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Enhancing the performance of turtle trading strategy in cryptocurrency trading systems through sentiment analysis

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***Abstract*—This study is based on the turtle trading strategy [1] to establish a cryptocurrency trading system. Additionally, sentiment analysis of Twitter user comments is employed as a method to enhance the performance of the trading system.**

I. Introduction

Dapp (Decentralized Application) refers to a decentralized application based on blockchain technology. User experience is an important indicator for measuring the quality of an application. Therefore, in this study, sentiment analysis techniques are utilized to enhance the adaptability of the turtle trading strategy in the field of cryptocurrency DApps. A comprehensive trading system is constructed, which not only enables 24hr tracking of market trends for executing buy and sell orders but also helps to avoid trading errors caused by subjective perceptions of traders.

II. Methods and Results

This study defines sentiment analysis as a text classification task, categorizing user comments on Twitter into three classes: positive, neutral, and negative. After comparing different language models, this study selected RoBerta-base [2], which achieved the highest accuracy, as the sentiment classification model for this system. Each positive review is assigned a weight of +1, while negative reviews are assigned a weight of -1. The scores for each day are summed to obtain the daily sentiment score.

In this study, daily sentiment scores are incorporated as reference indicators, and the order size is linearly adjusted. When a trading signal is generated, the daily sentiment scores of the past 100 days are considered. The 20th largest value is chosen as the positive threshold, while the 20th smallest value is set as the negative threshold. Two parameters are defined: "lookbackday" determines the number of days to reference the past sentiment scores, and "adj_parameter" acts as a coefficient to adjust the order size.

During the lookback period, if a daily sentiment score is greater than the positive threshold, the adj_parameter is added by 1. Conversely, the adj_parameter is decreased by 1. This adjustment is applied to determine the size of the order in the trading system, allowing it to dynamically respond to the sentiment analysis results.

To summarize the obtained optimized formulas, Eq.1 is applied to optimize the order size when the system generates a long signal, while Eq.2 is used to optimize the order size when the system generates a short signal.

$$optimized = \left(1 + \frac{adj\_parameter}{lookbackday}\right) * order\_size \qquad (1)$$

$$optimized = \left(1 - \frac{adj\_parameter}{lookbackday}\right) * order\_size \qquad (2)$$

Figure 1 displays the cumulative asset chart of the trading system in the cryptocurrency AXS. The blue line represents the account balance without the inclusion of the optimization algorithm in the trading strategy. The other lines represent the account balances with the optimization algorithm under different sentiment lookback window sizes. It is evident that the account balances with the optimization algorithm consistently outperform the account balance without the optimization algorithm.

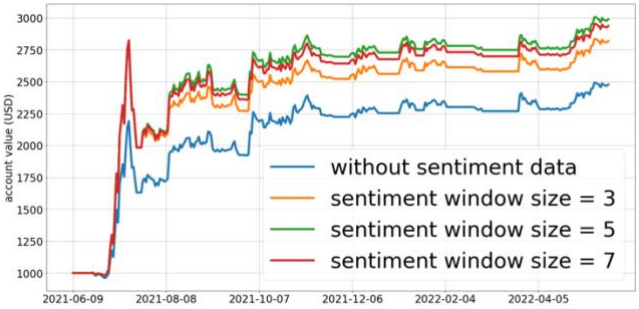

Figure 1. Cumulative asset chart of the trading system

III. Conclusion

This study utilized sentiment analysis techniques to enhance the performance of the turtle trading strategy in the field of cryptocurrency DApps, and it continues to maintain profitability up to the present day.

References

[1] Covel, Michael W. The complete TurtleTrader: how 23 novice investors became overnight millionaires. Harper Collins, 2009.

[2] Liu, Yinhan, et al. "Roberta: A robustly optimized bert pretraining approach." arXiv preprint arXiv:1907.11692 (2019).