<Receiver Operating Characteristic (ROC)>

→ graph of TPR & FPR at all classification thresholds,

True Positive Rate $= \frac{TP}{TP + FN}$ = Recall

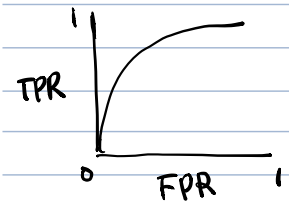
↳ How many (%) true positives were captured among actual positives

False Positive Rate $= \frac{FP}{FP + TN}$ ≠ Precision

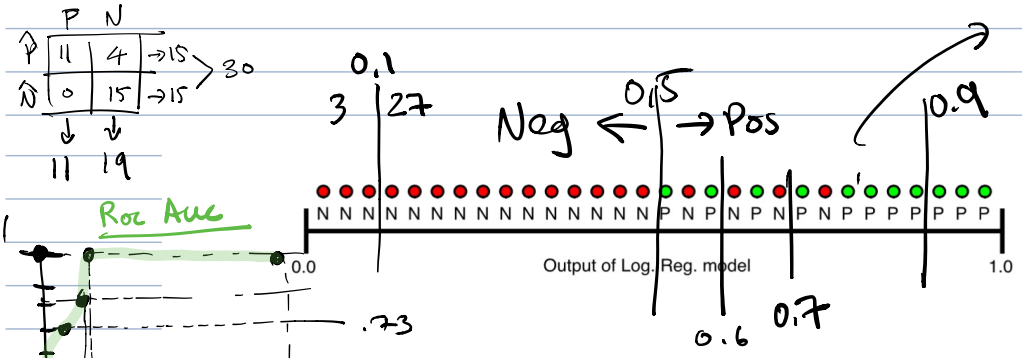
↳ Among all negatives, how many were falsely categorized as positive.

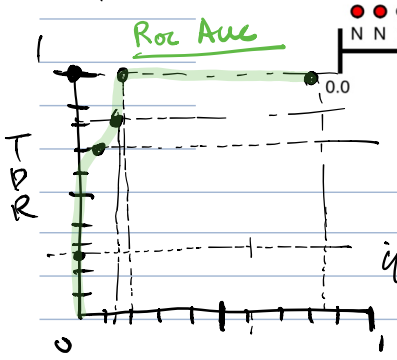
※ Confusion Matrix

Predicted \ Actual	P	N
$\hat{P}$	TP	FP
$\hat{N}$	FN	TN
	⇓ TPR	⇓ FPR



$$\text{Precision} = \frac{TP}{TP + FP}$$



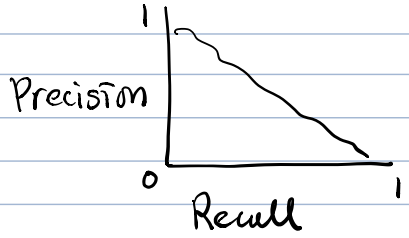


score = 0.95

if threshold	TP	FP	FN	TN	TPR	FPR
0.5	11	15 − 11 = 4	0	15	$\frac{11}{11+0} = 1$	$\frac{4}{4+15} = 0.21$
0.1	11	27 − 11 = 16	0	3	$\frac{11}{11+0} = 1$	$\frac{16}{16+3} = 0.84$
0.9	3	0	11 − 3 = 8	19	$\frac{3}{3+8} = .27$	$\frac{0}{0+19} = 0$
0.6	9	3	2	16	$\frac{9}{9+2} = .81$	$\frac{3}{3+16} = 0.15$
0.7	8	1	3	18	$\frac{8}{8+3} = .73$	$\frac{1}{1+18} = .05$

< Precision-Recall Auc >

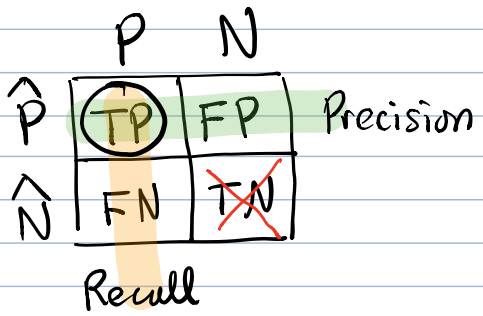
→ plot of precision + recall



→ $\text{Precision} = \frac{TP}{TP + FP}$

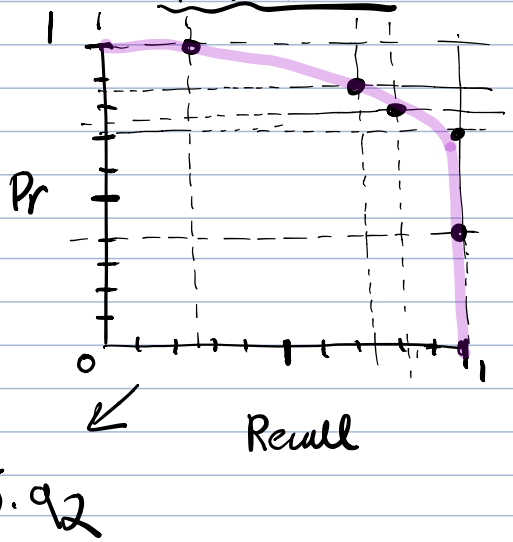
→ $\text{Recall} = \frac{TP}{TP + FN}$

⇒ extra focus on true positives



θ threshold	TP	FP	FN	TN	Recall = TPR	FPR	Precision
0.5	11	15-11=4	0	15	$\frac{11}{11+0}=1$	$\frac{4}{4+15}=0.21$	$11/11+4=.73$
0.1	11	27-11=16	0	3	$\frac{11}{11+0}=1$	$\frac{16}{16+3}=0.84$	$11/11+16=.4$
0.9	3	0	11-3=8	19	$\frac{3}{3+8}=.27$	$\frac{0}{0+19}=0$	$3/3+0=1$
0.6	9	3	2	16	$\frac{9}{9+2}=.81$	$\frac{3}{3+16}=0.15$	$9/9+3=.75$
0.7	8	1	3	18	$\frac{8}{8+3}=.73$	$\frac{1}{1+18}=.05$	$8/8+1=.88$

PR AUC



score = 0.92