

Sentiment Analysis With Machine Learning Accuracy

Vocabulary

- **Accuracy** - a measure of how often the model has guessed correctly. There are different ways of evaluating a model, accuracy being one.
- **False Positive** - when your program thinks something is true, but it isn't
- **False Negative** - when your program thinks something isn't true, but it is

Evaluation



Other Metrics for Evaluation

- Accuracy doesn't tell us the whole picture.
- There are different types of mistakes that we can make.
- Take the example of detecting whether there is a fire in your home or not.
- **False Positive (FP)**: When you think there is a fire, but there isn't
- **False Negative (FN)**: When you think there is not a fire, but there is

Other Metrics for Evaluation

	Actual: Yes	Actual: No
Predicted: Yes	True Positive (TP)	False Positive (FP)
Predicted: No	False Negative (FN)	True Negative (TN)

Other Metrics for Evaluation

	Actual: Yes	Actual: No
Predicted: Yes	True Positive (TP)	False Positive (FP)
Predicted: No	False Negative (FN)	True Negative (TN)

This table, when filled in with actual numbers, is called a **confusion matrix**

Evaluation Example

Actual	Predicted	TP/FP/TN/FN?
Fire	Fire	
No Fire	No Fire	
Fire	Fire	
No Fire	Fire	
Fire	Fire	
No Fire	Fire	
Fire	No Fire	
No Fire	Fire	
No Fire	No Fire	
No Fire	No Fire	



Evaluation Example

Actual	Predicted	TP/FP/TN/FN?
Fire	Fire	TP
No Fire	No Fire	TN
Fire	Fire	TP
No Fire	Fire	FP
Fire	Fire	TP
No Fire	Fire	FP
Fire	No Fire	FN
No Fire	Fire	FP
No Fire	No Fire	TN
No Fire	No Fire	TN



Other Metrics for Evaluation

- **Precision:** Probability that a positive prediction is correct, $TP / (TP + FP)$
- **Recall** (or Sensitivity): Probability that an actual positive outcome is predicted correctly, $TP / (TP + FN)$
- **Specificity:** Probability that an actual negative outcome is predicted correctly, $TN / (TN + FP)$
- **F1 Score:** Combination of precision and recall,
 $(2 * Precision * Recall) / (Precision + Recall)$

Evaluation Example

Precision: $TP / (TP + FP) = ?$

Recall: $TP / (TP + FN) = ?$

Specificity: $TN / (TN + FP) = ?$

F1 Score: $(2 * P * R) / (P + R) = ?$

Accuracy? **6/10** or **60%**

TP: 3	FP: 3
FN: 1	TN: 3

Evaluation Example

Precision: $TP / (TP + FP) = 3/6 = 50\%$

Recall: $TP / (TP + FN) = 3/4 = 75\%$

Specificity: $TN / (TN + FP) = 3/6 = 50\%$

F1 Score: $(2 * P * R) / (P + R) = 60\%$

Accuracy? **6/10** or **60%**

TP: 3	FP: 3
FN: 1	TN: 3

ACTIVITY SLIDE

1. Choose an article on a topic you care about.
 - Do you consider this article to be positive, negative, or neutral on this topic? Give it your own subjectivity and polarity scores.
 - Run it through the program; did it come out positive or negative? How close was it to your guessed numbers?
2. Do this again a few more times with other articles
 - How often did it think the same thing you did?
3. What words / phrases seemed to make it decide one thing or another?
4. Did it call things “positive,” “negative,” or “neutral” more often incorrectly? Where did this incorrectness come from?

Debrief

- What was your topic? How accurate was your program?
- Did your program have more false positives or negative? Why do you think that is?

Exit ticket: Unit 4.03 - Accuracy

A program correctly identified 97 people as having skin cancer. It correctly identifies 395 people as not having skin cancer. It incorrectly identifies 3 more as having skin cancer, when they actually don't. It also says 5 people who actually have skin cancer don't. What is the accuracy of this program? Would you use it?


