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YOLO V5 : An Innovative Approach For Ensuring Safety Among Road Users

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ABSTRACT

In the field of computer vision systems, accurate and efficient object detection is an important topic. In this research, we have used YOLO v5 that stands for "You Only Look Once Version 5". It is an upgraded version of the previous version of the YOLOs (YOLO v4, YOLO v3, etc.) . Moreover, YOLO v5 algorithm is better, faster and more capable of detecting objects in image/video with the help of a deep neural network. Also, YOLO v5 models include: YOLO v5n, YOLO v5s, YOLO v5m, YOLO v5l, YOLO v5x.Extensive experimentation was carried out using YOLO V5s using Python in google colab and we have done 100 iterations(Epochs). . For each phase we have estimated the average accuracy value of the model and increase in accuracy values in subsequent phases assert the effectiveness of the proposed approach.

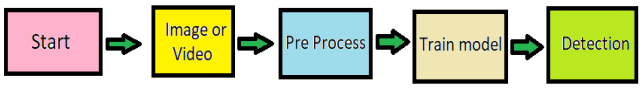
INTRODUCTION

The helmet monitoring model has become an excellent method of safety assessment, especially on building sites, steel plants, and other industries with multiple users. Many other experts have given presentations of deep learning-based object identification techniques in past years. Redmon et al. introduced the YOLO technique in 2015, which is way faster than existing techniques. In 2018, Redmon et al. released the YOLOv3 object detection mechanism, which enhanced detection speed and much more precision. By 2020, the YOLO storyline of methodologies had then advanced to YOLOv5. This reboots the consumer safety field's demands for helmet detection. Another major characteristic of YOLOv5 is its high acuity in identifying tiny things. This is done by employing the feature pyramid networks and anchor boxes, that permit the algorithm to identify objects at differing shapes and angle.

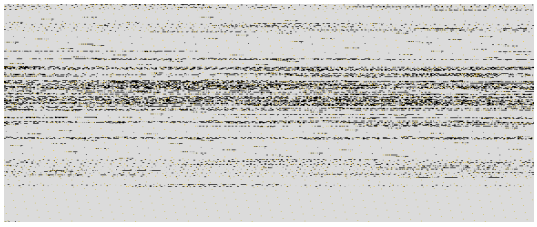
PROPOSED WORK

We are using 3 libraries in our code.CV2, TORCH , NUMPY AS NP. '**CV2**': a popular open-source computer vision and image processing library is cv2 library, also known as OpenCV (Open Source Computer Vision Library).'**TORCH**':'PyTorch', often known as the 'torch' library, is a powerful open-source machine learning framework. The dynamic computational graph and automated differentiation features of 'import torch' make it simple for users to create and test sophisticated deep learning models. '**NUMPY AS NP'**: 'numpy' library, a potent tool for numerical computation, by using the import 'numpy' as np command. . It is a key component of the ecosystem for scientific computing and is extensively utilized in disciplines including simulation, machine learning, and data analysis.

FLOWCHART/PICTORIAL REPRESENTATION



RESULTS



Accuracy Increase in Training part

Using the Labelling tool, the training procedure involves manually labelling the pictures designated class objects. It will give us the class label back. The studies are carried out on Google Colab using a browser on a computer with an NVIDIA GeForce RTX 3050 GPU and Intel Core i7-10750H processor running at 2.6 GHz and 16 GB of system RAM. We observed that the accuracy in every epoch is changing rapidly. The detected helmet can be seen in Fig. 1,2,3 along with the bounding boxes for each class ,after running the code in Thonny python platform.

1. 
2. 
3. 

The code for this work can be found at:
https://github.com/STRIPHYOG/YOLOv5/blob/main/YOLO.py

CONCLUSION

According to the data shown above, it is clear that YOLOv5 object detection is well suited for real-time processing and was successful in correctly classifying and localizing all object types. The suggested end-to-end model contains all the necessary components to be automated and deployed for monitoring, and it was successfully constructed. Once equipped with top-notch machinery, this system will be able to provide even more accuracy than the existing prototype. In the near future, further study may be done to identify and make the system operate with various camera angles. Just enough of the present dataset remains to create a functional prototype model. The primary goal of the project was to address the issue of ineffective traffic management. Now we are working on it to improve this model .

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