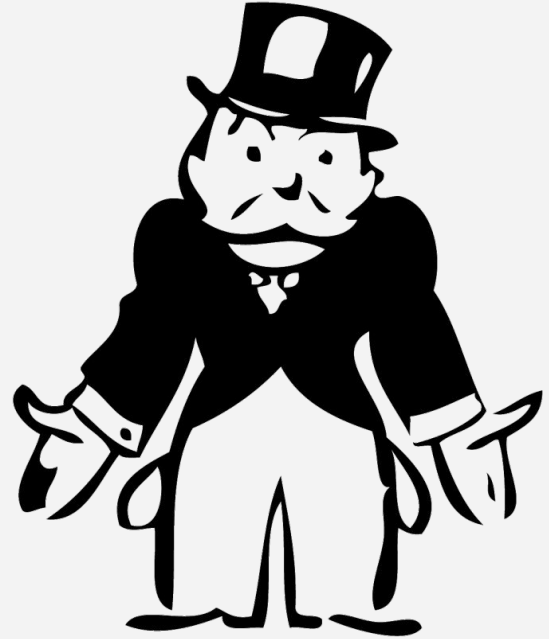# What will Mr. Market do tomorrow?

Disclaimer

This is an internal version of the presentation. It is not intended to be investment advice.

Contents

1. Who's Mr. Market?
2. How to predict him?
   a. Fundamentally
   b. Technically
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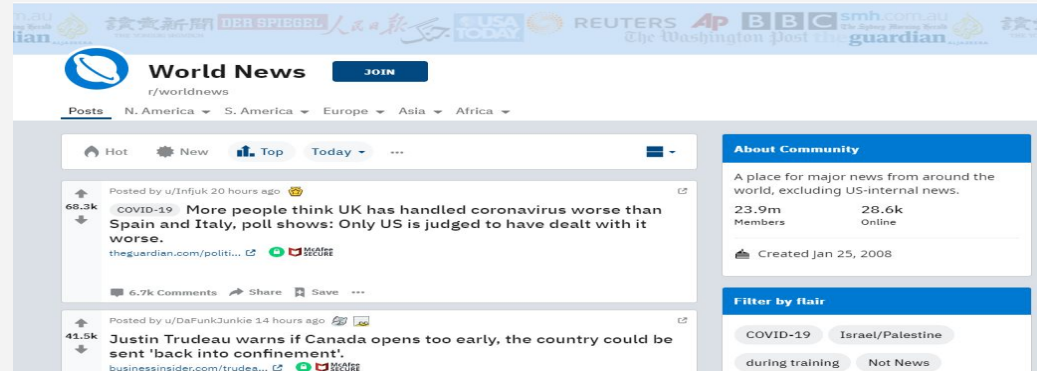5. Technical predictions
6. Conclusions
7. Future work

Who's Mr Market?

- Mr. Market is an allegory created by Benjamin Graham to describe the irrational or contradictory traits of the stock market … and is often identified as having human behavioral manic-depressive characteristics (*Wikipedia*)

- Market is driven by two sets of forces:
    - Fundamental (e.g. earnings and valuation)
    - Technical
        - Macro-factors (e.g. inflation and demographics)
        - Market sentiment (e.g. fears and affection)

- Markets everywhere:
    - Commodities (more technical)
    - Companies (more fundamental)
    - Debt (more fundamental)
    - Crypto (purely technical)
    - Relationships (hopefully technical)

- The market of choice:
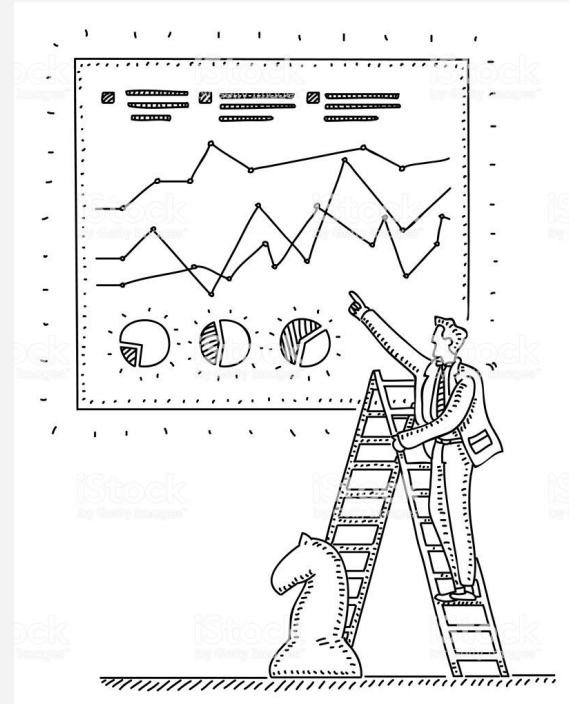   - Dow Jones Industrial Average 2008/08/08 - 2016/07/01

How to predict him? - Fundamentally

- A market can defined by its price and risk:
  - Price - the monetary equivalent of a unit of the market unit (e.g. one ounce of gold)
  - Risk - two approaches to define risk:
    - Probability of complete failure
    - Volatility - the degree of movement up and down

- Fundamental prediction
  - Utilize reddit's daily r/worldnews titles to identify market sentiment and its implications for the market tomorrow
  - Two types of feature generation procedures
    - Word2Vec (100 features)
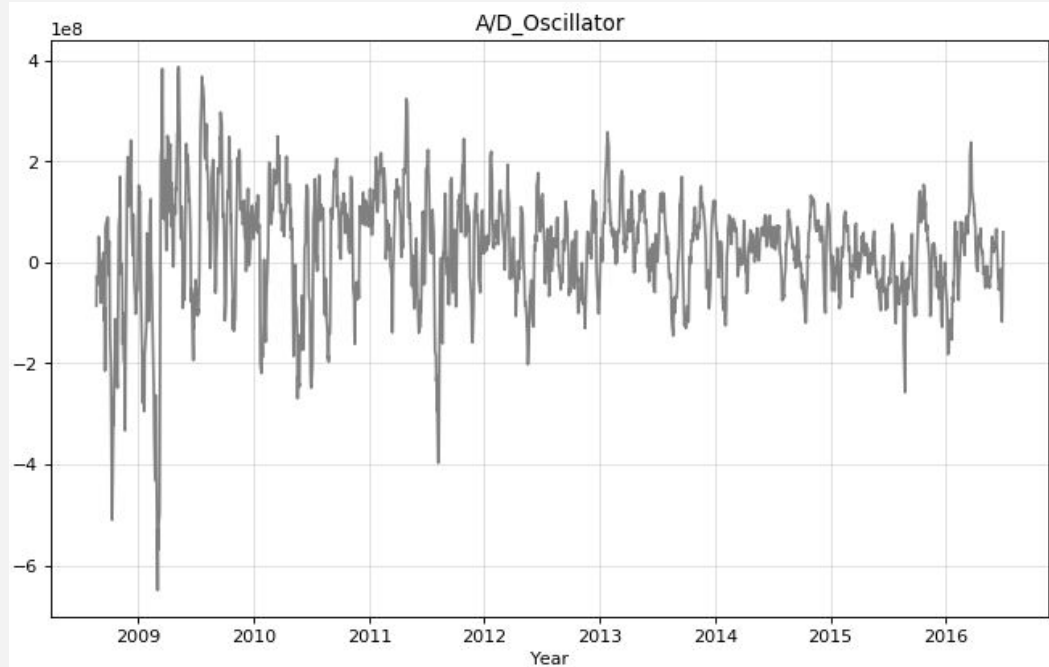   - Sentiment (4 features)

How to predict him? - Technically

- Technical analysis prediction
  - Pattern identification and decipherment
  - Application of 13 technical indicators based on derivations of previous market price movement
    - A/D Oscillator
    - Disparity 5
    - Momentum
    - MAs (5, 20, 60, 150 days)
    - MACD
    - Rate of Change
    - Stochastic %K
    - Stochastic %D
    - Stochastic RSI and
    - William's %R

How to predict him? - Technically Example

Accumulation/Distribution Oscillator is a cumulative indicator that uses volume and price to assess whether a stock is being accumulated or distributed. It seeks to identify divergences between the stock price and volume flow.

$$A/D = \text{Previous } A/D + CMFV$$

where:

$$CMFV = \text{Current money flow volume}$$

$$= \frac{(P_C - P_L) - (P_H - P_C)}{P_H - P_L} \times V$$
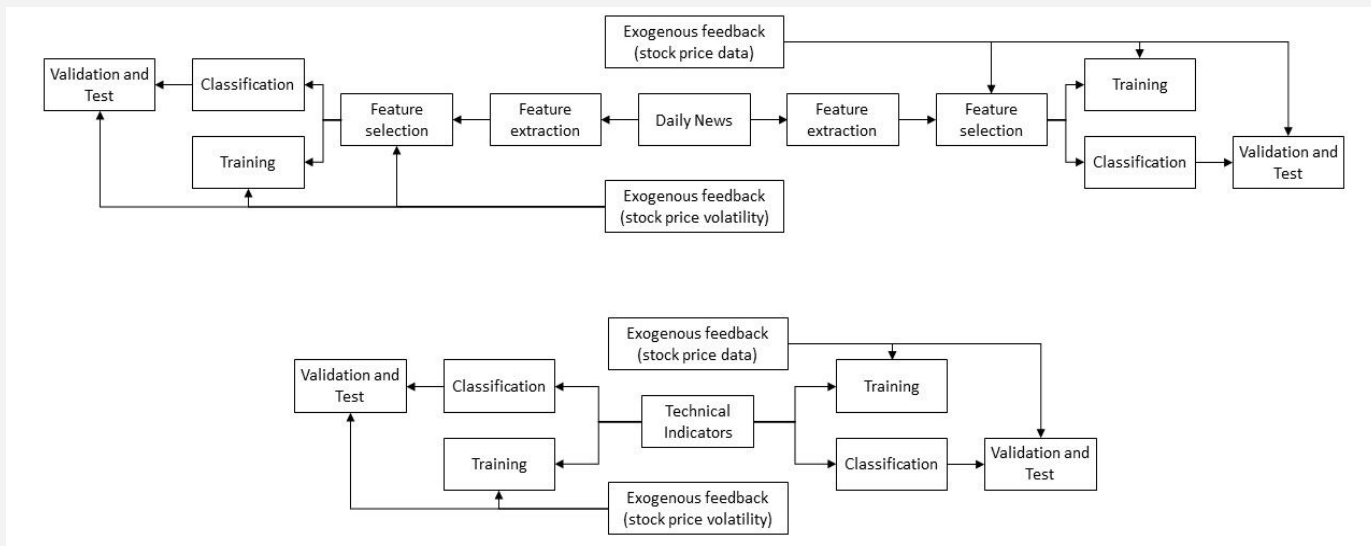
$P_C = \text{Closing price}$

$P_L = \text{Low price for the period}$

$P_H = \text{High price for the period}$
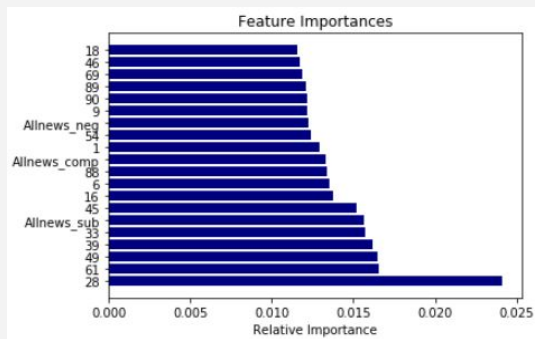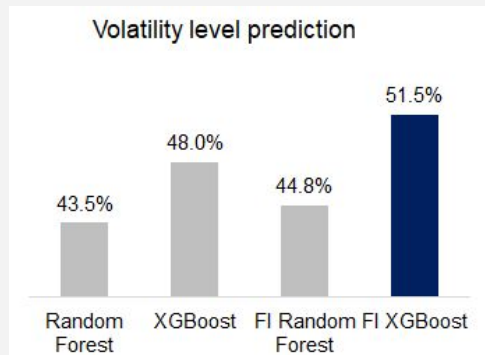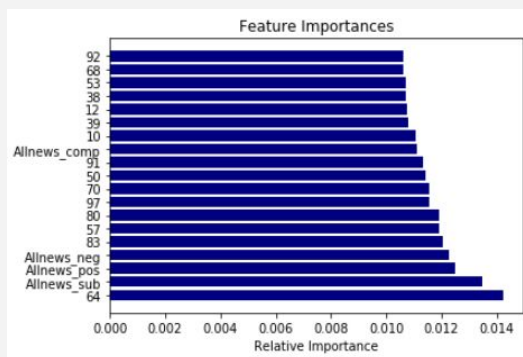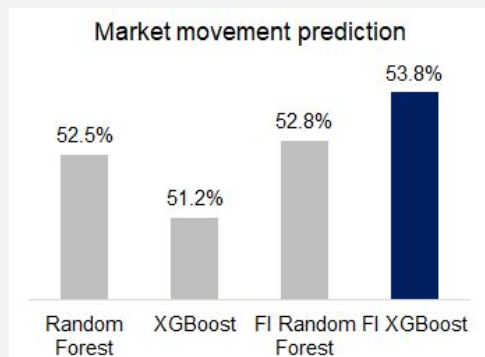
$V = \text{Volume for the period}$

Study outline

- Two inputs:
  - Text = Fundamental (News titles)
  - Nummeric = Technical (Technical indicators)
- Two target variables:
  - Market movement (up/same or down)
  - Volatility level (above or below 65 percentile over the previous 20 years = 130 volats)
- Two algorithms
  - Random forest
  - XGBoost

Fundamental predictions accuracy

Market movement prediction

Feature Importances

Volatility level prediction
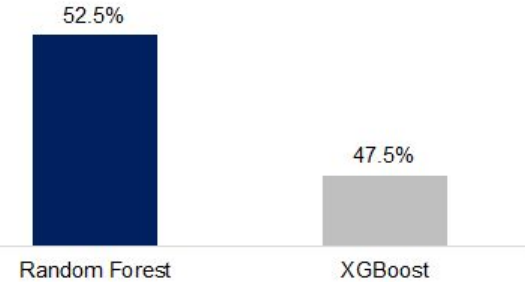

Feature Importances

- Results are not encouraging and barely better than a coin flip

- Sentiment features are however in top 20 by importance in both market movement and volatility level prediction

- RemarkA constant accuracy prediction of above 50% is sufficient to make money

- Text predicts market price movement better than volatility level
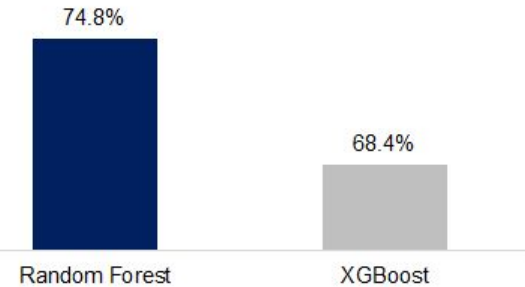
Technical indicators' predictions accuracy

- Market movement predictions are poor

- Since we only have 13 features, no feature importance analysis is necessary

- Volatility prediction is pretty good compared to other estimations

Market movement prediction

52.5% Random Forest
47.5% XGBoost

Volatility level prediction
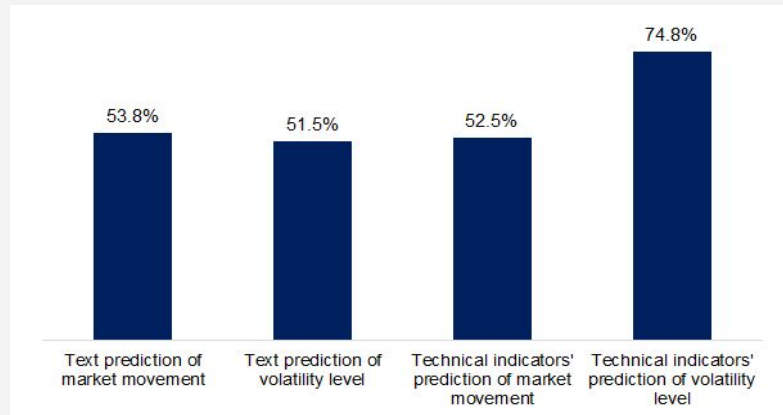
74.8% Random Forest
68.4% XGBoost

Concluding remarks

Future work

- Apply hourly or lower frequency news stream

- Utilize financial news

- Focus on a single stock instead of an index

- Training of vocabulary on Glove

- Neural Networks application

Results

- Prediction of price movement is tough
- But text as input performs better than technical indicators on price movement
- Technical indicators rock the volatility level prediction, but are of no use in price prediction

Thank you for your time and attention, and please invest responsibly!!!