CONFUSION MATRIX

Example: Medical Test for Disease

Suppose we tested 100 people.

- 40 actually had the disease.
- 60 did not have the disease.

Our model's predictions:

	Predicted Positive	Predicted Negative	Total
Actual Positive	TP = 30	FN = 10	40
Actual Negative	FP = 15	TN = 45	60
Total	45	55	100

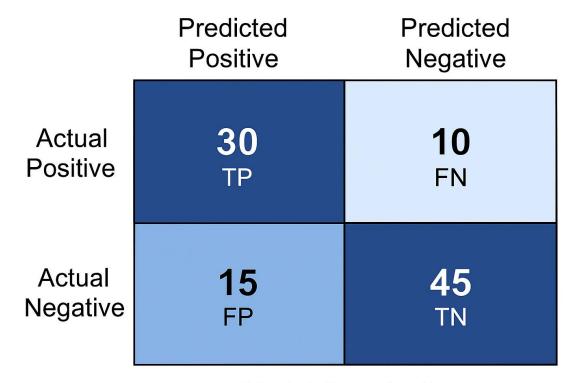
Calculations

- 1. **Accuracy** = (TP + TN) / Total= (30 + 45) / 100 = 0.75 (75%)
- 2. **Error Rate** = 1 -Accuracy = 1 0.75 =**0.25** (25%)
- 3. **Precision (Positive Predictive Value)** = TP / (TP + FP)= 30 / (30 + 15) = 30 / 45 =**0.67 (67%)**
- 4. **Recall (Sensitivity, TPR)** = TP / (TP + FN)= 30 / (30 + 10) = 30 / 40 =**0.75 (75%)**
- 5. Specificity (True Negative Rate) = TN / (TN + FP)= 45 / (45 + 15) = 45 / 60 = 0.75 (75%)
- 6. **F1 Score** = $2 \times (Precision \times Recall) / (Precision + Recall)$ = $2 \times (0.67 \times 0.75) / (0.67 + 0.75)$ $\approx 0.71 \ (71\%)$

Summary of Metrics:

- Accuracy = **75%**
- Error Rate = 25%
- Precision = 67%

- Recall (Sensitivity) = **75%**
- Specificity = **75%**
- F1 Score = **71%**



Model Complexity