

# Applied Artificial Intelligence with Python

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# Accuracy, Precision, Recall, F1

#### **Confusion Matrix**

#### Predicted/Classified

#### Actual

	Negative	Positive
Negative	998	0
Positive	1	1





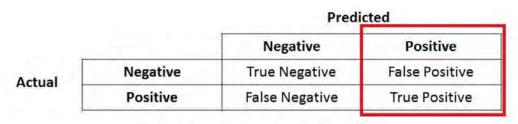
#### **Predicted**

Actual

	Negative	Positive
Negative	True Negative	False Positive
Positive	False Negative	True Positive



### Precision



True Positive + False Positive = Total Predicted Positive

$$Precision = \frac{True \ Positive}{True \ Positive + False \ Positive}$$
$$= \frac{True \ Positive}{Total \ Predicted \ Positive}$$

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.





$$\begin{aligned} \text{Recall} &= \frac{\textit{True Positive}}{\textit{True Positive} + \textit{False Negative}} \\ &= \frac{\textit{True Positive}}{\textit{Total Actual Positive}} \end{aligned}$$

		Predicted		
		Negative	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

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