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HELMET OR TRIPLE RIDING DETECTION USING DEEP LEARNING

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Abstract*- *Motorcycle accidents are growing throughout the years in all the countries, as there is difference in social, economical and the transport conditions differs from place to place. Motorcycle is one of the prominent means of transport used by middle class people. Wearing helmet is the main safety equipment of motorcyclists, which might not be followed by all drivers . Adults people doesn't take proper precaution safety riding take over speed, and triple riding. Accident of a motorcyclist is serious issue on society the structural support that a car does to keep drivers safe and protected. Even when a rider takes all possible precautions, accidents resulting in injury still occur .The primary objective of a helmet is to protect the driver's head in case of an accident or fall from a bike. Now a days use of helmets is low and many people does not follow traffic rules like triple riding .The proposed project helps to identify whether motorcyclists wear safety harnesses that is helmets while driving or not and maintain proper rules on triple riding.

Keywords— motorcyclists, Safety, Helmet, Accidents, Triple Riding.

I. INTRODUCTION

Driving without a helmet and triple riding is like risking one's life.In the event of an accident, a motorcycle lacks the structural support that a car does to keep drivers safe and protected [1]. Even when a rider takes all possible precautions, accidents resulting in injury still occur [2] .The primary objective of a helmet is to protect the driver's head in case of an accident or fall from a bike [3]. Now a days use of helmets is low [4]. The proposed project helps to identify whether motorcyclists wear safety harnesses that is helmets while driving or not [5]. This proposed strategy uses Mobilenet-SSD which is to automatically detect bike riders without helmets and triple riding using surveillance videos in real time [6].

II. RELATEDWORKS

An efficient method for recognition of Indian vehicle number plates has been devised [7]. We are able to deal with noisy, low illuminated, cross angled, non-standard font number plates [8]. This work employs several image processing techniques such as, morphological transformation [9], Gaussian smoothing [10], Gaussian thresholding [11] and Sobel edge detection method [12] in the pre-processing stage, after which number plate segmentation [13], contours [14] are applied by border following and contours are filtered based on character dimensions and spatial localization. Finally we apply Optical Character Recognition (OCR) to recognize the extracted

characters [15]. The detected texts are stored in the database, further which they are sorted and made available for searching [16]. Generally, we have number plate detection based on the image processing we accuracy is very low because by using R-CNN model [17].

Disadvantages:

1. It still takes a huge amount of time to train the network as you would have to classify 2000 region proposals per image.
2. It cannot be implemented real time as it takes around 47 seconds for each test image.
3.The selective search algorithm is a fixed algorithm. Therefore, no learning is happening at that stage. This could lead to the generation of bad candidate region proposals.

III. PROPOSED SYSTEM ARCHITECTURE

This project aims at prevention of accidents by automatically identifying the drivers wearing helmet or not and triple ride. For this, a Faster RCNN descriptor for features extraction is used. Based on Faster R-CNN feature Extraction and Haar Cascade Classier real time images captured by cameras are used. The best result obtained from classification was with an accuracy rate of 0.995, and the best result obtained from helmet detection is with an accuracy rate of 0.96, and best results obtained from triple riding detection is with an accuracy rate of 0.996. The algorithm used for this project is CNN (Convolution Neural Networks) which is shown in Fig.1.

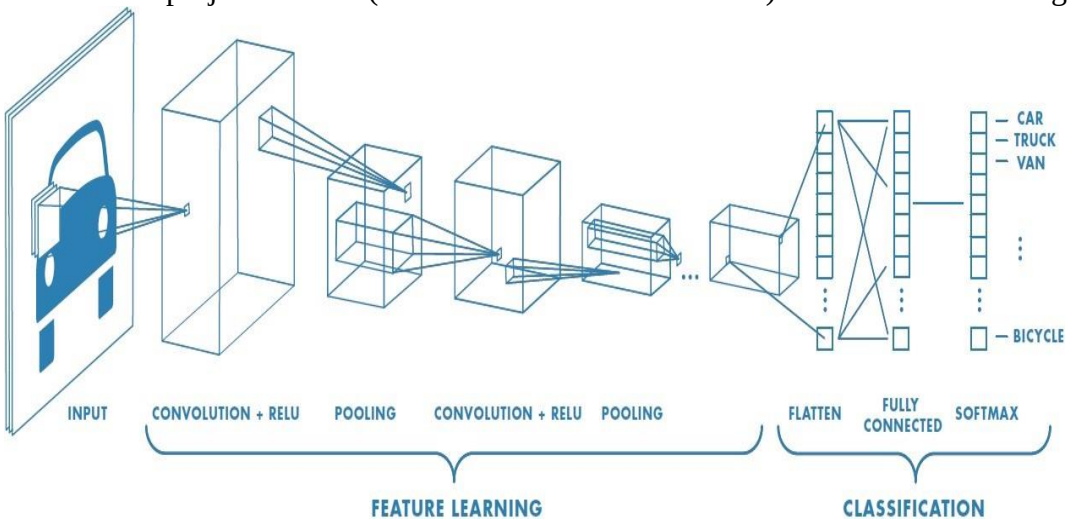

Fig.1 CNN Architecture

Convolution refers to the mathematical combination of two functions to produce a third function. In CNN, convolution is performed on input data with the use of Filter or Kernel then produce feature map. We use activation function to make output non-linear. Rectified Linear Unit for non-linear operations. It is used for hidden layers; f(x)=max(x,0). Fully Connected Layer: The layer we call as FC layer, we flattened our matrix into vector and feed it into a fully connected layer like a neural network which is shown in Fig.2. We have an activation function such as softmax or sigmoid to classify the outputs as cat, dog, car, truck etc,

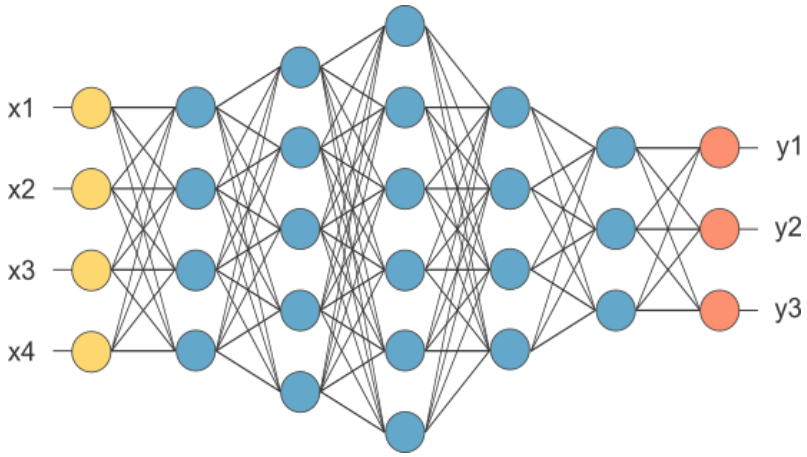

Fig.2 Fully Connected Layer

Steps involved in algorithm:

Step 1: Extraction of motorbikes from the surveillance video using YoloV3 Algorithm.

Step 2: Detection of helmet and triple riders using CNN-YoloV3

Step 3: Extraction of corresponding images with applied bounding boxes

Step 4: Recognition of number plate for respective motorcycles

Step 5: Viewing the output in an CSV folder.

IV. RESULTS AND DISCUSSION

Step 1: Extraction of motorbikes from surveillance video using YoloV3 Algorithm.

YOLOv3 is the latest variant of a popular object detection algorithm YOLO – You Only Look Once. The published model recognizes 80 different objects in images and videos, but most importantly it is super fast and nearly as accurate as Single Shot MultiBox (SSD). YOLO on the other hand approaches the object detection problem in a completely different way. It forwards the whole image only once through the network. SSD is another object detection algorithm that forwards the image once though a deep learning network, but YOLOv3 is much faster than SSD while achieving very comparable accuracy. YOLOv3 gives faster than realtime results on a M40, TitanX or 1080 Ti GPUs. For a given video frame the 80 classes are detected from which we extract only motorbikes for our project which is shown in Fig.3. Here we only considered only motorbikes by matching it with weights available in yolov3.weights file which is shown in Fig.4.

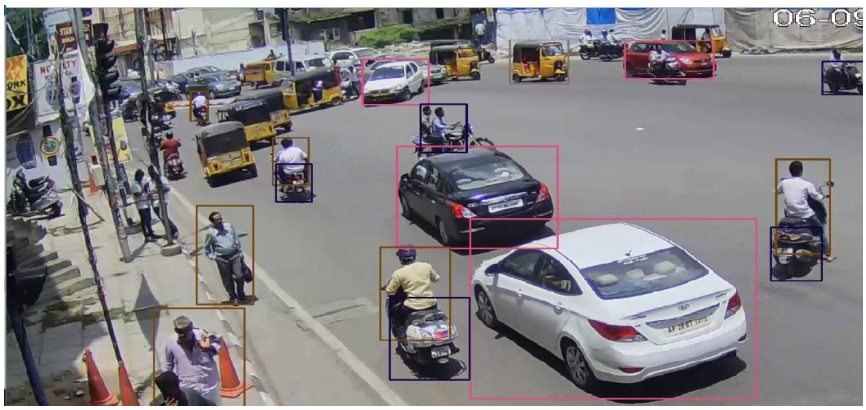

Fig.3 Extraction of motorbikes from surveillance video using YoloV3 Algorithm.

Step 2: Detection of helmet and triple riders using CNN-YoloV3

The YoloV3 consists of weights for the helmet and people in its yolov3.weights file. Once the cropped images of motorbikes are extracted we can then use these weights to identify the helmet violators and triple-riders by separating them from those who are wearing the helmets which is shown in Fig.5.

Fig. 4 Detection of helmet using CNN-YoloV3

Fig. 5 Detection of triple riding using CNN-YoloV3

Step 3: Extraction of corresponding images with applied bounding boxes which is shown in Fig. 6.

Fig.6 Extraction of corresponding images with applied bounding boxes

Step 4: Recognition of number plate for respective motorcycles: Conversion of RGB image into gray scale image which is shown in Fig. 7. Finding edges of the grayscale image by using canny,findContours. Create copy of original image to draw all contours by drawContours which is shown in Fig.8.

Fig.7 Conversion of RGB image into gray scale image

Fig.8 Finding edges of the grayscale image

Loop over our contours to find the best possible approximate contour of number plate and crop these contours and store it in cropped image folder which is shown in Fig.9. Final output is shown in Fig.10.

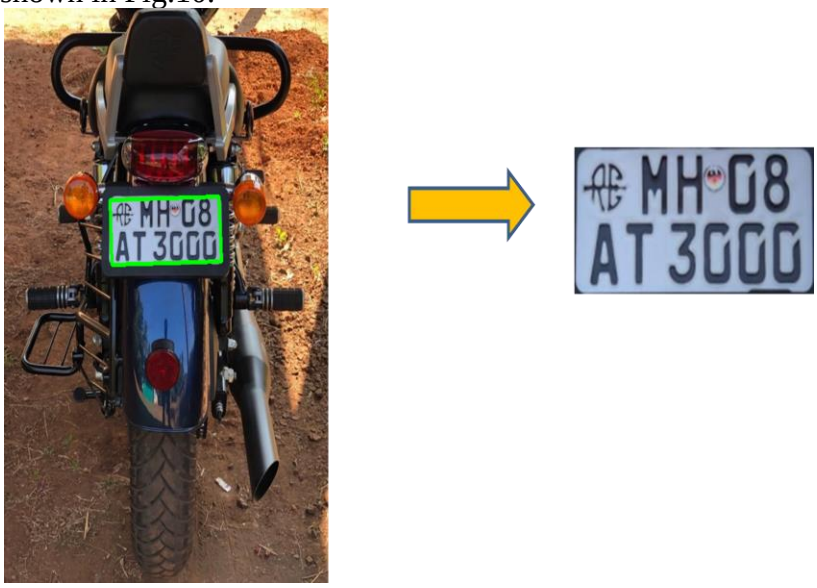

Fig.9 Loop over our contours to find the best possible approximate contour of number plate

Fig.10 Final Result

V. FUTURE SCOPE AND CONCLUSION

In this project we are trying to create a model that could detect bike rider in images or video feeds. The dataset that was used in this project was made and annotated so that the model could differentiate between image having bike rider or not. The proposed bike rider detector has been successfully trained by using Faster R- CNN learning methods on the sample vehicle datasets and the vehicle detection process has been successfully performed by the trained vehicle detector being tested on the test data set. In future, this model can be useful for project in which we detect a bike rider without helmet or Triple ride and recognize the licence plate of the bike so that e-challan could be generated.

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