

| P | A |      |
|---|---|------|
| 1 | 1 | → TP |
| 0 | 0 | → TN |
| 1 | 0 | → FP |
| 0 | 1 | → FN |

# Confusion Matrix

- For classification problem with a class output, the confusion matrix gives the counts of correct and erroneous predictions:

Handwritten formula for Error Rate:  $\frac{FP + FN}{TP + FP + FN + TN}$

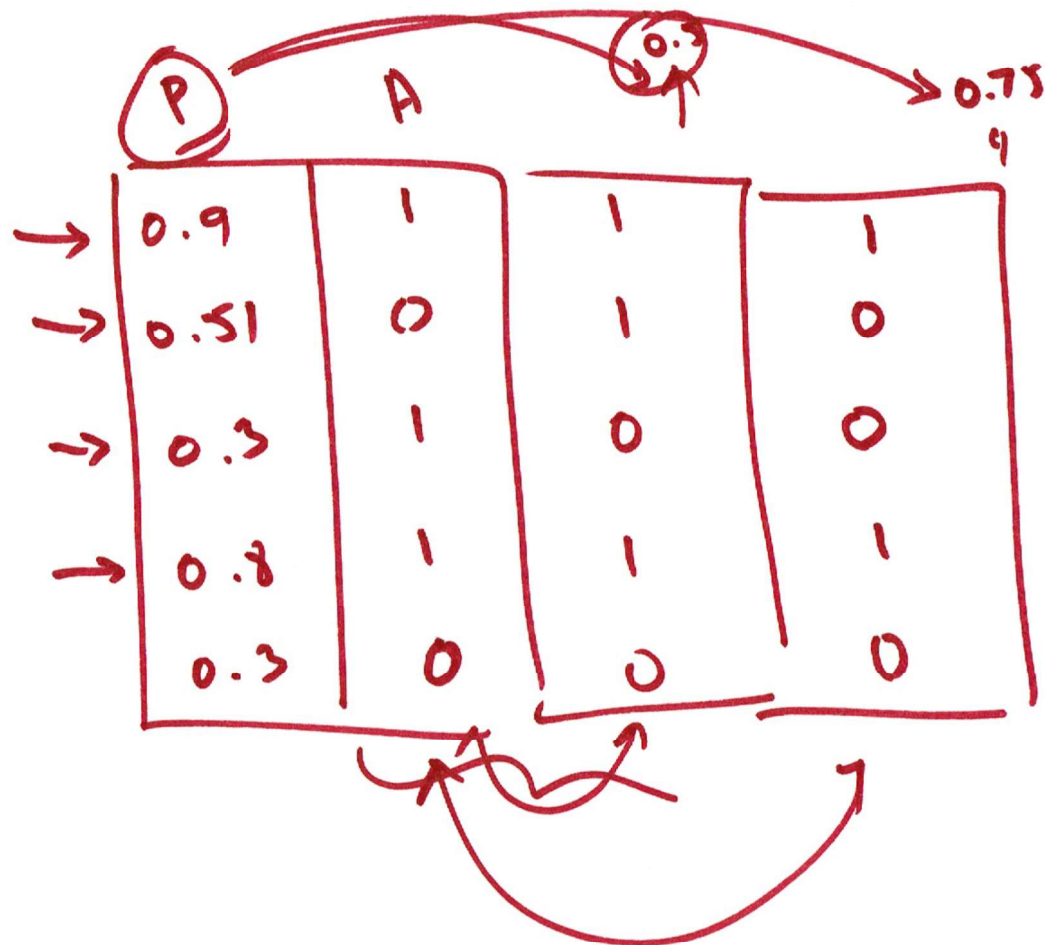
|           |   | Actual |    |
|-----------|---|--------|----|
|           |   | 1      | 0  |
| Predicted | 1 | TP     | FP |
|           | 0 | FN     | TN |

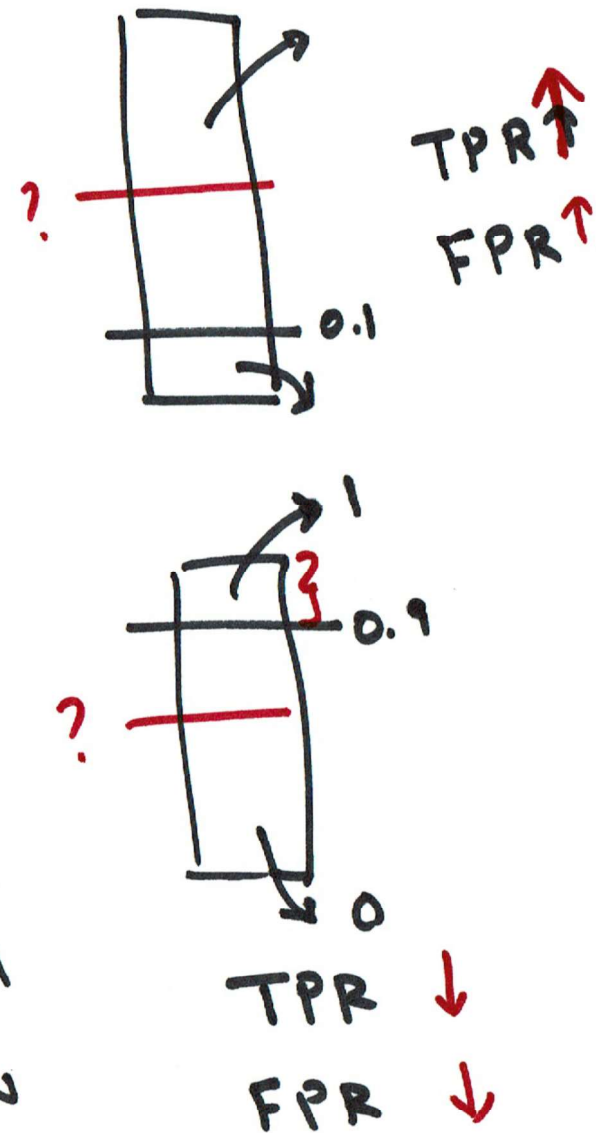
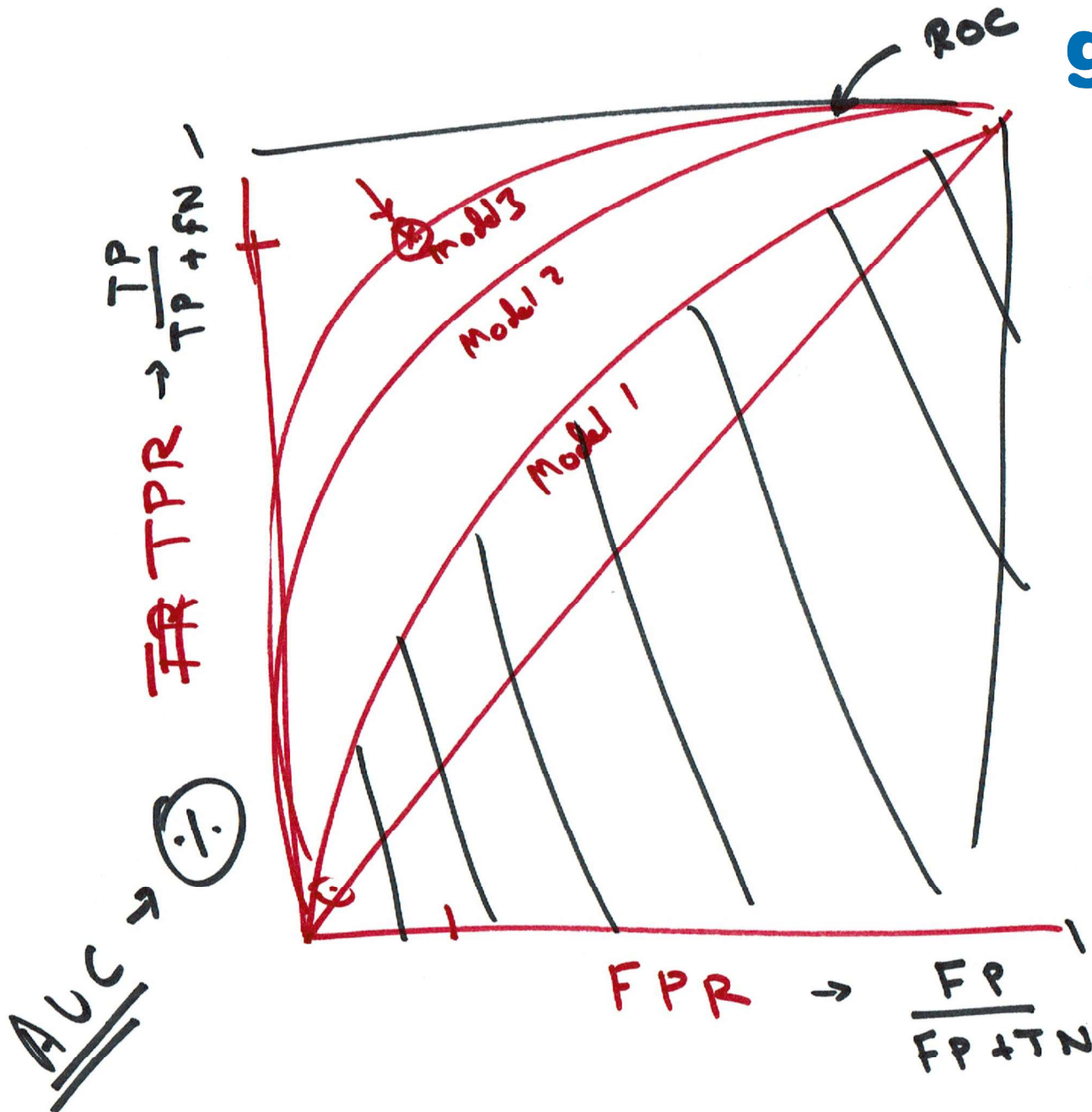
Handwritten annotations: A red box around TP is labeled 'I'. A red arrow points from FP to 'I'. A red arrow points from FN to 'II'. A red arrow points from TN to 'I'. A red arrow points from the Error Rate formula to the 'Error Rate' text in the list below.

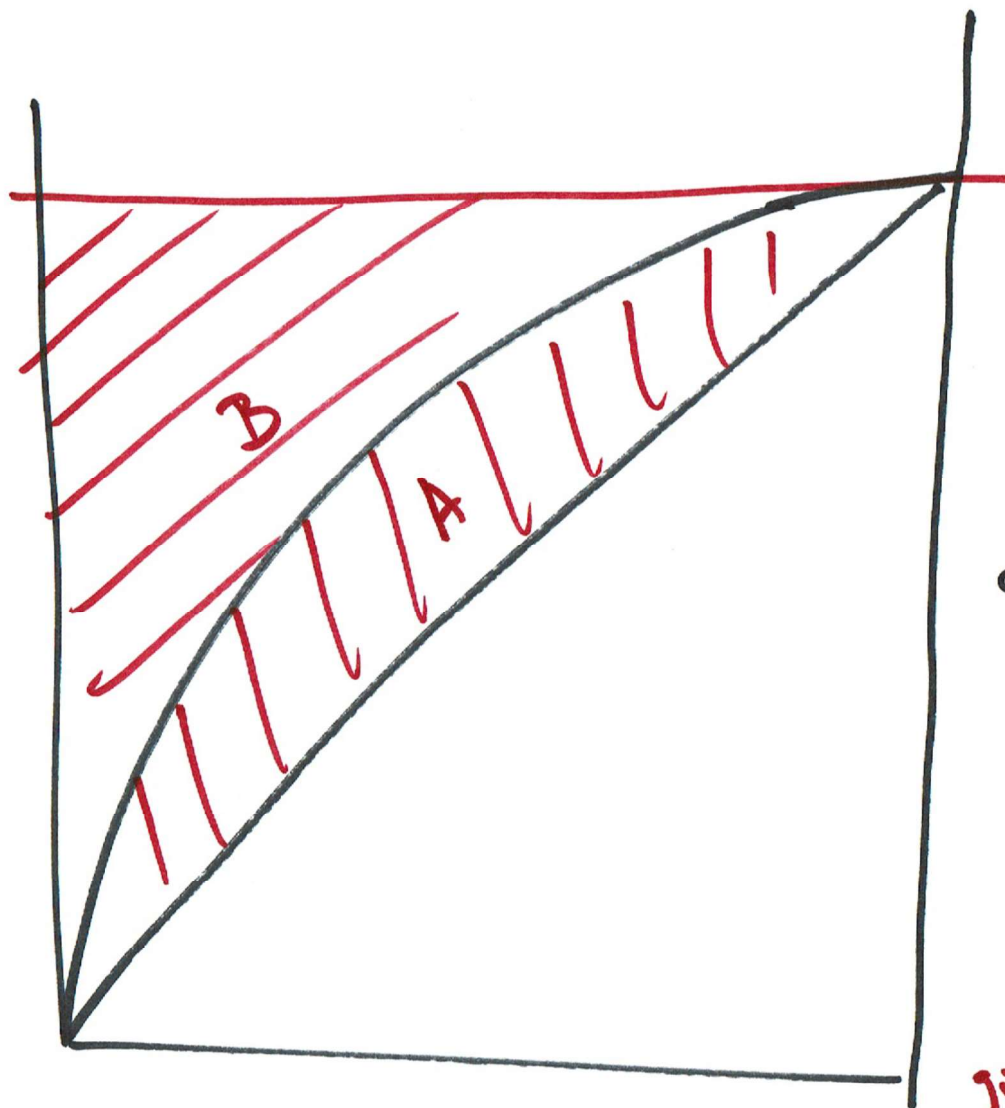
- Classification Error Rate: sum of Type 1 (FP) and Type 2 (FN) Errors (in percentage). Accuracy is 1-(error rate)
- Sensitivity (also called Recall or True Positive Rate): proportion of Total Positives that were correctly identified
- Specificity (also called True Negative Rate): proportion of Total Negatives that were correctly identified

$$\frac{TP}{TP + FN}$$

$$\frac{TN}{TN + FP}$$







~~AC~~

AUC

$$\text{gini coeff} = \frac{A}{A+B}$$

$$A = \text{AUC} - 0.5$$

$$A+B = 0.5$$

$$\text{gini coeff} = \frac{\text{AUC} - 0.5}{0.5}$$

$$\boxed{G_{\text{ini}} = 2\text{AUC} - 1}$$



|   | P   | A |
|---|-----|---|
| { | 0.9 |   |
|   | 0.1 |   |
|   | 0.3 |   |
|   | 0.7 |   |
|   | ⋮   |   |
|   |     |   |

↑

|   | P   | A            |                  |
|---|-----|--------------|------------------|
| 1 | 0.8 | <del>⋮</del> | { $\frac{1}{10}$ |
|   | 0.7 |              |                  |
| 2 | 0.3 |              | { $\frac{1}{10}$ |
|   | 0.1 |              |                  |
|   | ⋮   |              | { $\frac{1}{10}$ |
|   | ⋮   |              |                  |