Day 10 - K Nearest Neighbors and Evaluating Classification Models

Oct. 8, 2020

CMSE

Administrative

- **Homework 3** will be assigned Friday 10/9 and due Friday 10/23
- **Midterm** will be given Thursday 10/29 in class
- Please complete this MidSemester survey: www.egr.msu.edu/mid-semester-evaluation (https://www.egr.msu.edu/mid-semester-evaluation)

From Pre-Class Assignment

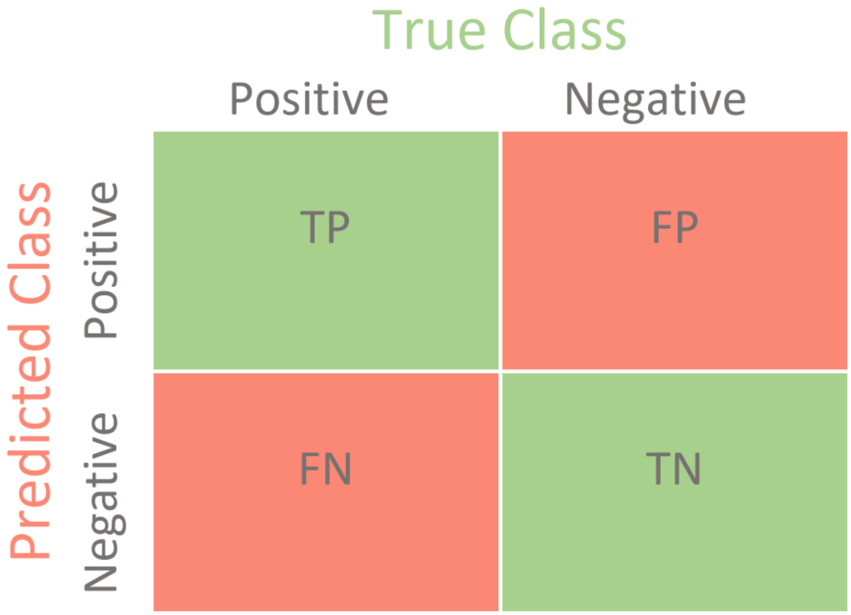
Useful Stuff

- Videos were useful, but they were a little long
- I have a better idea of how we are evaluating classification models

Challenging bits

- There's so much terminology, do I have to remember it all?
- I'm still confused about the ROC and what it is doing.
- How is KNN a binary classifier?

The Confusion Matrix



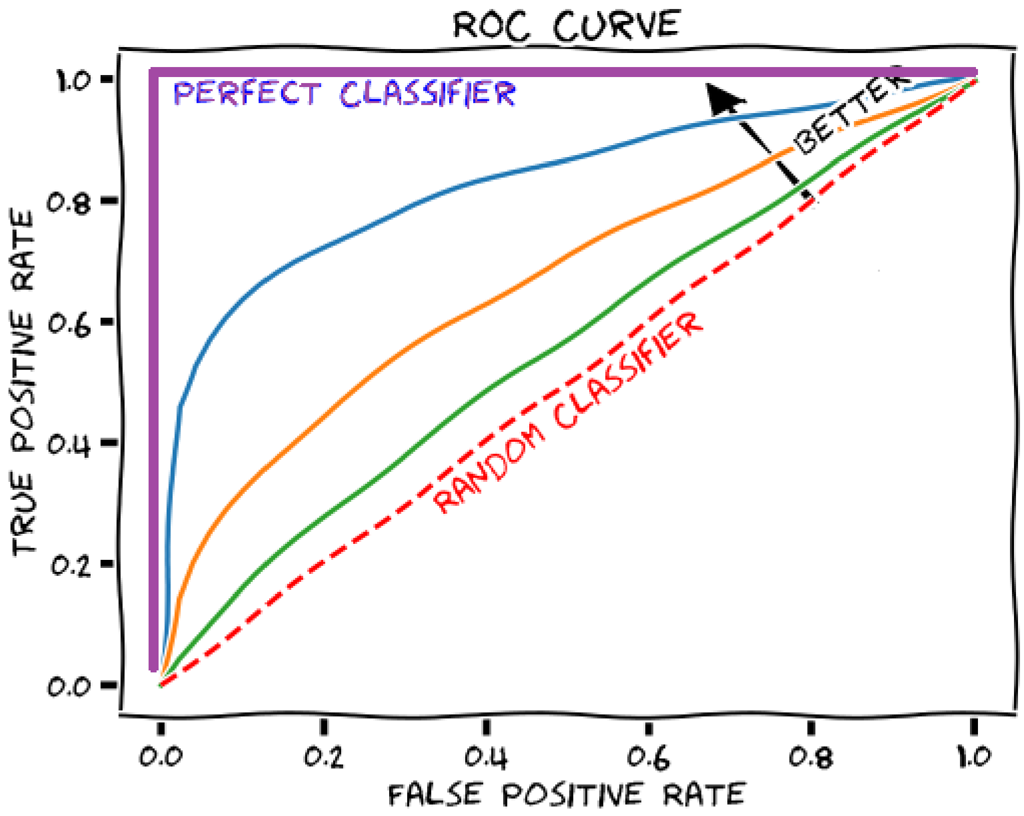
		True Class	
		Positive	Negative
Predicted Class	Positive	TP	FP
	Negative	FN	TN

```
from sklearn.metrics import confusion_matrix
confusion_matrix(y_true, y_predicted)
```

Other Metrics

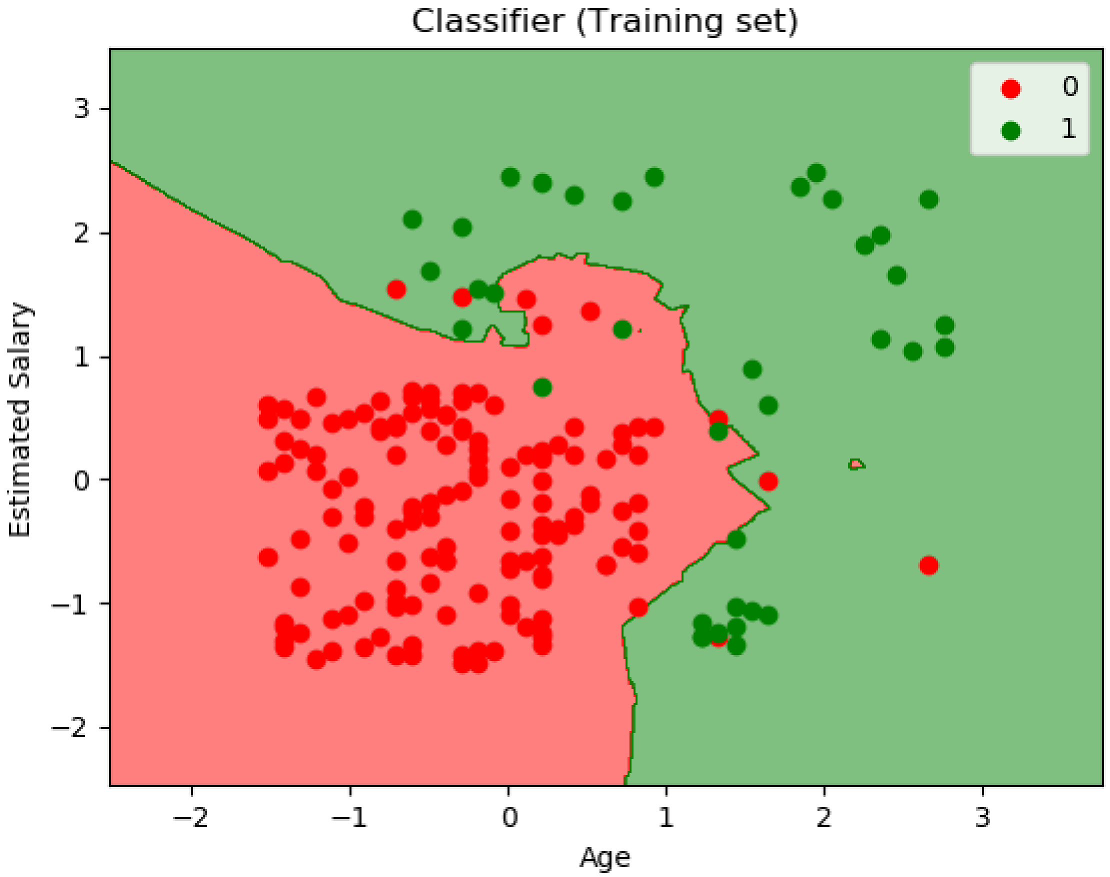
- Sensitivity (Recall): The ratio of True Positives to all True Cases $\dfrac{TP}{TP + FN}$
- Specificity: The ratio of True Negatives to all True Cases $\dfrac{TN}{TN + FP}$
- Precision: The ratio of True Positives to all Predicted Positives: $\dfrac{TP}{TP + FP}$
- F_1 Score: A balanced measure (0 to 1) that includes sensitity and recall: $\dfrac{2TP}{2TP + FP + FN}$

ROC Curve and AUC



```
from sklearn import metrics
fpr, tpr, thresholds = metrics.roc_curve(y_true, y_predict)
roc_auc = metrics.auc(fpr, tpr)
plt.plot(fpr, tpr)
```

KNN as a Binary Classifier



A Heads Up for Today

Working with Pima Diabetes Database, which has problems (zeros for various entries). We have given you a cleaned data set on D2L (you will need to download it again!).

You can skip 2.1 and 2.2 today and go to 2.3; we will discuss how to clean that data after class.

Questions, Comments, Concerns?