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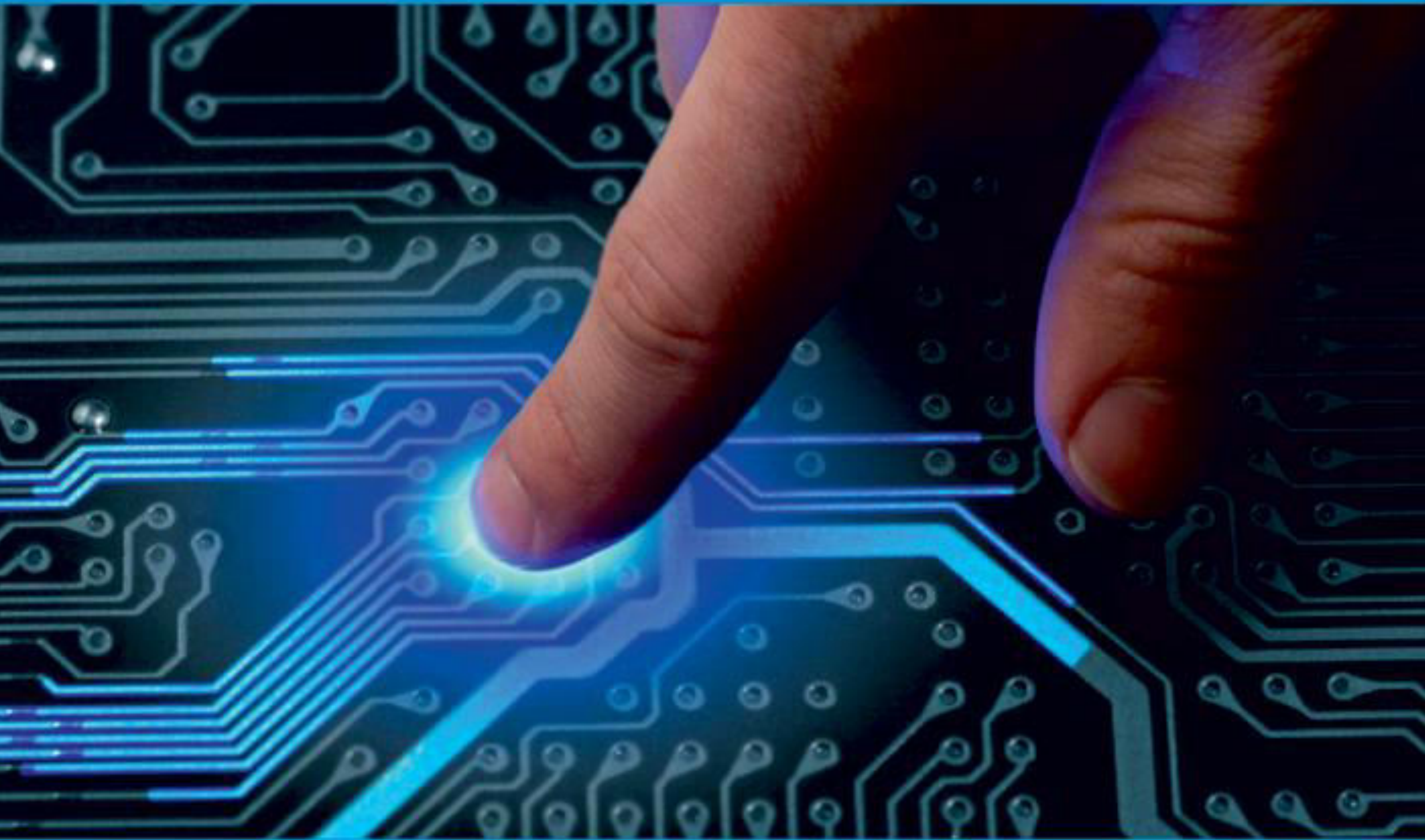

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Automated Helmet Detection and Fine Calculator

Santosh Ajitrao Korde[1], Vidya S Godbole[2], Prof Vivek Tanaji Patil[3]

Department of Computer Technology, Y.B.Patil Polytechnic, Akurdi, Pune, India[1,2]

Department of Computer Technology, D Y Patil International University, Akurdi, Pune, India[3]

ABSTRACT: Two-wheeler is the most popular modes of transport. Also, it is proved that one of every five bike riders who died on roads were not wearing helmet. This paper proposed a method for motorcycle detection and classification, helmet detection to detect and identify the motorcyclists without helmet and report it to concerned authorities. Support Vector Machine (SVM) is used for vehicle classification. For helmet detection, CNN algorithms are applied to extract the image attributes, and the SVM classifier is used to classify the objects. The email is sent to the helmet rule violators. The results are stored in the Database for further actions.
If there is any accident happen than there we alert will send to guardian. To detect accident we will be using accelerometer sensor.

I. INTRODUCTION

A helmet aims to reduce the risk of serious head and brain injuries by plummeting the impact of a force or collision to the head, motorcyclists must take extra precautions to protect their bodies. Riders and passengers wearing helmets increase their possibility of survival appreciably over non-helmet wearers. According to the law, every motorcyclist must wear a helmet while riding the motorcycle. But many bikers ignored and use their vehicle without defence apparatus. The policeman tried to control this problem manually but it is inadequate for the real state of affairs.

Recently helmets have been made mandatory, but still, people drive vehicles without helmets. The amount of deaths has been expanding every year, especially in developing countries as helmets are the main safety equipment for motorcycle drivers as well as passengers, but many drivers do not use them. Wearing a helmet is the most effective way to reduce head injuries and fatalities arising from motorcycle and bicycle accidents. This project also aims to address the critical issue of individuals being left without assistance in the event of an accident while riding their vehicle. With the implementation of an accident detection and alert system, this project seeks to provide a solution to this problem

II. LITERATURE SURVEY

'Helmet must for pillion riders in Karnataka from Jan 12'
Traffic cops will have to enforce the rule and a first-time offender will be fined Rs100. But a third-time offender may lose his/her driving license if the pillion rider does not wear a helmet. The rule is being implemented after the Supreme Court Committee of Road Safety directed the state to implement it at the earliest. This, was after TOI reported on the government deferring the rule on December 26. The committee notified the same to six states including Karnataka first on August 18, 2015, to implement the rule.[7]

"Safeguarding of motorcyclists through helmet recognition" The motorcycle is the most widely used vehicle in India. Fatalities due to road accidents in India are significantly high. Motorcycles being an obvious choice as a convenient transportation mode, ithas a major contribution to road accident casualties and injuries. Despite the Government traffic regulation, people still avoid using helmets. The impetuous or deliberate nature of people could be the reason for avoiding helmets. The proposed system is an effort to create awareness in society by endorsing the use of helmets and leading people to safety.[2]

"Automatic Detector for Bikers with no Helmet using Deep Learning" The success of digital image pattern recognition and feature extraction using a Convolution Neural Network (CNN) or Deep Learning was recently acknowledged over the years. Researchers have applied these techniques to many problems including traffic offense detection in video surveillance, especially for motorcycle riders who are not wearing a helmet. Several models of CNN were used to solve these kinds of problems but mostly required the image pre-processing step for extracting the Region of Interest (ROI) area in the image before applying CNN to classify helmets. In this paper, we proposed to apply another interesting method of deep learning called Single Shot Multi-Box Detector (SSD) to the helmet detection problem. This method is state-ofthe-art that can use only one single CNN network to detect the bounding box area of the motorcycle and rider

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and then classify whether the biker is wearing or not wearing a helmet at the same time. The results of the experiment were surprisingly good. The classification accuracy of bikers not wearing a helmet was extremely high and the detection of the ROI of the biker and motorcycle in the image can be done at the same time as the classification process.[4]

"I-Helmet: An intelligent motorcycle helmet for rear big truck/bus intimation and collision avoidance" We propose an intelligent motorcycle helmet, called I-Helmet, which integrates IR sensors with an image sensor and adopts the image recognition methodology to recognize rear big vehicles. Two detection modes (day/night) are designed for the purpose of image recognition accuracy. Experimental results showed that the proposed I-Helmet can successfully be achieved image recognition of the license plate for the rear big truck/bus. The recognition accuracy rate achieves about 70% (night) to 75% (day). Therefore, the proposed IHelmet can real-time provide related intimations for avoiding rear big truck/bus collisions.[5]

III. SYSTEM ARCHITECTURE

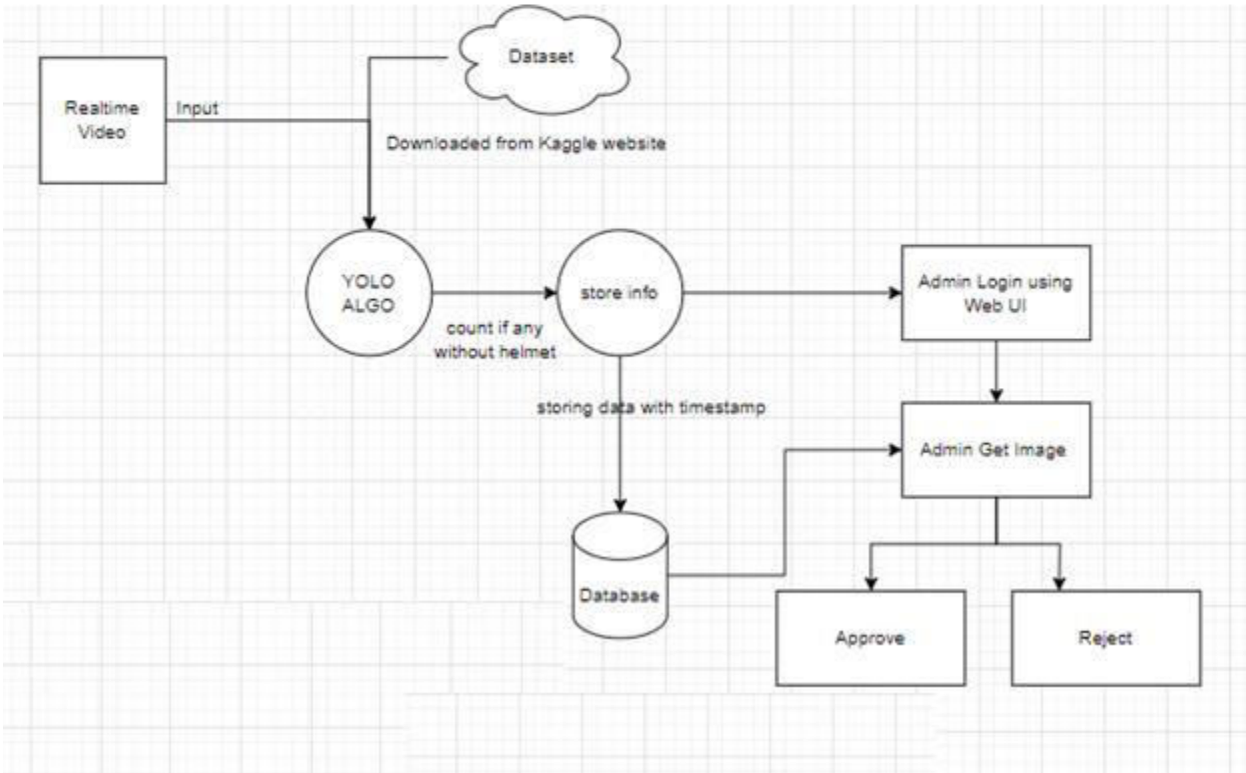

Fig 1. System Architecture

1. Start Realtime Video
2. Extract Image from Video convert them to gray scale
3. Detect if helmet is wear or not.
4. Use Yolo Algorithm to detect helmet
5. If helmet is not there send alert to owner over the email for cancelling license
6. Send Image of violation over the email

Yolo Algorithm:
1. The YOLO first divides the image into convolutions of size NxN like 13x13, and the size of each of the NxN cells depends on the size of the input.
2. Each cell of these NxN cells is responsible for predicting the number of bounding boxes in the input image
3. For every box in the input, the deconvolutional network predicts the confidence that the bounding box contains the object and the probability of the enclosed object being from one of the classes mentioned in the configuration file.
4. After that, it applies the Non-Max Suppression to remove the bounding boxes with less confidence value.
5. The processed images are subject to the Intersection over union function developed to find out the relation between the persons detected in the frame along with the motorbike. Thereby, marking the rectangular bounding box with

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helmet as the label.

IV. METHODOLOGY

Three phases are merged in the proposed vision-based framework. The first step is to create a suitable dataset for training our model, as there is none available off the shelf. Then does the data preprocessing, which is divided into three parts: data acquisition, data enhancement, and data annotation. The photographs acquired had high resolution, various angles, and different backgrounds to create a more realistic scenario. The collected images are expended through augmentation techniques in terms of scaling, dropping, and changing brightness to increase the diversity and richness of the experimental dataset. The next step after image augmentation is image annotation, which involves creating a boundary box surrounding the objects and its label that is helmet or no helmet. Following the augmentation and annotation, a dataset of 2480 images was generated, with 80% of the images being randomly selected for the training dataset and the remaining 20% for the testing collection.

During the training process, the image size will be reset, and the batch size will be fixed based on the memory constraints of the GPU. We will use the optimizer in the training, with the learning rate set to 0.001 and the other parameters remaining the same as they were in the YOLO model. The testing process will follow, during which a wide variety of images will be run through the proposed solution and results will be registered. A. Data Set The dataset consists of 2480 images of two classes 1. with helmet 2. without helmet B. Feature Extraction For training our custom object

detection model, we will need a lot of images of objects which we're going to train nearly a few thousand. Number of images is directly proportional to accurate precision. We first perform feature extraction to determine the distribution and mathematical characteristics of the dataset; then we build YOLOv3 on our pre-processed data for training to build our model to detect helmets on the camera. Based on the features of the dataset, we can obtain relevant information that will provide better support in building neural network training. For feature extraction, Calculation of the proportion of each target in the original image, calculate the average length of the target, calculate the average width, calculate the average area, calculate the average percentage of the target.Figure 1 shows the control flow diagram of Helmet Detection while capturing live feed. First of all, there will be a background subtraction from the extracted frame. The next stage would be that whether the output of first stage consists of a bike or not. If not then the process would be ended otherwise it will go to third stage i.e. the "Helmet Detection Module", Output of which would obviously our main concern

V. ALGORITHMS

In YOLO v3, the new association darknet-53 is used for incorporate extraction. There are 53 convolutional layers and 5 most limit pooling layers in the association structure. To keep away from over-fitting, a bundle normalization framework and a dropout movement are introduced after each convolutional layer. YOLO v3 improves target distinguishing proof accuracy by using a multi-scale incorporate blend computation to appraise the position and characterization on a multi-scale feature map. As far as possible encases YOLO v3, estimation bunches are used as before boxes. The k-infers approach is used to perform dimensional bundling on the goal encloses the dataset, achieving 9 priori boxes of various sizes that are reliably passed on among incorporate outlines of various scales. More unobtrusive concluded boxes are utilized for incorporate charts with a more noteworthy scale. Finally, the pack local area will be used to do security defensive cap wear recognizable. A. Architecture of YOLO v3 YOLO v3uses a variant of Darknet CNN architecture of Darknet has 53 layer network trained on Imagenet. In YOLO v3, the detection is done by applying 3x3 and 1 x 1 detection kernels on feature maps of three different sizes at three different places in the network. The output is a list of bounding boxes along with the recognized classes. Each bounding box is represented by 6 numbers (pc, bx, by, bh, bw, c). Finally, we do the IoU (Intersection over Union) and Non-Max Suppression to avoid selecting overlapping boxes. YOLO v3usesbinary cross- entropy for calculating the classification loss for each label while object confidence and class predictions are predicted through logistic regression. B. Hyper-parameters used Class_threshold- Defines probability threshold for the predicted object.

Non-Max suppression Threshold - It helps overcome the problem of detecting an object multiple times in an image. It does this by taking boxes with maximum probability and suppressing the close-by boxes with non-max probabilities (less than the predefined threshold).

input_height&input_shape - Image size to input. C. Training and Optimization The preparation information is parted into 8:2 with 8 sections for training and 2 sections for testing. As the camera situations are mind boggling and diverse

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camcorders have various goals, the full association layer is eliminated in YOLO v3, so the prepared model can be taken care of pictures of various scales. So, we focus harder on the most proficient method to distinguish the far off, little and unclear targets better. In the exploratory interaction, we tracked down that the YOLOv3 model has a decent reaction to the ID of "individual". Hence, right off the bat, the specialists in the video are distinguished and caught by utilizing the YOLO v3 model, and afterward certain and negative examples are made. Because of the low goal of the video, which is fluffy and difficult to recognize. Part of the information from the positive examples are haphazardly separated and fluffy handling is to recreate the little impact.

VI. CONCLUSION

This project aims to decrease the accidents caused due to not wearing a helmet, by sending a penalty message to the rider without a helmet. It also ensures whether the law is violated or not. It stores the image of the violated people. It is then sent through the mail to authorities. It will be helpful to reduce the work of Police Man, by detecting the person without helmets and sending a penalty message to those who violate traffic rules.

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