

# 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.

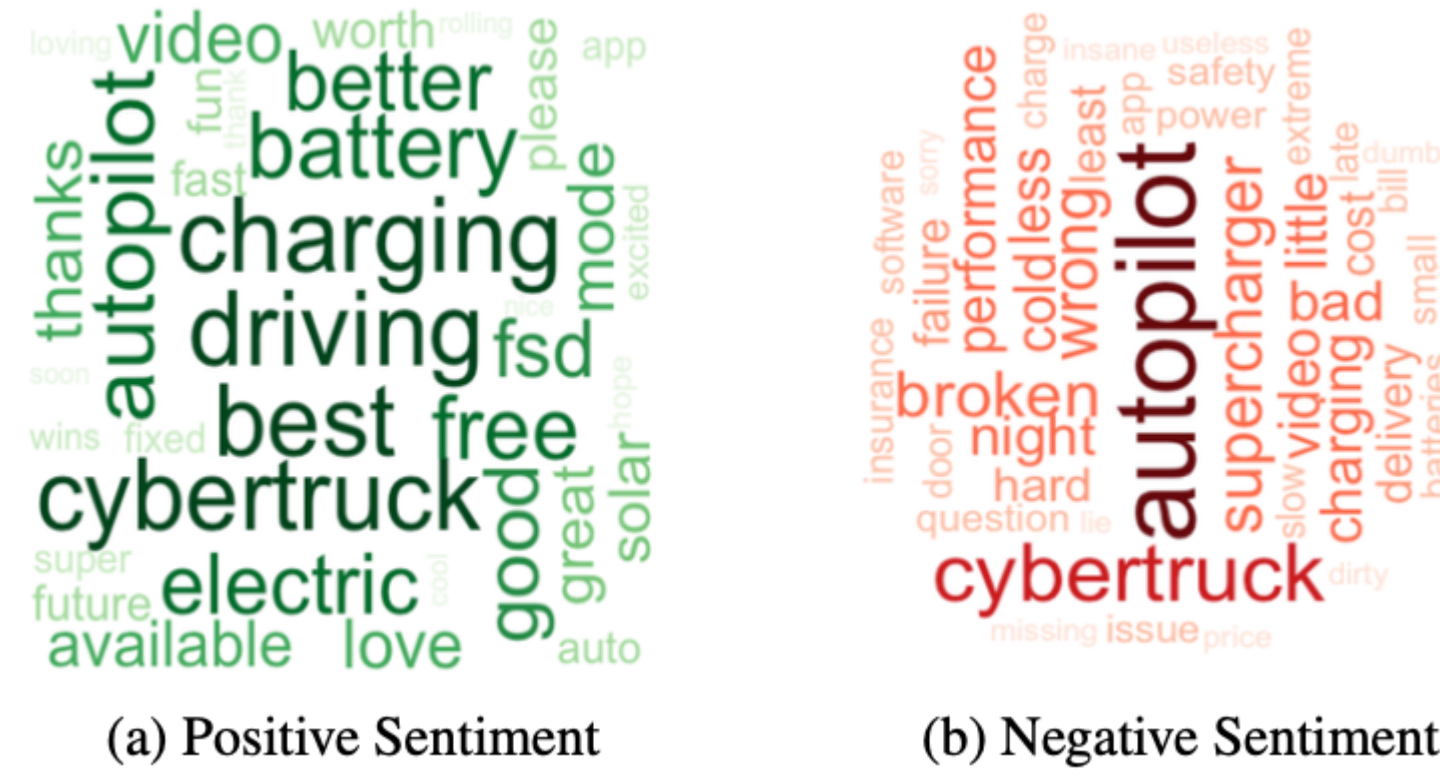
## Methodology

### 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.



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

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

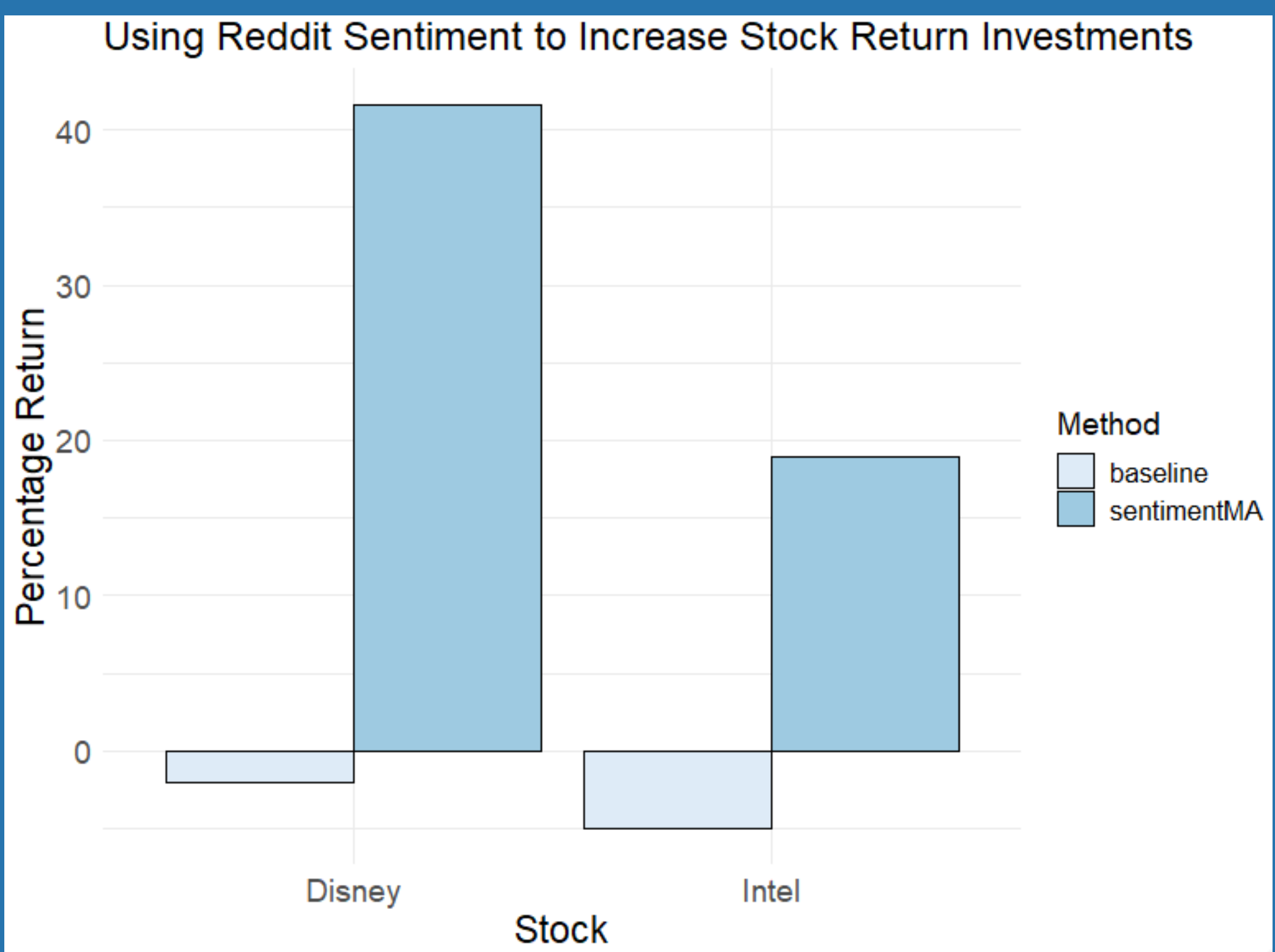
### 3. Moving Average

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

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

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

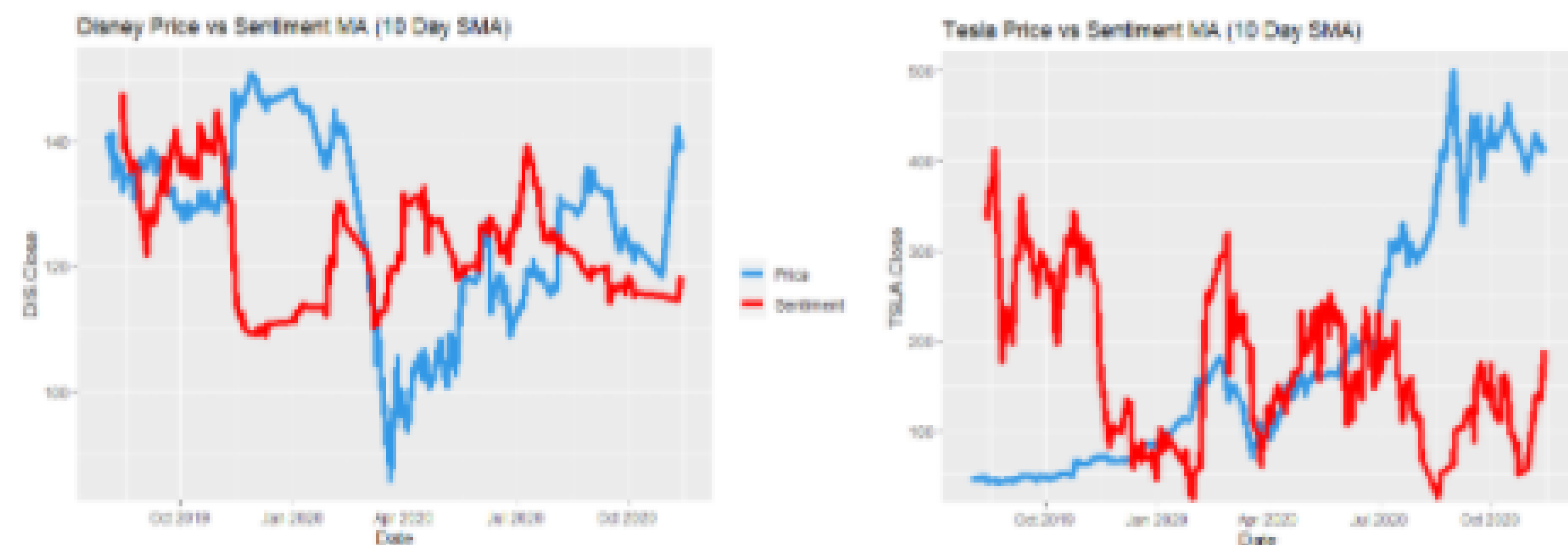
# Employing stock price and Reddit sentiment moving averages has varying effects on investment returns.



Escanee el QR para  
ver el desarrollo detallado

## 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%

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

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

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

<https://www.overleaf.com/project/5fc60882633b5637d3277908>

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 and Intel.

Conclude that sentiment has potential as valuable technical indicator