Each group is also required to write a report about what you have done for project 2 (you can start writing now if you want). The deadline is Sunday, May 6. The report in pdf should not be more than 5 pages long (single space, 12pt font). It should have the following sections:

Abstract

Introduction

Techniques (data pre-processing, features used, classification methods tried).

**Evaluation:** (results from different methods)

We applied normal sentiment analysis without considering the aspect term to get a base line model for comparing with aspect-based sentiment analysis models.

Few models that we tried were Naïve Bayes, Adaboost, SVM. SVM gave the best accuracy for normal sentiment analysis and hence we chose that model to train for aspect-based sentiment analysis. Then we performed neural network model which improved the accuracy and F1-score. The evaluation was done using 10-fold cross validation.

**Normal Sentiment Analysis:**

Data 1 (2313, 2969), Data 2(3602, 3614)

Classifier: Linear SVM with count vectorizer (No aspect term considered) (with 70, 30 partition and 10-fold cross validation)

|  |  |  |  |
| --- | --- | --- | --- |
| **Target Class** | **Precision** | **Recall** | **F-score** |
| **0** | 60% | 61% | 61% |
| **1** | 48% | 42% | 45% |
| **-1** | 83% | 86% | 84% |
| **Average** | 72% | 73% | 72% |
| **Overall Accuracy** | **72.52%** | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Target Class** | **Precision** | **Recall** | **F-score** |
| **0** | 73% | 75% | 74% |
| **1** | 53% | 44% | 48% |
| **-1** | 76% | 81% | 79% |
| **Average** | 71% | 72% | 71% |
| **Overall Accuracy** | **71.61%** | | |

Data 1 (2313, 2960), Data 2 (3602, 3614)

Classifier: Linear SVM with weight vector (Aspect term considered) (10-fold cross validation)

|  |  |  |  |
| --- | --- | --- | --- |
| **Target Class** | **Precision** | **Recall** | **F-score** |
| **0** | 78% | 70% | 74% |
| **1** | 39% | 59% | 47% |
| **-1** | 83% | 78% | 80% |
| **Average** | 75% | 72% | 73% |
| **Overall Accuracy** | **72.30%** | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Target Class** | **Precision** | **Recall** | **F-score** |
| **0** | 49% | 60% | 54% |
| **1** | 31% | 52% | 39% |
| **-1** | 90% | 76% | 82% |
| **Average** | 76% | 70% | 72% |
| **Overall Accuracy** | **70.32%** | | |

Data 1 (2311, 2961), Data 2 (3602, 3614)

Classifier: Feed forward neural network with weight vector (10-fold cross validation)

|  |  |  |  |
| --- | --- | --- | --- |
| **Target Class** | **Precision** | **Recall** | **F-score** |
| **0** | 73% | 77% | 75% |
| **1** | 63% | 43% | 51% |
| **-1** | 77% | 84% | 81% |
| **Average** | 73% | 73% | 73% |
| **Overall Accuracy** | **73.47%** | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Target Class** | **Precision** | **Recall** | **F-score** |
| **0** | 65% | 62% | 64% |
| **1** | 60% | 37% | 45% |
| **-1** | 81% | 92% | 86% |
| **Average** | 74% | 76% | 74% |
| **Overall Accuracy** | **75.62%** | | |

**Conclusion:**

In this project, we performed aspect-based sentiment analysis on two datasets (Restaurant and laptop review datasets) using weight vector as the features, calculated based on the word distance from the aspect term. We pre-processed the data by removing stop words and punctuation. We applied machine learning models, linear SVM and feed forward neural network, and found that neural network model had a better overall accuracy and F1 score than SVM.

Our models worked best on data instances with negative class and poor on data instances with positive class. For future work, the model should be trained on more data and a deeper neural network model like LSTM RNN should be used for better performance.

**References:**

Boiy, E. and Moens**,** MF. 2009. A machine learning approach to sentiment analysis in multilingual Web texts. Inf Retrieval (2009) 12: 526.

Zhang L., Liu B. 2016. Sentiment Analysis and Opinion Mining. In: Sammut C., Webb G. (eds) Encyclopedia of Machine Learning and Data Mining. Springer, Boston, MA