Project Report - Stock Market Analysis

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Introduction

Understanding and predicting stock market movements is useful for individual stock market traders as well as investment firms and banks. So far, the task of successfully predicting stock prices has been done by people. We ask the question, "Can ML algorithms effectively outperform the average trader?" and seek to answer that question. By introducing the performance history of different stocks, we can visualize the data and by dividing the data into training data and test data, we can predict future stock price movement. The data was stored in DataFrames to utilize for prediction.

Milestones

- Collect Data: https://www.kaggle.com/dgawlik/nyse
- Github: https://github.com/kristian-montoya/stockmarket_analysis
- Extract, clean and prep dataset for use
- Visualize and analyze trends
- Use the cleaned data to predict whether or not a stock should be bought or not using ML
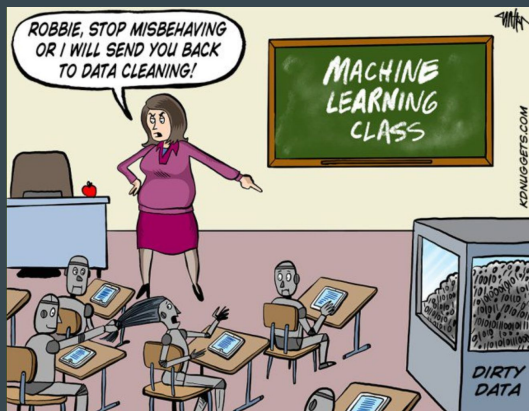
Methods

1. Data Analysis
   a. Viewing composition of data (including data-type, features, shape, df.info).
   b. Guided scope of project and helped determine overall goals.
2. Data Visualizations
   a. Graphic history of stock prices and stock volume.
   b. Visualizing interesting instances within the data (Ex. Apple's 7-1 stock split in 2014).
   c. Quick comparison between differing companies.
3. Long Short-Term Memory (LSTM) RNN Model
   a. Selection of model that specializes in finding patterns with sequential data (stock history).
   b. Preparation of data for recurrent neural network model (normalization, splitting, formatting)
   c. Tuning hyperparameters to optimize performance of model through training and testing data.
   d. Create prediction based on test data that overlaps a stock's history.
   e. Create future predictions of a stock's performance over a 15 day period to highlight future stock performance not yet seen.

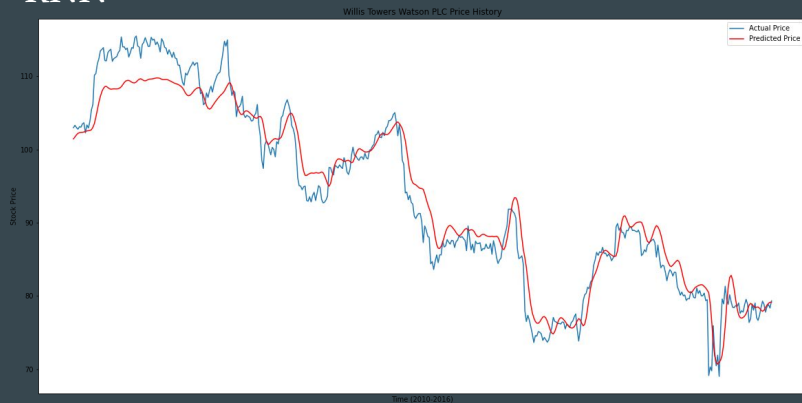# Results

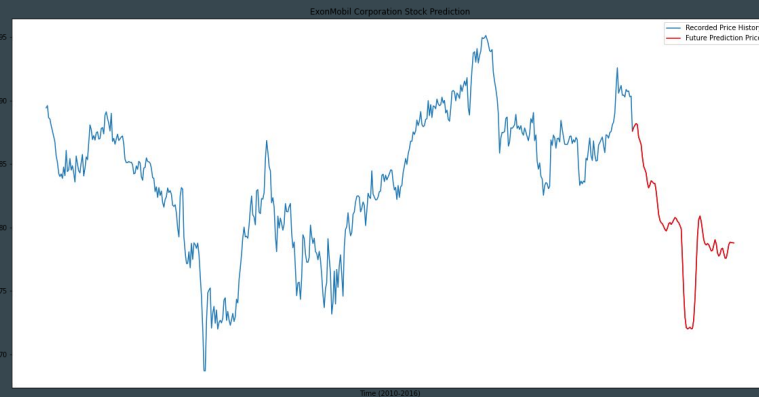## Stock Price Visualization
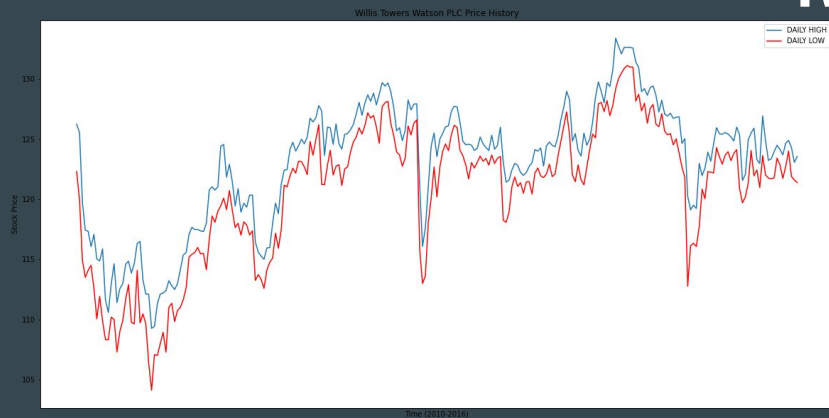
Stock Volume Visualization
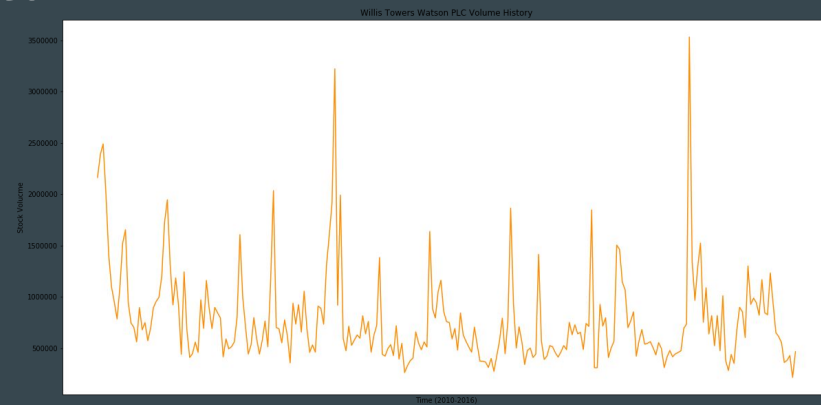
Stock Price Prediction through RNN

Stock Price Forecast

Possible Future Improvements

- In addition to using past stock prices and feeding them into ML algorithms for prediction, one can also utilize the company fundamentals to determine profitability for long-term investment.
- Use social sentiment analysis from social media such as twitter on a stock to predict price movements
- Utilizing Natural Language Processing on current news articles to predict movements.