Wobot.ai Assignment

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Stage 1: Deep Learning

Q] Hardhat/ Head detection using Deep learning techniques from the given dataset.

A] Methodology:

Step 1: Collecting the dataset for hardhat in the form of PASCAL VOC (.XML) files.

Step 2: Converting the .XML annotations of the dataset into YOLO compatible .txt format.

Step 3: Pretrain the model using YOLOv4-tiny architecture and fine tune for better accuracy.

Step 4: After training the model implement the YOLO weights and cfg files to predict the bounding boxes of hardhat/ head in the given youtube video.

B] Reasons why YOLOv4-tiny was choses for object detection:

- **Easy and faster to train as pretrained methodology is used.**
- **Gives faster and better results while detecting objects.**
- **Less complex than any other architectures (particularly YOLOv4-tiny) which can also be implemented on mobile phones.**
- **Easy to implement in python environment, just be using trained weights file.**
- **Architecture especially known for real-time detection.**

C] Difficulties faced and action taken on them:

- **Need to change the PASCAL VOC (.xml) annotations into .txt format used for training custom YOLO. So, all the .xml files were converted to .txt files format compatible for YOLO training using special code.**
- **All the images given (4750) were not used for training, as it would have taken too much time to train. So only 937 images and their respective annotated files were taken for training.**

D] Results:
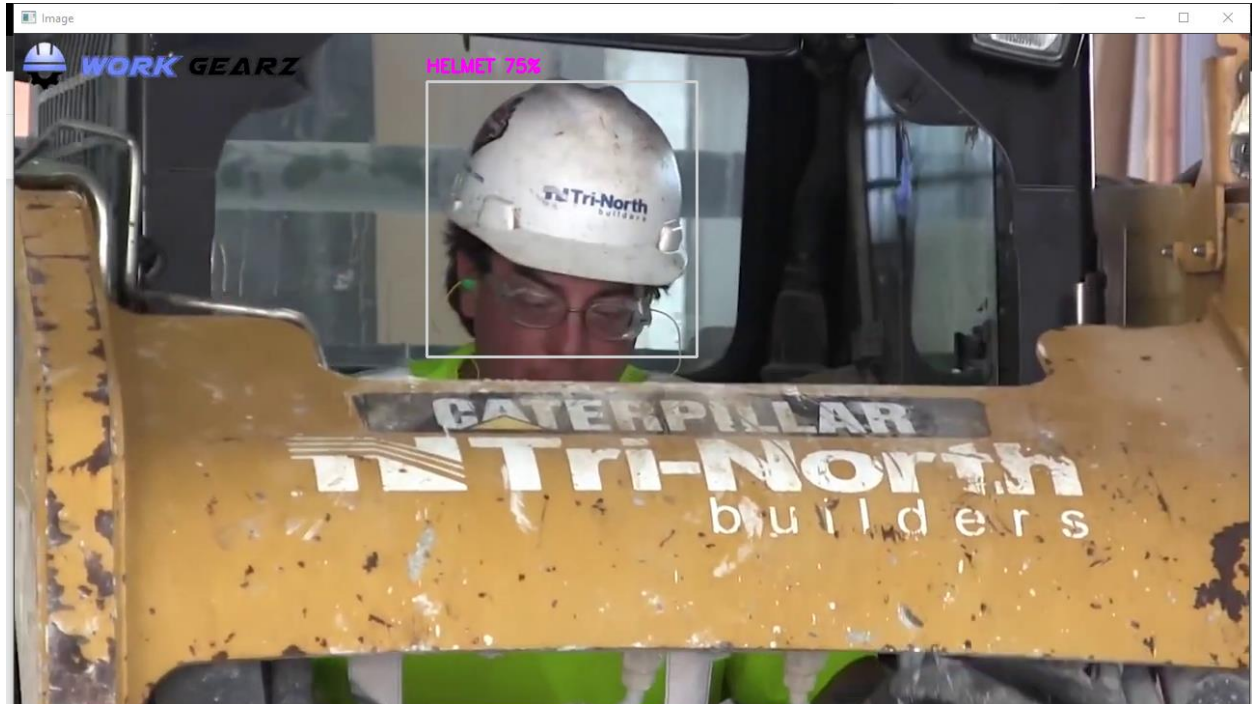
- **Hardhat/ head has been detected with the bounding box along with the percentage of the detecting has been printed on top of the box.**
- **It can be used on any video or even live feed camera.**
- **An accuracy of 85.63% was achieved while training of YOLO model.**
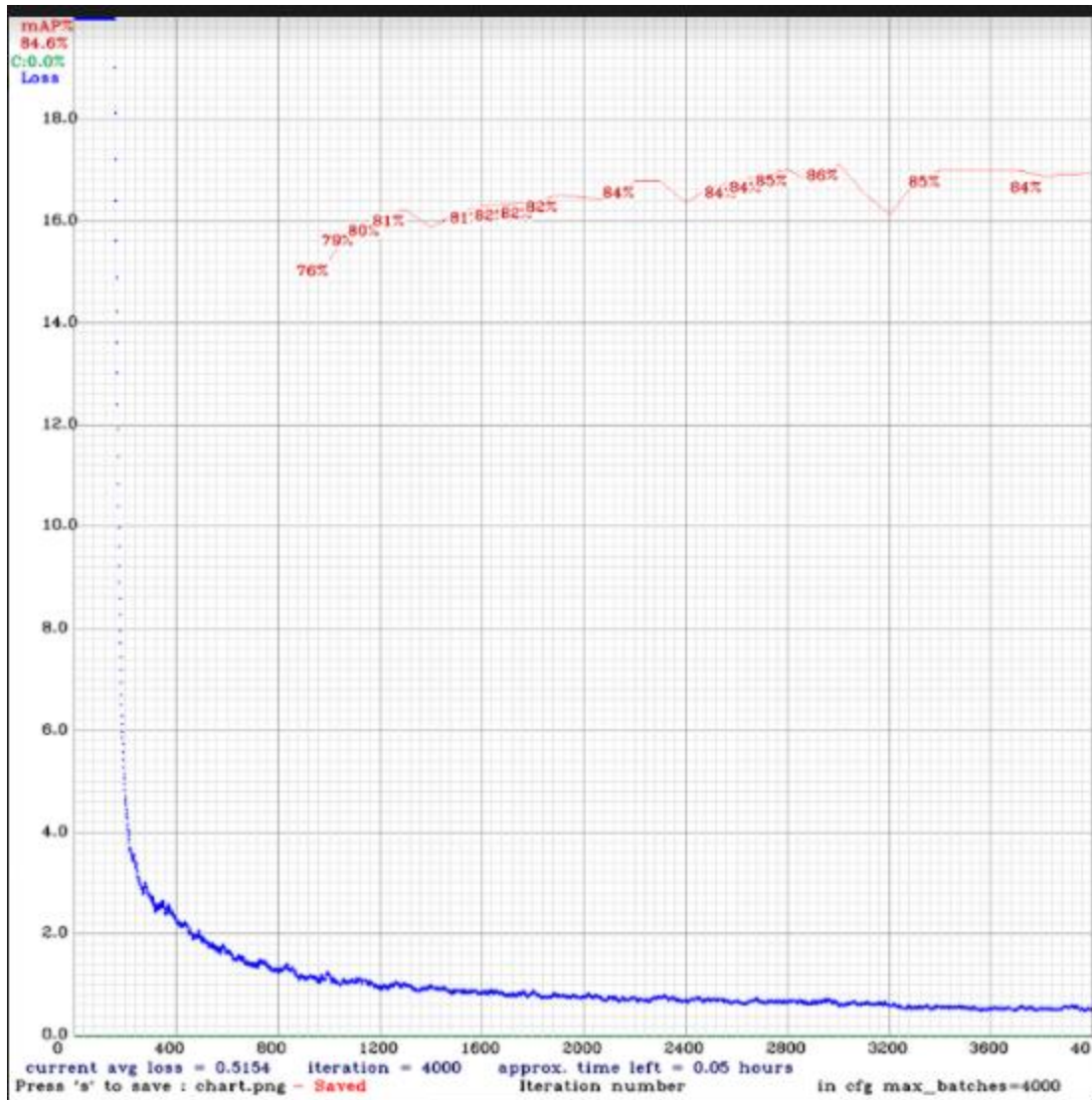
*All The codes along with weights files is uploaded in the zip file, you can also try using weights at your end.

* The Result video is also been uploaded.

E] References:

- https://pjreddie.com/darknet/yolo/
- https://gist.github.com/Amir22010/a99f18ca19112bc7db0872a36a03a1ec