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A Review on Helmet Detection by Using Real Time Surveillance Video

Prof. K.S.Zanwar, Anushri Tayade, Sonal Helode, Vanita Lande, Shruti Deshmukh, Ashutosh Wakde

Department of Computer Science and Engineering, Mauli Group of Institutions and College of Engineering, Shegaon, India

ABSTRACT: A helmet aims to scale back the impact of a force or collision to the head by an accident, that reduces a chance of great head and brain injuries by dissipating the force and energy of the impact, motorcyclists must take extra precautions to guard their bodies. As the law mandatorily tells that, every motorcyclist must wear a helmet while riding a motorbike. Wearing a helmet over non helmet wearer increase their possibility of survival. But many bike riders used to ignores their safety and thus leading to the violation of RTO helmet rule as they drive vehicle without defense apparatus like a helmet. The policeman tried to manage this problem manually but it is inadequate for the real situations. Recently helmets are made mandatory, but still, people drive vehicles without helmets. Hence there is a desire for a closed-circuit television that's capable of detecting helmets and preventing the deaths. To unravel this problem a more sophisticated computer vision model that encompasses image processing, CNN, Faster-RNN, OCR (Optical character recognition), SSD (Single Shot multi-box Detector), YOLO (You Only Look Once), etc., frameworks are used for real-time detection of traffic rule violators who ride bikes without employing a helmet. The road CCTV footage is employed using Deep Learning and Image Processing technology to detect whether a rider is wearing a helmet or not. And thus it will detect riders without a helmet then the system is going to send an automatic notification to the rider using the number plate (Optical character recognition (OCR) used for number plate detection.) of that vehicle

KEYWORDS : Helmet Detection, OpenCV ,YOLO, SSD, CNN, faster R-CNN, OCR.

I. INTRODUCTION

Motorcycle accidents are growing consistently throughout the years. Wearing helmets is critical to decrease the danger of injuries during accidents. Here we propose an approach for programmed identification of bicycle riders without helmets and who are triple riding. Using the process of image recognition in digital image processing. Bike accidents without helmets are far more likely to result in death or brain trauma than ones where the riders' head was properly protected. In 2014, according to the Insurance Institute for Highway Safety, over 60% of deaths in bicycle crashes were people who were not wearing a helmet. Laws making helmet use compulsory are important in increasing the wearing of helmets, especially in low-income and middle-income countries where helmet-wearing rates are low, and where there are large numbers of users of motorized two-wheelers. There have been many studies that have evaluated the impact of motorcycle helmet laws on helmet-wearing rates, head injury or death. When mandatory helmet laws are enforced, helmet-wearing rates have been found to increase to 90% or higher; when such laws are repealed, wearing rates fall back to generally less than 60%. The primary aim of our project is regarding the safety of the motorcycle riders. Drivers without helmets are detected. Other benefits include; The Motor vehicle department is able to reduce the number of accidents, real time identification and punishment of defaulters is possible, software capability to detect the violation of rules, enforcement of law and order in society.

II. LITERATURE SURVEY

[1] Madhuchhanda Dasgupta, Oishila Bandyopadhyay, Sanjay Chatterji, Computer Science & Engineering IIIT Kalyani West Bengal, India," Automated Helmet Detection for Multiple Motorcycle Riders using CNN". The ability to continuously monitor vehicle compliance with traffic rules is an important component of any effecti.ve traffic management system. In India, motorcycles may be one of the most prominent modes of transportation due to the fact that there are many citizens in urban areas. It has been stated that most motorcyclists have abstained from use of head protection in city traffic or even in the roadway driving. Many studies have shown that using a helmet on motorcycles reduces the likelihood of head and brain injuries when one is involved in a collision. Most traffic and safety rules are

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now monitored by a traffic video surveillance camera system, which allows the rules to be observed by means of breach of today.

[2] Y Mohana Roopa, Sri Harshini Popuri, Gottam Gowtam sai Sankar, Tejesh Chandra Kuppili, Computer Science and Engineering Institute of Aeronautical Engineering, Hyderabad, India," Convolutional Neural Network-based Automatic Extraction and Fine Generation. . It had helped me to come up with a great idea Humanity, particularly as a human beings, possesses a characteristic tendencies such as these: seeing correlations between causes and effects, ignoring what is related, and neglecting what has little bearing on the occurrence, and also perceiving faults in things that are not present.

[3] Bhavin V Kakani, Divyang Gandhi, Sagar Jani, E&C Engineering Department Institute of Technology Nirma University," Improved OCR based Automatic Vehicle Number Plate Recognition using Features Trained Neural Network". A major portion of the current focus in intelligent transportation is on expanding algorithms and discoveries in the research and development realm. A significant improvement is necessary in traffic and parking/facility regulation, and traffic control with the use of a rapid, integrated and highly reliable automatic recognition plates reading system. This paper is intended to be the starting point of departure for a new OCR techniques that have enhanced the neural trained features for object recognition.

III. PROPOSE METHODOLOGY

The system is divided into four modules:

3.1 Motorcycle Detection
3.2 Head Detection
3.3 Helmet Detection
3.4 Number plate Detection
3.5 Proposed Algorithm

3.1 Motorcycle Detection

Motorcycle Detection Bike and helmet recognition from an image can be done using image processing. The difficulties confronted were the state of the bike within the picture, whether the bike is empty (no rider), the bike having rider, the spot of the traveler's head, and the differentiating evidence of the helmet at the head area of the bike rider. Various steps of image processing are used on the video images format before detecting the motorcyclist within the frame. Recently, deep learning algorithms such as CNN have been employed on helmet wear analysis. Because the faster R-CNN shoot up the recognition rate of vehicles, compared to other deep networks such as CNN, fast R-CNN, and YOLO. We can use faster R-CNN. For image capturing we use CCTV footage videos by dividing the video into different frames later we may detect objects using open-CV source python code(based on faster RCNN) and if the system detects the presence of a motorbike, it first checks whether it has a rider or not. Based on this the specified part from the frame and further checks are done.

3.2 Head Detection

Faster R-CNN with VGG-16 a pre-trained model can differentiate humans or objects like persons, horses, and chairs. Angle of depression like concept matters a most as it depends upon camera position, it gives human-head like appearances. With the assistance of Gabor-Wavelets filter, proves its robustness and ideality against changes in the scale, orientation and dazzle can also be used for finding out highlights showing the facial segments. It thus find outs the human head under various ecological conditions

3.3 Helmet Detection

CNN that exists now helpless to regulate the challenges in real-world for helmet wear analysis like helmet detection of motorcyclists, so better to go with a new one that is faster R-CNN. This is because to seek out a sturdy and perfect model in accuracy for classification. The step by step reorganization of people riding a motorbike or it's just an steady vehicle with no riders, the location of head of that rider, and the detection of a helmet at the head location have been examined. Overlapping area of bike rider at a certain point of time is examined and also a set of coordinates dynamically depends on the position of the bounding boxes that are created around the motorbike and rider. The

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detected motorcycles were first manually classified into the helmet and non-helmet classes for training the device by cropping the image using coordinates of bounding boxes these cropped images from the frames are motorbike person combinations. Image classification model allows pictures to pass through it for the detection of helmet and thus if it is not helmet then it saves the image in a directory else it is simply removed.

3.4 Number Plate

Detection Optical Character Recognition (OCR) is aimed towards the acknowledgement of the vehicle number. Line separation using the row segmentation have been performed. Later the line separation is applied for the columns to perform individual character separation. Different variables are accustomed store the separated characters. An alphanumeric database is taken into account like reference to compare with the OCR of every character.

3.5 Proposed Algorithm

Require: D as a dataset, μ as mean, N is total no. of the dataset Xi is an individual value, f as mantissa, e as a biased exponent, S as a sign bit, W & b as output parameters Input: Datasets Output: Probability

Step 1. Import or generate data D = {xn, yn} is a dataset
Step 2. Transformation and normalization of data by using concept called mean, standard deviation and float to integer

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

Where μ is mean, N is total no. of the dataset, xi is an individual value (1 - 2s) x (1 + f) × 2 e s is the sign bit (0 or1), f is the mantissa and e is the biased exponent
Step 3. Set the Parameters W and b as TensorFlow variabl for result Step 4. Built Computation Graph by initializing weight and biases
Step 5. Declare Keras as Loss Function
Step 6. Initializing and Training Model to better predict our data as a outputs
Step 7. Evaluate the Model //Testing Phase
Step 8. Predict Outcomes & Declare Result
Step 9. End

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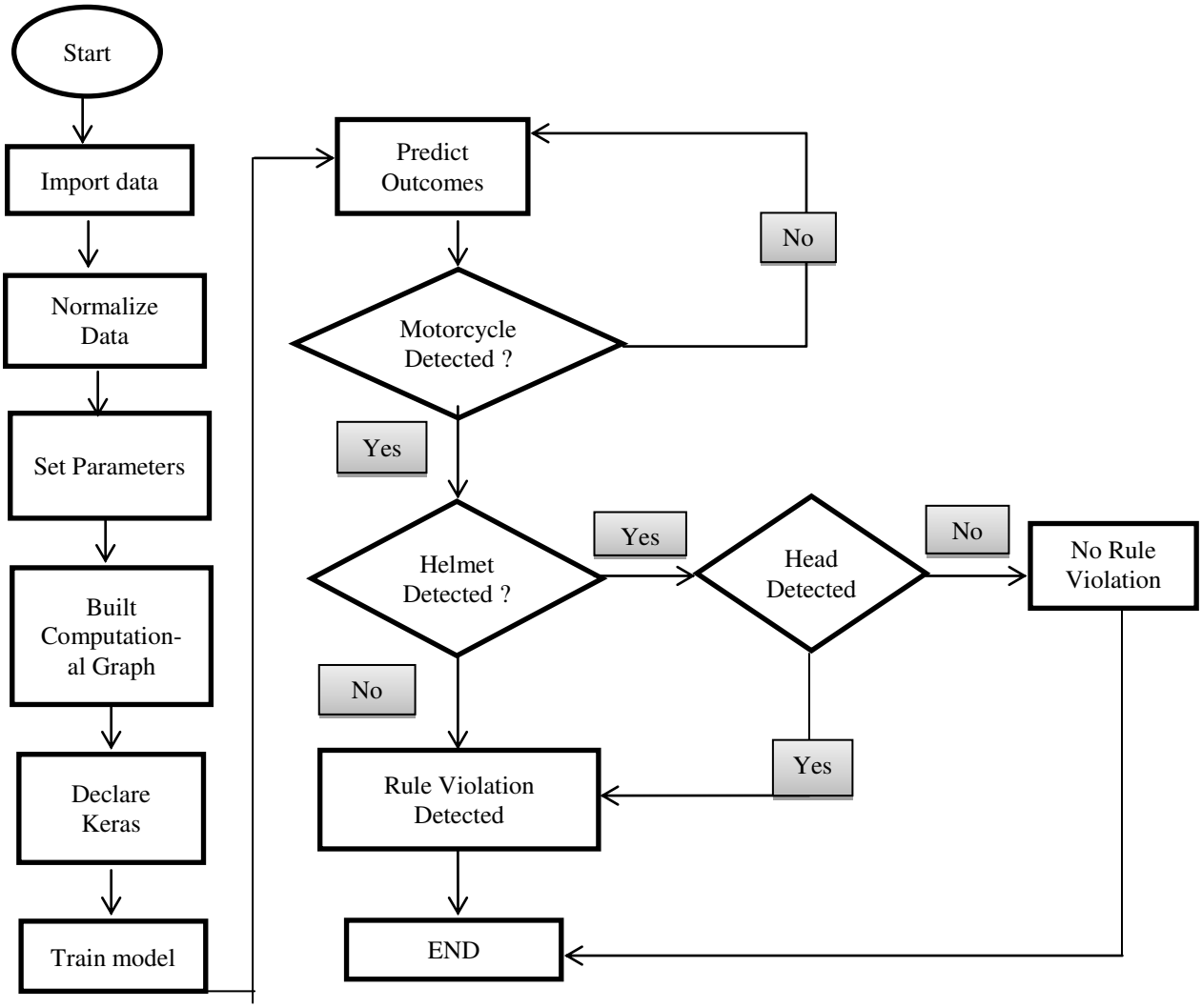
FLOWCHART:



1. ADVANTAGES

1. Reduce Human Works.
2. If we use helmet it increases of survival by 42%, it also reduces the injuries up to 70%.
3. It will help to create awareness about the need to wear helmet during motorcycle riding.
4. It will help to reduce the number of road accident which are very frequent in a country like India.

IV. CONCLUSION

Motorcycle accidents have been growing consistently throughout the years. Because of different social and monetary elements, individuals pick motorbikes over other vehicles as it is significantly less expensive to run, less demanding to park and adaptable in rush hour gridlock. Here we propose a system to detect motorcycle riders without helmet and sending a message to the motorcycle owner if he/she is not wearing the helmet. This system can save many lives as about 400 motorcycle riders perish every day in India because of not wearing helmet. If we use helmets it could increase the chances of survival by 42 percent. It also reduces the injuries up to 70 percent. In future, the system can be expanded by detecting motorcycle riders without helmet along with those who are triple riding. The proposed system will also assist the traffic police for such violators in odd environmental conditions like hot sun, rain etc.

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V. FUTURE SCOPE

The system implemented is a prototype. It can be expanded to process the day-to-day traffic video by attaining the permissions of the required authorities. A large database is created to maintain the records of the violators and their payment of the challans being monitored every few minutes. Also, the identification of the license plate becomes the core part of this project. So, a camera of high resolution is recommended to maintain precision and accuracy. For sending the challan directly to offender's mobile numbers, the subscriptions for SMS are required, as of now it is sent through mail ids, but the motto to send the challan to their mails as well as through SMS along with their violation photo, time and date. Our system is developed to process the above-mentioned future implementations.

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