IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, June 2022
Impact Factor: 6.252

Helmet Detection using Machine Learning and Automatic License Plate Recognition

Prof. Rahul Bambodkar, Kundankumar Rahangdale, Shejal Vilas Dhenge, Nachiket Vijay Gondane
J D College Of Engineering and Management, Nagpur, Maharashtra, India

Abstract: *Bike mishaps have been quickly developing during that time in numerous nations. In India in excess of 37 million individuals utilize bikes. Subsequently, it is important to foster a framework for programmed location of protective cap wearing for street wellbeing. Subsequently, a custom item location model is made utilizing a Machine learning based calculation which can recognize Motorcycle riders. On the location of a Helmetless rider, the License Plate is separated and the License Plate number is perceived utilizing an Optical Character Recognizer. This Application can be executed continuously involving a Webcam or a CCTV as info.*

Keywords: Automatic License Plate Recognition (ALPR), Deep Neural Network (DNN), Helmet Detection, Machine Learning, Mean Average Precision (mAP), Optical Character Recognition (OCR), You Only Look Once (YOLO).

I. INTRODUCTION

The primary security hardware of motorcyclists is the head protector. The head protector safeguards the motorcyclist against mishaps. Despite the fact that cap use is obligatory in numerous nations, there are motorcyclists that don't utilize it or use it mistakenly. Over the course of the last years many works have been completed in rush hour gridlock examination, including vehicle location and arrangement, and cap recognition. Wise traffic frameworks were carried out utilizing PC vision calculations, for example, foundation and closer view picture identification to fragment the moving items in scene and picture descriptors to extricate highlights. Computational insight calculations are utilized as well, similar to AI calculations to arrange the items. AI (ML) is the field of Artificial Intelligence wherein a prepared model deals with its own utilizing the information sources given during the preparation time frame.

AI calculations construct a numerical model of test information, known as "preparing information", to go with expectations or choices and are likewise utilized in the uses of item discovery. Consequently, via preparing with a particular dataset, a Helmet discovery model can be carried out. Utilizing this cap discovery model protective cap less riders can be effortlessly identified.

Based one the distinguished classes the tag of the rider is trimmed out and saved as a picture. This picture is given to an Optical Character Recognition (OCR) model which perceives the text and gives the License Plate number as result as Machine encoded text. Furthermore, it can likewise be executed progressively utilizing a Webcam.

The goal of this paper is to foster a framework to implement head protector wearing with the assistance of CCTV cameras. The created framework points in changing hazardous ways of behaving and thus lessening the quantity of mishaps and its seriousness.

II. RELATED WORK

Over the course of the last few years, different methodologies have been proposed to tackle the issue of head protector recognition. The creators in [7] utilize a foundation deduction technique to distinguish and separate between moving vehicles. What's more, they utilized Support Vector Machines (SVM) to group protective caps and human heads without protective caps. Silva et al. in [9] proposed a half breed descriptor model in view of mathematical shape and surface elements to naturally distinguish motorcyclists without head protectors. They utilized Hough change with SVM to recognize the top of the motorcyclist. Moreover, they expand their work in [10] by multi-facet discernment model for characterization of different items.

Wen et al. [10b] utilizes a circle bend location technique in light of the Hough change. They applied it to the recognition cap on the reconnaissance framework. The disadvantage of this work is that they possibly utilize mathematical elements

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to check assuming any security protective cap exists in the set. Mathematical highlights are adequately not to track down protective caps. In [11b] it proposes a PC vision framework planning to somewhat distinguish and portion bikes. A cap identification framework is utilized, and the head protector presence checks that there is a bike. To identify the cap presence, the edges are figured on the conceivable cap district. The Canny edge locator [12b] is utilized. Waranusat et al. [11] proposed a framework to identify moving items utilizing a k-NN classifier over the motorcyclist's head to order cap. These models were proposed in light of measurable data of pictures and had an impediment to the degree of precision that could be accomplished.

With the development of brain organizations and profound learning models there was further improvement in the exactness of characterization. Alex et al. [13] presented a convolutional brain organization (CNN) based strategy for object order and discovery. A. Hirota et al. [12] utilize a CNN for grouping of helmeted and non-helmeted riders. Despite the fact that they use CNN, their head protector identification precision is poor with constraints to cap tone and numerous riders on a solitary motorcyclist.

III. PROBLEM STATEMENT AND OBJECTIVE

3.1 Problem Statement

At present, the situation is that in the event that the patient is experiencing any side effects, he/she should visit the specialist or clinic to analyze the sickness. In any case, our primary goal is to lessen the time taken by patients to analyze the illness. Numerous patients are losing their lives simply because of the late determination of their infection. So our fundamental point is to decrease such passings. Utilizing Happy Healthing, the client can tackle the issue and can find out about the infections they are experiencing.

3.2 Flow Chart

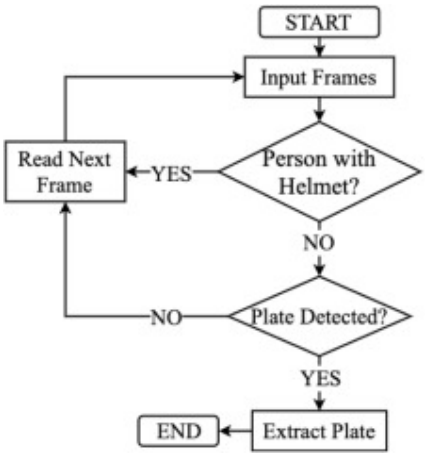

Fig 1

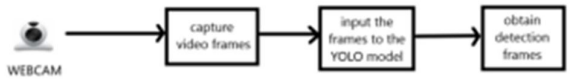

Fig 2

IV. PROPOSED WORK

For continuous protective cap recognition, there is a requirement for exactness and speed. Thus a DNN based model You Only Look Once (YOLO) was picked. Consequences be damned is a cutting edge constant item recognition framework. YOLOv3 is incredibly quick and exact and is a gigantic improvement over the past YOLO variants. It additionally makes expectations with a solitary organization assessment dissimilar to frameworks like R-CNN which require thousands for

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a solitary picture. This makes it very quick, more than 1000x quicker than R-CNN and 100x quicker than Fast R-CNN [4].

Object discovery is the art of distinguishing examples of a specific class, similar to creatures, people and a lot more in a picture or video. The Pre-Existing Object Detection API makes it simple to distinguish objects by utilizing pretrained object discovery models.

In any case, these models identify a few objects which are of no use to us, in this way to recognize the fundamental classes a custom item locator becomes essential. To carry out head protector location and number plate acknowledgment and extraction, 5 articles should be distinguished. The items are - Helmet, No Helmet, Motorbike, Person (sitting on the bicycle) and License Plate.

There is a need to make a custom item identification model that is equipped for recognizing these items. An assortment of pictures containing the objects of the classes to be identified are utilized as a Dataset. This dataset is then used to prepare the custom model. When the model has been prepared, recognizing these custom objects can be utilized.

- **Helmet Detection:** The clarified pictures are given as a contribution to the YOLOv3 model to prepare for the custom classes. The loads created subsequent to preparing are utilized to stack the model. Whenever this is finished, a picture is given as information. The model recognizes every one of the five classes prepared. From this we get the data with respect to individual riding motorbikes. In the event that the individual isn't wearing a cap, then, at that point, we can without much of a stretch concentrate the other class data of the rider. This can be utilized to separate the tag.
- **License Plate Extraction:** When the helmetless rider is distinguished, the related individual class is identified. This is finished by finding whether the directions of the no head protector class lie inside the individual class or not. Essentially, similar advances are followed to identify the related motorbike and tag. When the directions of the License plate are found, it is trimmed and saved as another picture.
- **License Plate Recognition:** The separated tag is given to an Optical Character Recognition (OCR) model. The OCR perceives text in the given picture and results in the perceived strings in the machine-encoded text. The OCR module inside will yield a rundown of anticipated tag numbers alongside a certainty esteem. The certainty esteem shows how sure it is in perceiving the given tag precisely. Then, at that point, the tag perceived with most noteworthy certainty esteem is put away in a text record for additional utilization.
- **Using Webcam** The webcam can be utilized as the info gadget to get the picture outlines for object location continuously. Since we are utilizing the YOLOv3-minuscule model, it upholds up to 220 fps handling speed.

4.1 Details of Hardware and Software

A. Software Requirements

- Python,
- OCR
- YOLO

4.2 Hardware Requirement

- Webcam
- Processor-i3
- Hard disk-5GB
- Memory-2GB RAM

V. RESULT AND DISCUSSION

The model was prepared on small YOLOv3 for 11,000 pictures on 5 classes for 50,000 cycles. The identifications of the relative multitude of items classes was obtained with high accuracy esteem and the mean typical accuracy (mAP) arrived at a steady max worth of 75% consequently the preparation was halted at 50,000 cycles.

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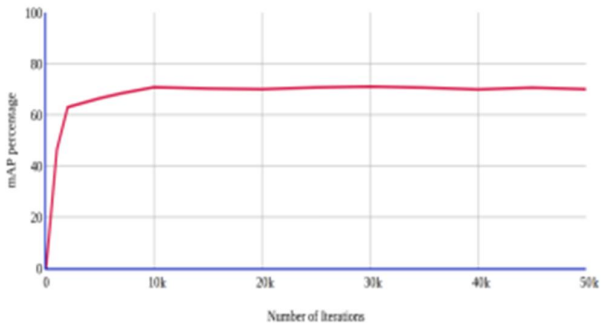

The code removes the License plate from the Object locator yield. The License plate extraction code removes just from the engine bicycles which has a rider who isn't wearing protective cap and disposes of the License plate of the engine bicycles whose rider has head protector. The OCR model can identify and perceive the License plates present in a picture with an exactness up to 85 percent.

VI. CONCLUSION

From the outcomes displayed above it is clear that the YOLO object location is appropriate for constant handling and had the option to precisely arrange and confine all the article classes. The proposed start to finish model was grown effectively and has every one of the capacities to be mechanized and sent for checking. For separating the number plates a few strategies are utilized by thinking about various cases like numerous riders without caps and intended to deal with the majority of the cases. Every one of the libraries and programming utilized in our undertaking are open source and consequently is truly adaptable and cost proficient. The undertaking was basically worked to tackle the issue of non-proficient traffic the board. Consequently toward the finish of it we can say that assuming conveyed by any traffic the board divisions, it would make their occupation simpler and more proficient.

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