**Assignment 3: Multinomial Naïve Bayes for Fake Review Detection**By Shivani Sanjay Mahaddalkar

The analysis involves two tasks:  
1. Predicting whether the review is a positive or a negative  
2. Predicting whether the review is a true or a false one.

**Task 1:** Sentiment prediction

Using 5-fold cross validation, we compare the average scores of different vectorizers. We pick the vectorizer with the highest average score. Tfidf vectorizer is used which removes stop words. Using that vectorizer we train the model using 60% of the data and test on the remaining 40% of the data.

The top ten features for positive and negative reviews are:

|  |  |
| --- | --- |
| Negative Features | Positive Features |
| Terrible | Japanese |
| Asked | Nice |
| Bad | Great |
| Minutes | Atmosphere |
| Took | Friendly |
| Come | Noodle |
| Said | Need |
| Indian | Fresh |
| Did | Amazing |
| Came | Best |

|  |  |  |
| --- | --- | --- |
| Confusion Matrix: | Predicted Negative | Predicted Positive |
| Actual Negative | 17 | 1 |
| Actual Positive | 3 | 16 |

Accuracy: 0.89

|  |  |  |  |
| --- | --- | --- | --- |
|  | precision | recall | f1-score |
| N | 0.85 | 0.94 | 0.89 |
| P | 0.94 | 0.84 | 0.89 |

False Positive:  
‘Carlo\'s Plate Shack was the worst dining experience of my life. Although my Southern Comfort Plate sounded to die for, the staff was extremely unhelpful at every turn. We started off with drinks, I had a sick Loganberry milkshake, and my friends had fresh brewed, but bland, iced tea (the ice likely melted and diluted). Eventually our server returned a half hour later to take our orders…’  
False Negative:  
‘Ruby Tuesday is my favorite America Style Restaurant. The salad is awesome. And I like the baby pork ribs so much . So does the coconut shrimp’

**Task 2:** Fake review detection

Using 5-fold cross validation, we compare the average scores of different vectorizers. We pick the vectorizer with the highest average score. Tfidf vectorizer is used which removes stop words. Using that vectorizer we train the model using 60% of the data and test on the remaining 40% of the data.

The top ten features for false and true reviews are:

|  |  |
| --- | --- |
| False Features | True Features |
| Want | People |
| Steak | Environment |
| Plate | Tables |
| Bring | Say |
| Free | Thing |
| Price | Finish |
| Casino | Flies |
| Definitely | Worst |
| Delicious | Glass |
| Coming | Did |

|  |  |  |
| --- | --- | --- |
| Confusion Matrix: | Predicted False | Predicted True |
| Actual False | 15 | 2 |
| Actual True | 14 | 6 |

Accuracy: 0.57

|  |  |  |  |
| --- | --- | --- | --- |
|  | precision | recall | f1-score |
| F | 0.52 | 0.88 | 0.65 |
| T | 0.75 | 0.30 | 0.43 |

Fake review predicted to be true:  
OMG. This restaurant is horrible. The receptionist did not greet us, we just stood there and waited for five minutes. The food came late and served not warm..  
True review predicted to be fake:  
This place used to be great. I can't believe it's current state. Instead of the cool, dimly-lit lounge that I was used to, I was in a cheap, smelly bar..