AMAZON REVIEW SENTIMENT ANALYSIS

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OUTLINE

- BUSINESS AND DATA UNDERSTANDING

- MODELING

- RESULTS

- CONCLUSION

- NEXT STEPS

BUSINESS UNDERSTANDING

- Sentiment analysis is one the of the most important tasks to understand user satisfaction.

- Most websites that offer products and services have various means of keeping track of user satisfaction criteria, such as stars-based system.

- However, most users are disincentivized to provide accurate rating for the products or services they purchased. In addition, manually sorting through users' comments to determine if the comments left by users/clients is positive or negative takes a lot of work.

- Therefore, the problem necessitates an automated way to determine sentiment analysis of clients.

DATA UNDERSTANDING

- The data used in this project was obtained from Kaggle.

- The dataset contains four million comments (3.6 million training and 0.4 million test datasets).

- The files are presented in fastText format, which will be parsed to the required type of data for processing.

- Both the training and test datasets are labeled, which will help in quantify how the predictions measure with true labels.

MODELING

- Text data was cleaned
  - De-contracted
  - Spell checked
  - Email and URL removed
  - Lemmatized and tokenized
- Models used
  - Shallow ML (naïve Bayes, logistic regression and random forest)
  - Gradient Boost (XGBoost and CatBoost)
  - Deep Learning (LSTM, LSTM with GloVe and DistilBert tokenized CNN)

RESULTS

precision	accuracy	recall	f1	auc	roc_auc
0.908266	0.91399	0.921	0.914589	0.970818	0.91399
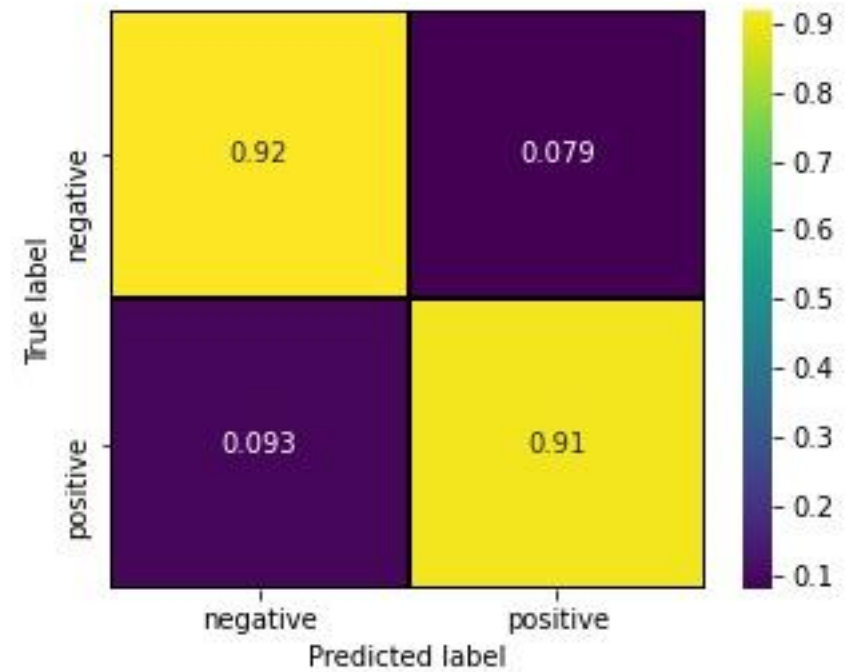
FINAL MODEL

LSTM model achieved 91.4% accuracy on a test dataset

Left panel:

Prediction probabilities
negative 0.01
positive 0.99

negative | positive

highly 0.11
comfortable 0.05
recommend 0.04
well 0.04
made 0.03
Men 0.03
important 0.03
would 0.02
fabric 0.01
could 0.01

Text with highlighted words

Gildan Men's Crew T-Shirts are very comfortable very well made and I would highly recommend them I wear a lot of white shirts and comfort bility and the style and fabric of the shirt is very important to me I Used to always Hans but they've got to be very expensive and I don't mind the price but the quality has also been reduced but Gildan Men's Crew T-Shirts Suppress my expectations and if I could give them a 10 star I would I would highly recommend

Right panel:

Prediction probabilities
negative 0.99
positive 0.01

negative | positive

buying 0.08
hole 0.07
suggest 0.06
rough 0.06
ever 0.05
multiple 0.05
arm 0.05
say 0.04
believe 0.04
shirts 0.03

Text with highlighted words

The shirts say they are 100% Cotten but I don't believe I have ever felt such rough scratchy cotton. I have had these shirts for a few weeks now and they have been washed multiple times and are still scratchy. I also put one on this morning and it has a hole in the arm pit. I would not suggest buying these and I will not buy them again.
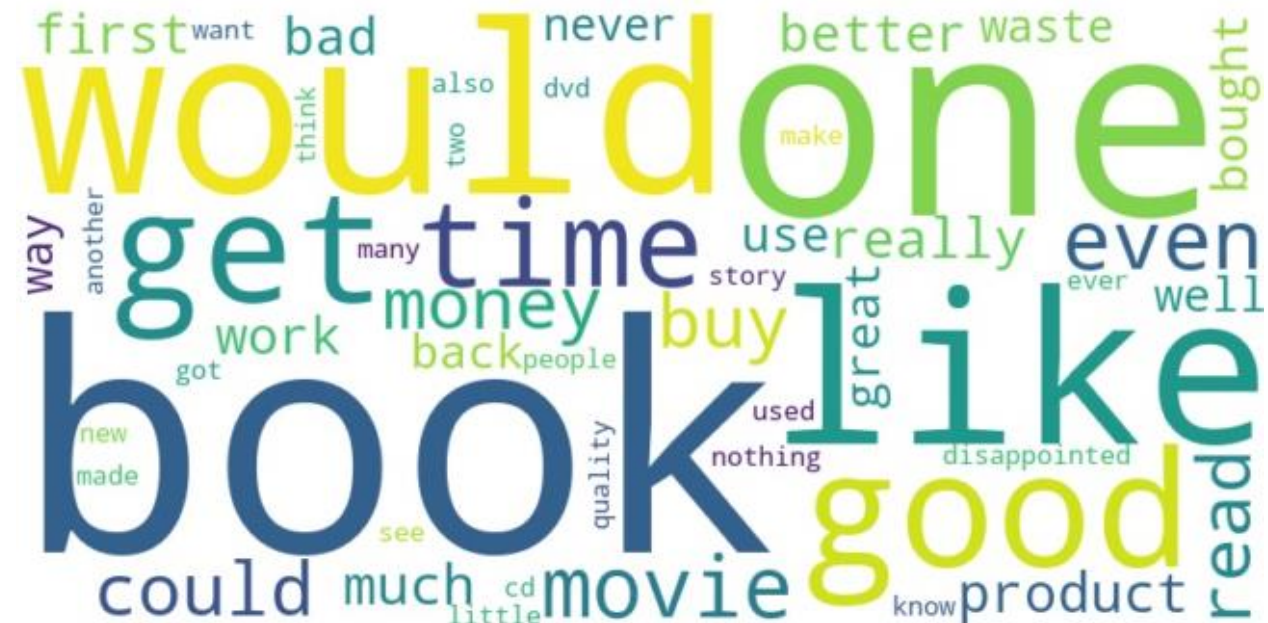
MODEL PREDICTION

Model was able to identify key words for positive or negative sentiment classification

True Positives   True Negatives

WORD FREQUENCY

Predictions from the final model were used to display the word frequency. The 50 most frequent words in the true positive and true negative are shown as follows.

CONCLUSION

- We built a binary text classification model LSTM that is able to perform Amazon reviews sentiment analysis with 91.4% accuracy.

- Our model was also able to assign probabilistic ratio for each word used from a completely unseen review.

- Word Clouds were generated to show which words are the appear the most in both true positive and negative reviews.

- It was also observed that LSTM with GloVe and BERT tokenized models also performed strongly.

- More deep learning architectures could be considered to improve the accuracy of test data.

NEXT STEPS

- The next steps include considering more robust models for an improved performance.

- Implement transformer models for a significantly higher performance compared to the traditional LSTM model.

- The dataset used in this project have binary classes. It would be interesting to test the model performance on a star-based rating, instead of positive or negative reviews.

- Create a web deployable application for an interactive feedback.

THANK YOU

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