<u>Help</u>

SamuelSimao47 v



### Which model is best?

For the two models (Logistic Regression and kNN Classification) trained previously, we can now compute the values for each metric discussed.

### Why is accuracy not enough?

- Imbalanced data: If one class has 99% of the data then a simple model that predicts that class would give us 99% accuracy. Though this indicates that the model trained has high performance, in reality this is not ideal.
- There exist different mistakes for different classes. It is difficult to distinguish between these mistakes.
- Utility: Is accuracy the metric I care about the most?

Predicted Predicted

**Positive** 

Negative

### **The Confusion Matrix**

The **Confusion Matrix** shows the number of correct and incorrect predictions for each class, arranging them by True Negative (upper left), False Positive (upper right), False Negative (bottom left), and False Positive (bottom right).

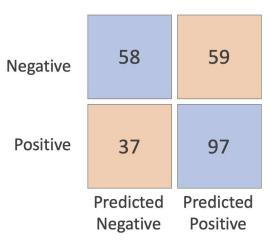
			TRUE NEGATIVE (TN)
Negative	TRUE NEGATIVE	FALSE POSITIVE	<ul> <li>Samples that are negative and that the classifier predicts as negative are called True Negatives.</li> <li>Example: a negative COVID test result would be a TRUE NEGATIVE if you actually don't have COVID.</li> </ul>
Positive	FALSE NEGATIVE	TRUE POSITIVE	
	Predicted Negative	Predicted Positive	
			FALSE POSITIVE (FP)
Negative	TRUE NEGATIVE	FALSE POSITIVE	Samples that are negative and that the classifier predicts as positive are called False Positives.
Positive	FALSE NEGATIVE	TRUE POSITIVE	Example: a positive COVID test result would be a FALSE POSITIVE if you actually don't have COVID.
	Predicted Negative	Predicted Positive	
			FALSE NEGATIVE (FN)
Negative	TRUE NEGATIVE	FALSE POSITIVE	<ul> <li>Samples that are negative and that the classifier predicts as positive are called False Negatives.</li> <li>Example: a negative COVID test result would be a FALSE NEGATIVE if you actually have COVID.</li> </ul>
Positive	FALSE NEGATIVE	TRUE POSITIVE	
	Predicted Negative	Predicted Positive	
			TRUE POSITIVE (TP)
Negative	TRUE NEGATIVE	FALSE POSITIVE	Samples that are positive and that the classifier predicts as positive are called True Positives.
Positive	FALSE NEGATIVE	TRUE POSITIVE	<ul> <li>Example: a positive COVID test result would be a TRUE POSITIVE if you actually have COVID.</li> </ul>

■ Calculator

### Confusion matrix results

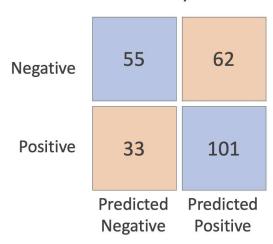
The confusion matrix for each class in the prediction vs. the true label for **Logistic Regression** has results as follows:

Accuracy = 
$$0.62$$



The confusion matrix for each class the prediction vs. the true label for **kNN Classification** has results as follows:

$$Accuracy = 0.62$$



Both models have slightly different confusion matrices, but identical accuracies.

#### Measurements

**ACCURACY** can be expressed in terms of different parts of the confusion matrix as follows:

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

### SENSITIVITY or RECALL or TRUE

**POSITIVE RATE:** This metric helps to examine how we do on the actual TRUE samples:

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

**FALSE NEGATIVE RATE** is used for the same purpose as the previous metric.

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

**TRUE NEGATIVE RATE**: This metric helps us examine how we do on the actual FALSE samples.

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



FALSE NEGATIVE RATE is used for the same purpose as the previous metric.

$$ext{FPR} = rac{FP}{TN + FP}$$

PRECISION is used to evaluate how we do when we predict TRUE.

$$Precision = \frac{TP}{TP + FP}$$

F-1 SCORE is a score that tries to capture all is the F-1 score which is really appropriate for imbalanced datasets.

$${\rm F1\,Score}\,=\,\frac{2\,\cdot\,precision\,\cdot\,recall}{precision\,+\,recall}$$

Based on these formulae, the accuracy for the logistic regression model is 0.62 - and the accuracy for the kNN classification model is also 0.62.

### **Discussion Board (External resource)**

Click OK to have your username and e-mail address sent to a 3rd party application.

ОΚ

Previous

Next >

© All Rights Reserved



### edX

<u>About</u>

**Affiliates** 

edX for Business

Open edX

Careers

**News** 

# Legal

Terms of Service & Honor Code

Privacy Policy

Accessibility Policy

**Trademark Policy** 

<u>Sitemap</u>

Cookie Policy

**Your Privacy Choices** 

## **Connect**

Idea Hub

Contact Us

Help Center

**Security** 

Media Kit



















© 2023 edX LLC. All rights reserved. 深圳市恒宇博科技有限公司 <u>粤ICP备17044299号-2</u>