NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

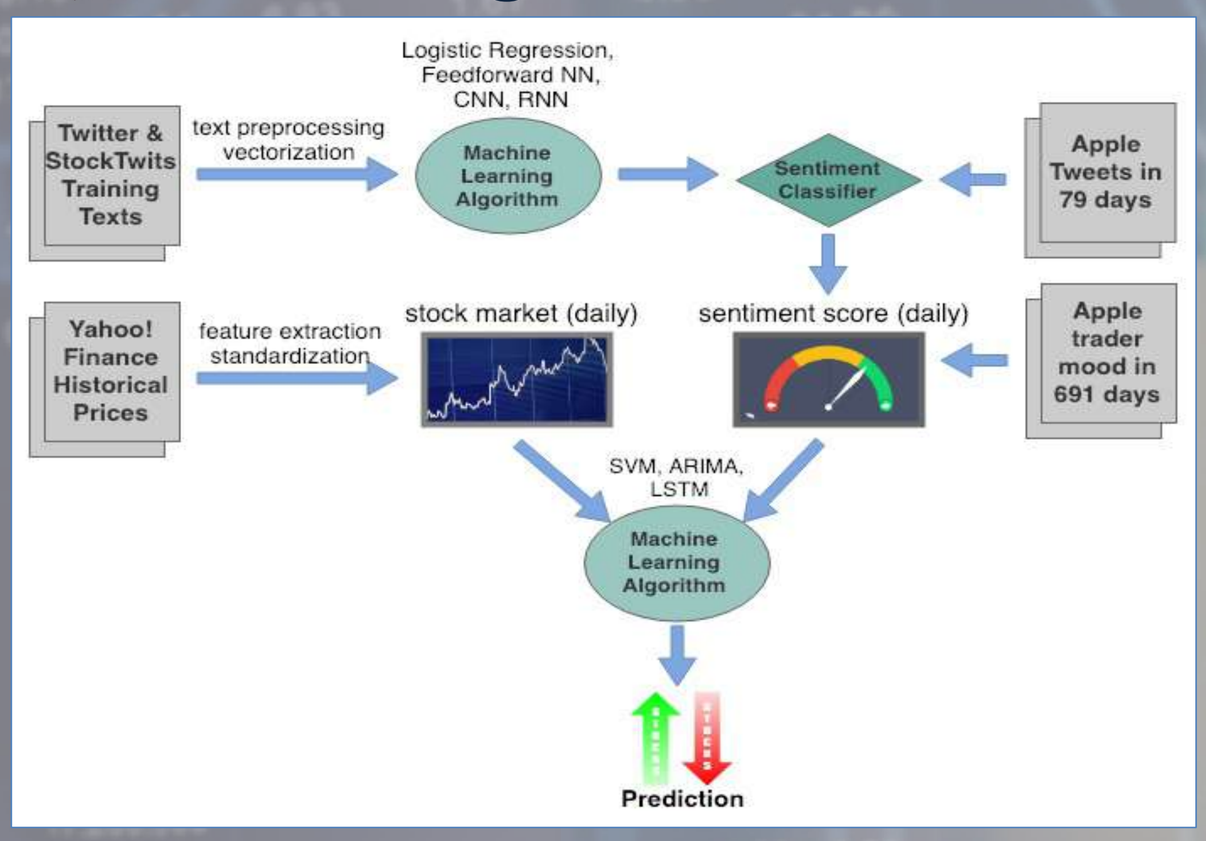
School of Computer Science and Engineering
College of Engineering

Forecasting Stock Market Movements Using Sentiment Analysis of Social Media

Abstract - This project aims to predict stock movement based on the extraction of daily public moods towards a stock from social media. Sentiment classifier was trained using Twitter and StockTwits messages to predict bullish/bearish sentiment. Subsequently, we conducted time series analysis to predict stock price changes. The final results demonstrate a promising capability of predicting binary stock movement.

Keywords:
- Stock market
- Sentiment analysis
- Time series prediction
- Neural networks

Overall Algorithmic Model



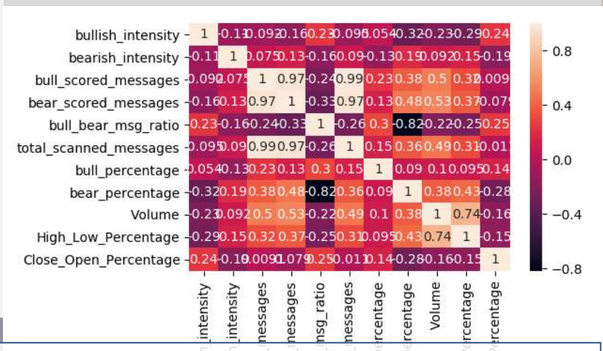
Feature Engineering

Sentiment Features

- bull_scored_messages
- bear_scored_messages
- total_scanned_messages
- bullish_intensity
- bearish_intensity
- bull_percentage
- bear_percentage
- bull_bear_msg_ratio

Stock Features

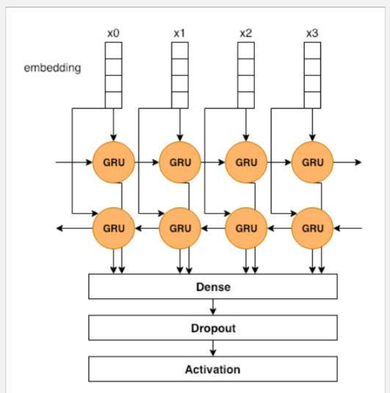
- volume
- high_low_percentage
- open_close_percentage

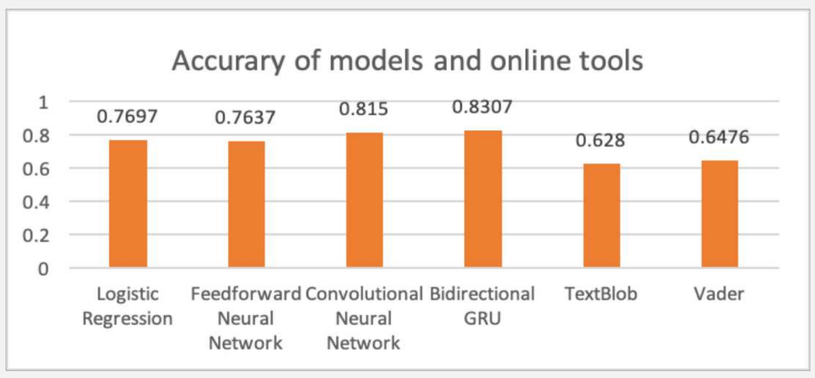


Features were extracted from discussion feeds and historical prices. Correlation analysis was performed to select the most effective features.

Model Training and Results

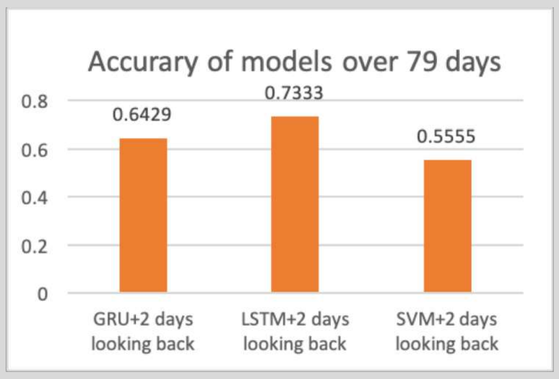
Sentiment Classification

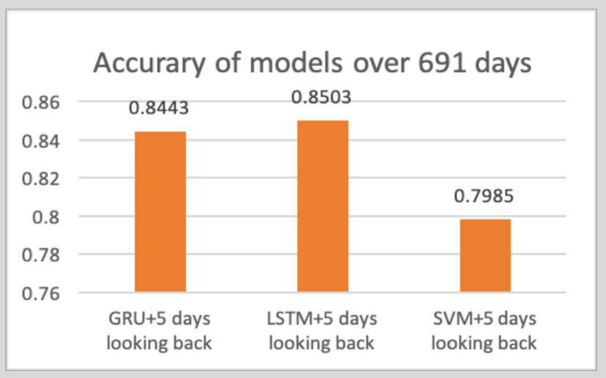




After text pre-processing, bidirectional recurrent neural network with GRU cells recognized bullish and bearish sentiments well with an overall accuracy of 83.07%.

Stock Movement Prediction





Over a period of 79 days, LSTM with 2 days looking back gave the best result (73.33%). For a period of 691 days, an accuracy of 85.03% was achieved by LSTM with 5 days looking back.

Conclusion

Compared to existing sentiment analysers, our model demonstrates much stronger capacity of detecting financial sentiments in internet messages. We also observed that the longer period of sample size helps to reduce amount of noise in the data thereby have higher chances of making successful prediction.

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