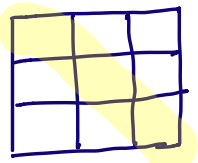
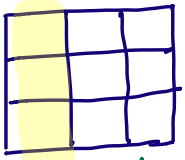
Metrics of Classification (confusion matrix)

- Accuracy
- Precision
- Recall
- F1 Score — harmonic mean of P & R

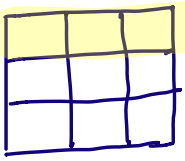
$$\frac{2 * (\text{Recall} * \text{Precision})}{\text{Recall} + \text{Precision}}$$



applicable for entire model (model metric)



applicable for each unique value of the label.



applicable for each unique value of the label

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

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

Precision (each unique label): when it predicts the positive result, how often is it correct?

$$\text{Precision} = \frac{TP}{TP + FP} \quad \ldots \text{Binary classification}$$

Recall (Sensitivity) (each unique label): when it is actually the positive result, how often does it predict correctly?

$$\text{Recall} = \frac{TP}{TP + FN} \quad \ldots \text{Binary classif}^{n}.$$

F1 Score : Harmonic mean of Precision and Recall.

(applicable for each unique label)

F1 Score is applicable for each unique value of the label

$$F1\ Score = \frac{2 * (Recall * Precision)}{Recall + Precision}$$

Note:- for unbalanced dataset to judge the quality of the model we use F1 Score instead of Accuracy.

We can also VISUALIZE the quality of the model using

METRICS VISUALIZATION

ROC - AUC curve

Balanced dataset

Supports

Binary classification

multiclass classification

Precision - Recall Curve.

Unbalanced dataset.

Supports

Binary classification

multiclass classification

ROC - AUC curve:

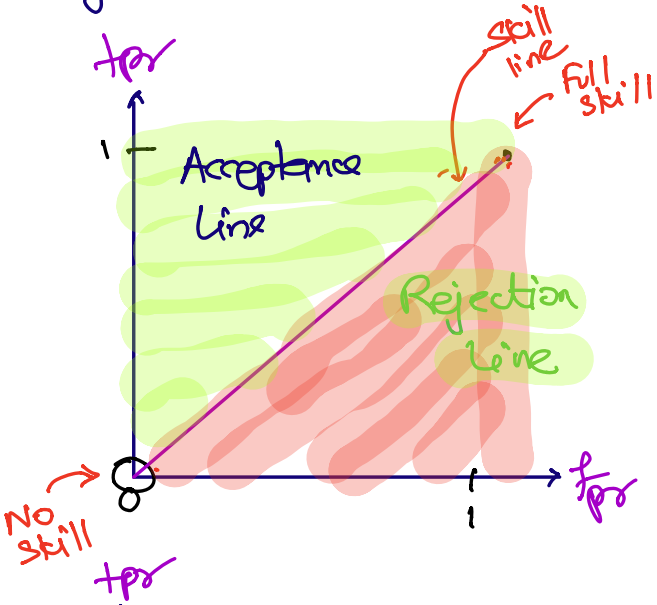
ROC - Receiver Operating Characteristics.

AUC - Area Under Curve.

x, y plot which plots the dispersion of learning of the model.

x axis → FPR False Positive Rate = $\frac{FP}{FP + TN}$

y axis → TPR True Positive Rate = $\frac{TP}{TP + FN}$ (Recall)



we are plotting the probabilities

Two pts;

No Skill Coordinate → (0,0)

Full Skill Coordinate → (1, 1)

Concept:-

Higher the AUC

&

above the Rejection layer

↓

Model can be shortlisted

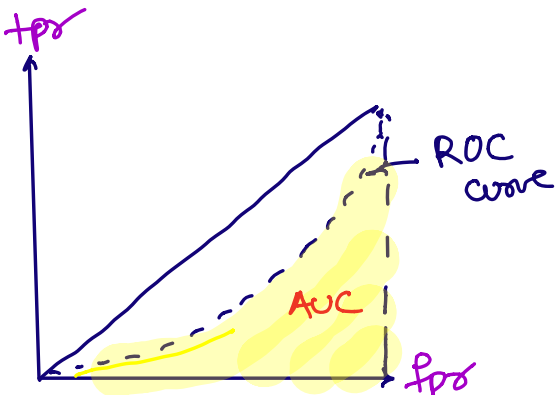
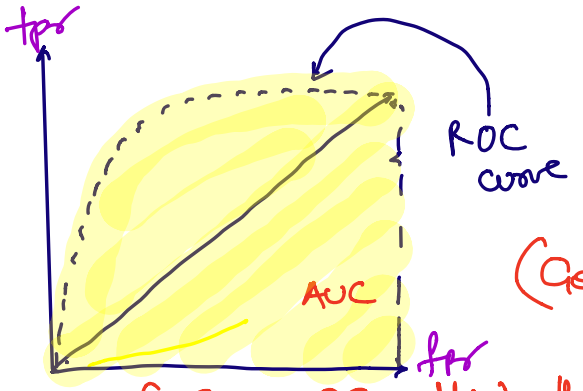


fig1 (Reject the model)



Higher the AUC & above the Rejection layer (Good model)

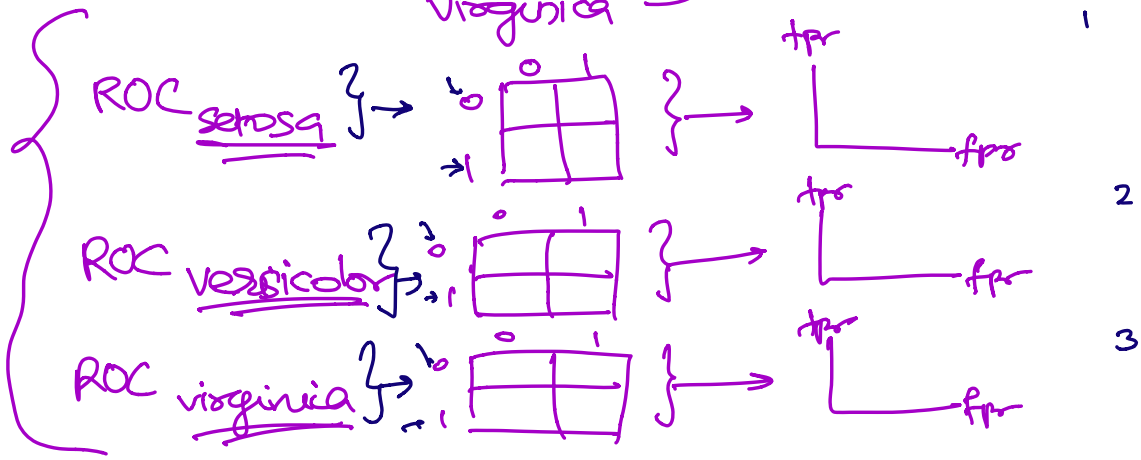
Fig 2 → (Shortlist the model)

ROC is a line that defines the speed of knowledge model carries.

Note:- The above is valid for Binary classification. In case of multi-class classification, you need to create ROC-AUC curve for each unique label.

eg: iris.csv

Labels : Setosa, Versicolor, Virginica } Multiclass classification

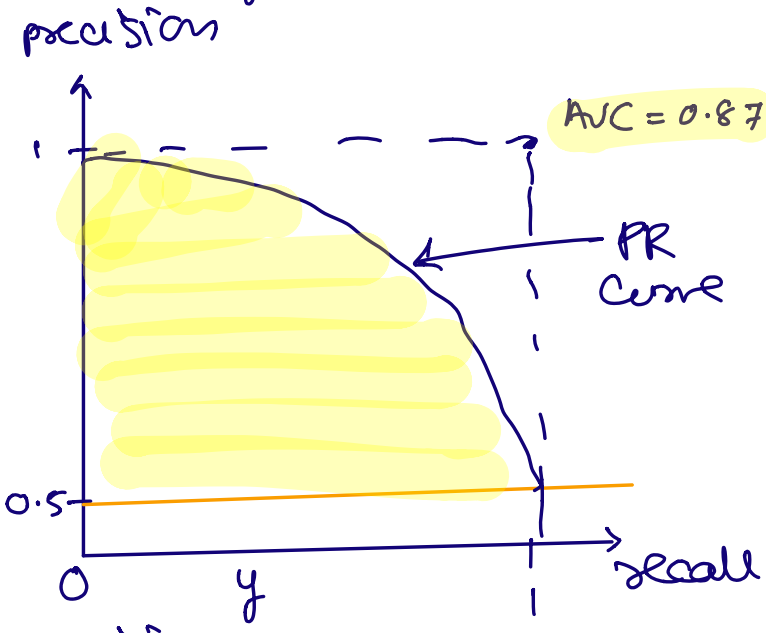


Precision Recall Curve

This curve is applicable for unbalanced dataset

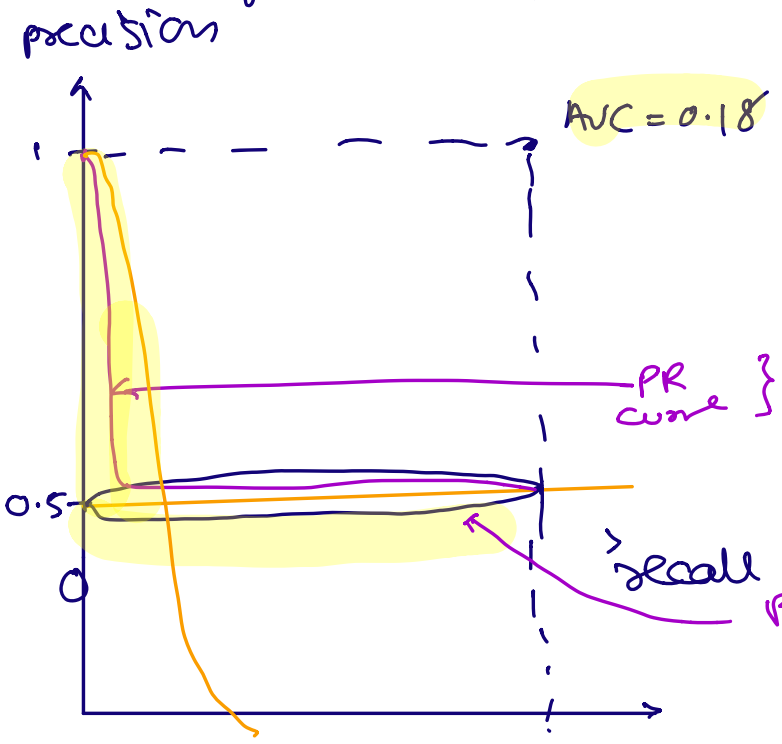
x - axis → Recall

y - axis → Precision



still line
(0, 0.5)
(1, 0.5)

Acceptance



still line
(0, 0.5)
(1, 0.5)

Reject