

Log loss :- 
$$-\frac{1}{N} \sum_{i=1}^n \underbrace{y_i \cdot \log p_i}_{\textcircled{I}} + \underbrace{(1-y_i) \cdot \log (1-p_i)}_{\textcircled{II}}$$

Sigmoid func :- 
$$\frac{1}{1 + e^y}$$

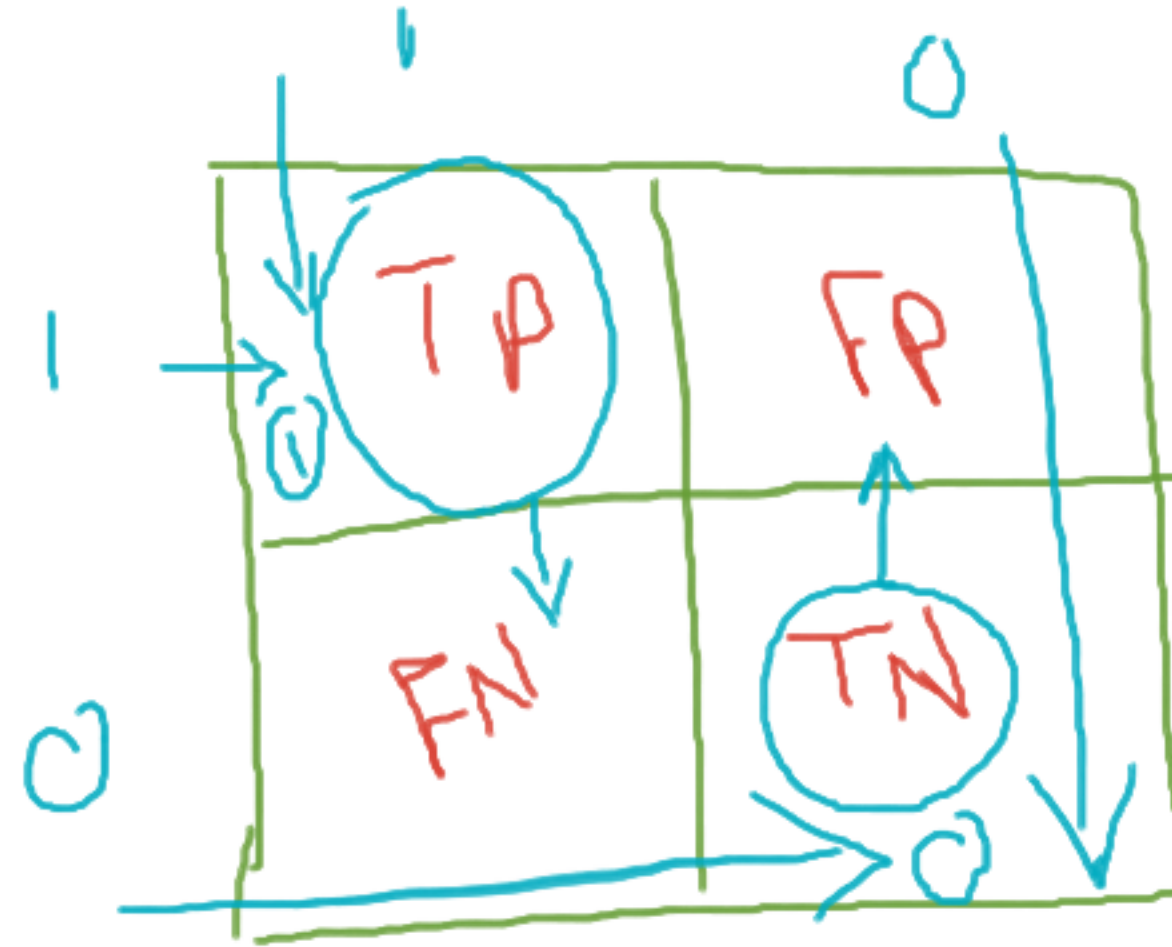
$$\text{Logit odd} = \log\left(\frac{p}{1-p}\right) \rightarrow \text{Logit odd}$$

$\rightarrow$  Logit transformation

$$\left(\frac{p}{1-p}\right) \rightarrow \text{odds}$$

# Confusion Matrix :-

$$\bar{y}_0 \Rightarrow \underline{y_0} \rightarrow 1$$
$$y_0 \rightarrow 0$$



50  $\Rightarrow$  30  $\rightarrow$  Class 1  
20  $\rightarrow$  Class 0

25	3
5	17

30	0
0	20

$$\Delta \text{ Accuracy} = \frac{TP + TN}{TP + FN + TP + FP}$$
$$= \frac{25 + 17}{25 + 5 + 17 + 3}$$
$$= 0.84$$
$$= 84.00\%$$

$$= 100\%$$

Actual

Positive  
1

Negative  
0

Predicted Positive  
1

TP

FP

→ Type-I

Negative  
0

FN

TN

↓  
Type II

] TPR:- True positive Rate

TPR = Sensitivity = Recall



$$TPR = \frac{TP}{TP + FN}$$

ii) FNR - False Negative Rate =  $FNR = \frac{FN}{TP + FN}$

iii] TNR = True Negative Rate

$$TNR = \frac{TN}{TN + FP}$$

iv] FPR = false positive rate.

$$FPR = \frac{FP}{FP + TN}$$



1] TPR =

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

	IP	NO	
IP	TP	FP	→ Type I
ON	FN	TN	→ Type II

= Proportion of positive class got correctly classified  
by the classifier



$$\text{II] FNR} = \frac{FN}{FN + TP}$$

= proportion of positive class got incorrectly  
classified by the classifier

$$\text{iii] TNR} = \frac{TN}{TN + FP}$$

	P	N
P	TP	FP
N	FN	TN

= Proportion of -ve class got correctly  
classified by the classifier

$$IV] \text{ FPR} = \frac{FP}{FP + TN}$$

= Proportion of -ve class got incorrectly  
classified by the classifier

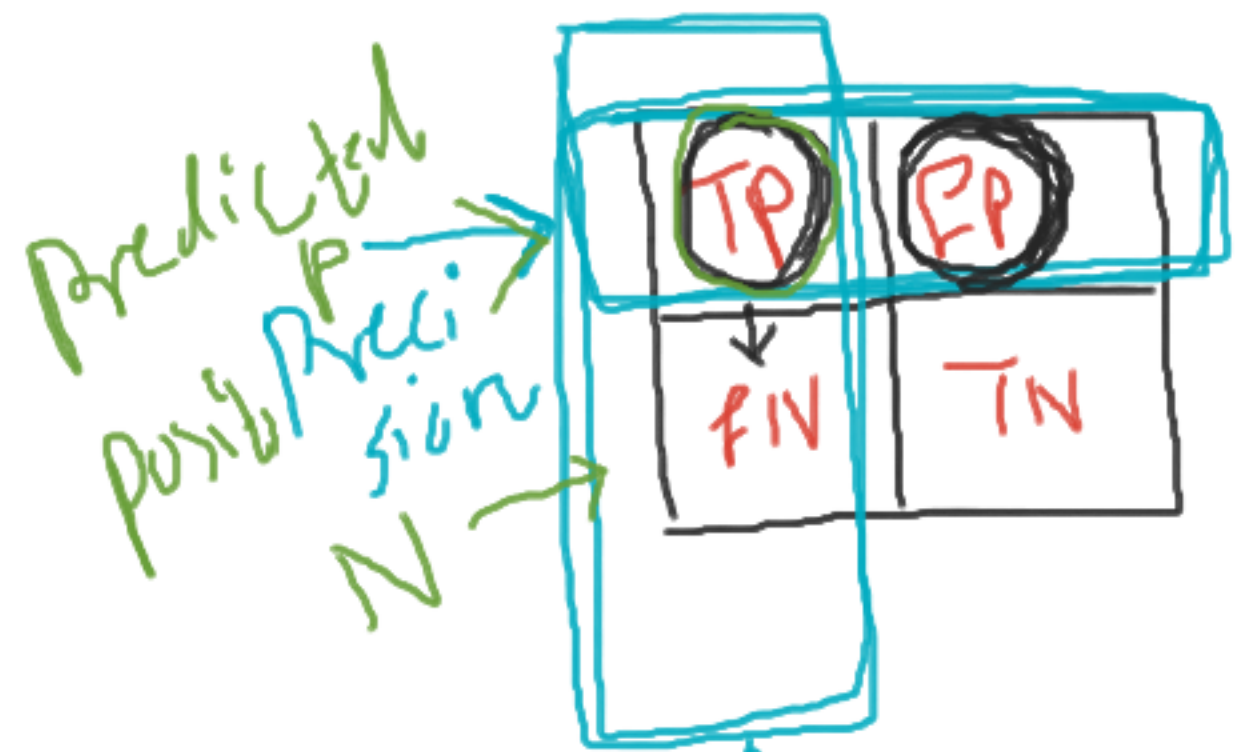
## 2] Classification Report :-

i] Precision

ii] Recall

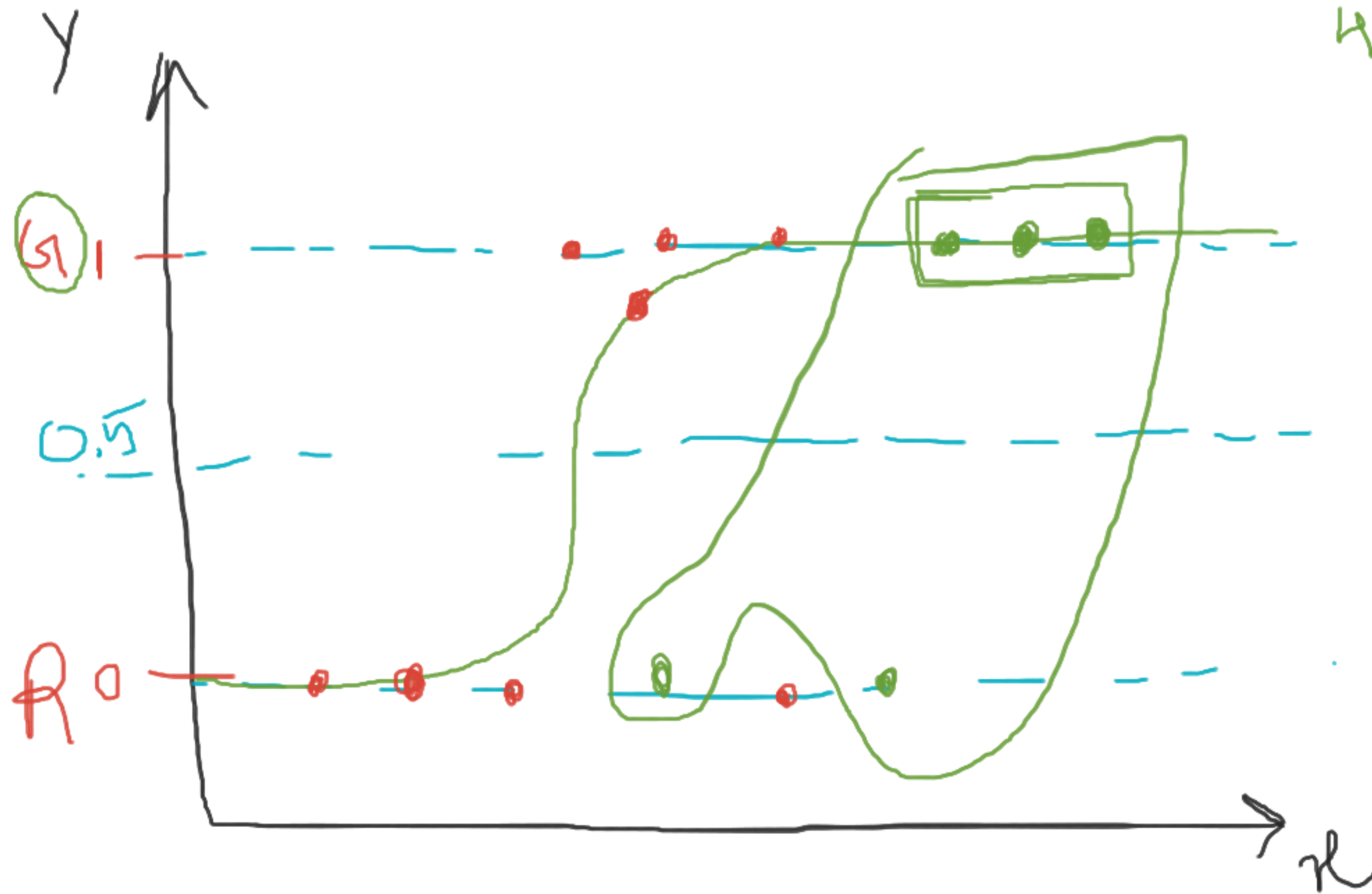
iii]  $F_1$ -Score

1] Precision := 
$$\frac{TP}{TP + FP}$$



= out of total predicted positive

Values, How many values are actual positive



$4+3=7$   
 overall 7  
 3 | 7  
 4 // miss  
 1

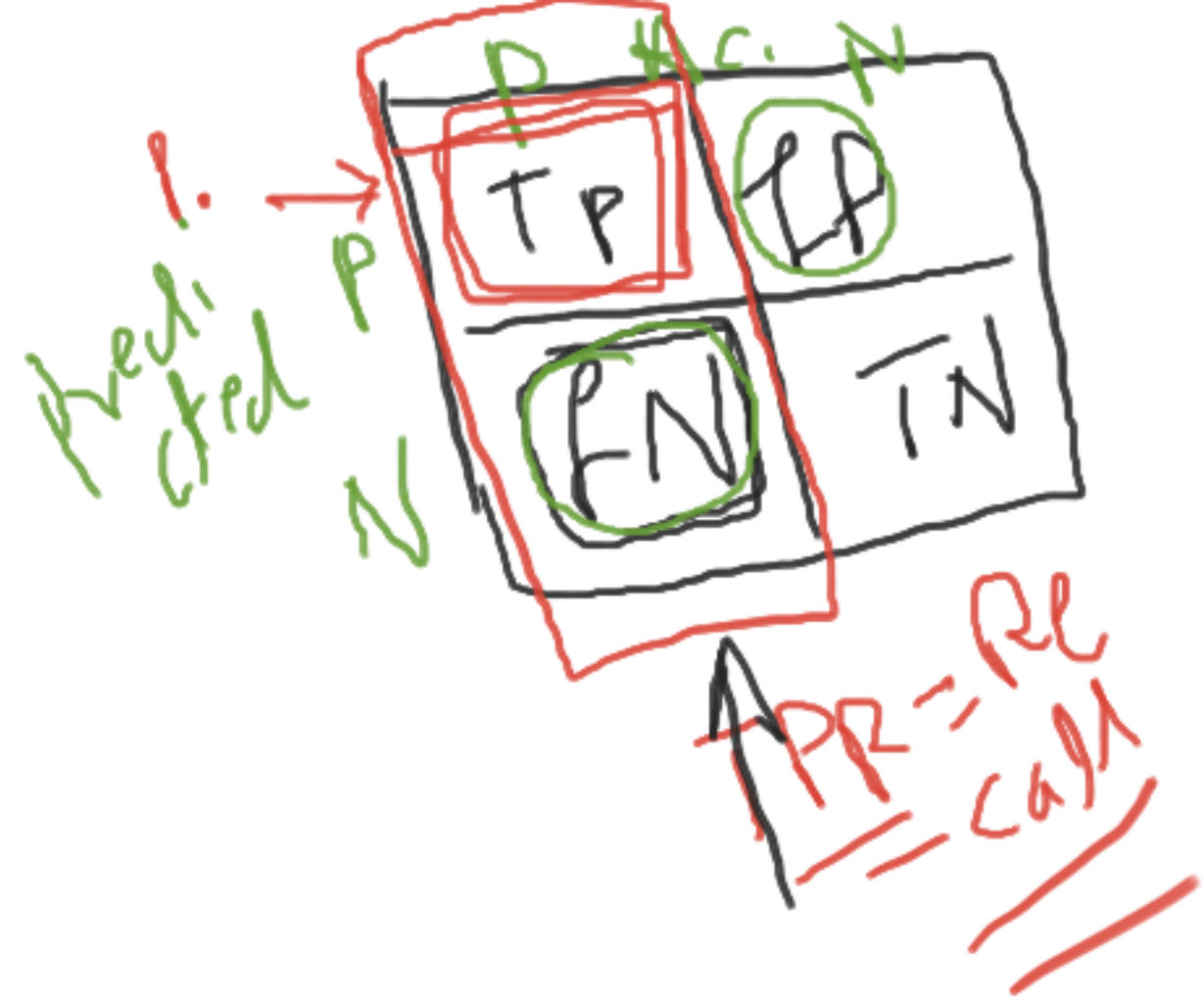


$$\text{Recall} = \frac{TP}{TP + FN}$$

$TP + FN$  = total actual positive values

$TP$  : true positive values

= Out of total actual positive values/Results, How many are positive predicted values of Results



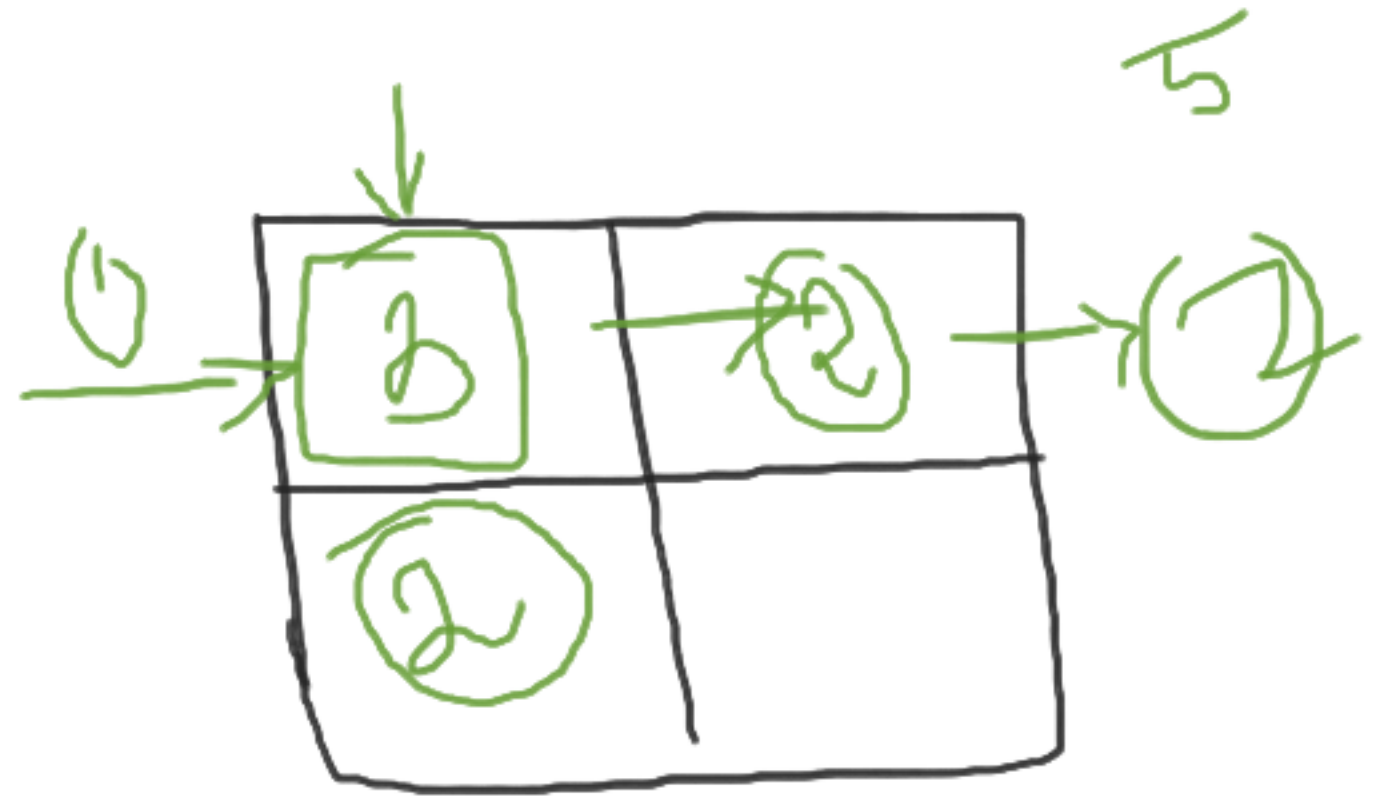


III)  $F_1$ -Score :-

$$F_{\beta}\text{-Score} = \frac{(1 + \beta^2) \times P \times R}{\beta^2 \times P + R}$$

For  $\beta = 1$

$$= \frac{(FP + FN)}{(1 + 1) \times P \times R} = \boxed{\frac{2PR}{P + R}}$$



$= 2 \rightarrow \underline{\underline{\text{Green}}}$

$= 2 \rightarrow \text{Red}$

$$\boxed{F_1 \text{ score}} = \frac{2PR}{P+R}$$

When  $\beta = 0.5$  (FP).

$$\beta = 0.5, \quad = \frac{(1 + (0.5)^2) \times P \times R}{(0.5)^2 \times P + R}$$

$$\beta = 2 \quad \frac{(\text{FN})}{1} = \frac{(1 + (2)^2) \times P \times R}{(2)^2 \times P + R}$$