

W U T I S

Price Movement Prediction using Natural Language Processing

Systematic Trading Division

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Team Overview

Systematic Trading



Yiqing Rosaline
Chen

Analyst

- Backtesting
- Trading Strategy



- B.S. – 6th Sem. – (IB)
- B.S. – 3rd Sem. – (CS)



Florian
Kollarczik

Analyst

- Natural Language Processing
- Signal Prediction



- B.S. (WU) – 5th Sem.



Isaac
Manopla

Analyst

- Backtesting
- Trading Strategy



- B.A. – 4th Sem. – (IB)



Thomas
Ziller

Analyst

- Natural Language Processing
- Signal Prediction



- B.S. (WU) – 5th Sem.

Natural Language Processing

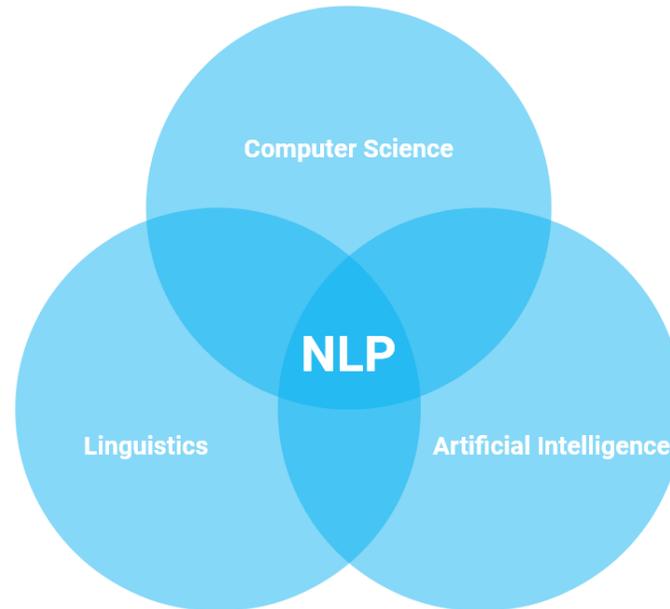
Systematic Trading

Tokenization

Today, I was swimming in the sea
with my girlfriend.



[Today] [I] [was] [swimming]
[in] [the] [sea]
[with] [my] [girlfriend]



Filtering

[Today] [I] [was] [swimming]
[in] [the] [sea]
[with] [my] [girlfriend]



[Today] [was] [swimming]
[sea] [girlfriend]

[Today] [was] [swimming]
[sea] [girlfriend]



[Today – NN] [was – VBD]
[swimming – VBG]
[sea – NN] [girlfriend – NN]

[Today – NN] [was – VBD]
[swimming – VBG]
[sea – NN] [girlfriend – NN]



[Today] [be] [swim]
[sea] [girlfriend]

Position of Speech

Lemmatization

Data – Reddit World News / S&P 500

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389,750

Observations

9

Years

Sample

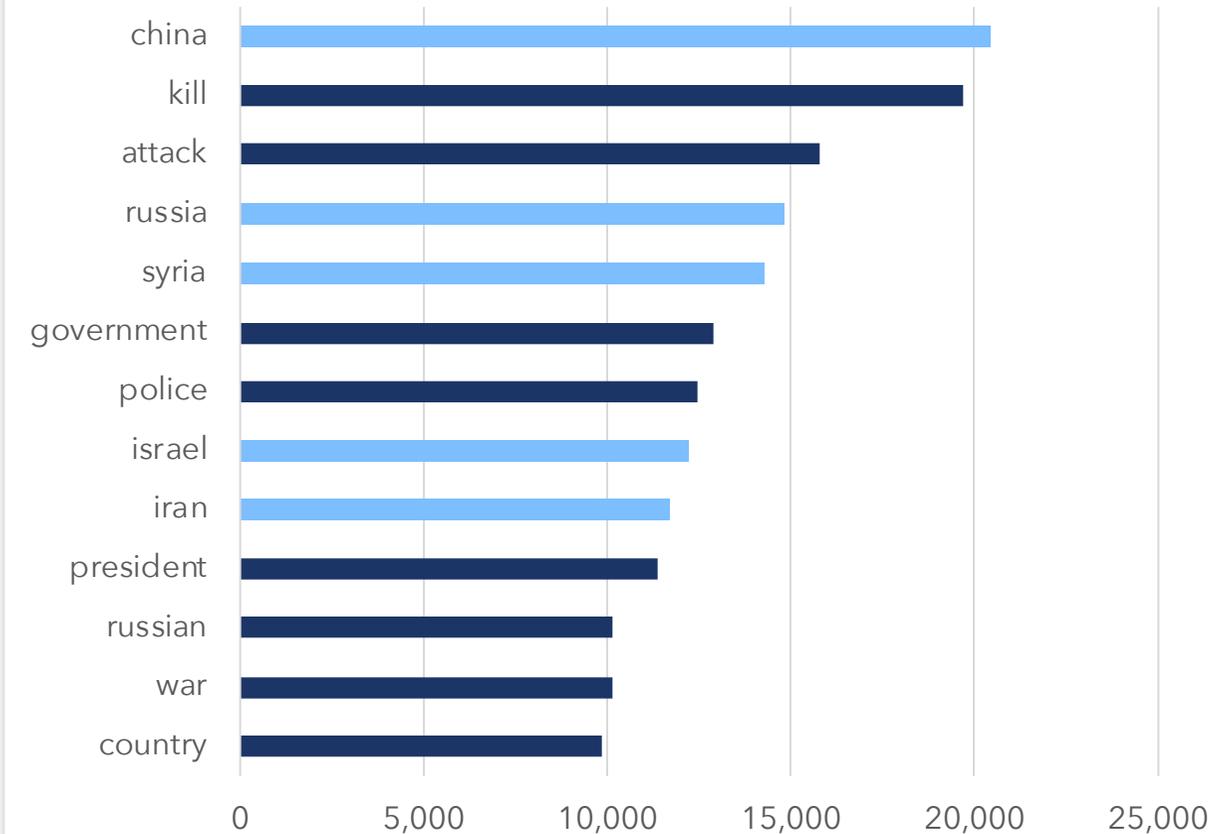
Sources: Yahoo Finance API / Kaggle

Date	Daily Return	Signal	Headlines
2014-03-24	0.004404	Sell	scores killed in pakistan clashes...
2014-03-25	-0.007000	Sell	the un mismanagement program...
2014-03-26	-0.001900	Buy	us plans for missile shields...
2014-03-27	0.004640	Buy	archbishop of canterbury...
2014-03-28	0.007924	Buy	migrant workers told to abandon...
2014-03-29	0.007039	Sell	four injured in firebomb attack...
2014-03-30	0.002853	Buy	japan oks additional role for...

Descriptive Statistics

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Most frequent words



5,589,154

Total Words

74,325

Unique Words

1,638,153

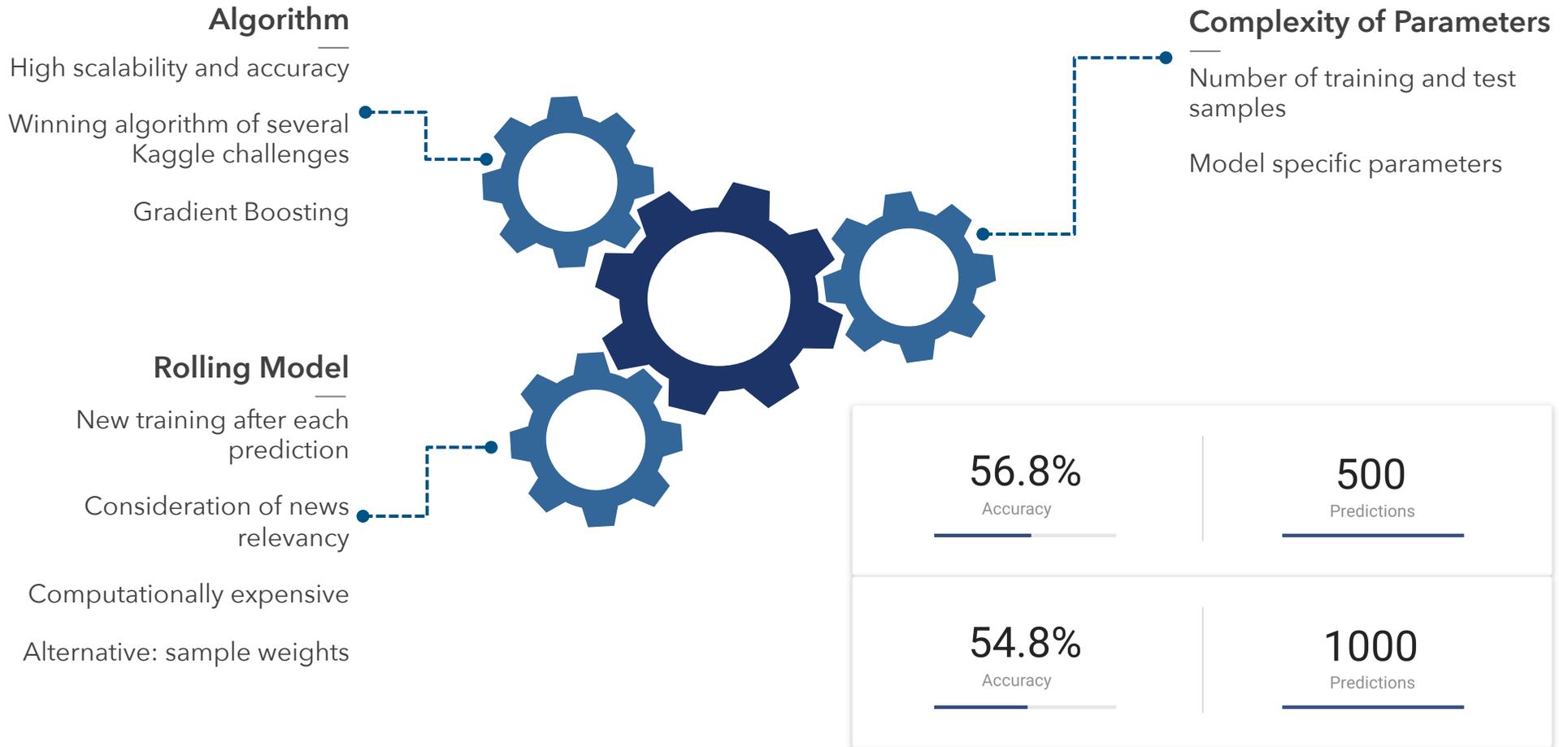
Total After Processing

1,478

Unique After Processing

Trading Signal Prediction with XGBoost

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Strategy

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Implementation

- Determined by NLP signals (Long/Short)
- Model will go Long or Short once every signal appears
- Hold position when same consecutive signal
- Positions are executed at closing price

Asset Allocation

- SPDR S&P 500 ETF Trust (SPY)
- S&P 500 (^GSPC)
- Initial account balance of \$100,000
- Every trade will allocate 100% of the current balance
- Time horizon: 2 years

Risks & Constraints

- Volatile markets
- Accuracy of the signals
- Calculation of the model for a certain date range and asset

Limitations

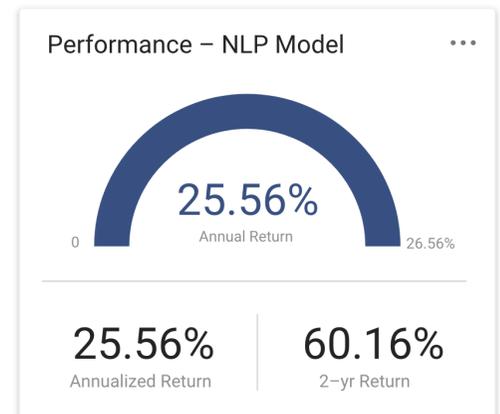
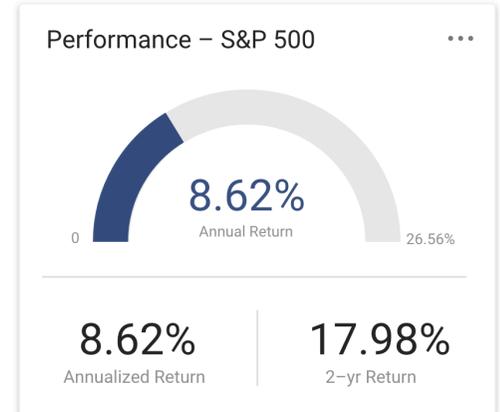
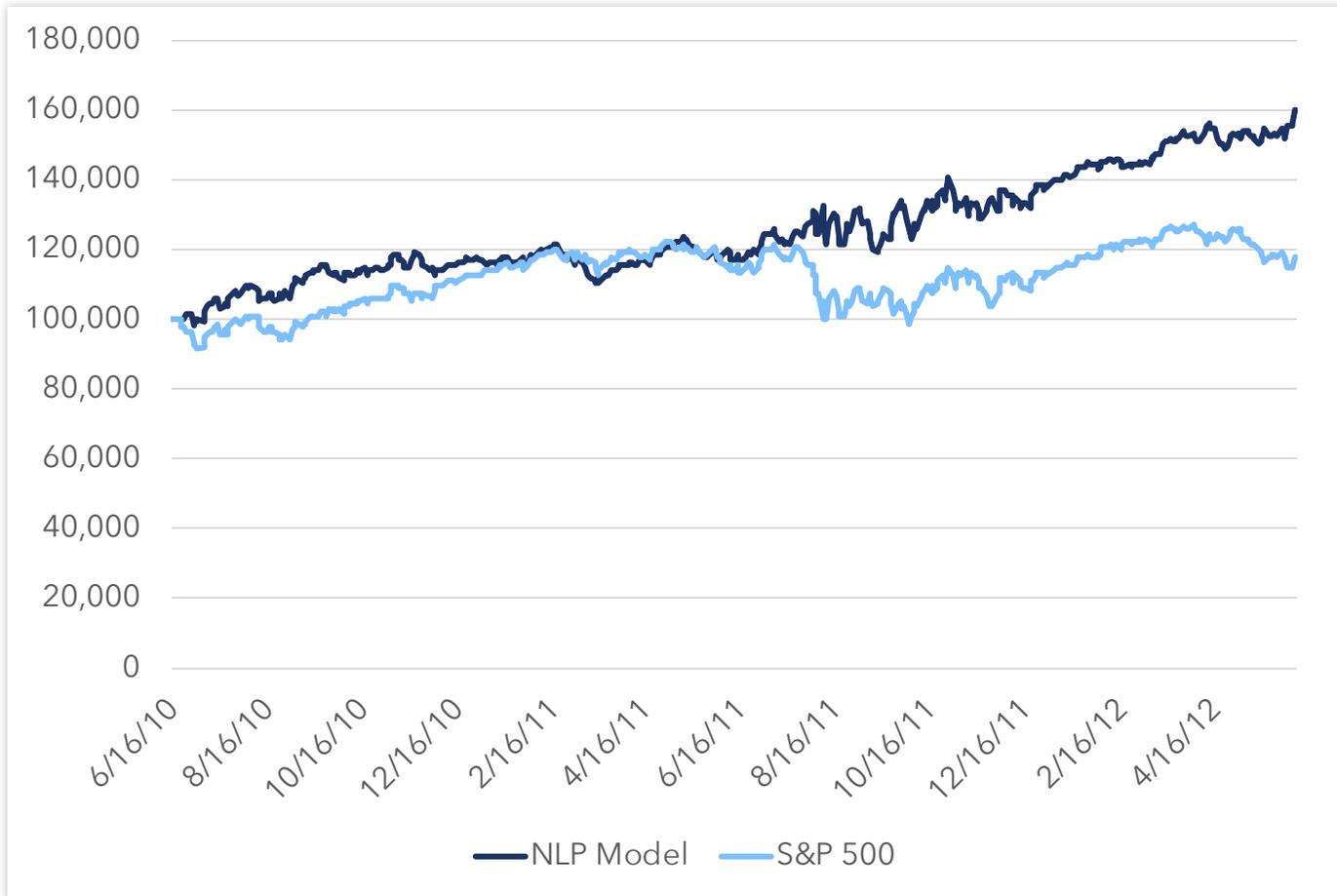
- Dataset timeframe 2008 – 2016
- Limited to world news on Reddit
- Lack of technical indicators
- Limited usage for today's stock market
- Supplementary investing strategy
- Best performance in volatile markets

Future Work

- Provided model is limited to world news and only gathers data from one news source
- Re-train model and add extensions (Hyper Parameter Tuning)
- Sentiment Analysis
- Implementation of tree-based algorithms to the model: 50% random forest & 50% (extreme) gradient boosting

Price Performance

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Price Performance

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