Confusion Matrix 101

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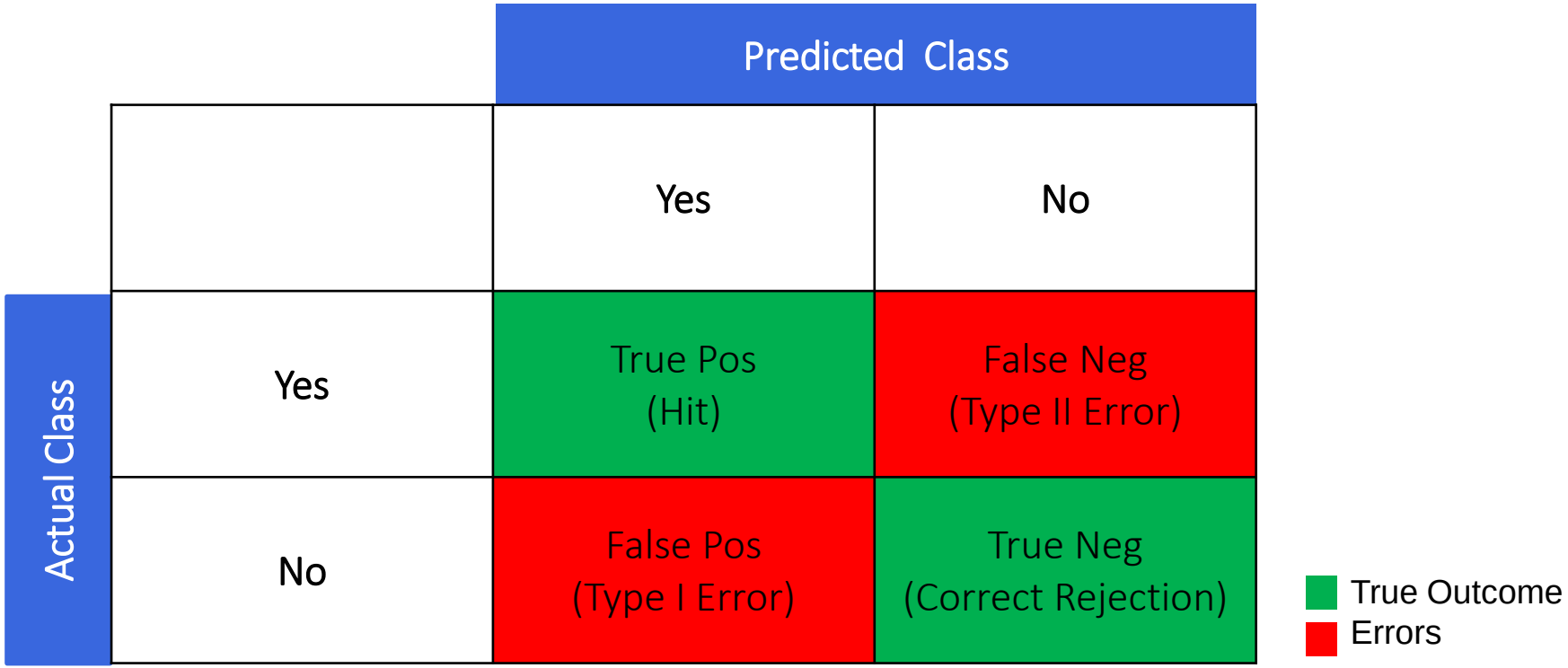
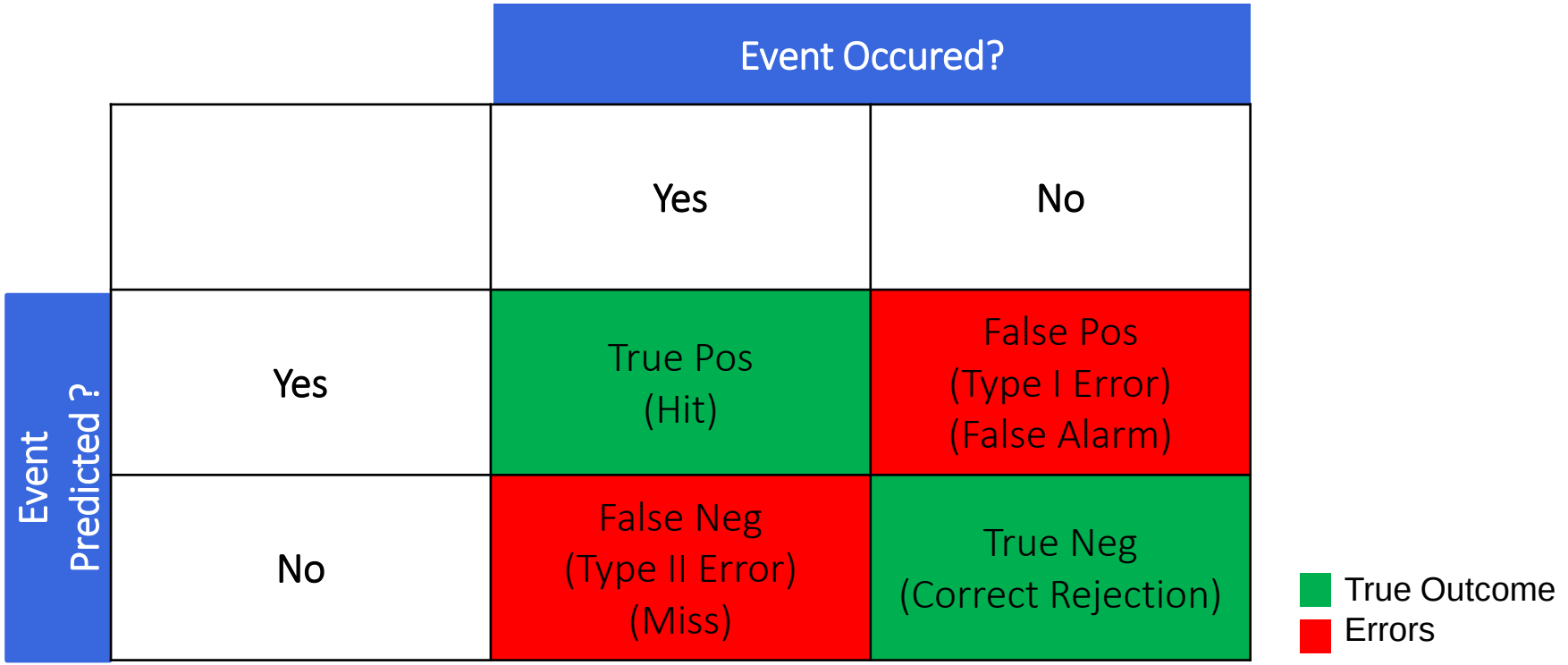
Confusion Matrix

Overview



Confusion Matrix

Example



Confusion Matrix

Example: Tsunami

Event Predicted ?	Event Occured? Yes	Event Occured? No
Yes	Tsunami was observed, when it actually happened	A tsunami was predicted, but there was none
No	There was a tsunami, but it was not predicted.	No tsunami occurred and nothing was Predicted

- True Outcome
- Less-critical Error
- Critical Error

Confusion Matrix

Performance Measures: Accuracy

Numerator

Effect Observed?		Effect Exists? Yes	Effect Exists? No
	Yes	True Pos	False Pos
	No	False Neg	True Neg

Denominator

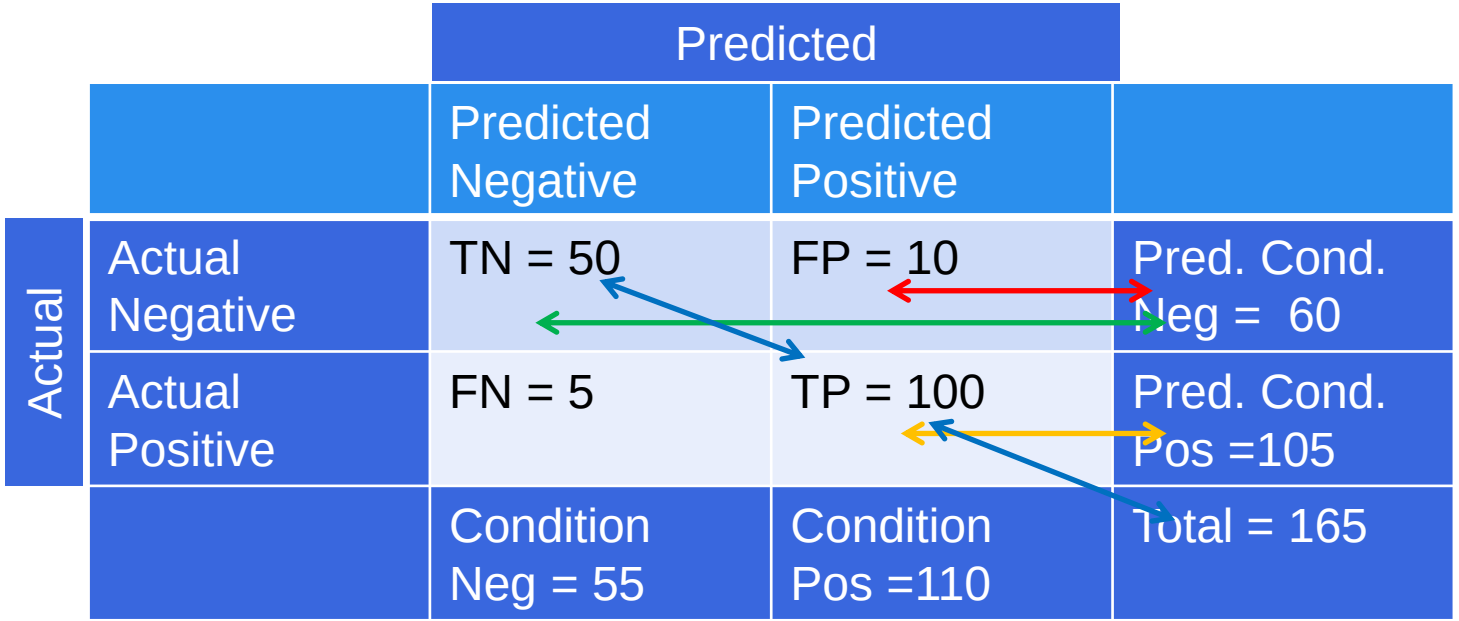
Effect Observed?		Effect Exists? Yes	Effect Exists? No
	Yes	True Pos	False Pos
	No	False Neg	True Neg

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

Usually compared to baseline result or to compare models

Confusion Matrix

Example



TP…True Positive
FP…False Positive
TN…True Negative
FN…False Negative

Confusion Matrix

Performance Measures

Accuracy = (TN+TP)/Total = (100+50)/ 165 = 0.91
…measures correct classifier

Error Rate= 1 – Accuracy = 1 – 0.91 = 0.09
…how often is classifier wrong?

Specificity = TN / Actual NO = 50 / 60 = 0.83
…when actually no,
how often predicted no?

TPR = TP/Actual Pos = 100/105 = 0.95
…when actually yes, how often predicted yes

FPR = FP/Actual Neg = 10/60 = 0.17
…when actually no, how often predicted yes

Precision = TP / Predicted Pos = 100/11 0 = 0.91
…when predicted yes,
how often correct?