Applied Artificial Intelligence with Python

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Accuracy, Precision, Recall, F1

Confusion Matrix

		Predicted/Classified	
		Negative	**Positive**
Actual	**Negative**	998	0
	Positive	1	1

Confusion Matrix

		Predicted	
		Negative	**Positive**
Actual	**Negative**	True Negative	False Positive
	Positive	False Negative	True Positive

Precision

		Predicted: Negative	Predicted: Positive
Actual	Negative	True Negative	False Positive
	Positive	False Negative	True Positive

True Positive + False Positive = Total Predicted Positive

$$\text{Precision} = \frac{True\ Positive}{True\ Positive + False\ Positive}$$

$$= \frac{True\ Positive}{Total\ Predicted\ Positive}$$

Precision is a good measure to determine, when the costs of False Positive is high.

For instance, email spam detection. In email spam detection, a false positive means that an email that is non-spam (actual negative) has been identified as spam (predicted spam). The email user might lose important emails if the precision is not high for the spam detection model.

Recall

$$\text{Recall} = \frac{True\ Positive}{True\ Positive + False\ Negative}$$

$$= \frac{True\ Positive}{Total\ Actual\ Positive}$$

		Predicted: Negative	Predicted: Positive
Actual	Negative	True Negative	False Positive
Actual	Positive	False Negative	True Positive

True Positive + False Negative = Actual Positive

- **Recall** shall be the model metric we use to select our best model when there is a high cost associated with False Negative.
- If a sick patient (Actual Positive) goes through the test and predicted as not sick (Predicted Negative). The cost associated with False Negative will be extremely high if the sickness is contagious.

F1 Score

- a function of Precision and Recall.
- F1 Score is needed when you want to seek a balance between Precision and Recall

$$F1 = 2 \times \frac{Precision * Recall}{Precision + Recall}$$

https://koopingshung.com/blog/machine-learning-model-selection-accuracy-precision-recall-f1/