Evaluation Metrics for Object Detection



Evaluation Metrics for Object Detection



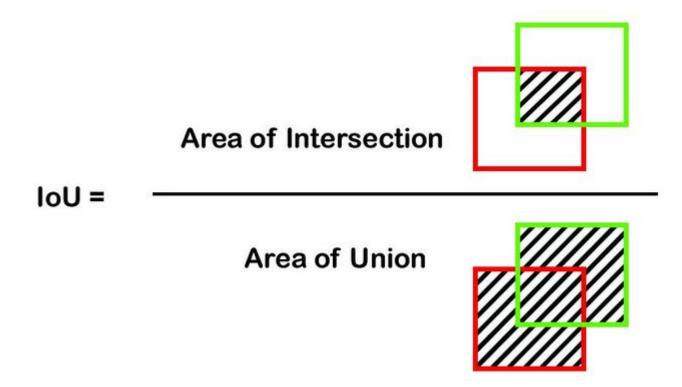


Evaluation Metrics for Object Detection

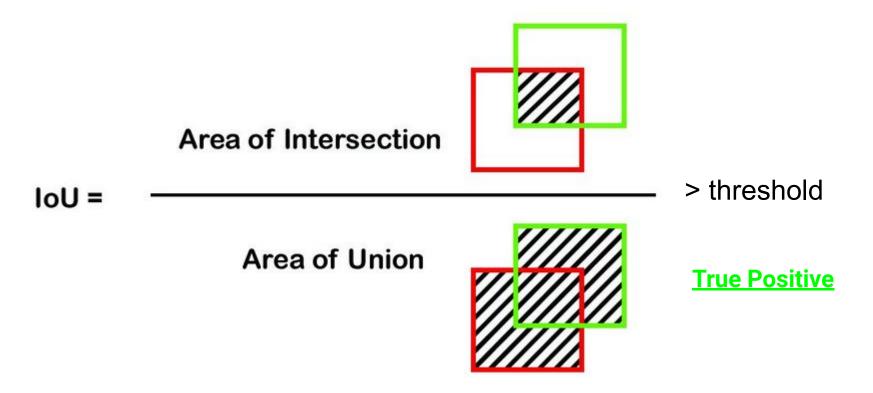
Intersection over Union (IoU)

mean Average Precision (mAP)

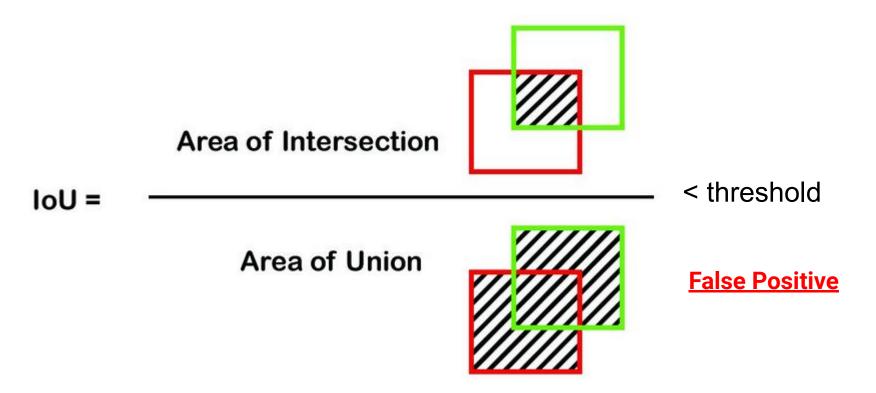




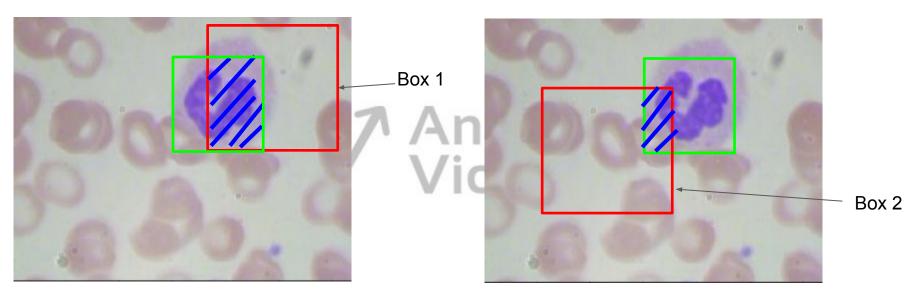












True Positive

Actual class and predicted class

False Positive

Object not present in the bounding box

Analytics
Vidhya

$$\frac{TP}{TP + FP}$$
Analytics
Vidhya



Analytics Vidhya

Predicted IoU

Bounding Box 1 0.7

Bounding Box 2

Bounding Box 3 0.9

Bounding Box 4 _{0.8}

Bounding Box 5 0.4



Predicted IoU TP/ FP Analytics Vidhya 0.7 Bounding Box 1 0.2 Bounding Box 2 **Bounding Box 3** 0.9 TP Bounding Box 4

TP

FP

8.0

0.4

Bounding Box 5



Predicted	loU		TP/ FP		
Bounding Box 1	0.7	7	Ana	precision =	$\frac{TP}{TP+FP}$
Bounding Box 2	0.2	7	₹Vidh	lyti(^{precision} = nya	= 3/5
Bounding Box 3	0.9		TP		= 0.6
Bounding Box 4	0.8		TP		
Bounding Box 5	0.4		FP		✓ Analy Vidhy

$$precision = \frac{TP}{TP + FP}$$

Analytics

 $AP = \frac{1}{N} \sum precision_i$



Predicted IoU

TP/ FP

Bounding Box 1

0.7

0.4

Analytics Vidhya

Bounding Box 2

TP

Bounding Box 3 0.9

TP

Bounding Box 4 8.0

FP

Bounding Box 5



Predicted IoU

TP/ FP

Precision_i

Bounding Box 1

0.7

0.2

0.4

Analytics Vidhya

Bounding Box 2

Bounding Box 3

0.9

TP

Bounding Box 4

0.8 TP

Bounding Box 5

FP



Predicted IoU TP/FP Precision,

Bounding Box 1 0.7 TP 1

Bounding Box 2 0.2 FP 1

Bounding Box 3 0.9 TP

8.0

TP

Bounding Box 5 _{0.4} FP

Bounding Box 4

Analytics Vidhya

Predicted IoU TP/FP Precision, Analytics Vidhya 0.7 Bounding Box 1 0.2 Bounding Box 2 **Bounding Box 3** 0.9 TP $\frac{2}{3} = 0.66$ Bounding Box 4 8.0 TP 0.75 Bounding Box 5

0.4

FP

0.75



Predicted	loU	TP/ FP	Precision _i	
Bounding Box 1	0.7	Analy	vtics _D -	$1_{\sum precision}$
Bounding Box 2	0.2	idh	/13 AP -	$\frac{1}{N} \sum_{i} \frac{precision_{i}}{N}$ = \% (4.16)
Bounding Box 3	0.9	TP	0.66	= 0.832
Bounding Box 4	0.8	TP	0.75	
Bounding Box 5	0.4	FP	0.75	7 Analytics

$$precision = rac{TP}{TP + FP}$$
 $A malytics$
 $AP = rac{1}{N} \sum_{r} precision_{r}$

$$mAP = \frac{\sum_{i=1}^{K} AP_i}{K}$$

Average across all class







$$precision = rac{TP}{TP + FP}$$
 At a defined threshold

$$AP = \frac{1}{N} \sum precision_r$$
 Average at different threshold

$$mAP = \frac{\sum_{i=1}^{K} AP_i}{K}$$

Average across all class



Predicted IoU

Bounding Box 1 0.7

Bounding Box 2

Bounding Box 3 0.9

Bounding Box 4 _{0.8}

Bounding Box 5 0.4

Analytics Vidhya



Predicted IoU TP/ FP Analytics Vidhya 0.7 Bounding Box 1 0.2 Bounding Box 2 **Bounding Box 3** 0.9 TP Bounding Box 4 8.0 TP

FP

0.4

Bounding Box 5



Predicted	IoU	TP/ FP	
Bounding Box 1	0.7	A halytic precision	$n = rac{TP}{TP + FP}$
Bounding Box 2	0.2	Analytic precision felidhya	= 3/5
Bounding Box 3	0.9	TP	= 0.6
Bounding Box 4	0.8	TP	
Bounding Box 5	0.4	FP	✓ Analy Vidhy