
DATA SCIENCE

CONFUSION MATRIX

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Confusion Matrix: table to describe the performance of a classifier

n=165	Predicted: NO	Predicted: YES
Actual: NO	50	10
Actual: YES	5	100

Example: Test for presence of disease

NO = negative test = False = 0

YES = positive test = True = 1

- How many classes are there?
- How many patients?
- How many times is disease predicted?
- How many patients actually have the disease?

CONFUSION MATRIX

n=165	Predicted: NO	Predicted: YES	
Actual: NO	TN = 50	FP = 10	60
Actual: YES	FN = 5	TP = 100	105
	55	110	

Basic Terminology:

- True Positives (TP)
- True Negatives (TN)
- False Positives (FP)
- False Negatives (FN)

Accuracy:

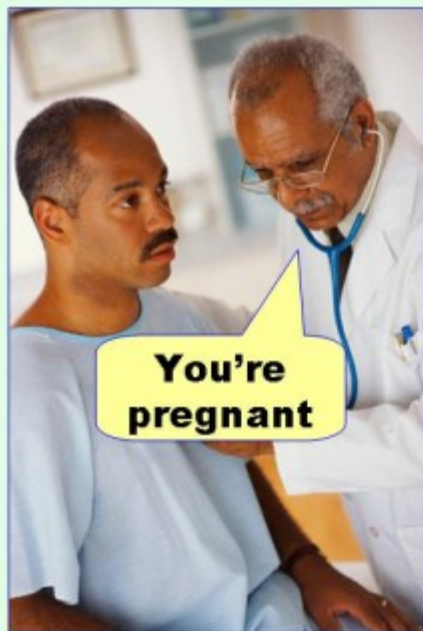
- Overall, how often is it **correct**?
- $(TP + TN) / \text{total} = 150/165 = 0.91$

Misclassification Rate (Error Rate):

- Overall, how often is it **wrong**?
- $(FP + FN) / \text{total} = 15/165 = 0.09$

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Type I error
(false positive)



Type II error
(false negative)



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n=165	Predicted: NO	Predicted: YES	
Actual: NO	TN = 50	FP = 10	60
Actual: YES	FN = 5	TP = 100	105
	55	110	

False Positive Rate:

- When actual value is **negative**, how often is prediction **wrong**?
- $FP / \text{actual no} =$

Specificity:

- When actual value is **negative**, how often is prediction **correct**?
- $TN / \text{actual no} =$

Sensitivity:

- When actual value is **positive**, how often is prediction **correct**?
- $TP / \text{actual yes} = 100/105 = 0.95$
- “True Positive Rate” or “Recall”

Precision:

- When the predicted value is **positive**, how often is prediction **correct**?