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Number Plate And Helment Detection Using CNN and Deep Learning

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ABSTRACT:

Nowadays, road accidents are one of the major causes that leads to human death. Among them, motor bike accidents are common and causes critical injuries. Helmet is one of the main protection unit for a motor bicyclist. However, many fail to conform to the law of wearing helmet. Here, to detect the motorcyclists who are violating the helmet laws, a system using image processing and convolutional neural network is implemented. The system consist of motorbike detection , helmet vs no helmet classification and motorbike licence plate recognition. The motorbikes are detected using the feature vector HOG. Once the motorbike is detected, by means of convolutional neural network, it is determined whether the motorcyclist is wearing a helmet or not. If the motorcyclist is identified without helmet, then the license plate of the motorcycle is detected using tesseract OCR.

Key words: GBM, boosting algorithm, Heart performance.

I INTRODUCTION

The main safety equipment of motorcyclist is the helmet. The helmet protects the motorcyclist against accidents. Although the helmet use is mandatory in many countries, there are motorcyclists that do not use it or use it incorrectly. Over the past years many works have been carried out in traffic analysis, including vehicle detection and classification, and helmet detection. Intelligent traffic systems were implemented using computer vision algorithms, such as: background and foreground image detection to segment the moving

ISSN : 2057-5688

objects in scene and image descriptors to extract features. Computational intelligence algorithms are used too, like machine learning algorithms to classify the objects. Machine learning (ML) is the field of Artificial Intelligence in which a trained model works on its own using the inputs given during training period. Machine learning algorithms build a mathematical model of sample data, known as "training data", in order to make predictions or decisions and are also used in the applications of object detection. Therefore, by training with a specific dataset, a Helmet detection model can be implemented. Using this helmet detection model helmet-less riders can be easily detected. Based one the detected classes the license plate of the rider is cropped out and saved as an image. This image is given to an Optical Character Recognition (OCR) model which recognizes the text and gives the License Plate number as output in the form of Machine encoded text. And it can also be implemented in real time using a Webcam. The objective of this paper is to develop a system to enforce helmet wearing with the help of CCTV cameras. The developed system aims in changing unsafe behaviors and consequently reducing the number of accidents and its severity.

II EXISTING SYSTEM

Over the past years, multiple approaches have been proposed to solve the problem of helmet detection. The authors in [7] use a background subtraction method to detect and differentiate between moving vehicles. And they used Support Vector Machines (SVM) to classify helmets and human heads without helmets. Silva et al. in [9] proposed a hybrid descriptor model based on geometric shape and texture features to detect motorcyclists without helmet automatically. They used Hough transform with SVM to detect the head of the motorcyclist. Additionally, they extend their work in [10] by

ISSN : 2057-5688

multi-layer perception model for classification of various objects.

Wen et al. [10b] uses a circle arc detection method based upon the Hough transform. They applied it to detect helmet on the surveillance system. The drawback of this work is that they only use geometric features to verify if any safety helmet exists in the set. Geometric features are not enough to find helmets. In [11b] it proposes a computer vision system aiming to detect and segment motorcycles partly. A helmet detection system is used, and the helmet presence verifies that there is a motorcycle. In order to detect the helmet presence, the edges are computed on the possible helmet region. The Canny edge detector [12b] is used.

III PROPOSED SYSTEM

Machine learning (ML) is the field of Artificial Intelligence in which a trained model works on its own using the inputs given during training period. Machine learning algorithms build a mathematical model of sample data, known as "training data", in order to make predictions or decisions and are also used in the applications of object detection. Therefore, by training with a specific dataset, a Helmet detection model can be implemented. Using this helmet detection model helmet-less riders can be easily detected. Based one the detected classes the license plate of the rider is cropped out and saved as an image. This image is given to an Optical Character Recognition (OCR) model which recognizes the text and gives the License Plate number as output in the form of Machine encoded text. And it can also be implemented in real time using a Webcam.

The objective of this paper is to develop a system to enforce helmet wearing with the help of CCTV cameras. The developed system aims in changing unsafe behaviors and consequently reducing the number of accidents and its severity.

For real-time helmet detection, there is a need for accuracy and speed. Hence a DNN based model You Only Look Once (YOLO) was chosen. YOLO is a state-of-the-art, real-time object detection system. YOLOv3 is extremely fast and accurate and is a huge improvement over the previous YOLO versions. It also makes predictions with a single network evaluation unlike systems like R-CNN which require thousands for a single image. This makes it extremely fast, more than 1000x faster than R-CNN and 100x faster than Fast R-CNN [4].

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Object detection is the craft of detecting instances of a certain class, like animals, humans and many more in an image or video. The Pre-Existing Object Detection API makes it easy to detect objects by using pretrained object detection models. But these models detect several Objects which are of no use to us, therefore in order to detect the necessary classes a custom object detector becomes necessary. In order to implement helmet detection and number plate recognition and extraction, 5 objects need to be detected. The objects are – Helmet, No Helmet, Motorbike, Person (sitting on the bike) and License Plate. There is a need to create a custom object detection model that is capable of detecting these objects. A collection of images containing the objects of the classes to be detected are used as a Dataset. This dataset is then used to train the custom model. Once the model has been trained, it can be used to detect these custom objects.

IV METHODOLOGY

DATA SET:

The model was trained on tiny YOLOv3 for 11,000 images on 5 classes for 50,000 iterations. The detections of all the objects classes was obtained with high precision value and the mean average precision (mAP) reached a constant max value of 75% hence the training was stopped at 50,000 iterations.

HELMET DETECTION

The annotated images are given as input to YOLOv3 model to train for the custom classes. The weights generated after training are used to load the model. Once this is done, an image is given as input. The model detects all the five classes trained. From this we obtain the information regarding person riding motorbike. If the person is not wearing a helmet, then we can easily extract the other class information of the rider. This can be used to extract the license plate.

LICENSE PLATE EXTRACTION

Once the helmetless rider is detected, the associated person class is detected. This is done by finding whether the coordinates of the no helmet class lie inside the person class or not. Similarly, the same steps are followed to detect the associated motorbike and license plate. Once the coordinates of the License plate are found, it is cropped and saved as a new image.

LICENSE PLATE RECOGNITION

The extracted license plate is given to an Optical Character Recognition (OCR) model. The OCR recognizes

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text in the given image and outputs the recognized strings in the machine-encoded text. The OCR module within will output a list of predicted license plate numbers along with a confidence value. The confidence value indicates how confident it is in recognizing the given license plateaccurately. Then, the license plate recognized with highest confidence value is stored in a text file for further use.

Fig.4.1. Detection system.

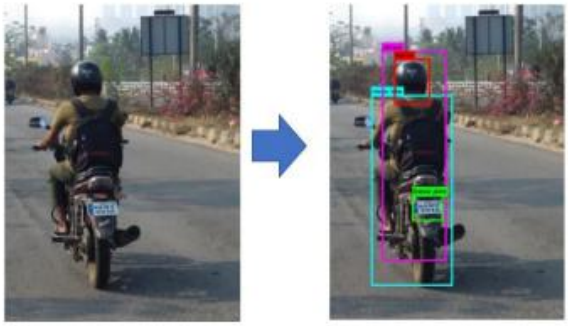

Fig.4.2. Helmet detection system.

V CONCLUSION

From the results shown above it is evident that the YOLO object detection is well suited for real-time processing and was able to accurately classify and localize all the object classes. The proposed end-to-end model was developed successfully and has all the capabilities to be automated and deployed for monitoring. For extracting the number plates some techniques are employed by considering different cases such as multiple riders without helmets and designed to handle most of the cases. All the libraries and software used in our project are open source and hence is very flexible and cost efficient. The project was mainly built to solve the problem of non-efficient traffic management. Hence at the end of it we can say that if deployed by any traffic management departments, it would make their job easier and more efficient.

REFERENCES

[1] Viola and Jones, “Robust Real-time Object Detection”, IJCV 2001.

[2] Navneet Dalal and Bill Triggs, “Histogram of oriented gradients for human detection”.

[3] Ross, Jeff, Trevor and Jitendra “Rich feature Hierarchy for Accurate object Detection”.

[4] Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun, “Fast R-CNN”

ISSN : 2057-5688

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[5] Joseph Redmon, Ali Farhadi, "YOLO9000: Better, Faster, Stronger", University of Washington, Allen Institute Of AI.

[6] Joseph Redmon, Ali Farhadi, "YOLOv3: An Incremental Improvement", University of Washington, Allen Institute of AI.

[6] Wei Liu, Dragomir Anguelov, Dumitru Erhan, Christian Szegedy, Scott Reed, Cheng – Yang Fu, Alexander C. Berg, "SSD: Single Shot MultiBox Detector".

[7] A. Adam, E. Rivlin, I. Shimshoni, and D. Reinitz, "Robust real-time unusual event detection using multiple fixedlocation monitors," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 30, no. 3, pp. 555–560, March 2008.

[8] AlexeyAB, https://github.com/AlexeyAB/darknet #requirements.

[9] C.-Y. Wen, S.-H. Chiu, J.-J. Liaw, and C.-P. Lu, "The safety helmet detection for atm's surveillance system via the modified hough transform," in IEEE 37th Annual International Carnahan Conference on Security Technology., 2003, pp. 364–369.

[10] C.-C. Chiu, M.-Y. Ku, and H.-T. Chen, "Motorcycle detection and tracking system with occlusion segmentation," in WIAMIS '07, USA, 2007

[11] A. Hirota, N. H. Tiep, L. Van Khanh, and N. Oka, Classifying Helmeted and Non-helmeted Motorcyclists. Cham: Springer International Publishing, 2017, pp. 81–86.