

Homework 1

*Lecturer: Dr. Fei Liu**Due: Wednesday, 2/1 11:59PM EST*

Note: Homework modified from Lisbon machine learning summer school.

1.1 Text Classification and Naive Bayes (15 points)

The goal of this assignment is for you to gain familiarity with the **multinomial Naive Bayes classifier**. Specifically, you will look into an existing Python-based implementation and fill out the missing code block to gain an understanding of applying multinomial Naive Bayes to text classification.

In the homework package (HW1.tar.gz), you are provided with the starter code and a dataset. The code was written in Python 3.11 and numpy. If you would like to install this programming environment, please go to <https://www.continuum.io/downloads>. Download the Anaconda version (with Python 3.11) that is compatible with your operating system. The installation instructions are available at <http://docs.continuum.io/anaconda/install>. Installing Anaconda will install both Python 3.11 and numpy.

There are two data files in the package: `positive.review` and `negative.review`. They correspond to positive and negative book reviews. The text has been preprocessed so that each line contains a review document; each token (e.g., `year:2`) represents a word and its frequency in the document. The last token (e.g., `#label#:negative`) in each line indicates the polarity (label) of the document.

The starter code includes four files: `linear_classifier.py`, `multinomial_naive_bayes.py`, `run_classifier.py`, `sentiment_reader.py`. The functionality of the files should be self-evident.

- (10 points) The file `multinomial_naive_bayes.py` currently has a missing code block. Search `TODO` in the file and you will find the missing block. Your task is to fill out the missing code. Upon successful completion of the code, you will run `python run_classifier.py` and this will return the following results: Accuracy on training set: 0.972500, on test set: 0.835000.
- (5 points) The starter code randomly chooses about 80% the documents to form the training set and the rest as test set. Modify the code so that the train/test split is 50%/50%. After that, run `python run_classifier.py` and report the returned results.

Please submit: A report named `report_firstname.lastname.pdf`. Copy and paste to the report: 1) the missing code block you filled in, and 2) the returned result after modifying the train/test splits.