Precision and Recall

Precision
Positive Predictive Value

$$\text{Precision} = TP / (TP + FP)$$

"When model says positive, how often is it right?"

Recall
Sensitivity / True Positive Rate

$$\text{Recall} = TP / (TP + FN)$$

"Of all actual positives, how many did we find?"

Focus Comparison

Precision Focus

Predicted Positives

Among what we predicted as positive, how many are correct?

VS

Recall Focus

Actual Positives

Among what is actually positive, how many did we catch?

📊 How They're Calculated from Confusion Matrix

TP True Positive	**FP** False Positive		**Precision** $TP / (TP + FP)$ *Focuses on predicted positives*
FN False Negative	**TN** True Negative		**Recall** $TP / (TP + FN)$ *Focuses on actual positives*

Actual →

Predicted →

⚖️ **The Precision-Recall Tradeoff**

Improving precision often decreases recall and vice versa

High Precision Needed

When false positives are costly

Example: Spam filter

High Recall Needed

When false negatives are costly

Example: Cancer screening