

Confusion Matrix

A confusion matrix is a table used to describe the performance of a classification model. It compares the predictions with the actual value. The table consists of 4 different combinations of predicted and actual value.

		Actual	
		Negative (0)	Positive (1)
Prediction	Negative (0)	TN	FN
	Positive (1)	FP	TP

Figure 1: Confusion matrix table

- **True Negative (TN)**: We predicted negative and it is actually negative.
- **True Positive (TP)**: We predicted positive and it is actually positive.
- **False Positive (FP)**: We predicted positive but it is actually negative. This is also called as “Type 1 Error”
- **False Negative (FN)**: We predicted negative but it is actually positive. This is also called as “Type 2 Error”

The performance metrics for confusion matrix are *accuracy*, *sensitivity* and *specificity*, which are calculated on the basis of classifier above.

Accuracy represents the ratio of correctly classified points to the total number of points.

$$Accuracy = \frac{TP + TN}{TP + FP + FN + TN}$$

Sensitivity represents the ratio of correctly predicted positive points to all actual positives.

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

Specificity represents the ratio of correctly predicted negative points to all actual negatives.

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