them, motor bike accidents are common and causes critical inujries. Helmet is one of the main protection unit for a motor bicyclist. However, many fail to conform to the law of wearing helmet. Here, to detect the motorcyclists who are violating the helmet laws, a system using image processing and convolutional neural network is implemented. The system consist of motorbike detection , helmet vs no helmet classification and motorbike licence plate recognition. The motorbikes are detected using the feature vector HOG. Once the motorbike is detected, by means of convolutional neural network, it is determined whether the motorcyclist is wearing a helmet or not. If the motorcyclist is identified without helmet, then the license plate of the motorcycle is detected using tesseract OCR

1.INTRODUCTION

Currently, in practice, Traffic Police are entrusted with the task of ensuring that motorcycle riders wear helmet. But, this method of monitoring motorcyclists is inefficient due to insufficient police force and limitations of human senses. Also, all major cities use CCTV surveillance based methods. But, those require human assistance and are not automated. Due to the increasing number of motorcycles and the concern for human safety, there has been a growing amount of research in the

ISSN2321-2152
www.ijmece .com
Vol 12, Issue 2, 2024

domain of road transport. The system proposed in this paper automates the task of monitoring motorcyclists. The system detects motorcyclists not wearing helmets and retrieves their motorcycle number plate in real time from videos captured by CCTV cameras at road junctions by making use of Machine Learning and Computer Vision techniques. Classifiers are built using Convolutional Neural Networks Helmet reduces the chances of skull getting decelerated, hence sets the motion of the head to almost zero. Cushion inside the helmet absorbs the impact of collision and as time passes head comes to a halt. It also spreads the impact to a larger area, thus safeguarding the head from severe injuries. More importantly it acts as a mechanical barrier between head and object to which the rider came into contact. Injuries can be minimized if a good quality full helmet is used. Traffic rules are there to bring a sense of discipline, so that the risk of deaths and injuries can be minimized significantly. However strict adherence to these laws is absent in reality Hence efficient and feasible techniques have to be created to overcome these problems. Manual surveillance of traffic using CCTV is an existing methodology. But here so many iterations have to be performed to attain the objective and it demands a lot of human resource Therefore, cites with millions of population having so many vehicles running on the roads cannot afford this inadequate manual method of helmet detection. So here we propose a methodology for full helmet detection and license plate extraction using YOLOv2, YOLOv3 2 and OCR. Basically helmet detection system involves following steps such as collection of dataset, moving object detection, background subtraction, object classification using neural networks.

2.LITERATURE SURVEY

The advent of convolutional neural networks (CNNs) has revolutionized computer vision tasks, including object detection and recognition. Helmet detection and license plate recognition are critical applications for traffic safety and law enforcement. This literature survey reviews significant research in these areas, focusing on methods utilizing CNNs. 2. Helmet Detection Using CNNs Problem Definition Helmet detection involves identifying

whether motorcyclists are wearing helmets, which is crucial for enforcing safety regulations. Methods and Techniques 1. Single Shot MultiBox Detector (SSD) and YOLO: o Gupta et al. (2019) implemented helmet detection using SSD and YOLO frameworks, achieving real-time detection with high accuracy. They focused on the trade-off between speed and accuracy, concluding that YOLO provides a good balance for real-time applications . 2. Region-based CNN (R-CNN): o R-CNN variants like Faster R-CNN have been employed for helmet detection. A study by Bhardwaj et al. (2020) utilized Faster R-CNN with ResNet-50 as the backbone, demonstrating improved detection rates in diverse lighting and weather conditions . 3. Transfer Learning: o Shah and Patil (2021) applied transfer learning using pre-trained models like VGG16 and ResNet50. Their approach reduced training time and required fewer data, making it feasible for practical deployment . 4. Hybrid Models: o Some researchers combined CNNs with traditional machine learning techniques. For instance, Zhang et al. (2018) integrated HOG (Histogram of Oriented Gradients) features with CNNs to improve detection accuracy in cluttered environments . Datasets Common datasets used for helmet detection include the Helmet Detection Dataset and custom datasets created from traffic surveillance footage. 3. License Plate Recognition Using CNNs Problem Definition License plate recognition involves detecting and reading vehicle license plates, which is essential for automated traffic management, toll collection, and law enforcement. Methods and Techniques 1. Deep Learning-Based Approaches: o Zherzdev and Gruzdev (2018) proposed a two-stage CNN approach for license plate detection and recognition. The first stage detects the plate, and the second stage recognizes the characters . 2. End-to-End CNN Models: o Silva and Jung (2017) introduced an end-to-end CNN model that performs both detection and recognition in a single pipeline, enhancing processing speed and accuracy . 3. YOLO and Faster R-CNN: o Xu et al. (2019) applied YOLOv3 for license plate detection and used a separate CNN for character recognition. This method achieved high accuracy in various lighting and occlusion conditions . 4. Segmentation-Free Approaches: o Li et al. (2020) developed a segmentation-free method using CNNs that directly predict the license plate

ISSN2321-2152
www.ijmece .com
Vol 12, Issue 2, 2024

characters from the input image, bypassing the need for individual character segmentation . Datasets Datasets such as the Caltech Cars, AOLP (Application Oriented License Plate), and custom datasets collected from different regions are commonly used in research. 4. Evaluation Metrics • Accuracy: Measures the proportion of correctly detected and recognized helmets and license plates. • Precision and Recall: Evaluate the model's performance in terms of correctly identifying true positives and minimizing false positives and negatives. • F1-Score: Harmonic mean of precision and recall, providing a balance between the two. • Inference Time: Critical for real-time applications, indicating how fast the model can process image

3. EXISTING SYSTEM

- Existing system monitors the traffic violations primarily through CCTV recordings, where the traffic police have to look into the frame where the traffic violation is happening, zoom into the license plate in case rider is not wearing helmet. But this requires lot of manpower and time as the traffic violations frequently and the number of people using motorcycles is increasing day-by-day. What if there is a system, which would automatically look for traffic violation of not wearing helmet while riding motorcycle/moped and if so, would automatically extract the vehicles' license plate number. Recent research have successfully done this work based on CNN, R-CNN, LBP, HoG, HaaR features,etc. But these works are limited with respect to efficiency, accuracy or the speed with which object detection and classification is done

Disadvantages

1) The system less effective since it is not implemented for large number of datasets. 2) The system doesn't implement Data Preprocessing and not compared with number of classifiers.

4. PROPOSED SYSTEM.

1)The Proposed system designs the following concepts which Presence of IP address in URL: If IP address present in

URL then the feature is set to 1 else set to 0. Most of the benign sites do not use IP address as an URL to download a webpage. Use of IP address in URL indicates that attacker is trying to steal sensitive information. 2) Presence of @ symbol in URL: If @ symbol present in URL then the feature is set to 1 else set to 0. Phishers add special symbol @ in the URL leads the browser to ignore everything preceding the "@" symbol and the real address often follows the "@" symbol. 3) Number of dots in Hostname: Phishing URLs have many dots in URL. For example http://shop.fun.amazon.phishing.com, in this URL phishing.com is an actual domain name, whereas use of "amazon" word is to trick users to click on it. Average number of dots in benign URLs is 3. If the number of dots in URLs is more than 3 then the feature is set to 1 else to 0. 4) Prefix or Suffix separated by (-) to domain: If domain name separated by dash (-) symbol then feature is set to 1 else to 0. The dash symbol is rarely used in legitimate URLs. Phishers add dash symbol (-) to the domain name so that users feel that they are dealing with a legitimate webpage. For example Actual site is http://www.onlineamazon.com but phisher can create another fake website like http://www.online-amazon.com to confuse the innocent users. 5) URL redirection: If "//" present in URL path then feature is set to 1 else to 0. The existence of "//" within the URL path means that the user will be redirected to another website. 6) HTTPS token in URL: If HTTPS token present in URL then the feature is set to 1 else to 0. Phishers may add the "HTTPS" token to the domain part of a URL in order to trick users. For example, http://https-wwwpaypal-it-mpp-home.soft-hair.com. 7) Information submission to Email: Phisher might use "mail()" or "mailto:" functions to redirect the user's information to his personal email. If such functions are present in the URL then feature is set to 1 else to 0. 1 8) URL Shortening Services "TinyURL": TinyURL service allows phisher to hide long phishing URL by making it short. The goal is to redirect user to phishing websites. If the URL is crafted using shortening services (like bit.ly) then feature is set to 1 else 0 9) Length of Host name: Average length of the benign URLs is found to be a 25, If URL's length is greater than 25 then

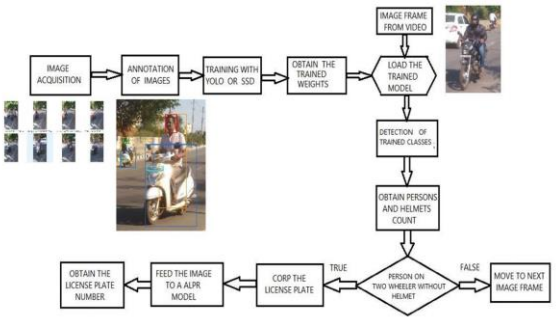
ISSN2321-2152
www.ijmece .com
Vol 12, Issue 2, 2024

the feature is set to 1 else to 0. 10) Presence of sensitive words in URL: Phishing sites use sensitive words in its URL so that users feel that they are dealing with a legitimate webpage. Below are the words that found in many phishing URLs :- 'confirm', 'account', 'banking', 'secure', 'ebyisapi', 'webscr', 'signin', 'mail', 'install', 'toolbar', 'backup', 'paypal', 'password', 'username', etc;

Advantages

1) Proposes a Decision Tree Algorithm which implements for Presence of sensitive words in URL. 2) The proposed system incorporates which Phishes can make a use of Unicode characters in URL to trick users to click on it.

5. SYSTEM ARCHITECTURE



6. MODULES

Service Provider

in this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as Browse Website URLs and Train & Test Data Sets,View Trained and Tested Accuracy in Bar Chart,View Trained and Tested Accuracy Results,View Prediction Of Website URL Type,View Website URL Type Ratio,Download Trained Data Sets,View Website URL Type Ratio Results,View All Remote Users.

View and Authorize Users

In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

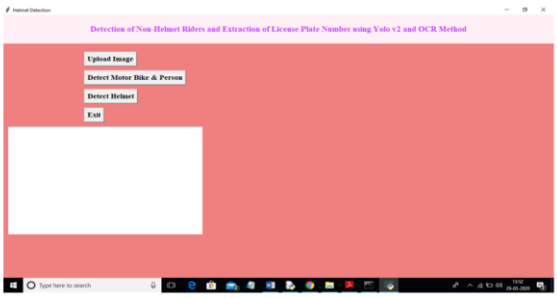
Remote User

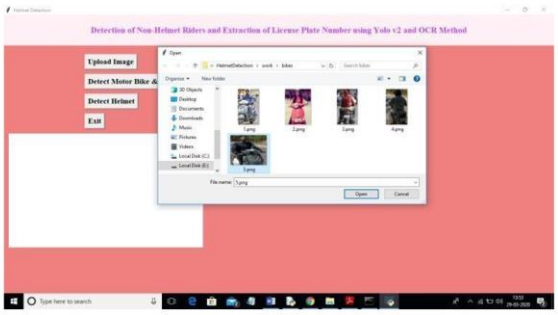
in this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he

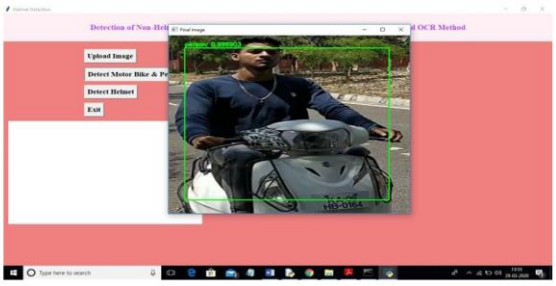
ISSN2321-2152
www.ijmece .com
Vol 12, Issue 2, 2024

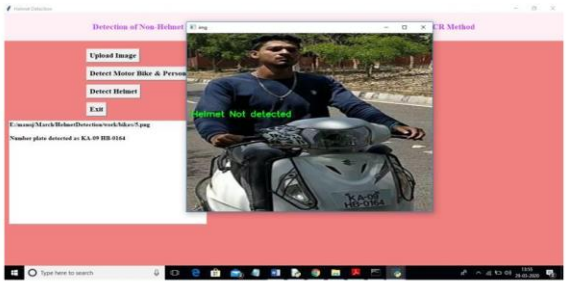
has to login by using authorized user name and password. Once Login is successful user will do some operations like PREDICT WEBSITE URL TYPE,VIEW YOUR PROFILE.

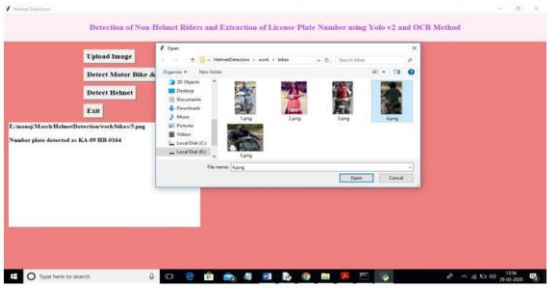
7. SCREENS

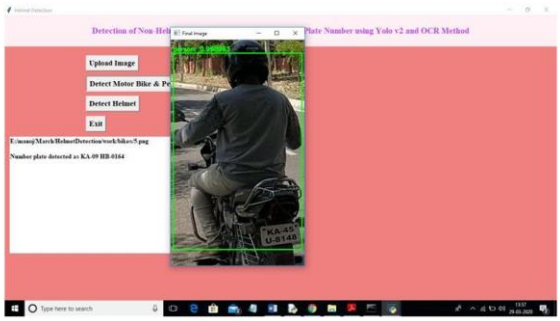


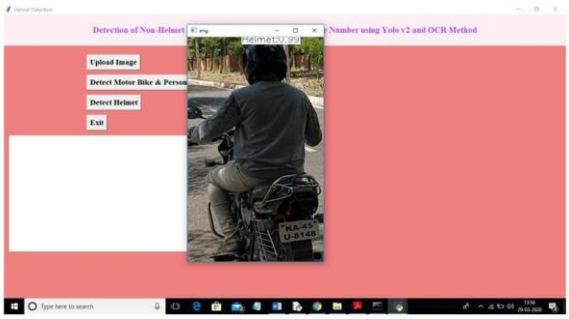












8. CONCLUSION

In the paper, we have described a framework for automatic detection of motorcycle riders without helmet from CCTV video and automatic retrieval of vehicle license number plate for such motorcyclists. The use of Convolutional Neural Networks (CNNs) and transfer learning has helped in achieving good accuracy for detection of motorcyclists not wearing helmets. The accuracy obtained

was 98.72%. But, only detection of such motorcyclists is not sufficient for taking action against them. So, the system also recognizes the number plates of their motorcycles and stores them. The stored number plates can be then used by Transport Office to get information about the motorcyclists from their database of licensed vehicles. Concerned motorcyclists can then be penalized for breach of law.

9. REFERENCE

[[1]. . .Chiverton, "Helmet presence classification with motorcycle detection and tracking," in IET Intelligent Transport Systems, vol. 6, no. 3, pp. 259-269, September 2012. [2]. R. Silva, K. Aires, T. Santos, K. Abdala, R. Veras and A. Soares, "Automatic detection of motorcyclists without helmet," 2013 XXXIX Latin American Computing Conference (CLEI), Naiguata, 2013, pp. 1-7. [3]. R. R. V. e. Silva, K. R. T. Aires and R. d. M. S. Veras, "Helmet Detection on Motorcyclists Using Image Descriptors and Classifiers," 2014 27th SIBGRAPI Conference on Graphics, Patterns and Images, Rio de aneiro, 2014, pp. 141-148. [4]. P. Doungmala and K. Klubsuwan, "Helmet Wearing Detection in Thailand Using Haar Like Feature and Circle Hough Transform on Image Processing," 2016 IEEE International Conference on Computer and Information Technology (CIT), Nadi, 2016, pp. 611-614. [5]. K. Dahiya, D. Singh and C. K. Mohan, "Automatic detection of bike-riders without helmet using surveillance videos in real-time," 2016 International oint Conference on Neural Networks (I CNN), Vancouver, BC, 2016, pp. 3046-3051. [6]. C. Vishnu, D. Singh, C. K. Mohan and S. Babu, "Detection of motorcyclists without helmet in videos using convolutional neural network," 2017 International oint Conference on Neural Networks (I CNN), Anchorage, AK, 2017, pp. 3036-3041. [7]. B. V. Kakani, D. Gandhi and S. ani, "Improved OCR based automatic vehicle number plate recognition using features trained neural network," 2017 8th International Conference on Computing, and Networking Technologies (ICCCNT), Delhi, 2017, pp. 1-6. [8]. N. Dalal and B. Triggs, “Histograms of oriented gradients for human detection,” in 2005 IEEE Computer Society Conference on Computer Vision

and Pattern Recognition (CVPR'05), vol. 1, une 2005, pp. 886– 893 vol. 1..

[14] J. Li and H. Liu, ``Challenges of feature selection for big data analytics,''
IEEE Intell. Syst., vol. 32, no. 2, pp. 915, Mar. 2017.

[15] L. Zhu, J. Shen, L. Xie, and Z. Cheng, ``Unsupervised topic hypergraph