

# What will Mr. Market do tomorrow?



## **Disclaimer**

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

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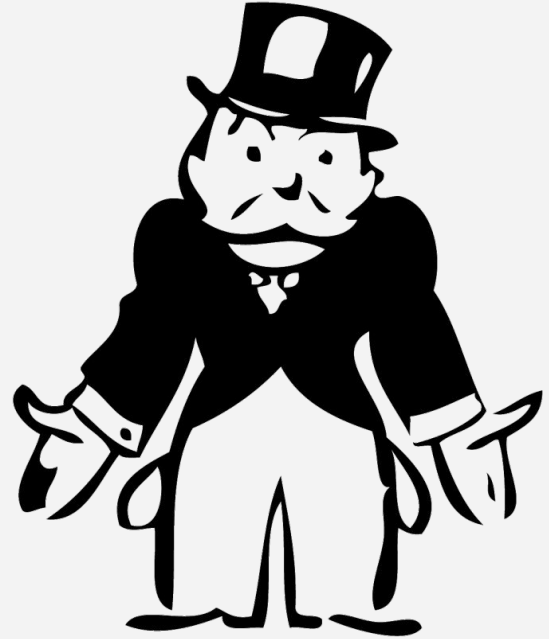
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# Who's Mr Market?

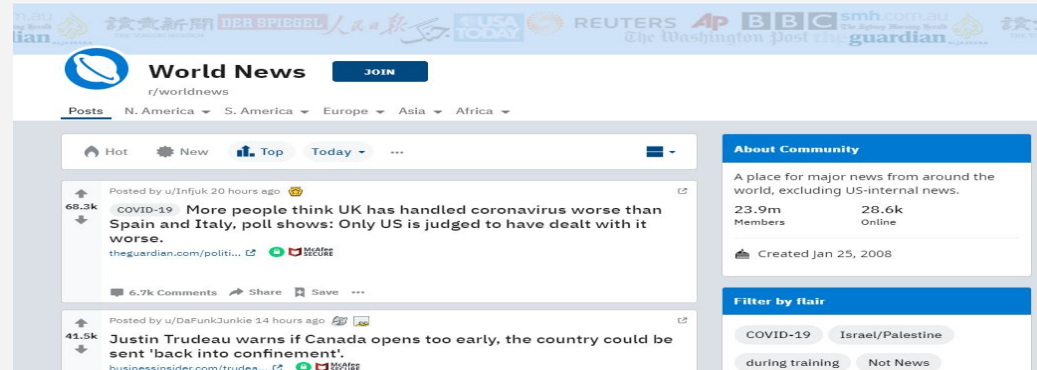
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- Mr. Market is an allegory created by Benjamin Graham to describe the irrational or contradictory traits of the stock market ... and is often identified as having human behavioral manic-depressive characteristics (*Wikipedia*)
- Market is driven by 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)
- The market of choice:
  - Dow Jones Industrial Average 2008/08/08 - 2016/07/01



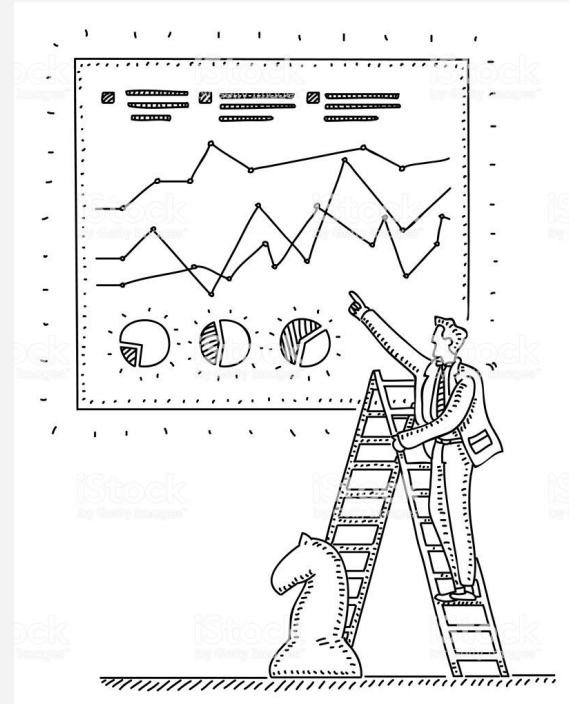
# How to predict him? - Fundamentally

- A market can be defined by its price and risk:
  - Price - the monetary equivalent of a unit of the market (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)



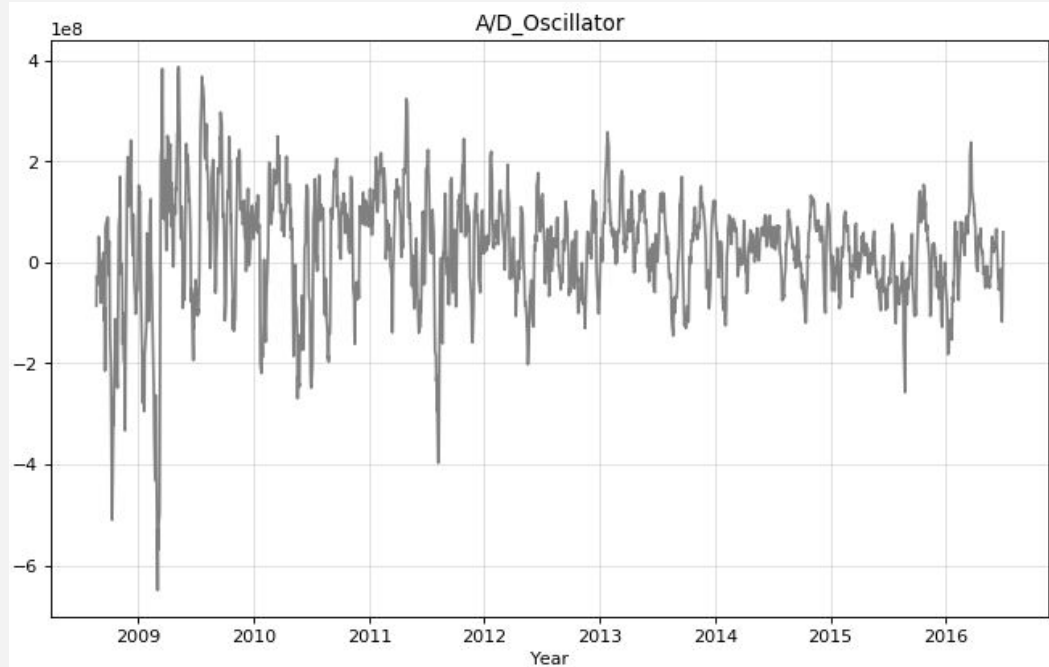
# How to predict him? - Technically

- 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.



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

**where:**

$$\begin{aligned} \text{CMFV} &= \text{Current money flow volume} \\ &= \frac{(P_C - P_L) - (P_H - P_C)}{P_H - P_L} \times V \end{aligned}$$

$P_C$  = Closing price

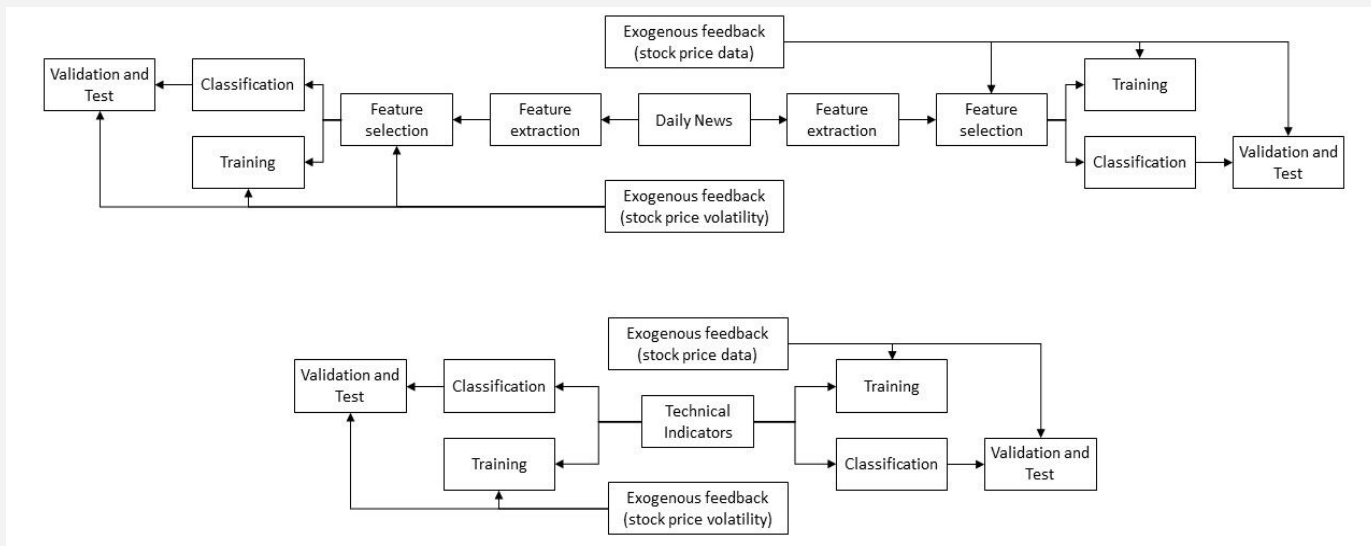
$P_L$  = Low price for the period

$P_H$  = High price for the period

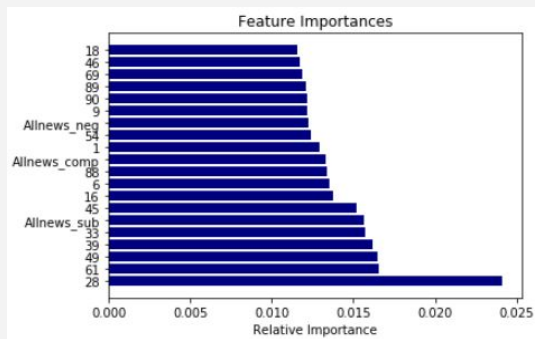
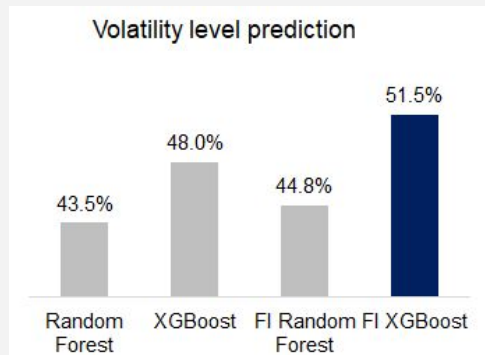
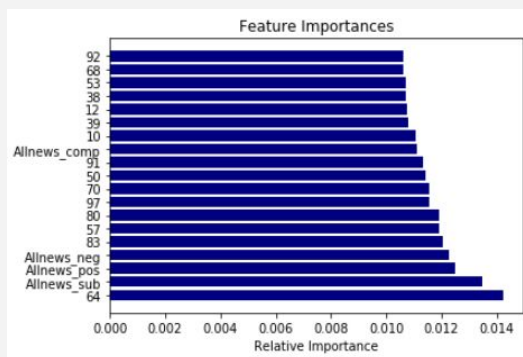
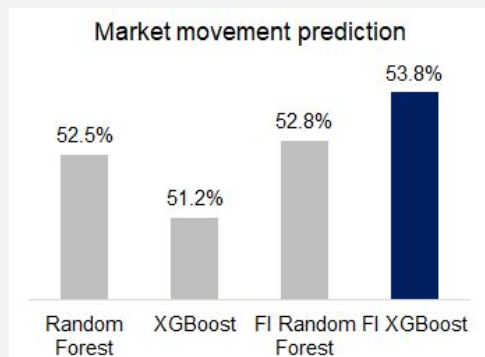
$V$  = Volume for the period

# Study outline

- Two inputs:
  - Text = Fundamental (News titles)
  - Numeric = 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



- 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
- Remark A constant accuracy prediction of above 50% is sufficient to make money
- Text predicts market price movement better than volatility level

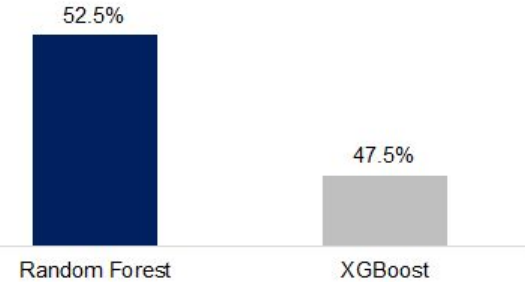


## Technical indicators' predictions accuracy

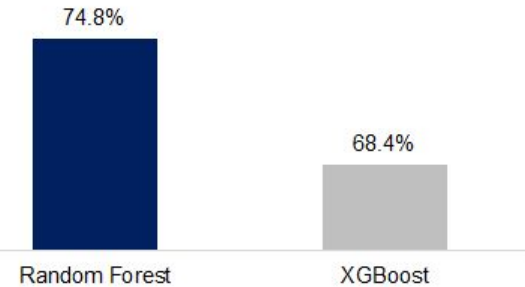
- Market movement predictions are poor
- Since we only have 13 features, no feature importance analysis is necessary
- Volatility prediction is pretty good compared to other estimations



Market movement prediction



Volatility level prediction



# Concluding remarks

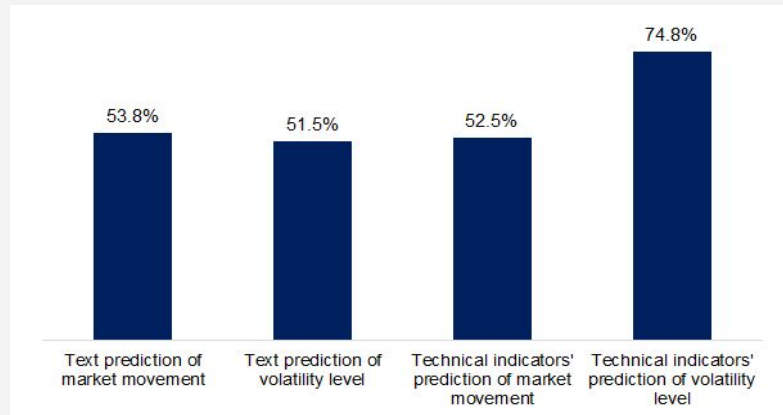
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## Future work

- 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!!!**

