

# HELMET DETECTION ON MOTORCYCLISTS USING IMAGE DESCRIPTION AND CLASSIFIERS

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## ABSTRACT

In current situation, we come across various problems in traffic regulations in India which can be solved with different ideas. Riding motorcycle/mopeds without wearing helmet is a traffic violation which has resulted in increase in number of accidents and deaths in India. 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. 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. Then the license plate registration number is extracted using OCR (Optical Character Recognition). All these techniques are subjected to predefined conditions and constraints, especially the license plate number extraction part. Since, this work

takes video as its input, the speed of execution is crucial. We have used above said methodologies to build a holistic system for both helmet detection and license plate number extraction.

## I. 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, cities 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 and OCR. Basically helmet detection system involves following steps such as collection of dataset, moving object detection, background subtraction, object classification using neural networks.

## II. SYSTEM ANALYSIS 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.

### 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 wear helmet then application will stop hear itself. If rider 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.

## III. IMPLEMENTATION

### Modules description

#### 1.Upload Image

#### 2. Detect Motor Bike & Person

The frame chosen is given as input to YOLOv2 object detection model, where the classes to be detected are „Motorbike“, „Person“. At the output, image with required class detection along with confidence of detection through bounding box and probability value is obtained.

With the help of functions given by Image AI library, only the detected objects are extracted and stored as separate images and named with class name and image number in order. For example, it will be saved as motorcycle-1, motorcycle-2, etc.... if extracted object is motorcycle or person-1, person-2, etc.... if extracted image is of person. The details of these extracted images which is stored in a dictionary which can be later used for further processing.

#### 3. Detect Helmet

Once the person-motorcycle pair is obtained, the person images is given as input to helmet detection model. While testing the helmet detection model, some false detections were observed. So, the person image was cropped to get only top one-fourth portion of image. This ensures that false detection cases are eliminated as well as avoid cases leading to wrong results when the rider is holding helmet in hand while riding or keeping it on motorcycle while riding instead of wearing.

#### 4.Exit

## IV. 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, then the license plate number of that motorcycle is extracted 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.

### FUTURE WORK

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. Further more we can merge the algorithm of automated license plate detection and make a system which generates challans for those who don't wear helmets.

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