Location, Location, Location

Using Machine Learning to determine the city a tweet was sent from

Twitter is used by many people around the world. The idea that we can identify where a tweet was sent from purely based by what the tweet says seems like a pretty tall order.

Classifying using Language

In order to do this, I'll be using a Naïve Bayes classifier. This classifier is based on Bayes' Theorem. It's simple, but effective. Naïve Bayes will look at the features provided to determine the most likely class to place it in. Think of your email spam filter, which also uses this classifier!

For this to work correctly, we need to look at how language is used differently in the three locations considered: New York, London, and Paris. New York and London are both in English speaking countries, while Paris is in a French speaking country. Knowing this, what will tell apart a New York tweet from a London tweet are the words used in the tweet itself.

The model and Score

After combining all the data together and training the model using part of it, the classifier can be scored on how well it has done. For the data provided, the model is correctly classifying 67% of the tweets.

Digging deeper, the model can be further evaluated by looking at the confusion matrix. The confusion matrix is a table that describes how well the classifier made its predictions.

	New York	London	Paris
New York	541	404	28
London	203	824	34
Paris	38	103	340

The classifier correctly classified 541 tweets from New York as tweets from New York, but also thought that 404 London tweets and 28 Paris tweets were also from New York.

The classifier correctly classified 824 tweets from London as tweets from London, but also thought that 203 New York tweets and 34 Paris tweets were also from London

The classifier correctly classified 340 tweets from Paris as tweets from Paris, but also thought that 38 New York tweets and 103 London tweets were also from Paris.

Testing some custom tweets

For fun, I threw two completely original tweets at the classifier to see what it would guess:

"Just got back from my trip. The Statue de la Liberté was neat!"

"La statue de la liberté est incroyable! What a fun time!"

Since I saw how much language played a role in classification, I thought it would be interesting to try to "trick" the classifier by including both French and English in the same tweet to see what it would do. Tweet 1 was classified as from New York and Tweet 2 was classified as from Paris. This is the correct outcome for both tweets.

This is important to know since I wasn't sure if just the inclusion of French would make the classifier automatically think that this must be from Paris.