A Comparison of Sentiment Analysis Algorithms for Online Reviews on E-Commerce Websites

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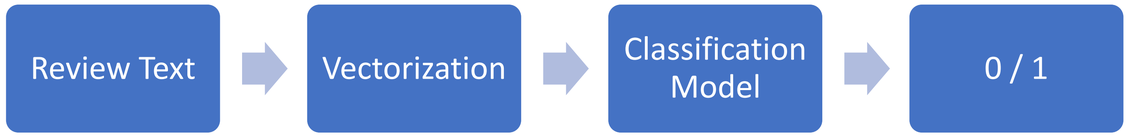
Introduction

- Online reviews are valuable!
- NLP can help us extract information from textual data!
- Curious: Given a review, is the machine smart enough to tell
  1. whether the reviewer would recommend the product
  2. whether the reviewer gives a positive rating score or a negative one
- Dataset: Women's E-commerce Clothing Reviews



Data Pre-process

- Data cleaning: no punctuation, stop words, or data missing
- Tokenisation
- Bag-of-words: for SVM and Naïve Bayes
- Vectorisation
- Word-embedding (GloVe): for RNN

Evaluation

For the model estimation, the metrics we used include confusion matrix, F1-score and AUC score.

Results

- Bidirectional RNN-LSTM achieved the best performance overall
- Imbalanced dataset reduces the prediction accuracy for negative classes
- Naïve Bayes and SVM produced good results despite the independent assumption condition not being satisfied

Table 2: Result of different models for recommendation prediction, the F1-score(P) means the F1-score for the positive class

model	F1-score(P)	F1-score(N)	AUC score
Naive Bayes	0.93	0.66	0.800
SVM	0.91	0.65	0.816
RNN	0.94	0.7	0.777

Table 3: Result of different models for sentiment prediction, the F1-score(P) means the F1-score for the positive class

model	F1-score(P)	F1-score(N)	AUC score
Naive Bayes	0.96	0.68	0.806
SVM	0.94	0.64	0.814
RNN	0.96	0.66	0.813

Models

- Three underlying models:
  - SVM
  - Naïve Bayes
  - Bidirectional RNN with LSTM
- Two classifiers:
  1. Predicting whether the reviewer recommended the product or not
  2. Classifying the rating score the reviewer gave

Conclusion

Compared the performance of three different models with two different ways of feature engineering on the sentiment classification.

- Future work:
  - Handle the imbalance of the dataset
  - Build an ensemble classifier using majority voting
  - Perform grid search of parameters to find the optimal model