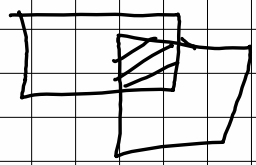
Assignment 4

Task 1

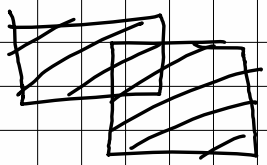
a) Explain what the Intersection over Union is and how we can find it for the bounding boxes

It is used to evaluate accuracy of object detection.

$$IoU = \frac{\text{Area of overlap}}{\text{Area of Union}} =$$



The result is the area between the ground truth and prediction box.



b) Write down the equation of precision and recall, and shortly explain what a true positive and false pos is.

TP: Correct detection, Actual is Pos and predicted is Po

FP: False detection, Actual is neg and predicted is Pos

Precision: $\frac{TP}{TP + FP}$

Recall: $\frac{TP}{TP + FN}$

false negative

C) Find mean average precision

Class 1: Precision = [1, 1, 1, 0.5, 0.2]
Recall = [0.05, 0.1, 0.4, 0.7, 1]

Class 2: Precision = [1, 0.8, 0.6, 0.5, 0.20]
Recall : [0.3, 0.4, 0.5, 0.7, 1]

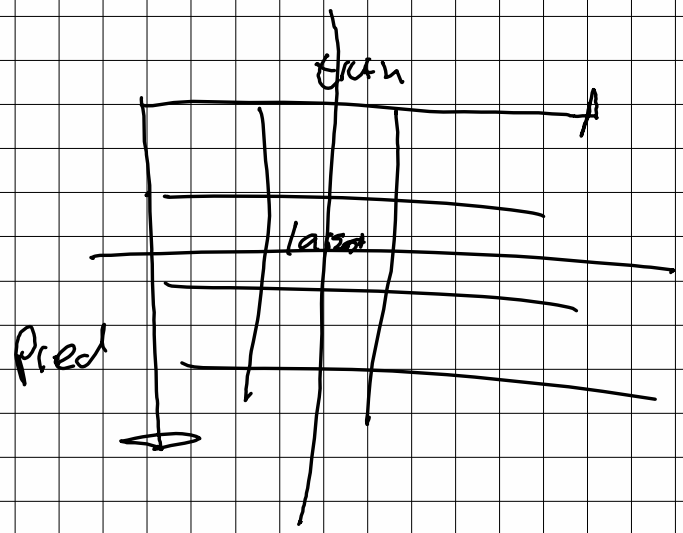
$= 0.1 \cdot 1 + 0.3 \cdot 1 + 0.05 \cdot 1 + 0.4(0.8 + 1)$
$+ 0.5(0.6) + 0.7(0.5 + 0.5) + 1(0.2 + 0.2 + 0.4$
$+ 0.1 + 0.05 + 0.3)$

$= 3.42$

$mAP = \frac{3.42}{5} = 0.684 = 68.4\%$

2)

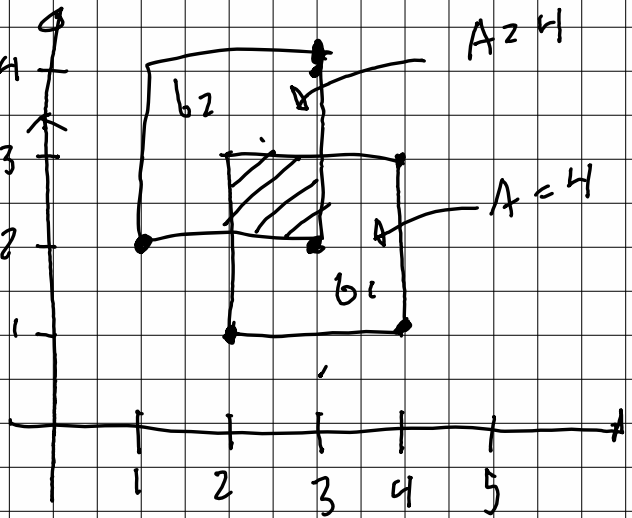
IoU Map



Pred(2) and truth(2) match

$b_1 = [2, 1, 4, 3]$ ← $[x_{min}, y_{min}, x_{max}, y_{max}]$

$b_2 = [1, 2, 3, 4]$



$IoU = \frac{1}{4+4-1} = \frac{1}{7}$