

1 Performance evaluation and metrics

When only the wealthy could afford education, tests and exams did not evaluate students' potential. Instead, teachers were judged by parents who wanted to know whether their children had learned enough to justify the instructors' wages. Obviously, this has changed over the years. Now, such evaluations are used to distinguish between high- and low-achieving students, filtering them into careers and other opportunities.

Given the significance of this process, a great deal of effort is invested in developing accurate student assessments. Fair assessments have a large number of questions that cover a wide breadth of topics and reward true knowledge over lucky guesses. They also require students to think about problems they have never faced before. Correct responses therefore indicate that students can generalize their knowledge more broadly.

The process of evaluating machine learning algorithms is very similar to the process of evaluating students. Since algorithms have varying strengths and weaknesses, tests should distinguish among the learners. It is also important to forecast how a learner will perform on future data.

The metrics that you choose to evaluate your machine learning model is very important. Choice of metrics influences how the performance of machine learning algorithms is measured and compared.

Confusion Matrix

The Confusion matrix is one of the most intuitive and easiest metrics used for finding the correctness and accuracy of the model. It is used for Classification problem where the output can be of two or more types of classes.

		Actual value	
		P	N
Prediction outcome	P	True Positive	False Positive
	N	False Negative	True Negative

Figure 1

Terms associated with Confusion Matrix:

True Positives (TP): True positives are the cases when the actual class of the data point was 1(True) and the predicted is also 1(True).

True Negatives (TN) True negatives are the cases when the actual class of the data point was 0(False) and the predicted is also 0(False).

False Positives (FP): False positives are the cases when the actual class of the data point was 0(False) and the predicted is 1(True). False is because the model has predicted incorrectly and positive because the class predicted was a positive one. (1).

False Negatives (FN): False negatives are the cases when the actual class of the data point was 1(True) and the predicted is 0(False). False is because the model has predicted incorrectly and negative because the class predicted was a negative one. (0).

You can also find some more metrics in the references.

References:

<https://towardsdatascience.com/metrics-to-evaluate-your-machine-learning-algorithm-f10ba6e38234>

<https://machinelearningmastery.com/metrics-evaluate-machine-learning-algorithms-python/>