Research Article

Detection of Non-Helmet Riders and Triple riders

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ABSTRACT

It is difficult to enforce traffic regulations in India due to the country's large population. Despite the clear risks, many motorcyclists still opt out of wearing helmets. It takes a lot of time for the traffic police to monitor all the vehicles on the road. Many of the busier areas have installed cctvs for added security. The infrastructure to expedite the surveillance and monitoring of motorcyclists already exists. The authors of this investigation suggest a method for tracking down the VIN of every motorcycle being operated by an unprotected rider and for identifying those who are tripling up without helmets. The YOLO (You Only Look Once) method is used to determine the identity of the rider, the helmet, and the bike. Based on the COCO dataset, YOLO can distinguish between 80 distinct classes. YOLO was trained using data from sources such as pictures of helmets and licence plate information. The results from using this method are superb.

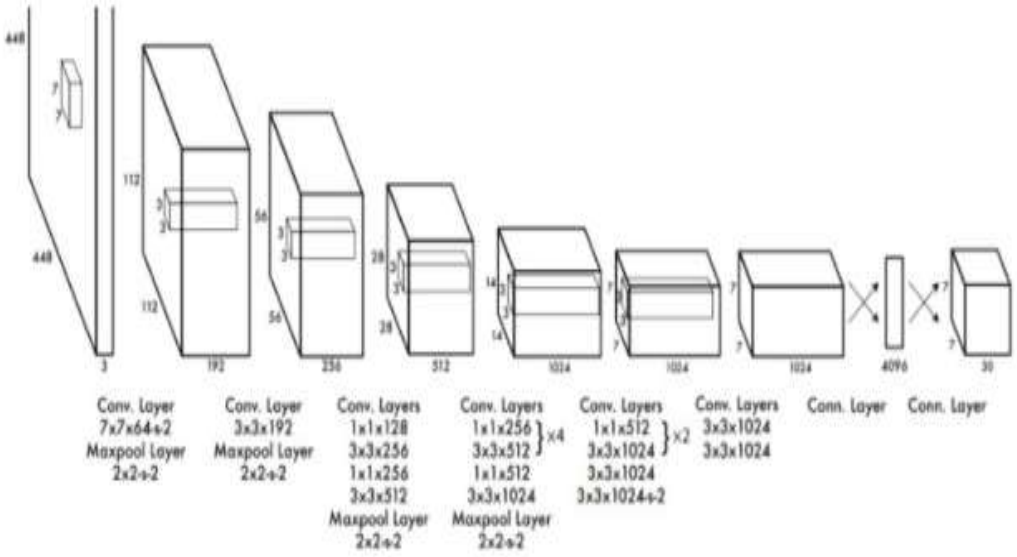
1. INTRODUCTION

According to the globe Health Organization's "The Global Status Report on Road Safety 2018," some 1.35 million people are killed and 50 million are injured in road accidents every year throughout the globe. It's hard to get one's head around the fact that motorcyclists, bicyclists, and pedestrians all have to carry the same load. This research suggests that a comprehensive strategy is required to save lives. The number of people killed in road accidents in India is the highest of any country. Several authorities say this is due to people's carelessness for their own safety when driving a car as a consequence of rising urbanisation. India signed the Brasilia Declaration on Road Safety in 2015, committing to halving the number of road fatalities by the year 2020. The amount of deaths that occur on India's roads must be reduced, but this cannot happen unless the underlying problems are addressed. In the event of a collision, the rider of a motorbike or scooter is often thrown from the vehicle due to the impact and subsequent quick deceleration. When something strikes a person's head, the head stops moving but the brain keeps going till the object reaches the brain. In extreme circumstances, this form of brain injury might be fatal. Helmets are essential in these circumstances because they prevent head trauma. With a helmet, there is far less of a chance that your skull may decelerate, therefore your head will hardly move at all. The helmet's internal cushion absorbs the force of a collision, allowing the wearer's head to come to a stop. By spreading the impact's force across a larger area, it helps prevent significant head trauma. A full helmet not only protects the rider's head from impact, but also acts as a mechanical barrier between the rider's head and whatever the rider may have

collided with. The purpose of having traffic laws is to keep the peace and prevent chaos as well as injuries, deaths, and property damage. However, in actual use, this standard is seldom adhered to. Therefore, it is essential to find workable answers to these problems. Manual traffic monitoring using closed-circuit television cameras is one current option. There are a lot of iterations before success, thus a lot of people will need to be involved. Because of the sheer number of vehicles and pedestrians in major cities, manual helmet recognition is just not feasible. In this study, we offer a method for doing just that by combining yolov2, yolov3, and optical character recognition to pick out licence plates from within helmets.

If the rider is not wearing a helmet, the system will gather datasets, recognise moving things, remove the background, and categorise the items using neural networks. Extracting and labelling moving objects was the focus of rattapoomwaranusast et al. [2], where a KNN classifier was used.

The status of a helmet is assigned to a head based on a number of features extracted from the divided crown. It's possible that adaptive background subtraction (ABS) may detect things in motion [13]. The vibe approach [15] for simulating backgrounds may also be used to detect moving things. [19]. The Canny edge detection approach (Ref. 21) is used to create a segmentation of the moving objects. Romuere Silva et al. [3], [17] introduced a method for feature extraction using LBP-based hybrid descriptors, HOG, and Hough transform descriptors. The authors of Xinhua Jiang [8] employed a grey level co-occurrence matrix and LBP to extract features. Objects may be identified and placed into relevant categories with the use of datasets like yolov2 and COCO. Audience members include those who ride motorcycles, people who walk, and people who work in the motorcycle industry. Colour may be used to distinguish between different types of motorbike helmets and tyres [6]. Kunal Dahiya et al. [9] used techniques like background removal and object segmentation to single out the cyclist. A number of other people [13][24] also utilised CNN to specifically look for motorcyclists. Wearing helmets is a crucial measure for protection on building sites. HOG [7] might be used here. In the case of an accident, preventative measures might include technologies like automatic fall detection, backdrop removal, and optical character recognition (OCR) [10]. Two-wheeler accident detection using a microcontroller and an accelerometer was developed by Shoeb Ahmed Shabbeer et al. [12]. Most people hurt in automobile accidents are pedestrians, therefore protecting them is paramount. An SVM method (HOG) for categorising pedestrians was developed by Jie Li et al. [15] using histograms of directed gradient data. The last step is headgear recognition. Colour and circular Hough transforms are used for helmet recognition. It is possible to identify helmets using HOG descriptors [22]. One alternative is to use feature-based colour recognition [15]. Kang Li et al. [19] employed color-space transformation and color-feature discrimination to recognise a helmet. Back-Propagation artificial neural network and GLCM statistical features are utilised to improve helmet identification [8]. Romuere Silva et al. Created a multi-layer perception classifier to identify motorcyclists without helmets.



Pathasudoungmala et al. [11] employed Haar-like properties to differentiate between a full and no helmet, and circular hough transforms to differentiate between a half and no helmet. To improve helmet detection's precision, we use the principal component analysis technique [14]. Open Automatic Licence Plate Reader (ALPR)[20], [18], [16] has been used to read licence plates and extract their contents. OCR, mobilenets, and Inception-v3 are a few more methods.

2. LITERATURE SURVEY

According to the globe Health Organization's "The Global Status Report on Road Safety 2018," some 1.35 million people are killed and 50 million are injured in road accidents every year throughout the globe. It's hard to get one's head around the fact that motorcyclists, bicyclists, and pedestrians all have to carry the same load. This research suggests that a comprehensive strategy is required to save lives. The number of people killed in road accidents in India is the highest of any country. Several authorities say this is due to people's carelessness for their own safety when driving a car as a consequence of rising urbanisation. India signed the Brasilia Declaration on Road Safety in 2015, committing to halving the number of road fatalities by the year 2020. The amount of deaths that occur on India's roads must be reduced, but this cannot happen unless the underlying problems are addressed. In the event of a collision, the rider of a motorbike or scooter is often thrown from the vehicle due to the impact and subsequent quick deceleration. When something strikes a person's head, the head stops moving but the brain keeps going till the object reaches the brain. In extreme circumstances, this form of brain injury might be fatal. Helmets are essential in these circumstances because they prevent head trauma. With a helmet, there is far less of a chance that your skull may decelerate, therefore your head will hardly move at all. The helmet's internal cushion absorbs the force of a collision, allowing the wearer's head to come to a stop. By spreading the impact's force across a larger area, it helps prevent significant head trauma. A full helmet not only protects the rider's head from impact, but also acts as a mechanical barrier between the rider's head and whatever the rider may have collided with. The purpose of having traffic laws is to keep the peace and

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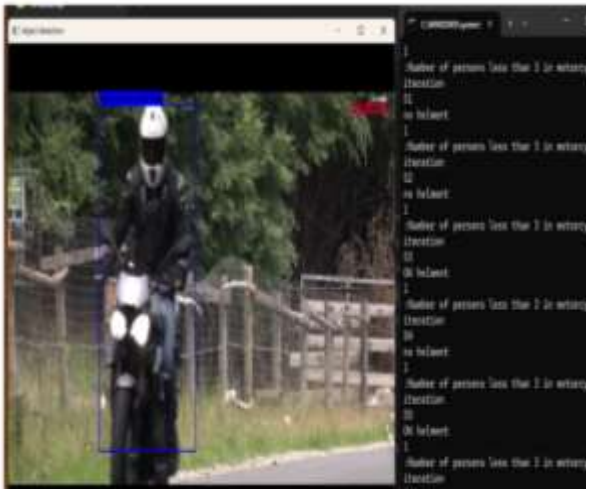
3. SYSTEM DESIGN

As it is, traffic offences are mostly monitored by CCTV footage, which require traffic police to peek into the frame where the violation is occurring and, if the rider is not wearing a helmet, zoom into the licence plate. However, this calls for a significant investment of time and resources, since traffic offences are common and the number of motorcyclists grows daily. What if there was a way for a computer to determine whether or not a motorcyclist was breaking the law by failing to wear a helmet and then, if they were, to get the vehicle's registration information for them? Recent studies have accomplished this using cnns, R-cnns, lbps, hogs, haarfeatures, etc. However, the speed and accuracy of object identification and categorization are severely constrained by these works. This study's research aims to automate the processes of identifying the traffic infraction of not wearing a helmet and retrieving the number plate number of the offending cars. The core idea is a three-tiered approach to object detection using Deep Learning.More significantly, it prevents the rider's head from coming into direct contact with whatever surface they hit. If a high-quality complete helmet is used, head trauma may be kept to a minimum. Discipline fostered by following traffic regulations helps keep people safe on the road and reduces the likelihood of tragedy. However, in practise, there is no observance of these regulations. Therefore, practical and effective methods for solving these issues need to be developed. Traffic may already be monitored manually using CCTV

4. METHODOLOGY

The aforementioned method consists of two stages. Bikers have their helmets and ability to ride a triple examined beforehand. Second, using licence plate readers to identify motorcycle riders who haven't taken precautions. The yolov4 Darknet model for object detection is used in both parts and is implemented in exactly the same way. Both systems use images as input and can evaluate both still and moving pictures

5. Results



6. CONCLUSION

This research shows that bicyclists, with or without helmets, may be identified using their licence plates. The average accuracy for identifying helmets is 85.77%, whereas it is 77.33% for licence plate recognition and 67.11% for recognising triple riding. The model employs the CNN-based yolov4 algorithm for both helmet and licence plate identification. Yolov4 has a respectable level of detection performance and accuracy. The biker's licence plate was recovered when they discovered he or she had not been wearing a helmet. The accuracy of the algorithm may be improved by increasing the size of the dataset. More images taken in a wide range of conditions should be added to the archive to boost the recognition rate. The data source utilised for the work contains both bicycle and automotive number plates, which may lead to inaccurate number plate recognition. Licence plate recognition might benefit from more motorbike licence plate images. Using and contrasting several approaches may provide the best results.

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