Understanding Classification metrics

Confusion matrix : (Binary classification) → Positive, Negative

Its a table used to describe the performance of classification model.

eg.

True \ Predicted	NO	YES
NO	TN: 50	FP: 10
YES	FN: 5	TP: 100

eg: Patient has disease or not

Positive → Disease (1)

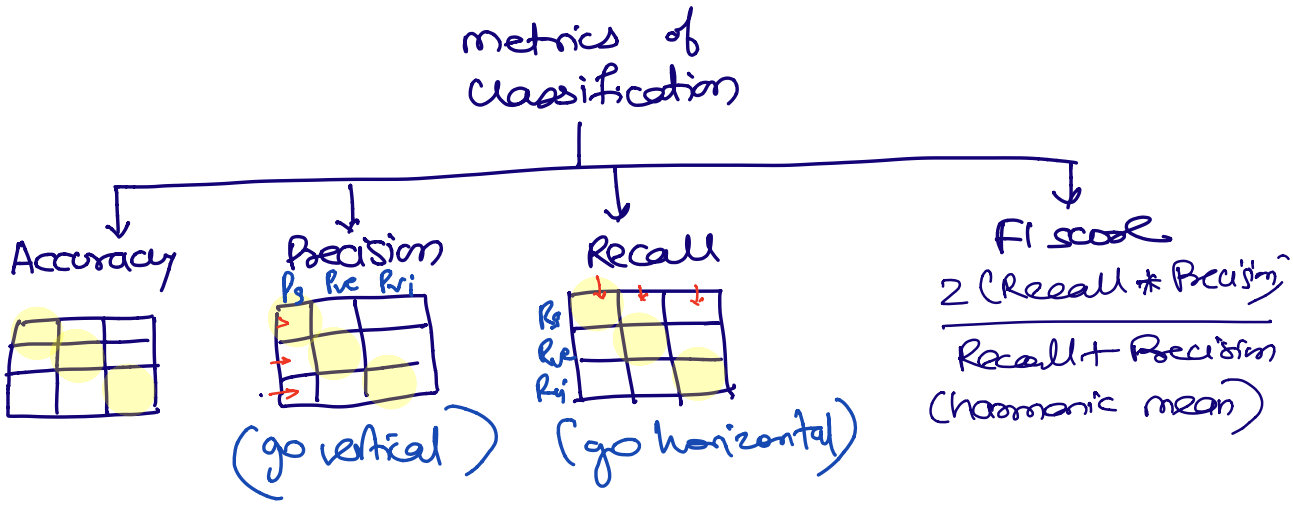
Negative → No disease (0)

TP → Cases where Prediction was YES for True YES

TN → Cases where Prediction was NO for True NO

FP → Cases where Prediction was YES for True NO

FN → Cases where Prediction was NO for True YES



Accuracy: (model) How often is the classifier correct?

$$\text{Accuracy} = \frac{\text{No. of correctly classified items}}{\text{No. of all items}}$$

Precision: When it predicts the positive result, how often is it correct?

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

Recall: When it is actually the positive result, how often does it predict correctly?

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

F1 Score: Harmonic mean of precision and recall

$$f_1 \text{ score} = 2 * \frac{(\text{precision} * \text{recall})}{\text{precision} + \text{recall}}$$

Metrics can also be visualized using

1. ROC - AUC curve (Balanced dataset)
2. Precision - Recall curve (Unbalanced dataset)

ROC → Receiver Operating characteristics

AUC → Area Under Curve.

For ROC → If your dataset is balanced.

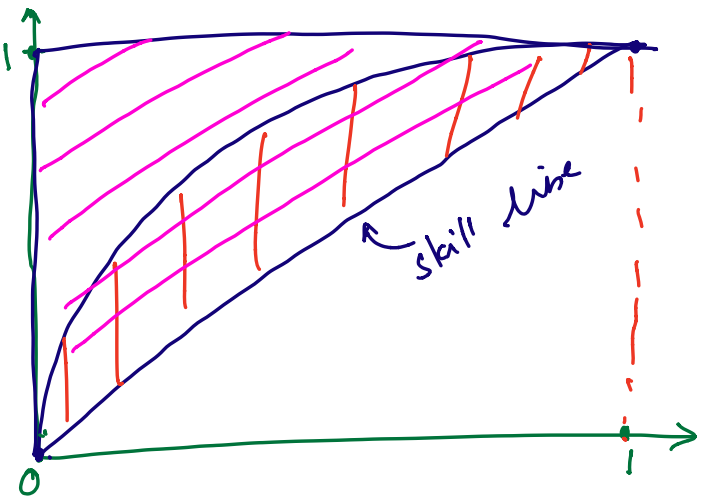
x-axis :→ $FPR = \frac{FP}{FP + TN}$

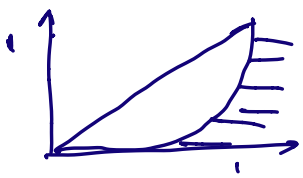
y-axis :→ $TPR = \frac{TP}{TP + FN}$ ... Recall (Sensitivity)

For Precision – Recall curve :→ If your dataset is not balanced

x-axis :→ Recall

y-axis :→ Precision





no skill → 0,0

full skill → 1, 1

ROC curve

AUC

↳ spread ness

measures of dispersion

$$\text{accuracy} = \frac{50+100}{50+10+5+100}$$

True \ Predicted	NO	YES
NO	TN: 50	FP: 10
YES	F: 5	TP: 100

$P_s \rightarrow 1$ ✓

$P_{ve} \rightarrow 0.875$ ✓

$P_{vi} \rightarrow 1$ ✓

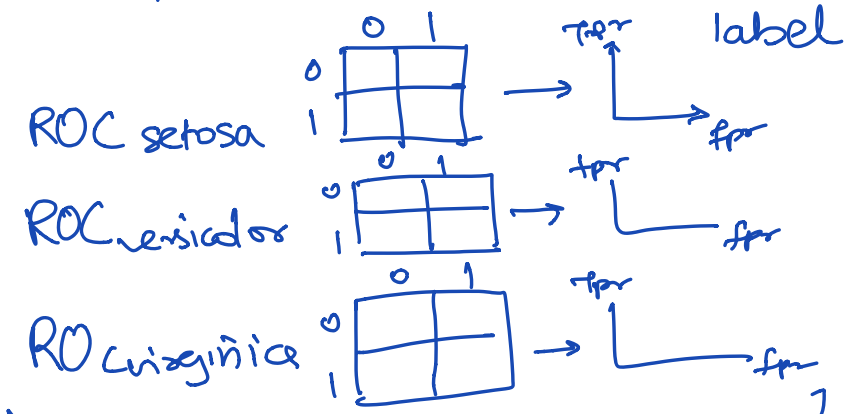
$R_s \rightarrow 1$ ✓

$R_{ve} \rightarrow 1$ ✓

$R_{vi} \rightarrow 0.92$ ✓

ROC curve → iris.csv — balanced data

label → setosa
versicolor
virginica

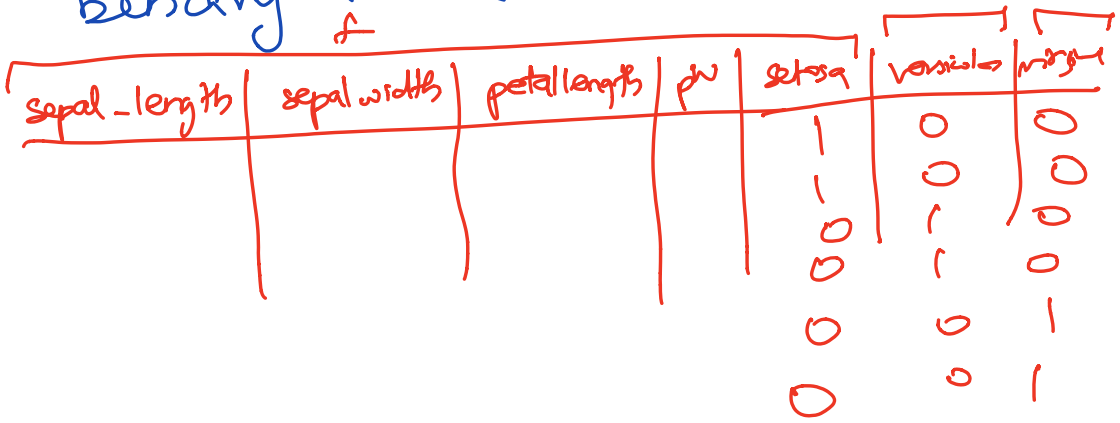


THEORY

sklearn

categorical data

① Convert your multiclass label to binary label



② Create ROC curve for each label

Classification metrics (Binary | multiclass)	
Balanced data	Unbalanced data
metric used: Accuracy score viz: ROC	metric used: Precision _or_ f1score Recall viz: Precision Recall curve
For multiclass → label_binarizer for viz.	