

Using Reddit and Twitter Sentiment as a Technical Indicator for Investments

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Introduction

- Using sentiment, can we predict future stock price direction?
- Investigated Amazon, Disney, Intel, and Tesla stocks.

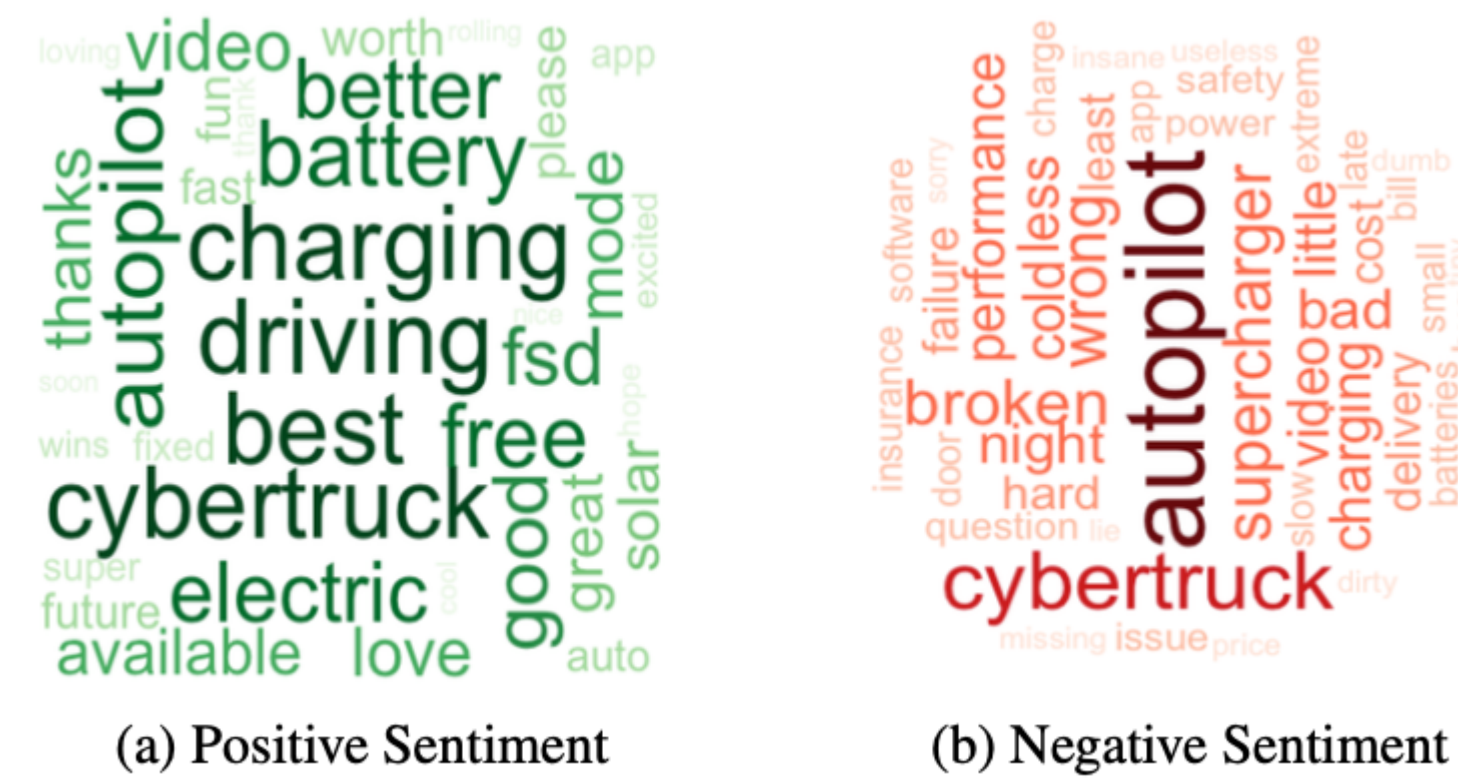
Methodology

1. Gathering and Cleaning Data

- Used Tidyquant to grab stock price data for each company.
- Python scripts used to scrape Reddit and Twitter.
 - Reddit: Over 250,000 comments and 10,000 posts collected.
 - Twitter: Over 500,000 Tweets collected.

2. Sentiment Calculation:

Calculated the sentiment scores using Python's TextBlob library.



Custom built dynamic centering and scaling algorithm to make unbiased.

$$Daily\ Weighted\ Sentiment_n = \frac{\sum_{n=1}^{\#Comments} Sentiment_n * Score_n}{\#Comments}$$

$$Center\ Scaled\ Sentiment_n = \frac{DWS_n - \overline{DWS}}{sd(DWS)} * IQR(P_w) + \bar{P}_w$$

3. Moving Average

$$Simple\ MA_n = \frac{\sum_{n=1}^{Window\ Size} P_n}{Window\ Size}$$

$$Weighted\ MA_n = \frac{\sum_{n=1}^{Window\ Size} W_n * P_n}{Window\ Size}$$

$$Exponential\ MA_n = EMA_{n-1} - P_n * \frac{2}{Window\ Size + 1} + P_n$$

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Reddit and Twitter are useful technical indicators for predicting a stock's direction.

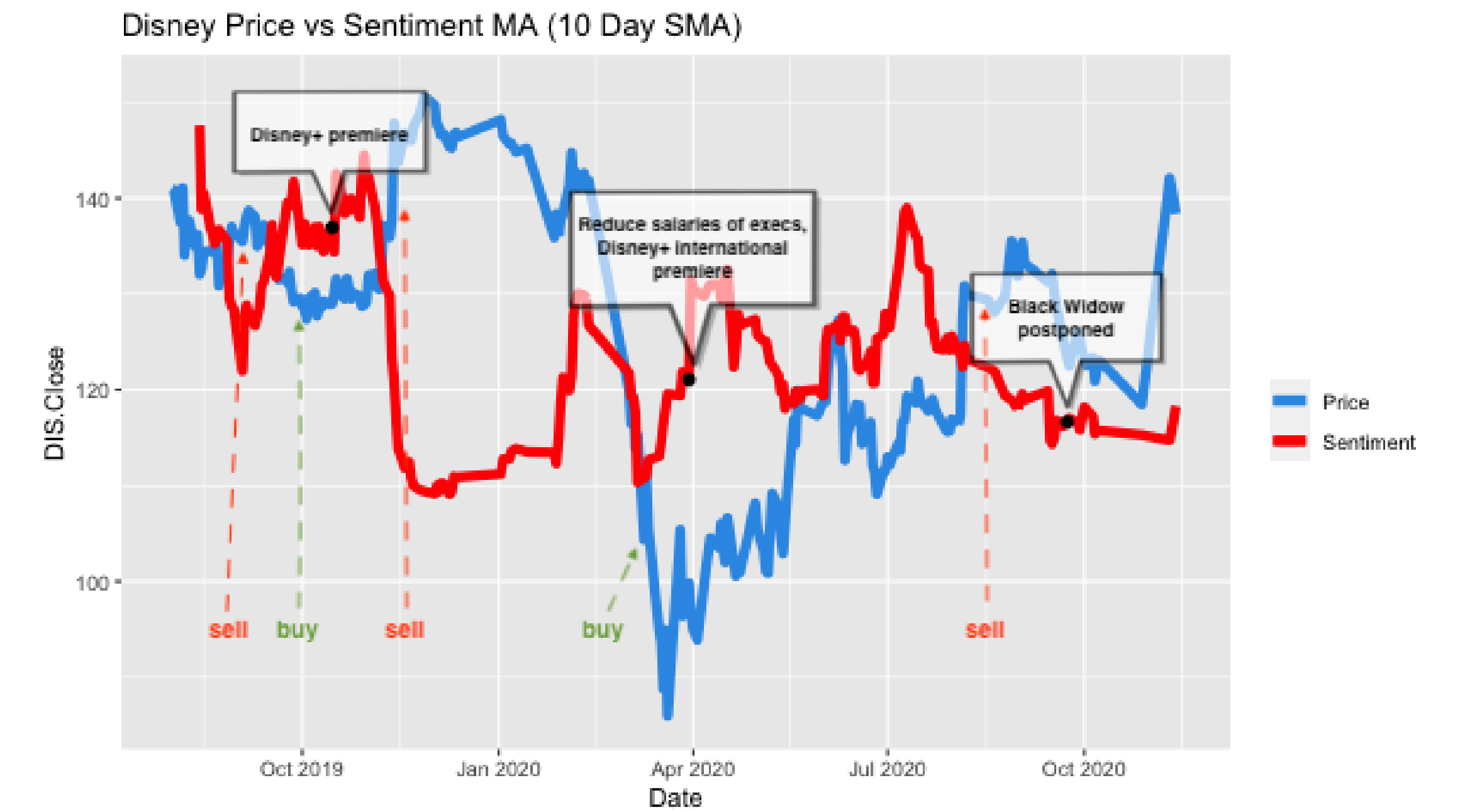
Using Reddit Sentiment to Increase Stock Return Investments



Scan QR code to view GitHub repository.

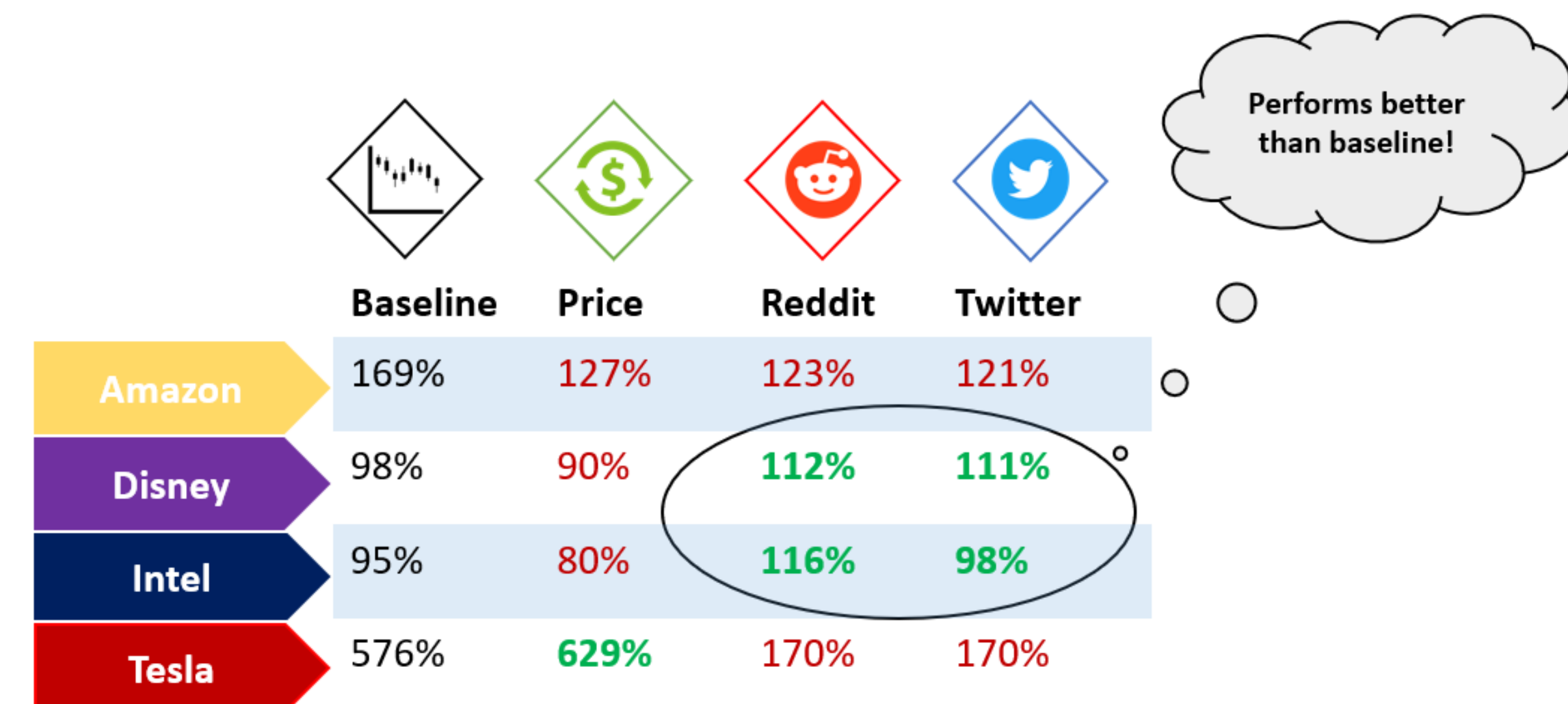
Analysis

Reddit Sentiment MA vs Price for Disney and Tesla.



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

- Implemented unbiased (time invariant) 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.



- Computed average returns for each group and stock.
- Sentiment MA seems to perform well for Disney and Tesla.
- Still made profit for Amazon and Tesla.

One-Tailed test comparing algorithm to baseline return of holding using significance level of 10 %.

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

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

Conclusion

- As expected, no conclusive results could be determined.
- Succeeded in outperforming Disney and Intel.
- Failed to outperform Amazon and Tesla using sentiment.

Impossible to always predict direction of a stock.

Inconclusive how valuable sentiment is a valuable technical indicator.

However, sentiment does show some predicting potential.