

* CONFUSION MATRIX:-

		ACTUAL LABEL	
		0	1
PREDICTED LABEL	0	TN	FN
	1	FP	TP

	ACTUAL	PREDICTED
* TRUE NEGATIVES	0	0
* FALSE NEGATIVES	1	0
* FALSE POSITIVES	0	1
* TRUE POSITIVES	1	1

* Efficacy of a covid testing kit has to be evaluated

		1500		
	600 (Actually +ve)	1	400 (Actually -ve)	0
	> 580 (+ve)	1	> 300 (-ve)	0
	> 20 (-ve)	0	> 100 (+ve)	1

		ACTUAL LABELS	
		0	1
PREDICTED LABELS	0	300	20
	1	100	580

TP : 580
 TN : 300
 FP : 100
 FN : 20

* LOAN DEFAULT CLASSIFICATION:-

		1500		
	500 (ND)	1	500 (D)	0
	> 400 (ND)	1	> 450 (D)	0
	- - -	-	- - - (ND)	1

> 400 (N)	0	> 450 (D)	0
> 150 (D)	0	> 50 (ND)	1
ACTUAL LABEL			
0	1		
PREDICTED LABEL			
0	450	150	
1	50	400	

$$\begin{aligned} TP &: 400 \\ TN &: 450 \\ FP &: 50 \\ FN &: 150 \end{aligned}$$

* COVID CASE : PRIORITY → MINIMIZE FN

* LOAN CASE : PRIORITY → MINIMIZE FP

* ACCURACY SCORE :-

> Ratio of correct predictions w.r.t. total predictions.

$$\text{ACCURACY} = \frac{\text{No. of Correct preds}}{\text{Total no. of preds}}$$

$$\text{ACCURACY} = \frac{TP + TN}{TP + FP + TN + FN}$$

* PRECISION:- Ratio of correct positive predictions
w.r.t. total positive predictions.

$$\text{PRECISION} = \frac{\text{No. of Correct +ve preds}}{\text{Total no. of +ve preds}}$$

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

* RECALL: Ratio of correct positive predictions wrt total actual positive cases.

$$\text{RECALL} = \frac{\text{No. of Correct +ve Predictions}}{\text{Total No. of actual +ve Cases}}$$

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

* COVID CASE : High recall

* LOAN CASE : High precision

$$\therefore \text{Harmonic Mean}(a, b) = \frac{2ab}{a+b}$$

* F1 SCORE: Harmonic mean of precision and recall.

$$\text{F1 Score} = \frac{2PR}{P+R}$$

* LOG LOSS:

$$\text{Log Loss} = -\frac{1}{n} \sum \log(P_c(y_i))$$

P_c = Corrected probability

$$\text{Log Loss} = -\frac{1}{n} \sum [Y_i \log(P(Y_i)) + (1-Y_i) \log(1-P(Y_i))]$$

P = Predicted Probability

— X — X — X — X —

COVID CASE:-

$$\therefore \text{ACCURACY} : \frac{300 + 580}{1000} = \frac{880}{1000} = 0.88$$

COVID CASE:-

$$\text{* ACCURACY} : \frac{300 + 580}{1000} = \frac{880}{1000} = 0.88$$

$$\text{* PRECISION} : \frac{580}{580 + 100} = \frac{580}{680} = 0.85$$

$$\text{* RECALL} : \frac{580}{580 + 20} = \frac{580}{600} = 0.96$$

$$\text{* F1 SCORE} : \frac{2 \times 0.85 \times 0.96}{0.85 + 0.96} = 0.90$$

LOAN DEFAULT CASE:-

$$\text{* ACCURACY} : \frac{450 + 400}{1000} = \frac{850}{1000} = 0.85$$

$$\text{* PRECISION} : \frac{400}{400 + 50} = \frac{400}{450} = 0.88$$

$$\text{* RECALL} : \frac{400}{400 + 100} = \frac{400}{500} = 0.8$$

$$\text{* F1 SCORE} : \frac{2 \times 0.88 \times 0.8}{0.88 + 0.8} = 0.84$$