ST790 Quantopian Final Project

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Introduction

We were tasked with constructing a cross-sectional, long-short US equity strategy on Quantopian that fulfilled the following constraints:

- Trade liquid stocks
- Have no more than 5% of capital invested in any one asset
- Have no more than 10% net dollar exposure
- Achieve mean daily turnover between 5% and 65% over a 63-trading-day rolling window
- Attain gross leverage between 0.8x and 1.1x
- Have low correlation to the market
- Have less than 20% exposed to each of the 11 sectors as defined on Quantopian
- Result in positive returns

Trading Strategy

1. Once a week, we choose a universe of liquid assets from `QTradeableStocksUS` that pass the following filters:
    - It is not trading within 2 days of any earnings announcements as assets are generally more volatile within these dates.
    - It has not been announced as an acquisition target. To further reduce any possible volatility, we avoid acquisition targets as they often pose huge risk to quant strategies.
    - We are able to calculate a 5 day moving average of the bull-minus-bear signal from the `StockTwits` API.

Trading Strategy

2. We build an alpha vector for the universe of liquid assets filtered. The alpha model we use is quite simple: we rank the assets by its bull-to-bear intensity, averaged over the past 5 days as evaluated from `StockTwits`, and find a set of new portfolio weights that maximizes the sum of each asset's weight times this alpha value. As a result, our routine effectively goes long on assets with high bullish signal and short on those with a high bearish signal.

Trading Strategy

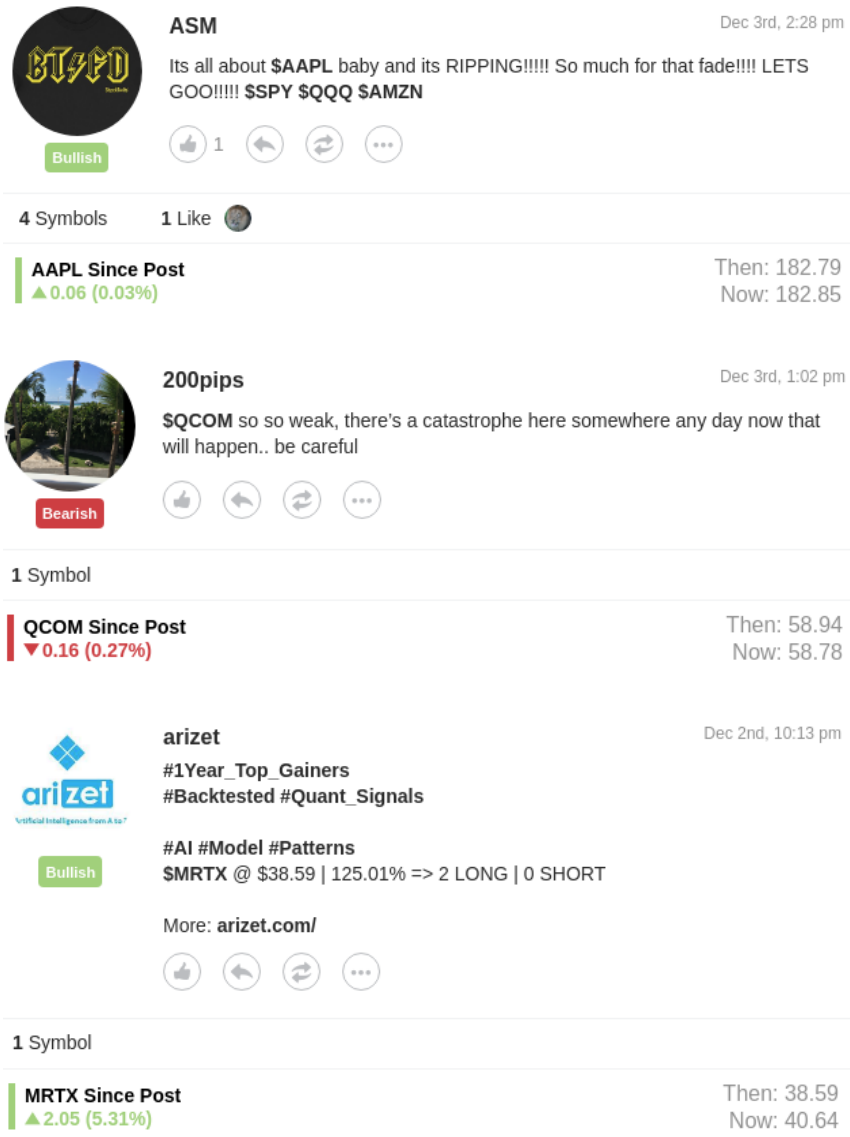
❸ Once a week, we calculate the portfolio that maximizes the alpha-weighted sum of our position sizes, subject to the following constraints:

- Our portfolio maintains a gross leverage of, or less than, 1.0x.
- Our portfolio has no more than 5% in any single asset.
- Our portfolio does not pass mean daily turnover of 80%.

November Performance

Metric	Our Result	Overall
rank	105	-
score	0.338	0.35
max_beta_to_spy_126day	0.076	0.14
max_cumulative_common_returns	0.009	0.04
max_leverage	1.047	1.05
max_max_drawdown	0.000	-0.00
max_net_dollar_exposure	0.032	0.04
max_total_returns	0.025	0.14
min_total_returns	-0.007	-0.02
max_turnover	0.905	1.07
max_volatility_126day	0.044	0.06

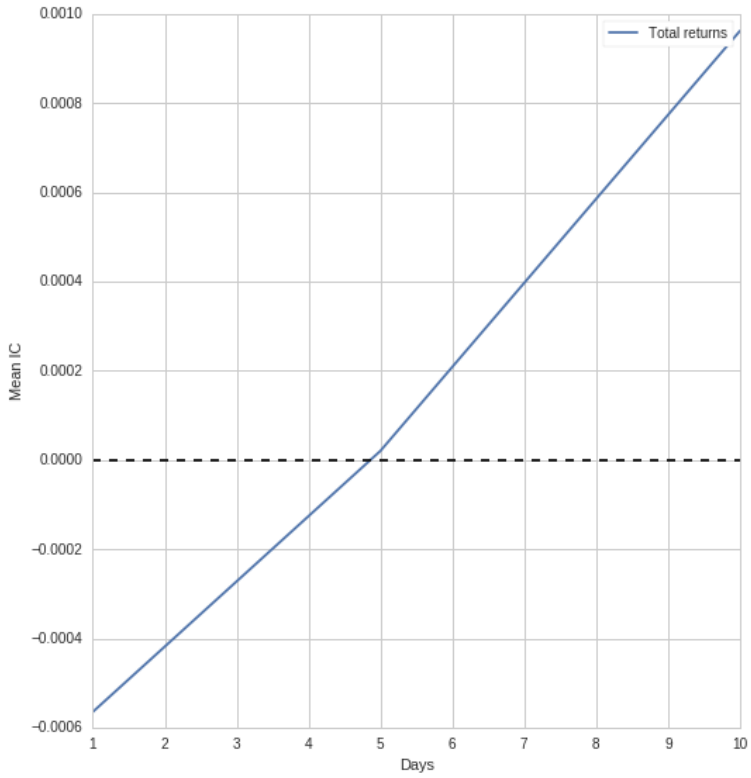
Choice of the sentiment score



Choice of the sentiment score

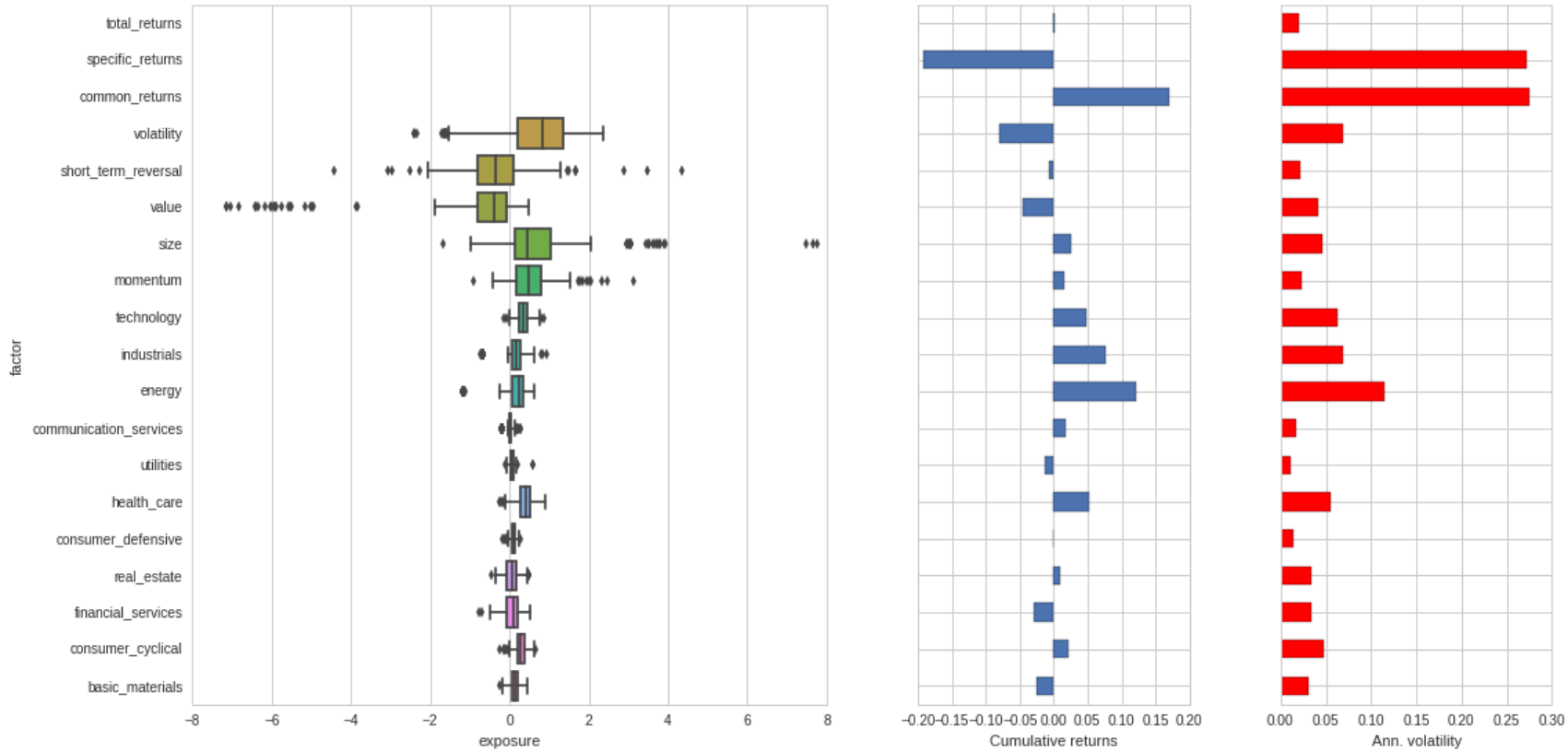
In addition to ease of implementation, the sentiment factor has:

1. **Predictive alpha** as measured by the mean information coefficient.



Choice of the sentiment score

❷ **Low exposures** as quantified by the `perf_attrib` function in `pyfolio`. We benefit from the fact that our exposures do not vary much over time.



Related Work

- Cutler, Poterba, Summers 1989 First empirical study on the relationship between news coverage and stocks. Qualitative data did not help unaccompanied by macroeconomic indicators.
- DeLong 1990 Low sentiment produces downward pressure on price.
- Antweiler and Frank 2004 Messages flagged as buy, sell or hold have some predictive power in trading volume and stock volatility.
- Zhang, Fuehres, Gloor 2011 Emotional outbursts on Twitter is a good predictor for how the Dow performs the next day.
- Tetlock 2015 High pessimism expressed in WSJ predicts downward pressure on stock prices.
- Agrawal 2018 Extreme sentiment has an effect on liquidity.

StockTwits Data

Excerpt from Bergman (2017) on sentiment data points on Apple:

Date	Open	High	Low	Close	Delta	Volume
2017-03-02	140.0	140.28	138.76	138.96	-0.83	26210984
2017-03-01	137.89	140.15	137.6	139.79	2.80	36414585
2017-02-28	137.08	137.44	136.7	136.99	0.06	23482860
2017-02-27	137.14	137.44	136.28	136.93	0.27	20257426
2017-02-24	135.91	136.66	135.28	136.66	0.13	21776585
2017-02-23	137.38	137.48	136.3	136.53	-0.58	20788186
2017-02-22	136.43	137.12	136.11	137.11	0.41	20836932
2017-02-21	136.23	136.75	135.98	136.7	0.98	24507156
2017-02-17	135.1	135.83	135.1	135.72	0.38	22198197
2017-02-16	135.67	135.9	134.84	135.34	-0.17	22584555

Date	Positivity	Activity	Bullish Intensity	Bearish Intensity
2017-03-02	0.62	45.80	1.82	1.87
2017-03-01	0.68	637.20	1.75	1.73
2017-02-28	0.63	-247.60	1.80	1.79
2017-02-27	0.69	120.20	1.90	1.85
2017-02-24	0.62	55.80	1.73	1.66
2017-02-23	0.61	-146.80	1.95	1.64
2017-02-22	0.64	-228.00	1.87	1.82
2017-02-21	0.69	-270.40	1.83	1.75
2017-02-17	0.62	-438.20	1.71	1.78
2017-02-16	0.68	-295.20	1.85	1.49

StockTwits Data

	mean	std	min	max
Total scanned messages	1072.41	966.04	26.00	8387.00
Bull scored messages	257.51	230.27	3.00	1995.00
Bear scored messages	157.33	155.76	0.00	1380.00
Bullish intensity	1.71	0.11	1.16	2.18
Bearish intensity	1.76	0.18	0.00	2.80

- Positivity: ratio of bullish tweets from all messages that have been classified.
- Activity: total scanned messages over a 5-day average
- Bullish/Bearish Intensity: Score on a 0-4 scale for bullishness/bearishness.
- Bull/Bear Scored: Total count of bullish/bearish sentiment messages scored.

Trading Strategy Analysis

Given that sentiment might be an early indicator for changes in financial assets, we

Backtest Analysis

- You need to summarize details on the backtesting procedure and results provided in quantopian. You should try to interpret and relate your results with domain knowledge.

Performance Analysis

- summary about your performance in the contest. Again you need to summarize the results provided in quantopian. You should try to interpret and relate your results with domain knowledge.

Discussion

- You may revisit the advantage and disadvantage of your strategy and provide some insights for future exploration directions.