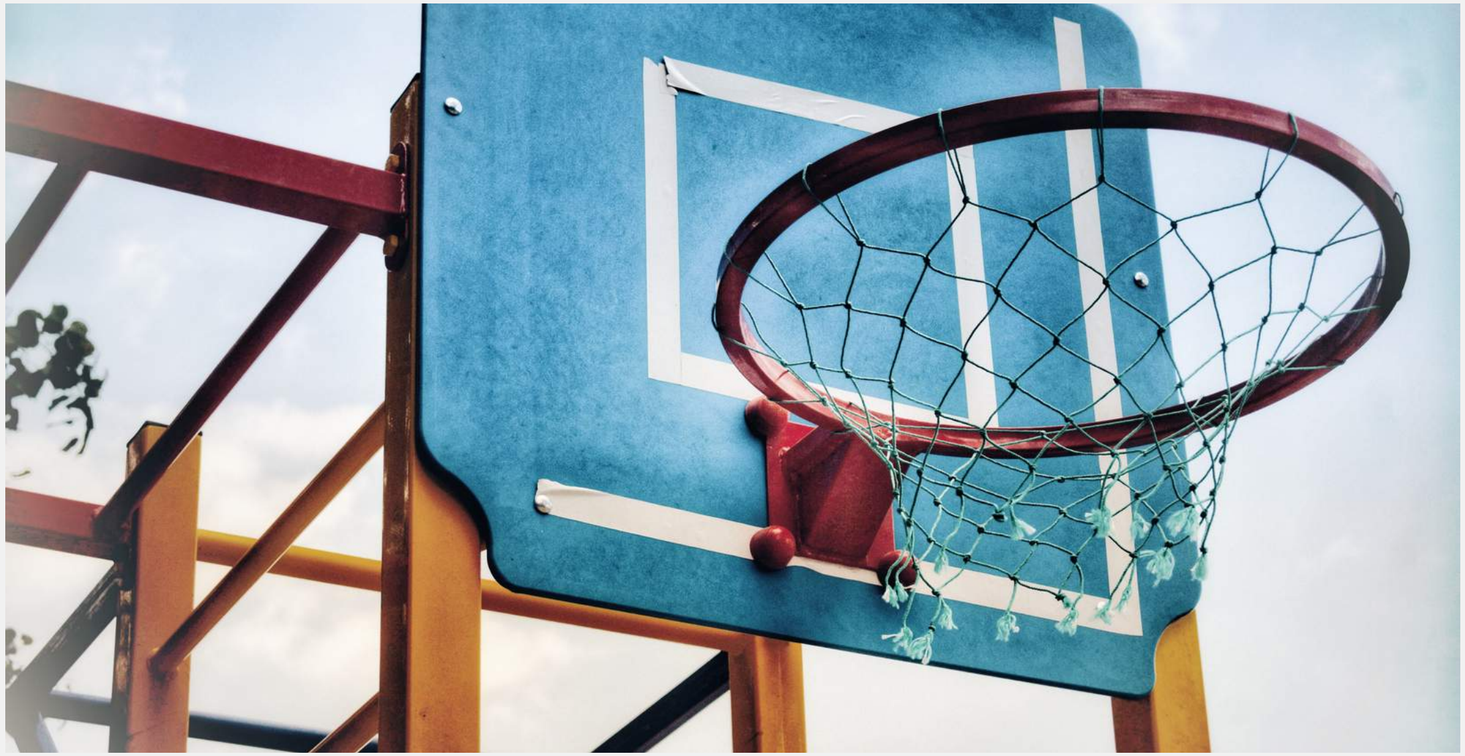
01

Sport Identification using Ball Detection

Group5



Prof. Manjunath Joshi

TA: Jignesh Patel, Ashish Tiwari, Tanisha Bhayani

Team Members

Ritika Lakdawala - 201801226

Nishtha Chaudhary - 201801235

Khushali Shah- 20180264

DATASET

Baseball, Basketball, Football, Tennis, Volleyball:
https://www.kaggle.com/ponrajsubramaniian/sportclassificationdataset

Rugby:
https://www.kaggle.com/ligtfeather/football-vs-rugby-image-classification

657 Total images for 6 classes (~100 for each)

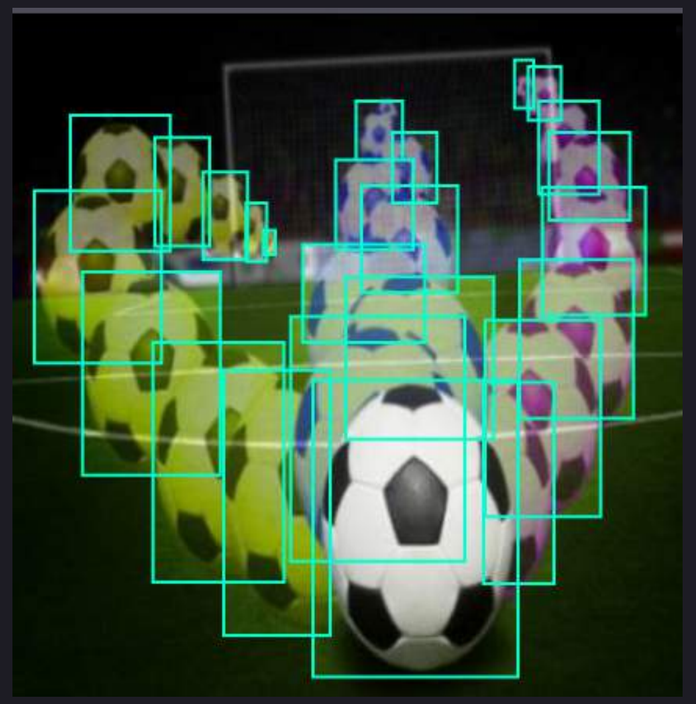
Training - 70 % (461 Images)
Validation - 15% (98 Images)
Testing - 15% (98 Images)

04

Image Labeling & Preprocessing

ANNOTATION AND LABELING :

[Applied for YOLO]



Tool used : https://app.roboflow.com/project/sports-final-dataset/1

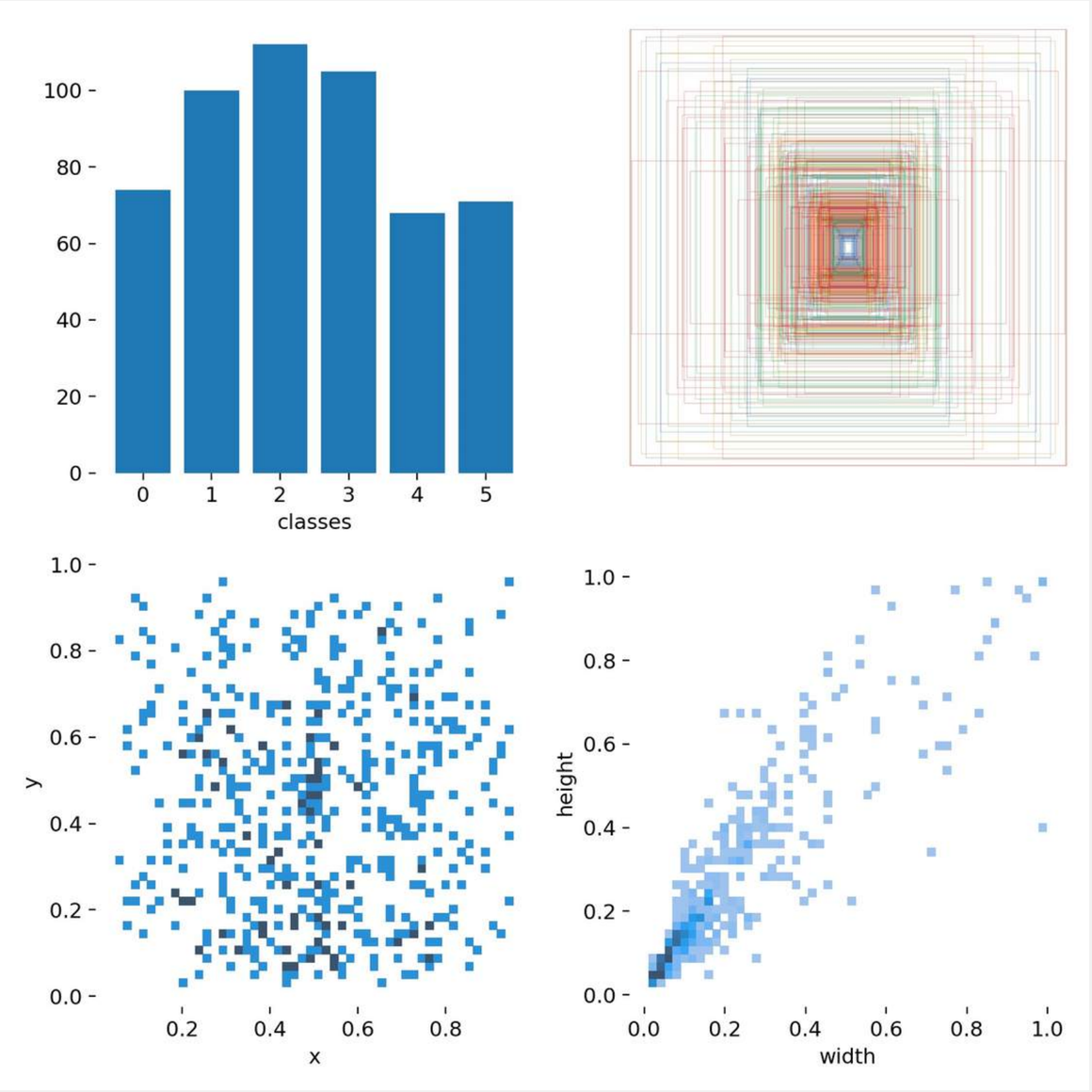
05

AUGMENTATION:
[Applied for ResNet]

Following are the augmentations that we applied to our images:

PREPROCESSING	**Auto-Orient:** Applied **Resize:** Stretch to 416×416
AUGMENTATIONS	**Outputs per training example:** 3 **Crop:** 0% Minimum Zoom, 11% Maximum Zoom **Rotation:** Between -7° and +7° **Brightness:** Between -8% and +8% **Exposure:** Between -6% and +6%

Example of an augmented image:



Data Visualization

Here we have visualized our annoted data by plotting graphs.

First plot: number of imagesfor each class

Second plot: Locations of all bounding boxes

Third plot: co-ordinates of the center of the box

Fourth plot: height vs width of the boxes

ALGORITHMS

YOLO v5

Using Pytorch, Performs Object Detection

YOLO v4

Using Pytorch with CUDA, Performs Object detection

RESNET34

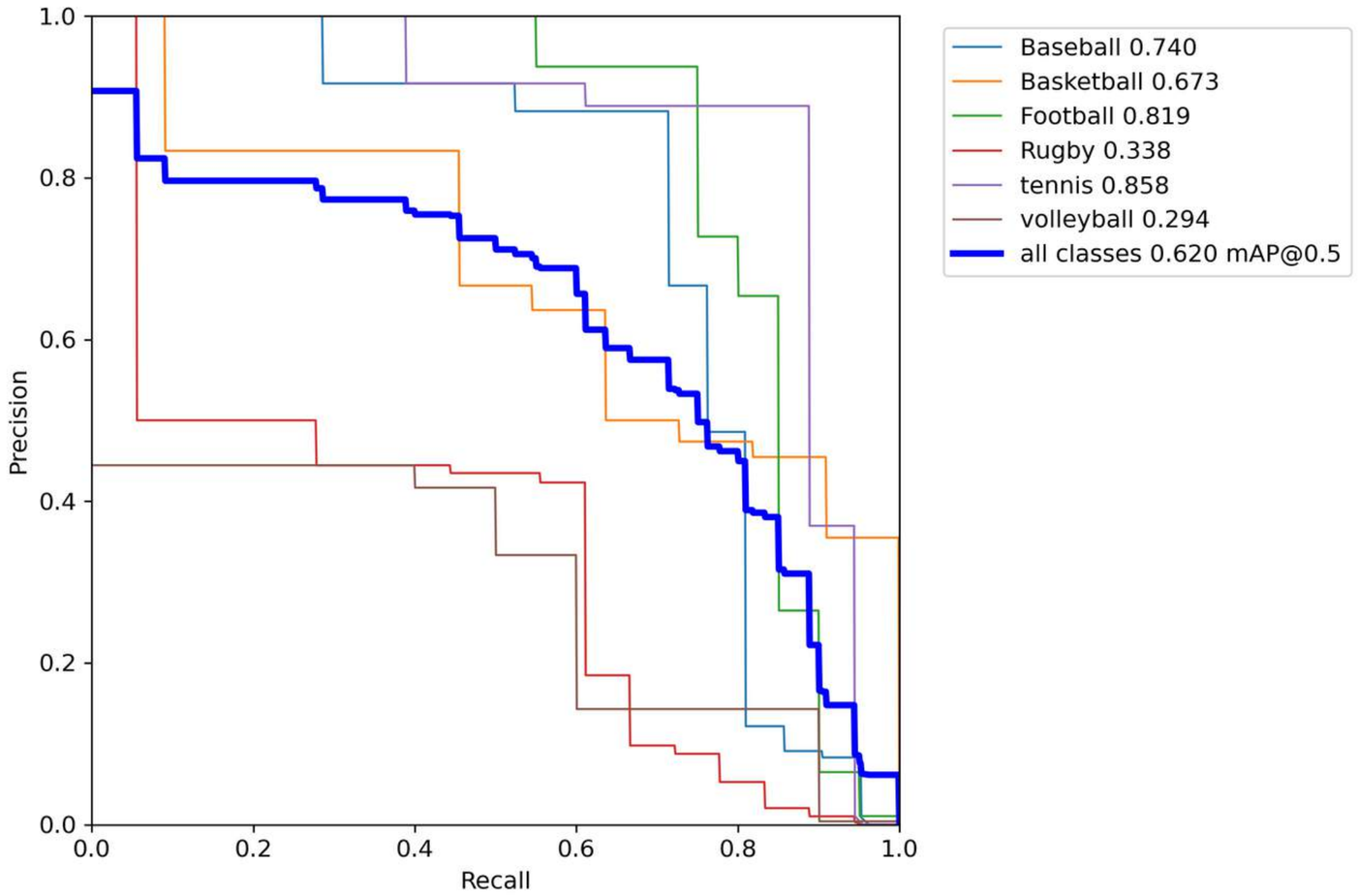
Using fastai and Pytorch Performs Classification

YOLO v5

ACTUAL

PREDICTED

PERFORMANCE

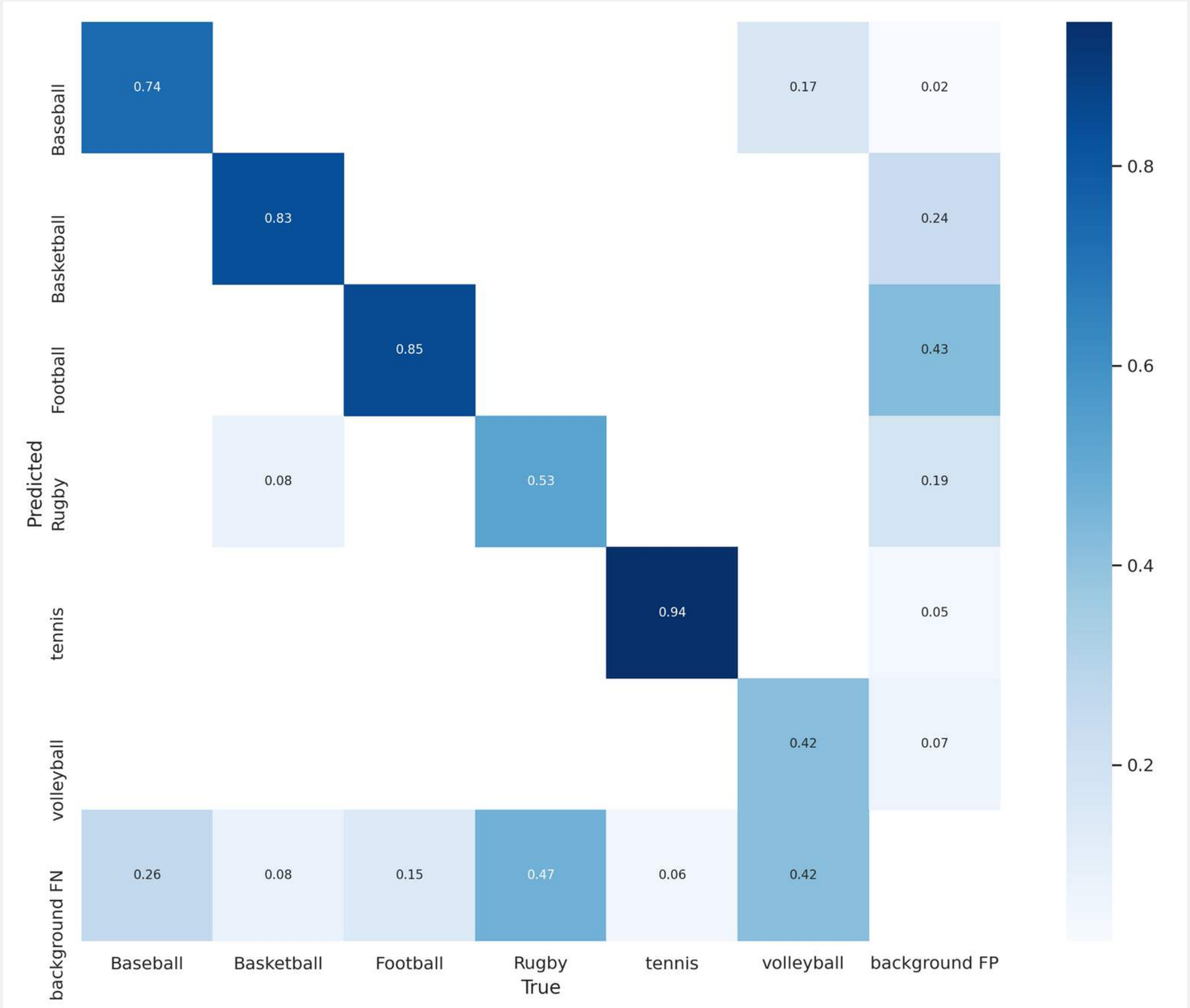


A high area under the curve: both high recall and high precision

high precision: a low false positive rate

high recall: a low false negative rate

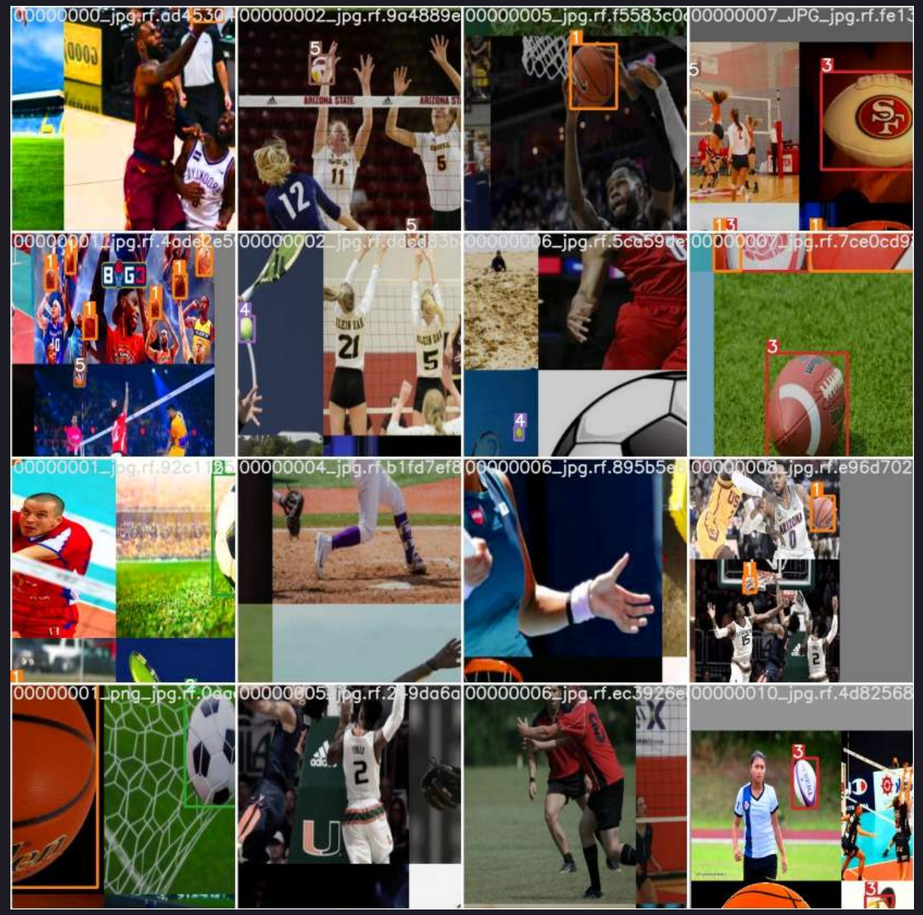
```
CPU times: user 6.17 s, sys: 708 ms, total: 6.88 s
Wall time: 8min 30s
```



Confusion Matrix

Rugby and Volleyball give low performance compared to other classes
i.e. 0.53 and 0.42 respectively
Same can be observed in Precision vs Recall graph

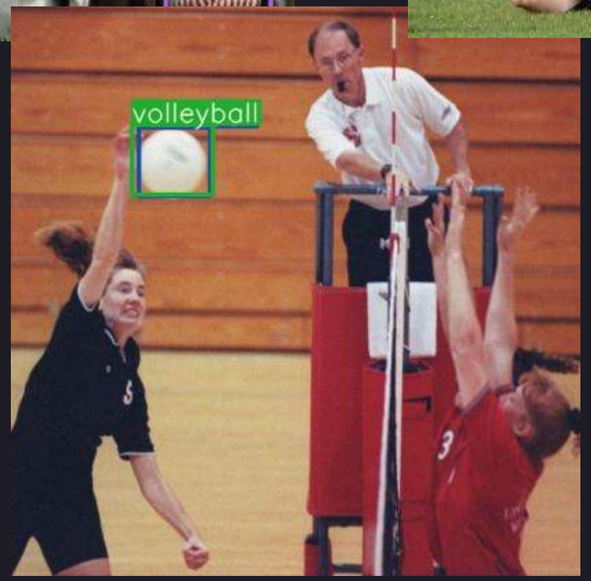
SCALED YOLO v4



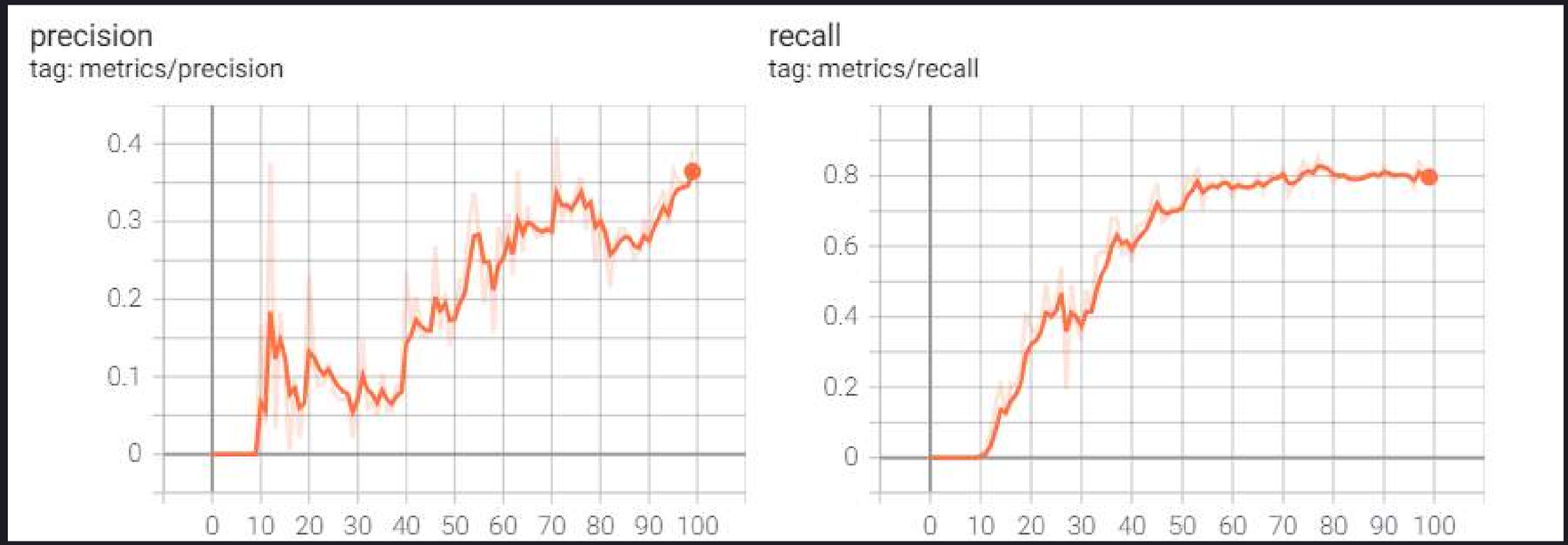
GROUND TRUTH

AUGMENTED

Predicted with Object Detection



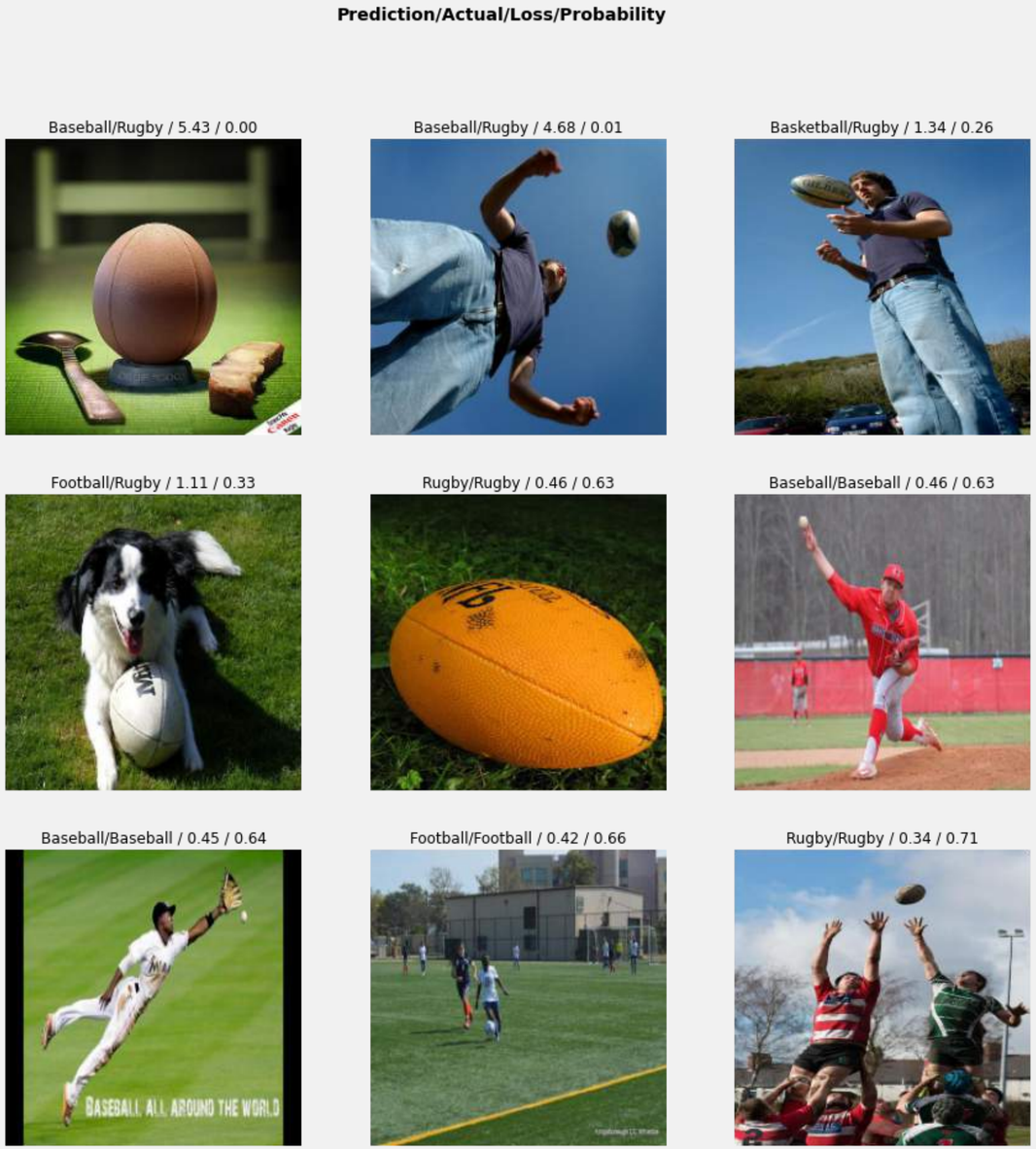
PERFORMANCE




```
CPU times: user 15.6 s, sys: 1.92 s, total: 17.5 s
Wall time: 30min 46s
```

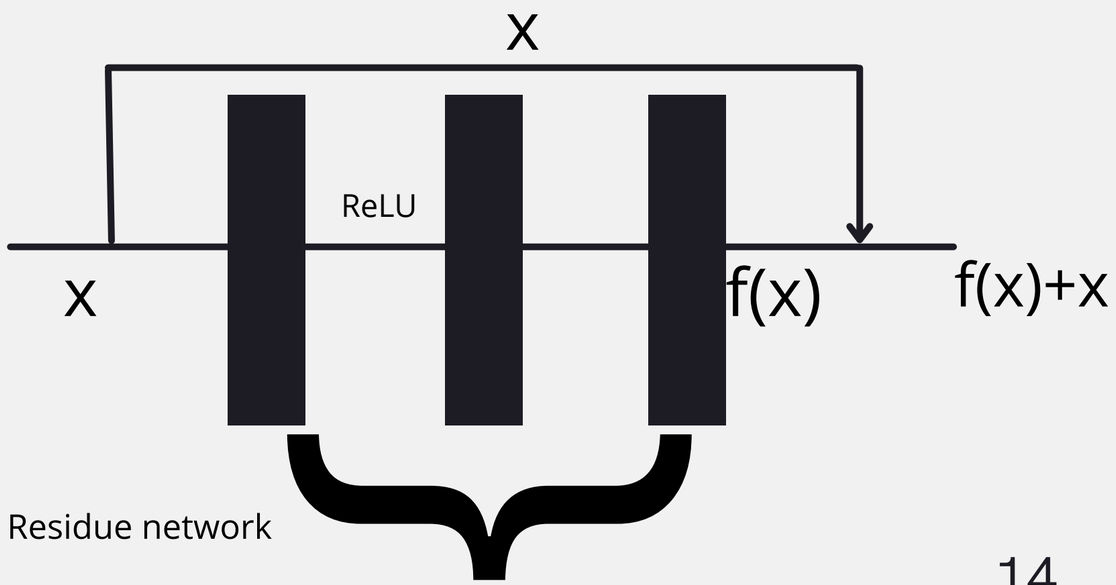
As we increase epochs, precision and recall will increase which shows that performance increses as the weights are updated .

RESNET34



Residual Neural Network with 34 layers

Solves Vanishing Gradient Problem



$y = f(x)+x$

Predicted with classification

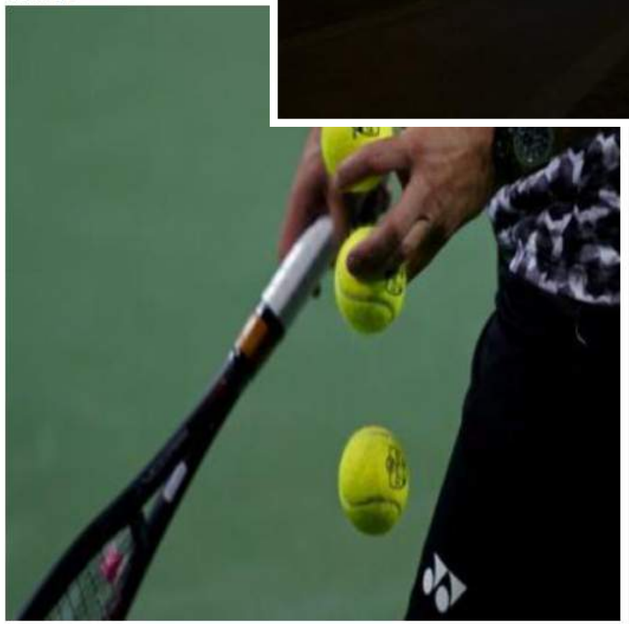
Football

Football

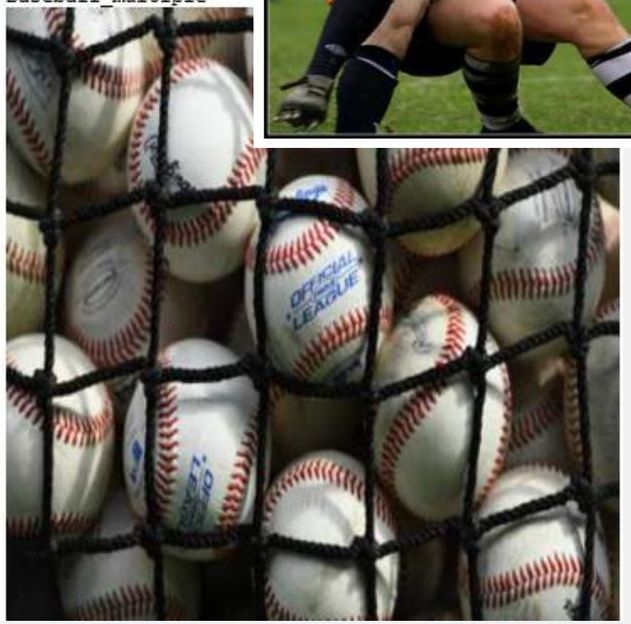
Rugby

Basketball

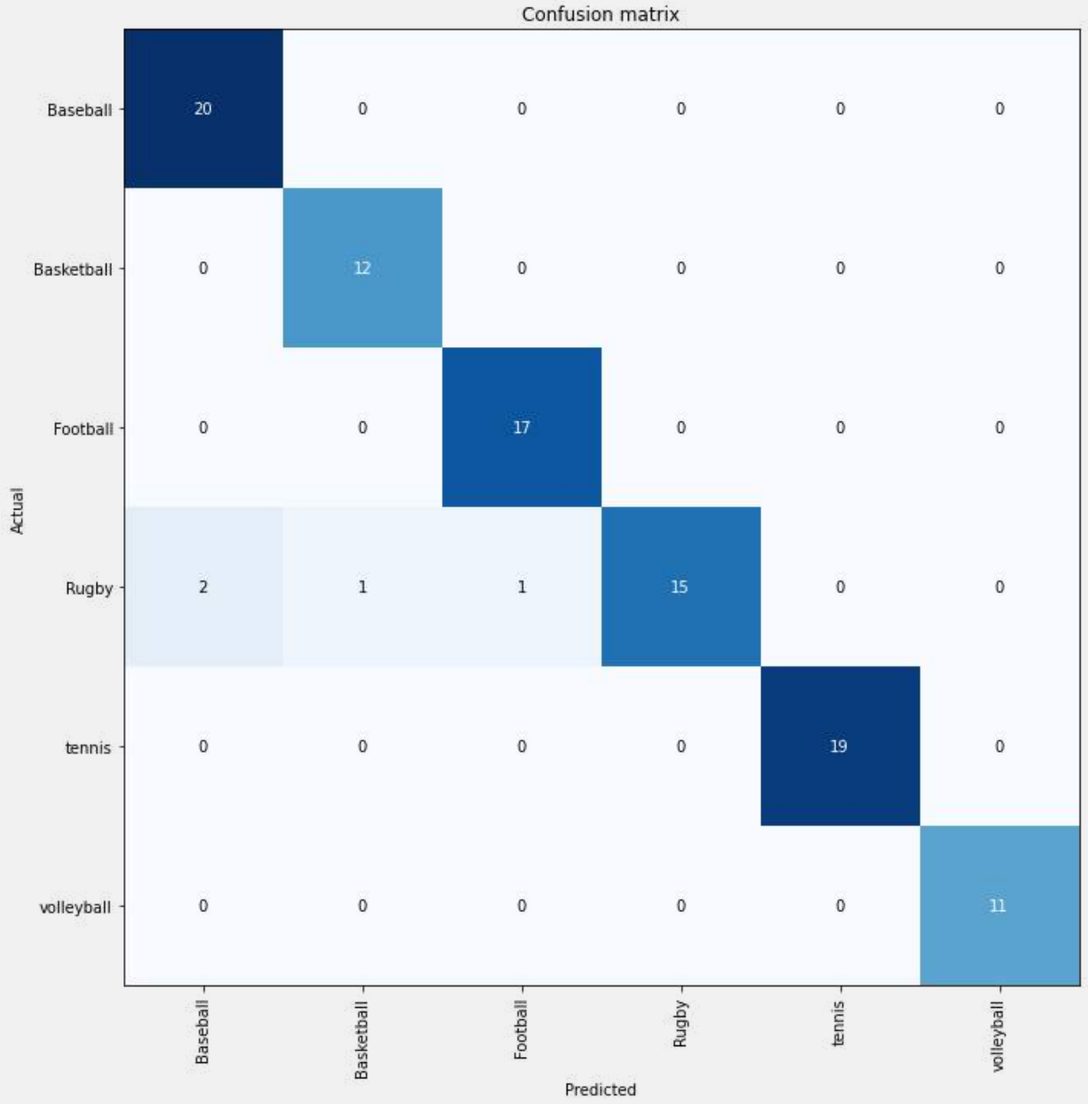
tennis



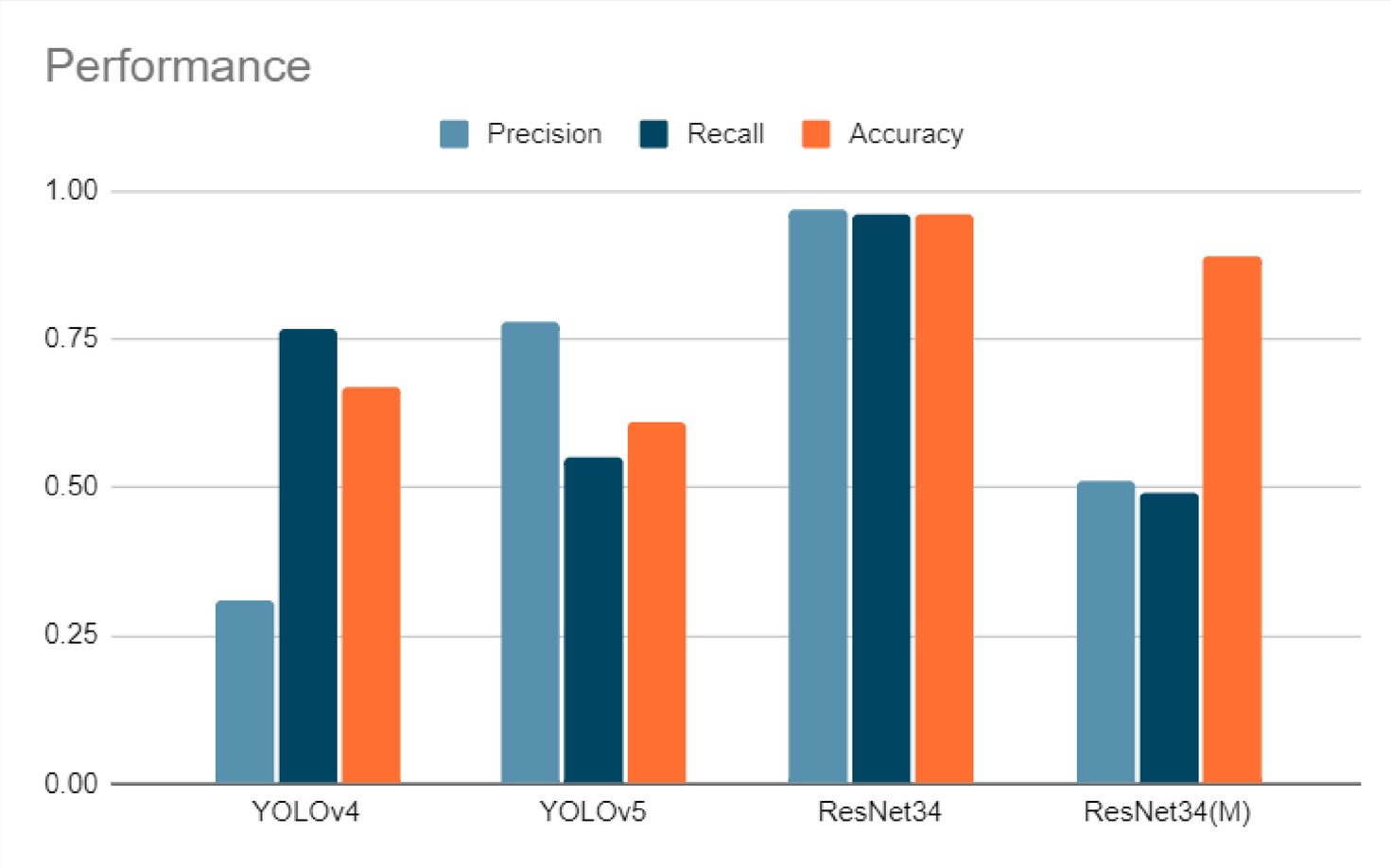
Baseball_multiple



Confusion Matrix



CONCLUSION


Performance
Precision
Recall
Accuracy
1.00
0.75
0.50
0.25
0.00
YOLOv4
YOLOv5
ResNet34
ResNet34(M)

THANK YOU