

ABSTRAK

Peristiwa Bitcoin Halving merupakan salah satu momen krusial dalam ekosistem kripto yang kerap memicu lonjakan dinamika opini dan sentimen publik di media sosial, khususnya X (sebelumnya *Twitter*). Tingginya volatilitas opini publik ini menciptakan tantangan dalam memahami kecenderungan respons pasar secara akurat. Penelitian ini bertujuan untuk menganalisis sentimen masyarakat terhadap *Bitcoin Halving* serta membandingkan performa tiga algoritma pembelajaran mesin dan *deep learning*, yaitu *Long Short-Term Memory* (LSTM), *Gated Recurrent Unit* (GRU), dan *Bidirectional Encoder Representations from Transformers* (BERT).

Kerangka kerja yang digunakan dalam penelitian ini mengadopsi metodologi *Cross-Industry Standard Process for Data Mining* (CRISP-DM) yang meliputi enam tahapan utama: *Business Understanding*, *Data Understanding*, *Data Preparation*, *Modeling*, *Evaluation*, dan *Deployment*. Metode penelitian dilakukan dengan mengumpulkan data cuitan *Twitter* terkait *Bitcoin Halving*, melakukan pembersihan dan pra-pemrosesan data (*preprocessing*), melakukan pelabelan sentimen, serta membagi dataset ke dalam beberapa proporsi rasio data latih dan data uji (mulai dari 90:10 hingga 50:50). Selanjutnya, ketiga model (LSTM, GRU, dan BERT) dilatih dan dievaluasi berdasarkan metrik *Accuracy*, *Precision*, *Recall*, dan *F1-Score*.

Hasil penelitian menunjukkan bahwa penerapan kerangka CRISP-DM efektif dalam menstrukturkan alur analisis sentimen data media sosial. Berdasarkan pengujian dan evaluasi performa model pada berbagai rasio pembagian data, model BERT secara konsisten menghasilkan tingkat akurasi dan metrik evaluasi tertinggi dibandingkan dengan model LSTM dan GRU. Hasil ini mengindikasikan bahwa arsitektur berbasis *transformer* lebih unggul dalam memahami konteks dan semantik bahasa kompleks pada data teks singkat dari *Twitter*. Hasil analisis sentimen ini diharapkan dapat memberikan gambaran komprehensif mengenai persepsi publik terhadap Bitcoin Halving serta menjadi acuan bagi peneliti dan praktisi di bidang analisis data finansial berbasis media sosial.

Kata Kunci: Analisis Sentimen, *Bitcoin Halving*, *Twitter*, CRISP-DM, LSTM, GRU, BERT.

ABSTRACT

The Bitcoin Halving event is a crucial moment in the cryptocurrency ecosystem that frequently triggers dynamic surges in public opinion and sentiment on social media, particularly X (formerly Twitter). High volatility in public opinion presents challenges in accurately understanding market response trends. This study aims to analyze public sentiment towards Bitcoin Halving and compare the performance of three machine learning and deep learning algorithms: Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), and Bidirectional Encoder Representations from Transformers (BERT).

The framework utilized in this study adopts the Cross-Industry Standard Process for Data Mining (CRISP-DM) methodology, comprising six main stages: Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment. The research method was conducted by collecting Twitter dataset related to Bitcoin Halving, performing data cleaning and preprocessing, labeling sentiment, and splitting the dataset into various training-to-testing ratios (ranging from 10:90 to 50:50). Subsequently, the three models (LSTM, GRU, and BERT) were trained and evaluated based on Accuracy, Precision, Recall, and F1-Score metrics.

The results show that the implementation of the CRISP-DM framework effectively structures the sentiment analysis workflow for social media data. Based on testing and performance evaluation across different data splitting ratios, the BERT model consistently achieved the highest accuracy and evaluation metrics compared to LSTM and GRU. These findings indicate that transformer-based architecture is superior in understanding context and complex language semantics in short-text Twitter data. The results of this sentiment analysis are expected to provide a comprehensive overview of public perception regarding Bitcoin Halving and serve as a reference for researchers and practitioners in social media-based financial data analysis.

Keywords: Sentiment Analysis, Bitcoin Halving, Twitter, CRISP-DM, LSTM, GRU, BERT.