1   Accuracy, Precision and Recall

Accuracy, Precision and Recall are all measures of relevance for a binary classifier. For a binary classifier that classifies instances into positive (1) and negative (0) instances, any single prediction can fall into one of four buckets:

True Positive (TP): The correct label of the given instance is positive, and the classifier also predicts it as a positive

True Negative (TN): The correct label is negative, and the classifier also predicts a negative

False Positive (FP): The correct label is negative, but the classifier incorrectly predicts it as positive

False Negative (FN): The correct label is positive, but the classifier incorrectly predicts it as negative

Figure 1

Lets say you test 20 patients and you want to know whether they have cancer or not. So, we have a simple Table

Patient	Diagnosis=Correct	Diagnosis=Wrong
Cancer	8	2
No cancer	1	9

Based on the above data, we can arrive at:
Probability of patient getting correct diagnosis given he has cancer is
$P\left(\frac{P}{C}\right)$ = True Positive = 8/10

Probability of patient getting wrong diagnosis given he has cancer is

$P\left(\frac{N}{C}\right)$ = False Negative = 2/10

Probability of patient getting wrong diagnosis given he has no cancer is

$P\left(\frac{N}{NC}\right)$ = True Negative = 9/10

Probability of patient undergone correct diagnosis given he has no cancer is

$P\left(\frac{P}{NC}\right)$ = False Positive 1/10

Given a test set that you are evaluating the performance of your classifier over, your predictions will consist of a bunch of TPs, TNs, FPs and FNs. Given these predictions, here is how Accuracy, Precision and Recall are defined:

Accuracy is simply the fraction of the total sample that is correctly identified.

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

Precision is the fraction of the positive predictions that are actually positive.

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

Recall is the measure of how much of positive samples have been identied as such.

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

There are also other additional concepts and can go through references[1].

2 References:

[1] https://www.analyticsvidhya.com/blog/2016/02/7-important-model-evaluation-error-metrics/