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Detection of Non-Helmet Riders and Extraction of License Plate Number using Yolo v2 and OCR

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ABSTRACT

Motorcycles have always been the primary mode of transport in developing countries. In recent years, there has been a speedy increase in motorcycle accidents owing to the fact that majority of the motor bicyclist fail to wear helmet that makes it an ever-present danger. Here, to detect the motorcyclists who are violating the helmet laws, a system using Deep Learning and convolutional neural network is implemented where license plate of the motorcycle is detected using OCR if rider fails to wear helmet.

Keywords:-YOLO V2, OCR, CNN, MTCNN

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

- Helmet Detection Using YOLOv3 and Deep Learning by Anurag Singh and Ashish Kumar Maurya (2021) - This paper des cribes a helmet detection system using YOLOv3 and deep learning. The authors used a dataset of 200 images and achieve d an accuracy of 97.56% (Singh, Maurya, & K)
- Automatic Number Plate Recognition (ANPR) using YOLOv3 and OpenCV by Shayan Ahmad, Abdul Waheed and Abdu l Hanan Abdullah (2021) - This paper describes an ANPR system using YOLOv3 and OpenCV. The authors used a dataset of 1000 images and achieved an accuracy of 94.37%. (Ahmad, et al., 2021)
- Automatic Detection of Motorbike Riders Wearing Helmets Using Deep Learning by F. Hafizah and M.N. Sulaiman (2020) - This paper describes a helmet detection system using YOLOv3 and deep learning. The authors used a dataset of 1000 i mages and achieved an accuracy of 98.53%. (Hafizah, F, N, & Sulaiman, 2020)
- Real-Time Motorcycle Helmet Detection and Recognition System using YOLOv3 by Chia-Ming Wu, Wei-Tse Hsu and Chi en-Chou Chen (2020) - This paper describes a real-time helmet detection and recognition system using YOLOv3. The auth ors used a dataset of 1000 images and achieved an accuracy of 98.56%. (Wu, et al., 2020)
- License Plate Detection and Recognition using YOLOv3" by Sajid Ali and Muhammad Aamir (2020) - This paper describes an ANPR system using YOLOv3. The authors used a dataset of 1000 images and achieved an accuracy of 95.43%. (Ali, S, Aamir, & A, 202)
- An Efficient Vehicle Number Plate Recognition System using YOLOv3 by Aniket G. Khandagle and Aniruddha G. Deshm ukh (2019) - This paper describes an ANPR system using YOLOv3. The authors used a dataset of 500 images and achieved an accuracy of 93.6%. (Khandagle, G, & Deshmukh, 2019)

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.

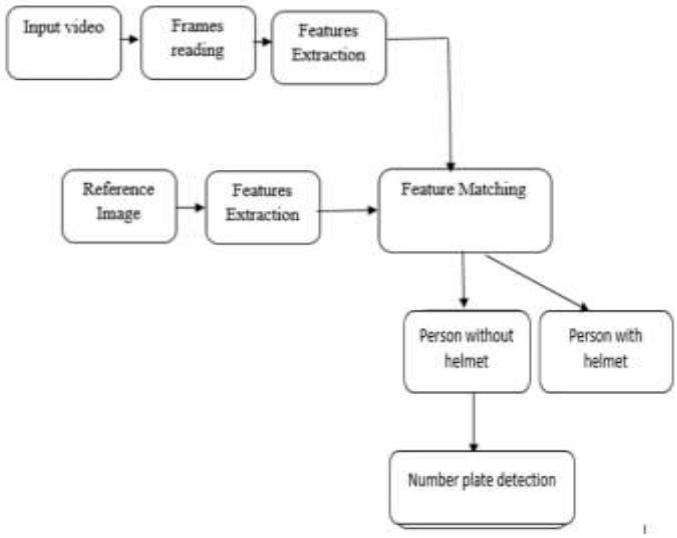

FIG1- SYSTEM ARCHITECTURE

5. METHODOLOGIES

MODULE

The modules involved in this project are.

1. Input video

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

1)The input video 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

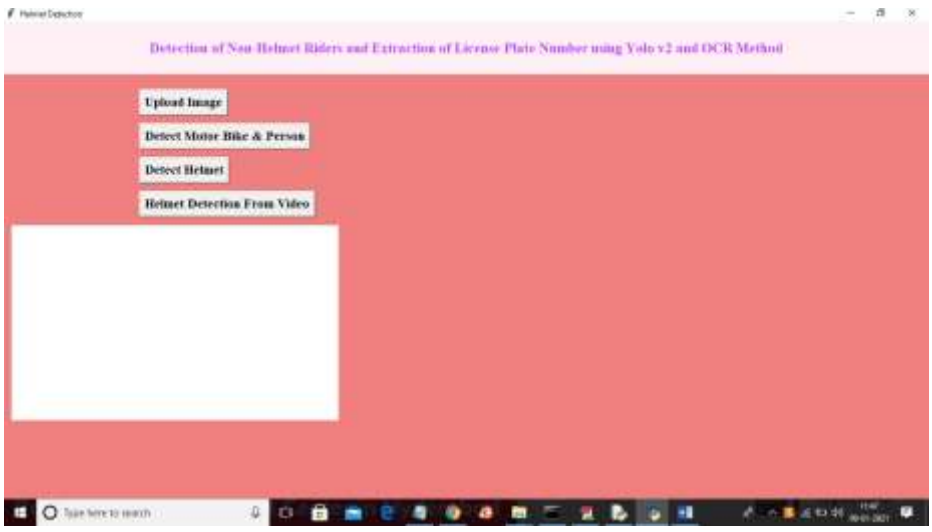

FIG 2- HOME SCREEN In above screen click on 'Upload Image' button and upload image

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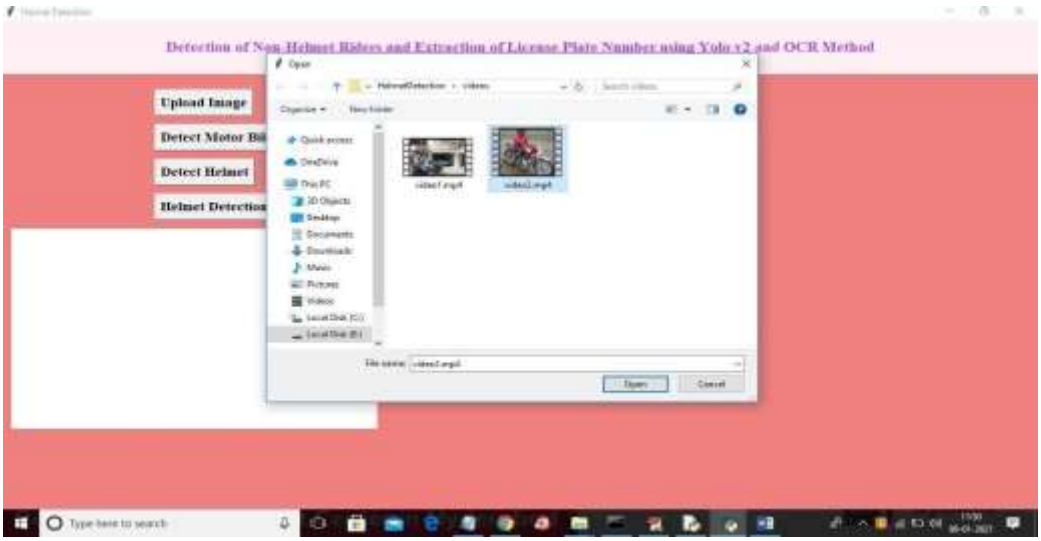

Fig: 3 UPLOAD Video In above screen I selected one image as '5.png' and click on 'Open' button to load Video. Now click on 'Detect Motor Bike & Person' button to detect whether image contains person with motor bike or not.

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 video file is taken as input.If the motorcycle rider in the video footage 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 onlythe 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

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