Using Crowdsourcing to form a Profitable Strategy in the Stock Market

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Project Number: J - MATH - 01

Introduction

- The rise of the Internet and high speed computers drastically increased the amount of information available on the stock market.
- The Wisdom of the Crowds: phenomenon in which averaged predictions from a large group of people can rival or even beat the accuracy of subject matter experts
- · 4 Criteria to use wisdom of the crowds:



Independence

Diversity

Decentralization



Aggregation

IDEA: Datamine a stock market simulator, and use the data to form a trading strategy

Purpose

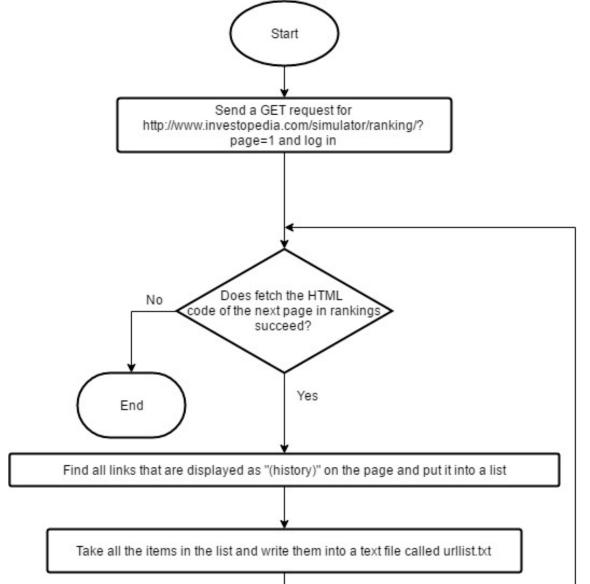
- To develop computer programs to scrape large amount (~ 1 million) of stock trading data from a stock market trading simulator.
- To develop a program to analyze the data, formulate 2 portfolios, backtest, then compare with S&P 500,

· To test a crowd wisdom guided approach on trading stock

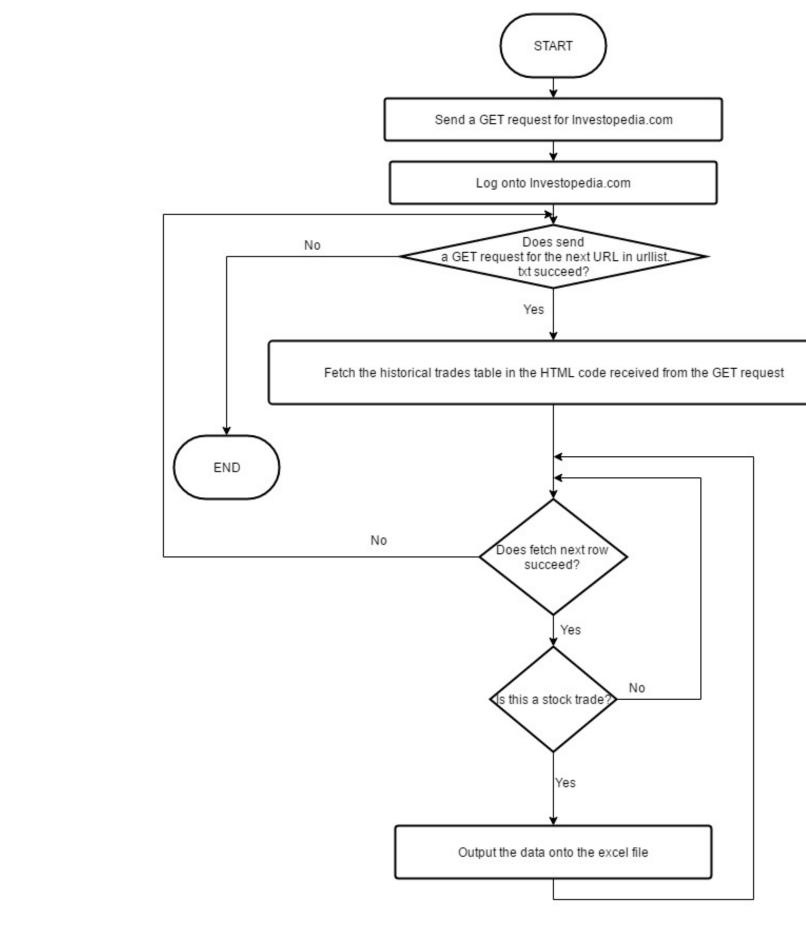
Methods

Data Collections

· Python programs were developed to scrape 834,842 stock trades from the Investopedia stock market trading simulator



Flow chart of data collection program to obtain the URLs of each player's trade history.



Flow chart of data collection program to obtain the trades from each player.

new row
['10/26/2016 12:12 PM', 'Stock: Sell at Market', 'VIIX', '3358', '', '\$10.44', '\$4.99', '\$35,052.53', '\$503,585.26']
cell finished
new row
['10/26/2016 10:24 AM', 'Short Stock: Short at Market', 'EERL', '242', '', '\$12.72', '\$4.99', '\$3,073.28', '\$501,618.48'
cell finished
new row
['10/26/2016 10:24 AM', 'Short Stock: Short at Market', 'EERL', '242', '', '\$12.72', '\$4.99', '\$159,005.51', '\$501,623.62']
cell finished
new row
['10/26/2016 10:24 AM', 'Stock: Buy at Market', 'HCHC', '3715', '', '\$4.53', '\$4.99', '\$16,833.94', '\$501,628.46']
cell finished
new row
['10/26/2016 10:21 AM', 'Stock: Buy at Market', 'VIIX', '3358', '', '\$10.64', '\$4.99', '\$35,734.11', '\$499,995.01']
cell finished
new row
['10/26/2016 10:21 AM', 'Stock: Buy at Market', 'ORIG', '86959', '', '\$1.05', '\$4.99', '\$35,734.11', '\$499,995.01']
cell finished

We are starting to scrape the person in rank 49136. The current errors are
[']
Timestamp: 2017-Jan-15 17:26:08
http://www.investopedia.com/simulator/trade/tradeoverview.aspx?UserID=81703384GameID=2968994Currency=USD
new row

('8/11/2016 11:26 AM', 'Stock: Buy at Market Open', 'FAYC', '3000', '', '\$49.89', '\$4.99', '\$149,674.99', '\$500,000.00']
cell finished

new row

('8/11/2016 31:35 PM', 'Stock: Buy at Market Open', 'FAYC', '3000', '', '\$49.89', '\$4.99', '\$111,339.99', '\$505,440.02']
cell finished

new row

('8/11/2016 31:35 PM', 'Stock: Buy at Market', 'QLGC', '7000', '', '\$15.91', '\$4.99', '\$111,339.99', '\$505,440.02']
cell finished

new row

('8/11/2016 31:35 PM', 'Stock: Buy at Market Open', 'TMTR', '5000', '', '\$18.67', '\$4.99', '\$111,339.99', '\$500,000.00']
cell finished

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('8/11/2016 31:35 PM', 'Stock: Buy at Market Open', 'TMTR', '5000', '', '\$18.67', '\$4.99', '\$111,339.99', '\$500,000.00']
cell finished

new row

('8/11/2016 31:35 PM', 'Stock: Buy at Market Open', 'TMTR', '5000', '', '\$18.67', '\$4.99', '\$111,339.99', '\$500,000.00']
cell finished

new row

('8/11/2016 31:35 PM', 'Stock: Buy at Market Open', 'TMTR', '5000', '', '\$18.67', '\$4.99', '\$111,54.99', '\$200,000

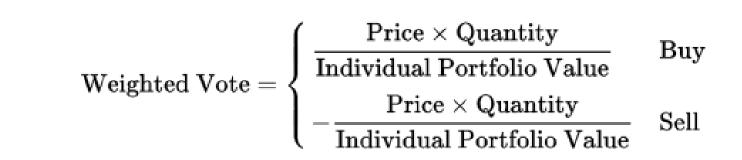
Screenshot of the computer program running.

225102 21 151 5010 5'25 LIM	Stock, Sell K	154	Ş//. 4 U	Ş4.22	\$10,500.01	2202,002.10	-1	1010
232770 5/12/2016 2:52 PM	Stock: Sell SBGL	781	\$13.77	\$4.99	\$10,749.38	\$503,690.09	-1	7818
232771 5/12/2016 2:52 PM	Stock: Sell BP	311	\$31.97	\$4.99	\$9,937.68	\$503,695.08	-1	7818
232772 5/12/2016 2:52 PM	Stock: Sell NKE	161	\$58.15	\$4.99	\$9,357.16	\$503,700.07	-1	7818
232773 5/12/2016 2:52 PM	Stock: Sell CVS	104	\$104.99	\$4.99	\$10,913.45	\$503,705.06	-1	7818
232774 5/12/2016 2:51 PM	Stock: Sell MCD	80	\$130.44	\$4.99	\$10,430.21	\$503,710.05	-1	7818
232775 5/12/2016 2:51 PM	Stock: Sell CMG	22	\$458.86	\$4.99	\$10,089.93	\$503,715.04	-1	7818
232776 5/12/2016 2:51 PM	Stock: Sell CMCSA	180	\$62.37	\$4.99	\$11,221.61	\$503,720.03	-1	7818
232777 5/12/2016 2:51 PM	Stock: Sell HSY	114	\$93.22	\$4.99	\$10,621.52	\$503,725.02	-1	7818
232778 5/12/2016 2:51 PM	Stock: Sell WWE	554	\$17.84	\$4.99	\$9,878.37	\$503,730.01	-1	7818
232779 5/12/2016 2:48 PM	Stock: Sell DIS	105	\$101.82	\$4.99	\$10,686.11	\$503,735.00	-1	7818
232780 5/12/2016 2:48 PM	Stock: Sell DAL	228	\$41.24	\$4.99	\$9,397.73	\$503,739.99	-1	7818
232781 5/12/2016 2:48 PM	Stock: Sell VZ	200	\$51.52	\$4.99	\$10,299.01	\$503,744.98	-1	7818
232782 5/12/2016 2:48 PM	Stock: Sell M	248	\$31.18	\$4.99	\$7,727.65	\$503,749.97	-1	7818
232783 5/12/2016 2:48 PM	Stock: Sell AAPL	103	\$90.38	\$4.99	\$9,303.64	\$503,754.96	-1	7818
232784 5/12/2016 2:48 PM	Stock: Buy WMT	149	\$66.97	\$4.99	\$9,983.52	\$503,759.95	1	7818
232785 5/12/2016 2:48 PM	Stock: Sell CAT	162	\$72.00	\$4.99	\$11,659.01	\$503,764.94	-1	7818
232786 5/12/2016 2:48 PM	Stock: Sell COKE	56	\$148.49	\$4.99	\$8,310.45	\$503,769.93	-1	7818
232787 5/12/2016 2:48 PM	Stock: Buy RL	115	\$87.49	\$4.99	\$10,066.34	\$503,774.92	1	7818
232788 5/12/2016 2:46 PM	Stock: Buy KSS	285	\$34.98	\$4.99	\$9,974.29	\$503,917.28	1	7818
232789 5/12/2016 2:45 PM	Stock: Buy BAC	707	\$14.16	\$4.99	\$10,012.58	\$503,922.27	1	7818
232790 5/12/2016 2:42 PM	Stock: Buy CAB	207	\$48.13	\$4.99	\$9,967.90	\$503,711.52	1	7818
232791 5/12/2016 2:42 PM	Stock: Buy MERC	1171	\$8.55	\$4.99	\$10,017.04	\$503,716.51	1	7818
232792 5/12/2016 2:39 PM	Stock: Buy UAL	266	\$44.17	\$4.99	\$11,754.21	\$503,635.86	1	7818
232793 5/12/2016 2:39 PM	Stock: Buy TWTR	709	\$14.13	\$4.99	\$10,023.16	\$503,640.85	1	7818
232794 5/12/2016 2:39 PM	Stock: Buy LUV	241	\$41.51	\$4.99	\$10,008.92	\$503,645.84	1	7818
232795 5/12/2016 2:37 PM	Stock: Buy PSA	38	\$264.57	\$4.99	\$10,058.65	\$503,608.36	1	7818
232796 5/12/2016 2:36 PM	Stock: Buy JNJ	88	\$114.18	\$4.99	\$10,052.83	\$503,613.35	1	7818
232797 5/12/2016 2:34 PM	Stock: Buy FB	83	\$120.36	\$4.99	\$9,994.87	\$503,660.05	1	7818
232798 5/12/2016 2:33 PM	Stock: Buy BURI	186	\$53.78	\$4.99	\$10.008.07	\$503.665.04	1	7818

Sample of the data collected for this study

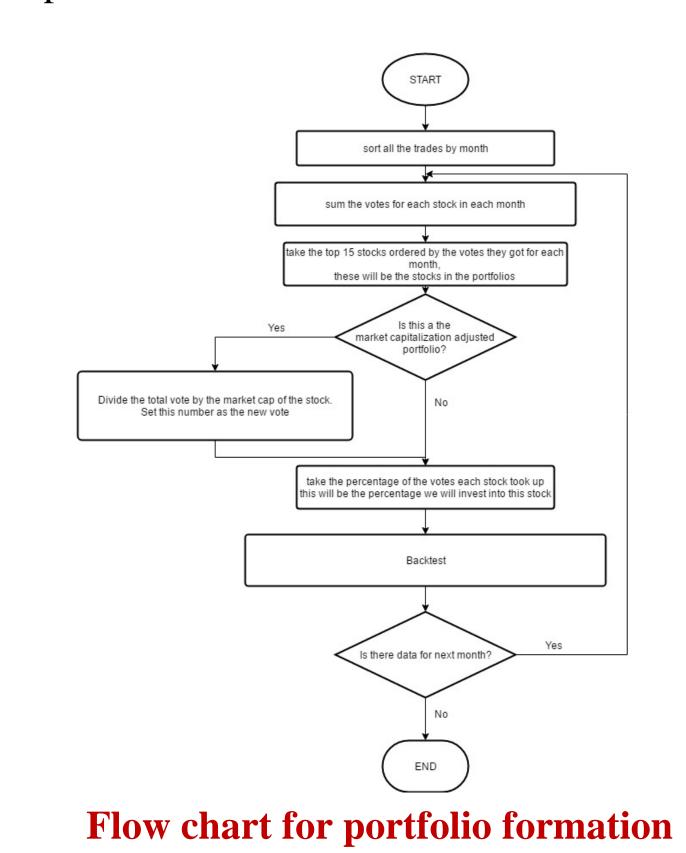
Data Analysis

- An excel VBA program was developed to datamine the 834,842 trades collected.
- · Each trade was analyzed as a weighted vote:



• The vote is weighted based on each trader's confidence in their decision

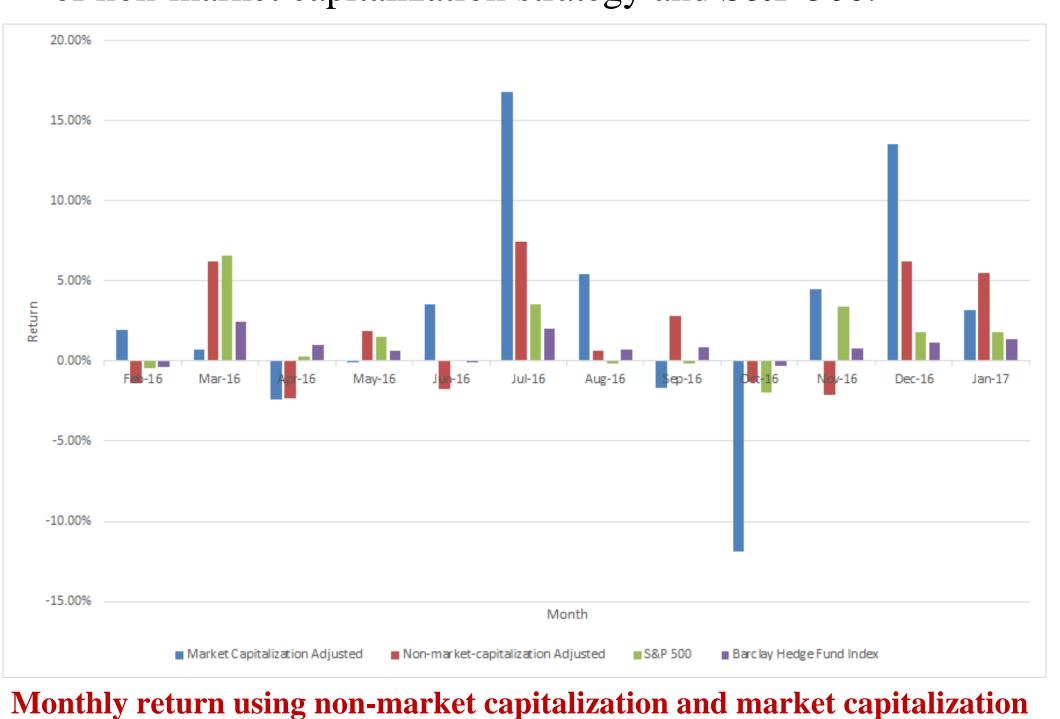
Market Capitalization= Total number shares*stock price



Results and Discussion

Monthly Return

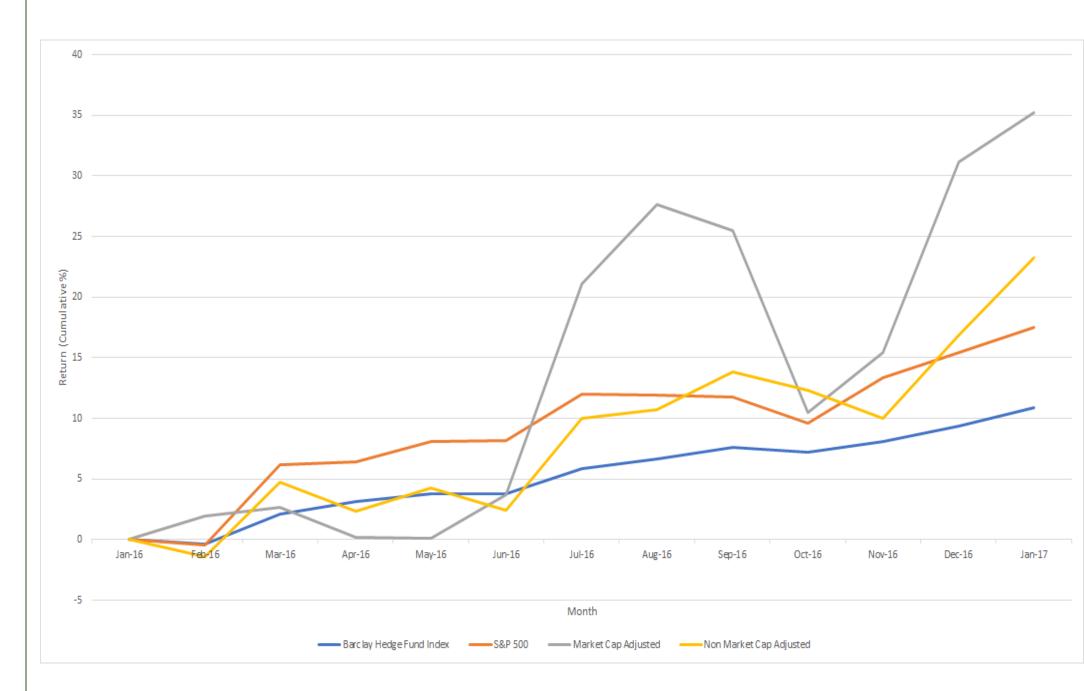
· Variation of market capitalization strategy is larger than that of non-market capitalization strategy and S&P 500.



strategies compared to S&P 500 and Barclay Hedge Fund Index.

Portfolio Growth

- Non-market cap adjusted portfolio had around a 23% yearly increase.
- · Market-cap adjusted portfolio had a 35% yearly increase,
- · S&P 500 only had a 17% yearly increase.
- Both non-market cap adjusted strategy and market-cap adjusted strategy are superior to S&P 500 in terms of return of year 2016.
- Using crowd wisdom on the stock market is a promising approach to effectively trade stocks.



Cumulative return with non-market cap and market cap adjusted strategies, compared to S&P 500 and Barclay Hedge Fund Index.

Summary

- Developed a method to use "wisdom of the crowds" on the stock market.
- Two portfolios were developed in reflection to the data, and both of them beat the S&P 500 in terms of return.
- · Crowd wisdom is a promising strategy for stock trading.

Future Work

- Reliability of using crowd wisdom for stock trading needs to be further studied using the data of other years.
- Explore the method of "wisdom of crowd" for day trading. This will require complete automatization of the process.
- Explore crowd wisdom method to other fields (ex. policy formulation, protein folding problem, etc.)