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A Case study in Sentiment Analysis and its Application in Financial Analysis

Financial Markets heavily rely on public and investor confidence in determining stock prices and general market direction. One of the possible ways we have of estimating these financial attitudes are through sentiment analysis. Sentiment analysis utilized natural language processing (NLP) algorithms to extract information from text. There are a wide range of sentiment analysis algorithms that exist nowadays each with their own use cases. Fine grained sentiment analysis can classify how extremely positive and negative text is. Aspect based sentiment analysis can be used to identify certain qualities about products or stocks. Emotion detection algorithms can classify text into categories like “happy” and “angry”. Many applications to financial analysis include analyzing news articles, social media, and financial reports.

For our use case we present how Elon Musk tweets can impact TSLA stock prices. We knew there have been specific instances of Elon Musk tweets impacting other companies and markets through his tweets. In one instance there was a significant increase by 200$ in the share price of GameStop when Elon Musk touted it in one of his tweets [1]. This shows the potential for at scale manipulation of stock prices based on his tweets and how the public and investors respond to his tweets. After changing his twitter bio to include #bitcoin, the price increased by 6000. This was a major market fluctuation [2]. There is no denying that Elon Musk’s opinions have major market implications. In this case study however, we will focus on a more general analysis of all of Elon Musk’s tweets. We want to see if there is any correlation between the sentiment of his tweets and the stock price of TSLA. You are free alternatively to analyze another public figure’s tweets or public opinions to perform analysis.

In this assignment, you will use the provided dataset of Elon Musk tweets and TSLA stock data to create a sentiment analysis model with the VADER python package. You will also create multiple time series analysis models to judge the correlation of sentiment and stock prices. Alternatively you may choose other social media data to create a sentiment analysis model and then use other relevant financial data to complete time series analysis. Scripts have been provided in the GitHub repository that can be modified to accomplish this task. You will submit your own Github repository containing all the code associated with your project along with a one page summary of the assignment.

Github Link: https://github.com/RyanErhardt/DS4002-CS3

References

1. Metta, Sanjeev & Madhavan, Nidheesh & Narayanan, Krishnamoorthy. (2022). Power of 280: Measuring the Impact of Elon Musk's Tweets on the Stock Market. Ushus Journal of Business Management. 21. 17-43. 10.12725/ujbm.58.2.
2. Lennart Ante, How Elon Musk's Twitter activity moves cryptocurrency markets, Technological Forecasting and Social Change, Volume 186, Part A, 2023, 122112, ISSN 0040-1625, https://doi.org/10.1016/j.techfore.2022.122112.
3. Hutto, C.J. & Gilbert, E.E. (2014). VADER: A Parsimonious Rule-based Model for Sentiment Analysis of Social Media Text. Eighth International Conference on Weblogs and Social Media (ICWSM-14). Ann Arbor, MI, June 2014.