HELMET AND NUMBER PLATE DETECTION USING DEEP LEARNING

Dr. T SUNIL KUMAR[1], BANDARU NAVEEN V.R.S. KUMAR [2], J . VARUN KUMAR[3], CH. R. SUVARNA[4], P. PAVAN[5]

[1].**Dr T SUNIL KUMAR-Professor, suneilkumart@gmail.com, DEPARTMENT OF COMPUTER SCIENCE And ENGINEERING,** SANKETIKA VIDYA PARISHAD ENGINEERING COLLEGE**, VISAKHAPATNAM – 530041**

[2,3,4,5]**B.Tech STUDENT, DEPARTMENT OF COMPUTER SCIENCE And ENGINEERING,** SANKETIKA VIDYA PARISHAD ENGINEERING COLLEGE**, VISAKHAPATNAM – 530041**

ABSTRACT

The number of motorcycle accidents is increasing worldwide, with head injuries being one of the most common causes of death. Riders can avoid life-threatening injuries by wearing helmets, but many choose not to use them. In order to solve this problem, the project created an automated solution that utilizes a CNN-based YOLOv3 (You Only Look Once) algorithm and Optical Character Recognition (OCR) to capture their license plate information. YOLO is a neural network model that splits images into smaller parts so that objects can be detected and classified at the same time. With the input image, the dataset is compared, and confidence scores and class probabilities are measured which leads to detection of wearing a helmet or not. In cases where the biker does not wear a helmet, physically OCR scans the number plate of a motorcycle and converts it into digital text. This text undergoes processes such as image acquisition, cleaning, recognition, and layout analysis to provide the desired output of number plate of helmetless motorcycles. This process automates detection of those who do not wear helmet and license plate details extraction for riders who do not wear helmets. Identification of these violations is done automatically which in turn, makes roads safer.

Keywords:-YOLO V3, OCR, CNN

1. INTRODUCTION

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 populations 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 and OCR. Basically, helmet detection system involves following steps such as collection of datasets, moving object detection, background subtraction, object classification using neural networks. In this paper we are detecting whether two-wheeler rider wearing helmet or not, if he is not wearing helmet then we are extracting number plate of that two-wheeler. To extract number plate, we have YOLO CNN model with some train and test images and if you want to add some other images then send

those images to us so we can include those images in YOLO model with annotation to extract number plate of those new images. In this research work, a Non-Helmet Rider detection system is built which attempts to satisfy the automation of detecting the traffic violation of not wearing helmet and extracting the vehicles' license plate number. The main principle involved is Object Detection using Deep Learning at three levels. The objects detected are person, motorcycle/moped at first level using YOLOv2, helmet at second level using YOLOv3, License plate at the last level using YOLOv2.

2. LITERATURE SURVEY AND RELATED WORK

1. Balasubramanian, P., Jaganathan, R., & Kumar, V. A. (2019). Real-time helmet detection and warning system for two-wheelers. International Journal of Engineering and Advanced Technology, 8(5), 110-114. The paper proposes a real-time helmet detection and warning system for two-wheeler riders. The system uses a camera mounted on a helmet to capture images of the rider and a deep learning algorithm to detect the presence of the helmet. If the helmet is not detected, an audio alarm is triggered to warn the rider. The system was tested on a dataset of images and achieved an accuracy of 95%. The proposed system can help reduce the number of road accidents caused by noncompliance with traffic regulations and promote safe driving practices.
2. Bhardwaj, P., & Tiwari, S. (2020). Automatic number plate recognition using deep learning techniques: a survey. International Journal of Machine Learning and Networking, 3(1), 1-11. This paper presents a survey of automatic number plate recognition (ANPR) systems that use deep learning techniques. ANPR is a computer vision technology that involves the extraction of vehicle registration plate information from images or videos. The paper reviews the recent developments in ANPR using deep learning techniques and provides a comparative analysis of the different approaches used. The survey also highlights the challenges and future directions for ANPR research. The paper concludes that deep learning techniques have significantly improved the accuracy of ANPR systems, and further research is needed to overcome the challenges associated with real-world scenarios.

3. Chen, X., Li, Y., & Chen, L. (2018). A real-time vehicle detection and recognition system for intelligent transportation systems. Sensors, 18(11), 3796. This paper proposes a real-time vehicle detection and recognition system for intelligent transportation systems. The system uses a deep learning model, specifically a Faster R-CNN, to detect and recognize vehicles in images captured by cameras mounted on roads. The proposed system achieves an accuracy of 91.8% in vehicle detection and 88.5% in vehicle recognition. The system can be used in various applications such as traffic surveillance, vehicle tracking,

and parking management.

4. Fan, H., & Yang, C. (2020). A review of vehicle detection and tracking systems. Journal of Advanced Transportation, 2020, 1-14. This paper presents a review of vehicle detection and tracking systems. The paper provides an overview of the different techniques and algorithms used for vehicle detection and tracking, including traditional computer vision techniques and deep learning approaches. The review includes a discussion of the advantages and limitations of the different techniques and provides insights into future research directions. The paper also highlights the potential applications of vehicle detection and tracking systems, including traffic monitoring, autonomous driving, and intelligent transportation systems. The review provides valuable insights into the current state of-the-art in vehicle detection and tracking systems and provides a roadmap for future research in this field.

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 has 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.

4. PROPOSED SYSTEM

In this project we are detecting whether two-wheeler rider wearing helmet or not, if he is not wearing helmet then we are extracting number plate of that two-wheeler. To extract number plate, we have YOLO CNN model with some train and test images and if you want to add some other images then send those images to us so we can include those images in YOLO model with annotation to extract number plate of those new images.

To implement above technique, we are following or implemented below modules.

1. First image will be upload to the application and the using YOLOV2 we will check whether image contains person with motor bike or not, if YOLO model detect both person and motor bike then we will proceed to step 2.
2. In this module we will use YOLOV3 model to detect whether object wear helmet or not, if he wears helmet then application will stop here itself. If rider does not wear helmet, then application proceed to step 3.
3. In this module we will extract number plate data using python tesseract OCR API. OCR will take input image and then extract vehicle number from it.

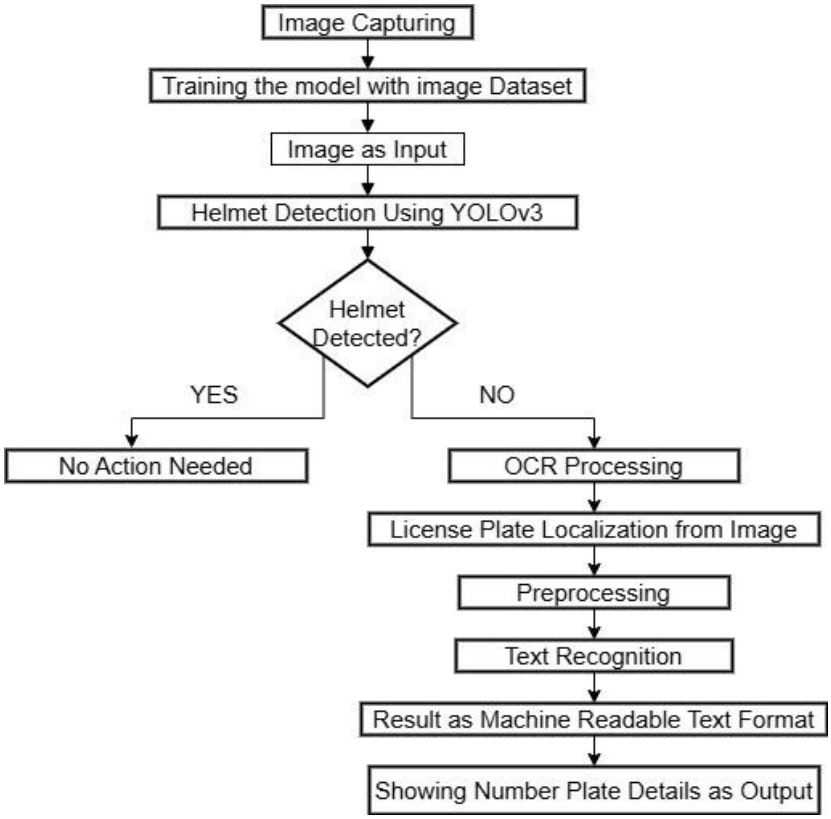

FIG1- SYSTEM ARCHITECTURE

5. METHODOLOGIES

5.1 MODULE

The modules involved in this project are.

1. Input Image
2. Image classification
3. CNN classifier
4. Final classification

1)The input image has been captured by using either ipcam or webcam, from this the bike is detected. These methods to detect the photo of motorcycle and driver from the image and then detect an area of the biker head before classify that this person is wearing a helmet or not. In this paper, we solve the biker and helmet detection problem from video surveillance data by using CNN models.

2) After gathering images for our training dataset, we split our images into two groups, one for training data and another for test data to use in classification experiment. This experiment we test them with CNN models for image classification.

3) All videos will be tested and calculated the accuracy of the biker with helmet and no helmet detection in the video. A CNN is a neural network with some convolutional layers (and some other layers). A convolutional layer has a number of filters that does convolutional operation. The last step, we compare the performance from two previous steps and make the conclusion.

4) The accuracy of the experiments will show the performance of each technique in terms of image classification and image detection.

5) Image pre-processing is the term for operations on images at the lowest level of abstraction. These operations do not increase image information content, but they decrease it if entropy is an information aim of pre-processing is an improvement of the image

data that suppresses undesired distortions or enhances some image features relevant for further processing and analysis task. Morphological operations are applied on segmented image for finding license plate number.

6) Dilation and erosion process will be used to enhance (smoothening)the license plate region by removing the unwanted pixels from outside region of plate. After applying morphological process , we will get the foreground and background separated output . From this number plate is extracted

6. RESULTS AND DISCUSSION SCREEN SHOTS

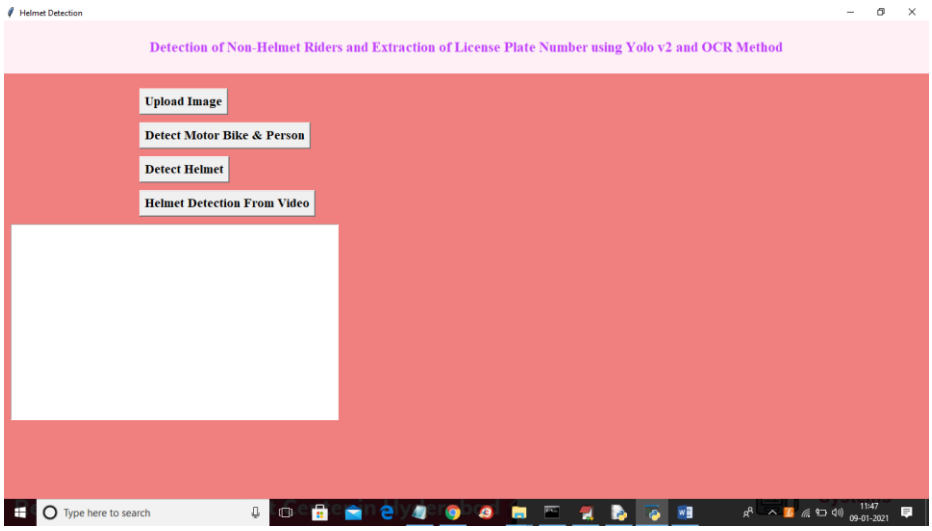

FIG 2- HOME SCREEN In above screen click on 'Upload Image' button and upload image

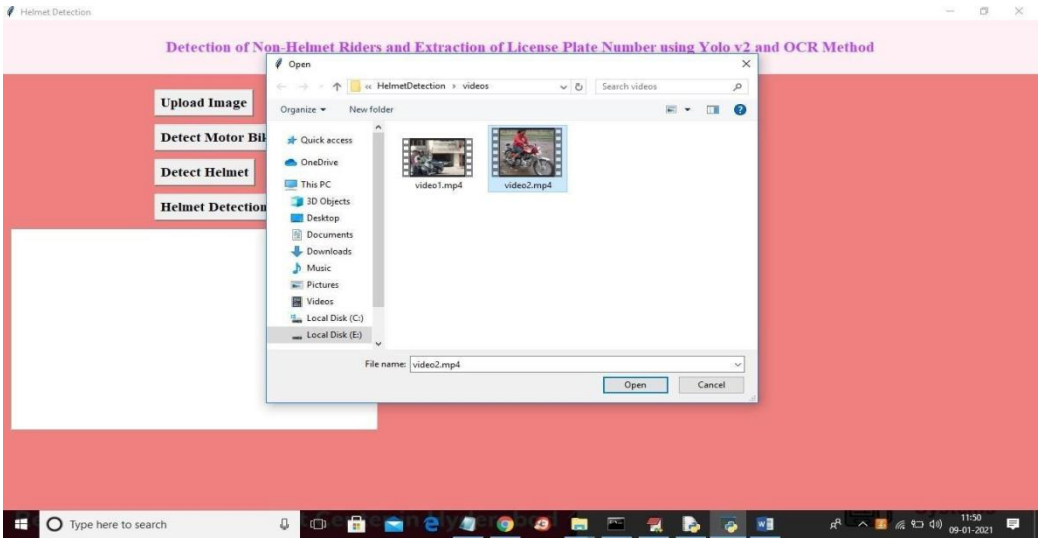

Fig: 3 UPLOAD Video In above screen I selected one image as '5.png' and click on 'Open' button to load Video. Now click on 'Detect Motor Bike & Person' button to detect whether image contains person with motor bike or not.

Fig: 4 DETECTION HELMET In above screen yolo detected image contains person and bike and now click on 'Detect Helmet' button to detect whether he is wearing helmet or not

7. CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

A Non-Helmet Rider Detection system is developed where a image file is taken as input. If the motorcycle rider in the image is not wearing helmet while riding the motorcycle, and then here we are uploading image to identify license plate numberof that motorcycle is extracted from image and displayed. Object detection principle with YOLO architecture is used for motorcycle, person, helmet and license plate detection. OCR is used for license plate number extraction if rider is not wearing helmet. Not only the characters are extracted, but also the frame from which it is also extracted so that it can be used for other purposes. All the objectives of the project is achieved satisfactorily.

7.2 FUTURE SCOPE

Our project can be linked with the traffic cameras and with some modifications it can be used to detect helmets in the real time system. Furthermore, we can merge the algorithm of automated license plate detection and make a system which generates challans for those who don't wear helmets.

8. REFERENCES

1. L Allamki, M Panchakshari, A Sateesh, and K S Pratheek, “Helmet Detection using Machine Learning and Automatic License Plate Recognition”, Int. Research J of Technology and Research (IRJET), Vol: 6, Issue: 12, Dec 2019.
2. C. Vishnu, D Singh, C. K Mohan, and S Babu, “Detection of Motorcyclists without Helmet in Videos using Convolutional Neural Network”, Institute of Electrical and Electronics Engineers (IEEE), July 2017.
3. Madhuchhanda Dasgupta, Oishila Bandyopadhyay, Sanjay Chatterji, “Automated Helmet Detection for Multiple Motorcycle Riders using CNN”,, Institute of Electrical and Electronics Engineers(IEEE) Dec 2019.
4. Balasubramanian, P., Jaganathan, R., & Kumar, V. A. (2019). Real-time helmet detection and warning system for two-wheelers. International Journal of Engineering and Advanced Technology, 8(5), 110-114.
5. Bhardwaj, P., & Tiwari, S. (2020). Automatic number plate recognition using deep learning techniques: a survey. International Journal of Machine Learning and Networking, 3(1), 1-11.
6. Chakraborty, S., Ghosh, A., & Das, A. (2020). Efficient detection of helmet and two-wheeler riding using deep learning. International Journal of Computer Applications, 179(32), 12-16.
7. Chen, X., Li, Y., & Chen, L. (2018). A real-time vehicle detection and recognition system for intelligent transportation systems. Sensors, 18(11), 3796.
8. Fan, H., & Yang, C. (2020). A review of vehicle detection and tracking systems. Journal of Advanced Transportation, 2020, 1- 14. 65.
9. Hu, J., Shen, L., & Sun, G. (2018). Squeeze-and-excitation networks. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 7132-7141).
10. Jain, V., & Gupta, A. (2021). Automatic detection of helmet wearing by two-wheeler riders using deep learning. In Proceedings of the 3rd International Conference on Emerging Trends in Engineering, Science and Technology (pp. 173-177). Springer, Singapore.