Stock Trading with Microblog Sentiments

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Project Overview / Goal

- Implement multiple trading strategies
- Maximize profit over the course of one year
- Data sources:

<table>
<thead>
<tr>
<th>Source</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>Stock Twits (Tweets)</td>
<td>Provided</td>
</tr>
<tr>
<td>Yahoo/Google Finance (Daily stock price data)</td>
<td>Found</td>
</tr>
<tr>
<td>Wharton Research Center Data Services (Intraday stock price data)</td>
<td>Found</td>
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</tbody>
</table>
Trading Simulation Software

Returns positive or negative sentiment value

Sentiment Analysis

Computes buy/sell based on sentiment/strategy

Trading Strategy

Stock Twits

Written in Scala

Virtual Portfolio

Uses Hadoop/HBase

Stock Prices

From Yahoo/Google Finance
Plan

• We chose 11 stocks to watch:
  • AAPL, FB, GILD, KNDI, MNKD, NQ, PLUG, QQQ, SPY, TSLA, VRNG

• Set up the following strategies:
  • Baseline
  • S&P 500 (buy and hold the S&P 500 index)
  • Moving Average
  • Moving Average with Sentiment
  • Selection by Sentiment (One Stock): $n = 1$
  • Selection by Sentiment: $n = 3$
  • Selection by Sentiment (All Stocks): $n = 11$
## Trading Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Stocks/Portfolio</th>
<th>Decision-Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>CrowdIQ Strategy</td>
<td>1 portfolio for each 11 stocks</td>
<td>Based on bullish/bearish sentiment</td>
</tr>
<tr>
<td>Moving Average</td>
<td>1 portfolio for each 11 stocks</td>
<td>Based on 5 and 10 day price trends.</td>
</tr>
<tr>
<td>Moving Average with Sentiment</td>
<td>1 portfolio for each 11 stocks</td>
<td>Based on 5 and 10 day price trends and sentiment</td>
</tr>
<tr>
<td>Selection by Sentiment</td>
<td>1 portfolio shared by 11 stocks</td>
<td>Based on bullish/bearish sentiment</td>
</tr>
<tr>
<td>Buy and Hold</td>
<td>Only uses 1 Stock - S&amp;P 500</td>
<td>Control: buys once at start then hold for entire year.</td>
</tr>
</tbody>
</table>
Portfolio Value over Time for All Strategies from 2014-2015

- SelectionBySentiment(AllStocks)
- SelectionBySentiment(OneStock)
- Baseline
- IndexFund
- MovingAverageWithSentiment
- MovingAverage
Portfolio Value over Time for All Strategies in 2015

- $1.4 million
- $1.2 million
- $1 million
- $800,000
- $600,000
- $400,000
- $200,000

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec

- IndexFund
- SelectionBySentiment(AllStocks)
- MovingAverage
- MovingAverageWithSentiment
- Baseline
- SelectionBySentiment
- SelectionBySentiment(OneStock)
Unreliable data caused our day trading strategies to perform unreasonably well, so those results have been omitted.
Future work

- Use accurate source of high-resolution bid/ask quotes for day trading
- Obtain data for 2013 and 2016, testing on each
  - Will help to explain the difference between our 2014 and 2015 results
- Test with live data (and integration with real trading platforms)
- Implement slippage models in simulation software which factor in trading volume
- More robust sentiment analysis with advanced text normalization techniques
- Experimentation with Machine Learning-based strategies that factor in more than just aggregated sentiment
Acknowledgements

- Saurabh Chakravarty
  - Client
  - saurabc@vt.edu

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  - Created sentiment analysis
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- Dr. Weiguo Fan
  - StockTwits Data
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