Stock Market Analysis and Forecasting based on Airline Reviews

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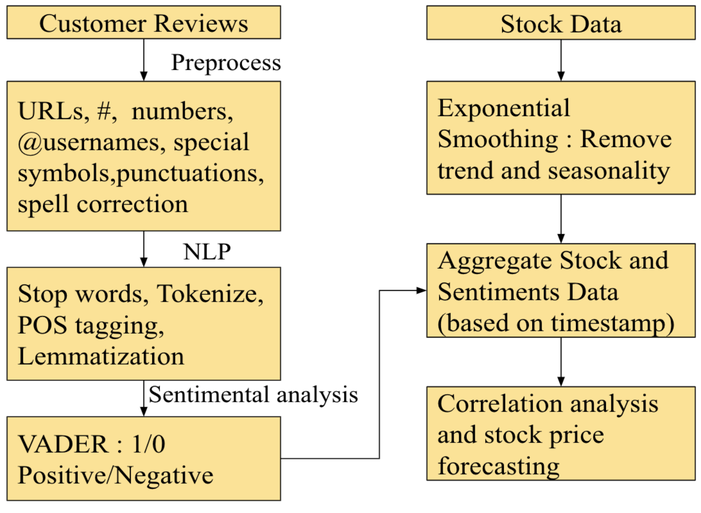
Introduction

Air travel is frequently used mode for traveling and with the increase in popularity of social media platforms, people easily share their traveling experiences on these platforms. Analyzing the effect of customer emotions on the stock market movement and closing prices of different airline companies can help them to improve their performance and services to keep their customers happy and satisfied.

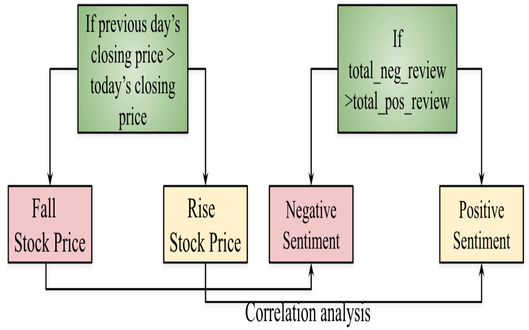
Dataset

- **2M customer reviews on different airlines**
  Sources: Twitter and Skytrax.com
- **Stock Data:** Open, High, Low, Close
  Sources: Yahoo! Finance
- **Duration:** January 2010 – October 2018

Data Preprocessing



Correlation : Stock Movement and Sentiments



Positive correlation showed that sentiments and stock prices are related.

- Positive Sentiment -> rise in stock price
- Negative Sentiment -> fall in stock price

Correlation Table

American	United	Delta	JetBlue	Alaska
0.94	0.93	0.92	0.90	0.89

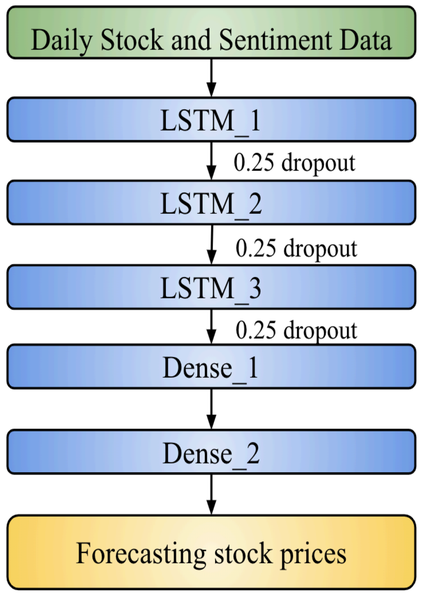
Models

- Forecasted closing prices using user sentiments and historical stock prices.
- Training Data: 80%
- Testing Data: 20%
- Normalized and de-normalized the data before and after forecasting.
- Metrics: Mean Squared Error

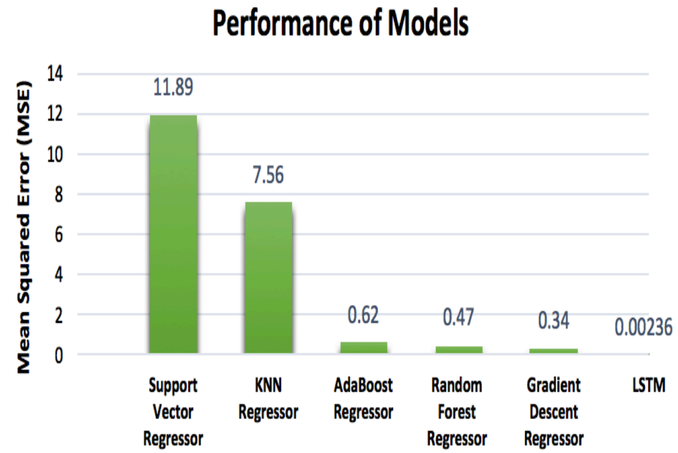
Machine Learning Models

- Support Vector Regressor
- KNN Regressor
- AdaBoost Regressor
- Random Forest Regressor
- Gradient Descent Regressor

Deep Learning Model (LSTM)



Results and Discussions



- Among all the 6 models, LSTM model performed the best and achieved a MSE of 0.0236 whereas Support Vector Regressor performed worst and achieved a MSE of 11.89.
- Results showed that sentiments are positively correlated with the stock behavior of different airlines and can help in accurately forecasting stock prices.

Future Work

- With more unstructured data (new articles), model should also improve in performance.
- Implement Time Series Models and other deep learning models for forecasting stock prices.

References

[1] Man Li, Chi Yang, Jin Zhang, Deepak Puthal, Yun Luo, and Jianxin Li. 2018. Stock market analysis using social networks
[2] Tushar Rao and Saket Srivastava. 2012. Analyzing Stock Market Movements Using Twitter Sentiment Analysis