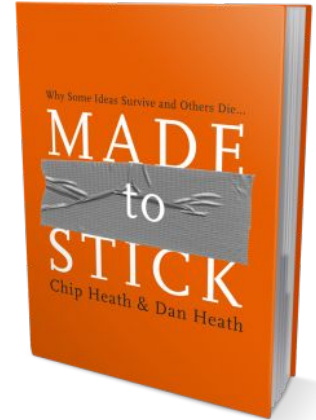# Stock Trading Bot

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Abstract

Creating and training a bot to buy and sell stocks in the stock market. This paper aims to create a stock trading bot that can successfully mimic a well-seasoned stock trader's strategy. The trading bot is trained using Deep Reinforcement Learning, specifically Deep Q-learning. To ensure a more educated and highly analyzed output, the bot generates buy and sell signals using technical indicators and sentiments for that stock.

Research Papers

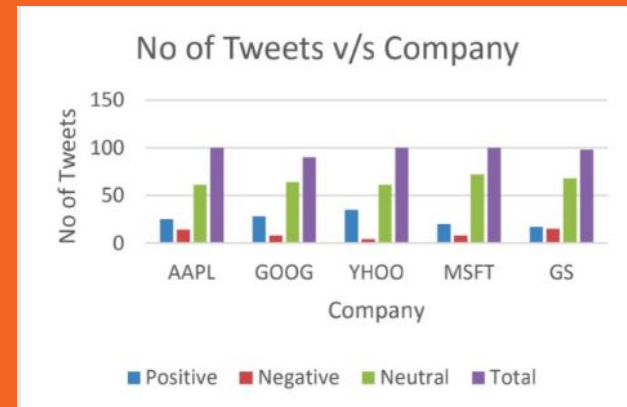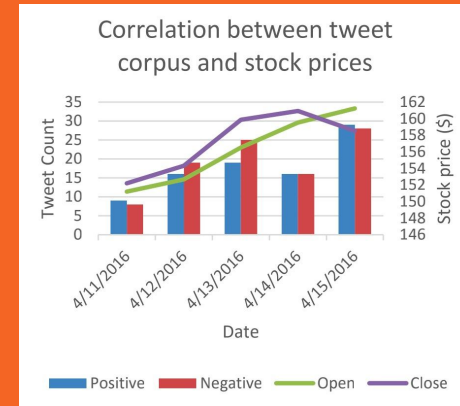**Base Paper - Replicating Stock Trading Strategy by Means of Neural Networks**

C. Zhang, "Replicating Stock Trading Strategy by Means of Neural Networks," 2020 7th International Conference

on Information Science and Control Engineering (ICISCE) 2020

Paper link - **Replicating Stock Trading Strategy - IEEE 2020**

- ❏ In this paper, We understood ways to replicate trading strategies generated by technical indicators using different neural network and input feature configuration.
- ❏ In the replication of MACD strategy, the best model in the test phase is that with related technical indicators. However, CNN model with raw data input feature also achieve acceptable good results.

Novelty

- Inclusion of sentimental analysis and technical analysis in the bot.
- There is a strong connection between the investors sentiment and market performance, which is reflected in stock prices and trends. It's vital in making sound decisions while trading stocks, and sentiment analysis can provide valuable insights into the stock market's future.
- The bot also is capable of real time trading.

Correlation between tweet corpus and stock prices

No of Tweets v/s Company

Methodology

Technical Analysis:

- Using Deep Q-learning to utilise user experience replay to learn about the stock environment and update and correct itself.
- In any given state the bot decides to sell/buy one stock at a time to simplify the process.
- The n-day window feature is represented by a vector following differences in the closing price of the currently being traded stock.
- A sigmoid operation to normalize the value into a range of [0,1]

Sentimental Analysis:

- We scrape twitter tweets for the specific company stock and specify keywords.
- Tweets are collected and stored in a csv file separating tweet time and tweet text.
- File is processed to remove stop words and training data is created.
- The training data is then classified into positive, negative, and neutral tweets.
- Lastly, generate a data set for stock predictions , classify it and predict upcoming stock decisions.

Sentimental Analysis

```
Starting Portfolio Value: 100000.00
2018-07-26, Close, 176.26
Sentiment Score: 0.593
2018-07-27, Close, 174.89
Sentiment Score: 0.603
2018-07-30, Close, 171.06
Sentiment Score: 0.603
2018-07-31, Close, 172.58
Sentiment Score: 0.973
2018-08-01, Close, 171.65
Sentiment Score: 0.973
2018-08-02, Close, 176.37
Sentiment Score: 0.991
2018-08-03, Close, 177.78
Sentiment Score: 0.991
2018-08-06, Close, 185.69
Sentiment Score: 0.991
2018-08-07, Close, 183.81
Sentiment Score: 0.991
2018-08-08, Close, 185.18
Sentiment Score: 0.996
2018-08-09, Close, 183.09
Sentiment Score: 0.996
2018-08-10, Close, 180.26
Sentiment Score: 0.996
...
2018-11-23, Close, 131.73
Sentiment Score: -0.84
2018-11-23, (MA Period 15) Ending Value 99742.12
Final Portfolio Value: 99742.12
```

Deep Q learning

Deep Q-Network, approximates a state-value function in a Q-Learning framework with a neural network. It leverages reinforcement learning.   Builds a Q-Table is the data structure used to calculate the maximum expected future rewards for action at each state

This model learns from :
- Current news article's sentiments.
- Technical indicators used on training datset

IMPLEMENTATION

Result

data/GOOG_2019.csv