



Sentimental Analysis of Restaurant Review

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Abstract

Sentimental Analysis is a part of the Natural Language Processing which deals with extracting the hidden sentiment (opinion and subjectivity) lying in the text. For computing machines, it's quite difficult to find the hidden sentiment, so Machine Learning algorithms play a role in extracting the sentiment from the text. In this paper, we will be discussing the different classifying algorithms for sentimental analysis while using the restaurant reviews as our primary data. We had used Naïve Bayes as base line model. We also compared our results with the other classifying algorithm. The goal of our project is to build a classifier that classifies the review of customer into positive and negative classes based on the text.

Goal

The main goal of our project is to use the textual review given by the customer to predict the numerical ratings (Positive or Negative). We would be using the supervised learning algorithms for prediction of ratings/sentiment (Positive or Negative) using free text of reviews. The algorithms we would be using include Multiclass Naïve Bayes, SVM. We had used classification report of scikit to evaluate our results. For feature selection we defined our own feature set by removing the stop words, punctuation marks and tokenizing the text. We will be discussing the algorithm used in detail further in the report. We would also be comparing our results with non-machine learning methods.

Models

Multinomial Naïve Bayes: Naive Bayes classifiers are a family of simple "probabilistic classifiers" based on applying Bayes' theorem with strong (naive) independence assumptions between the features.

SVM: A Support Vector Machine (SVM) is a discriminative classifier formally defined by a separating hyperplane. In other words, given labeled training data (supervised learning), the algorithm outputs an optimal hyperplane which categorizes new examples.

Vader Sentimental Analysis: Non Machine learning method that calculates the Sentiment based on lexicon of words.

Dataset

The data we used in this experiment was provided by Yelp which is available at <https://www.yelp.com/dataset/challenge>. The yelp dataset contains approximately 1,569,264 business reviews. The dataset used by us for this experiment consisted of Restaurant reviews. Since they are too large in number too, so we ran our Algorithms on the sample size of 10,000.

Results

For each of the algorithm, we calculated the results on the dataset of 10,000 while splitting the data into 0.7 training and 0.3 testing part. The results are shown below:

Model	Precision	Recall	F1-Score
Naïve Bayes	0.93	0.93	0.93
SVM	0.90	0.90	0.90
Vader	0.92	0.93	0.92

Features

Naive Bayes:
Uni-gram
Bi-gram
Tri-gram
SVM:
Binarized Form

Discussion

We got the best precision for positive reviews from the Naïve Bayes using Uni-gram and selecting the top max features. For the negative reviews, we got maximum precision using the Uni-gram and without removing the stop words. The recall was maximum for both positive and negative reviews using the Uni-gram representation of the feature vector. Moreover, when bigram and trigram were used as feature vector, we observed a drop in the precision and recall of the algorithms. The results of SVM were not bad, but we got a bit less precision and recall using SVM for both negative and positive reviews. The results obtained using the non-machine learning method i.e. Vader sentimental analysis surprised us with its result. The results were equally good as Naïve Bayes

Conclusions

We had used different Supervised learning algorithms i.e. Naïve Bayes and SVM for classifying the Textual reviews of yelp dataset into positive and negative reviews. We had used precision and recall as our evaluation metrics. We got the highest precision and accuracy for Naïve Bayes after removing stop words and selecting top max features. Future research could use the sentimental emotions (funny, useful and cool) for more accurate analysis of the textual reviews. This could help us to know how others user feel about the review. Moreover, this experiment was specifically for restaurant, other business reviews sentimental analysis could be done while combining the business specifics for better results.

References

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