

Reddit: Using Public Sentiment as a Technical Indicator for Investments

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Introduction

- Given a period of sentiment, can we predict if the future stock price will be bull or bear?
- Investigated Amazon, Disney, Intel, and Tesla stocks.

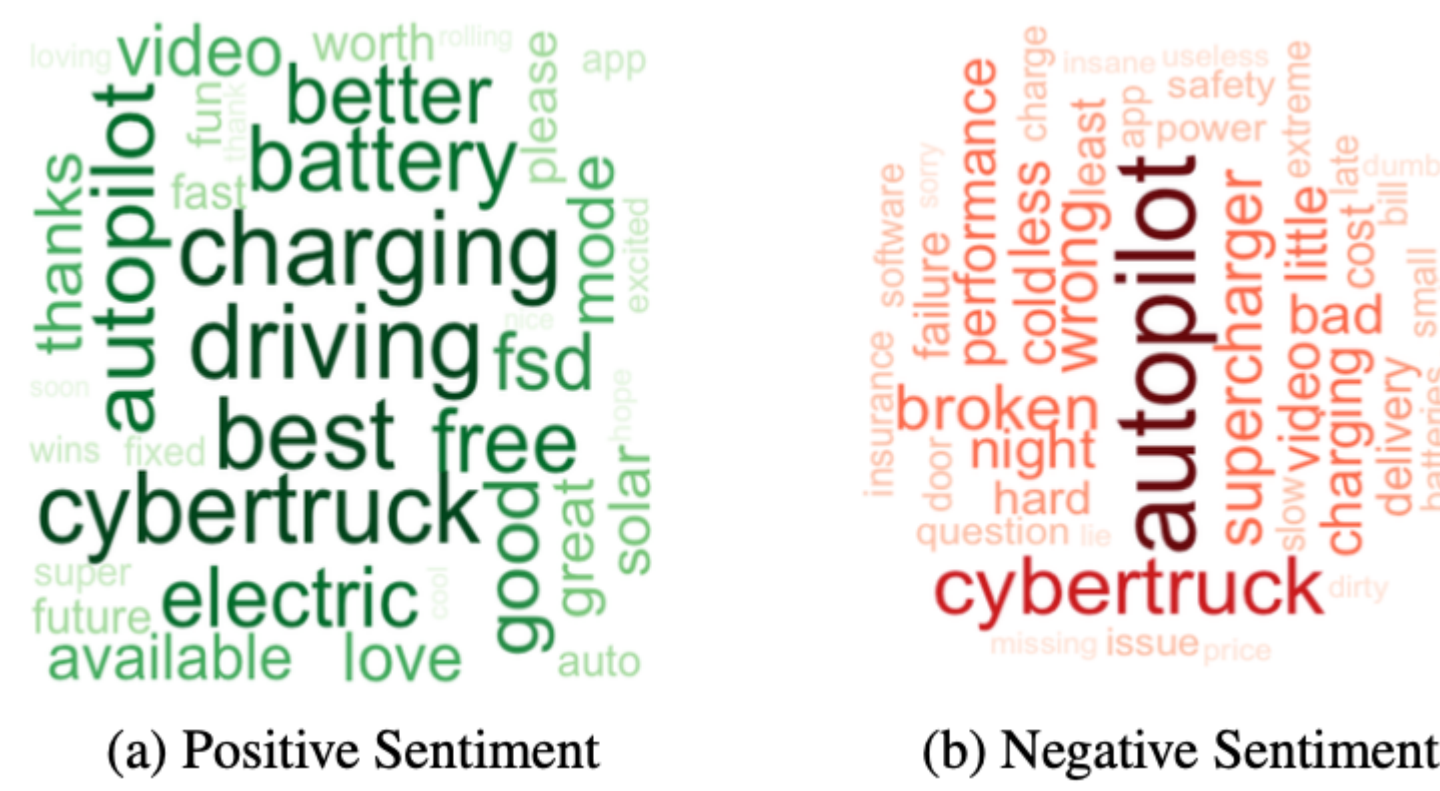
Methodology

1. Gathering and Cleaning Data

- Used Tidyquant to grab stock price data for each company.
- Used Reddit's API to collect all posts and comments for each company.
 - Over 500,000 comments and 10,000 posts collected.

2. Sentiment Calculation:

Calculated the sentiment scores using Python's TextBlob library.



$$\text{Daily Weighted Sentiment}_n = \frac{\sum_{n=1}^{\# \text{ Comments}} \text{Sentiment}_n * \text{Score}_n}{\# \text{ Comments}}$$

$$\text{Centered and Scaled Sentiment}_n = \frac{DWS_n - \overline{DWS_n}}{sd(DWS_n)} * IQR(P) + \bar{P}$$

3. Moving Average

$$\text{Simple Moving Average}_n = \frac{\sum_{n=1}^{\text{Window Size}} P_n}{\text{Window Size}}$$

$$\text{Weighted Moving Average}_n = \frac{\sum_{n=1}^{\text{Window Size}} W_n * P_n}{\text{Window Size}}$$

$$\text{Exponential Moving Average}_n = EMA_{n-1} - P_n * \frac{2}{n+1} + P_n$$

Reddit Sentiment is a useful technical indicator for predicting a stock's direction.

Using Reddit Sentiment to Increase Stock Return Investments



Scan QR code to view GitHub repository.

Analysis

Sentiment MA vs Price for Disney and Tesla.



Idea: Buy when price below sentiment, sell when sentiment above price.

- Implemented trading algorithm finding optimal buy and sell dates.
- Created back-testing algorithm to calculate return.
- Back-tested all window sizes between 5-50 days using all MA types for price, sentiment, and both.

| Stock | Baseline Return | PMA Return | SMA Return | PMA & SMA Return |
|--------|-----------------|------------|------------|------------------|
| Amazon | 169% | 130% | 153% | 165% |
| Disney | 98% | 92% | 142% | 100% |
| Intel | 95% | 79% | 119% | 151% |
| Tesla | 500% | 630% | 339% | 552% |

Computed average returns for each group and stock.

SMA seems to perform well by itself and combined with PMA.

One sided t-test comparing algorithm to baseline return of holding.

$$H_0 : \text{Algorithm Return} \leq \text{Baseline Return}$$

$$H_a : \text{Algorithm Return} > \text{Baseline Return}$$

T-Test Results

| Stock | PMA P-value | SMA P-value | PMA & SMA P-value |
|--------|-------------|-------------|-------------------|
| Amazon | 1.000 | 1.000 | 0.851 |
| Disney | 0.996 | <2e-16 | 1.000 |
| Intel | 1.000 | <2e-16 | <2e-16 |
| Tesla | <2e-16 | 1.000 | 0.061 |

Conclusion

- Sentiment MA worked better for Disney and Intel.
- Price MA worked better for Tesla.
- Failed to outperform Amazon baseline.

It was expected that sentiment would not work for every stock.

Promising results from Disney, Intel, and Tesla.

Conclude that sentiment has potential as a valuable technical indicator