

Peer Review

Review of: "CryptoPulse: Short-Term Cryptocurrency Forecasting with Dual-Prediction and Cross-Correlated Market Indicators"

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The manuscript presents CryptoPulse, a deep learning framework designed for short-term cryptocurrency forecasting by integrating macroeconomic signals, technical indicators, and sentiment analysis from financial news. The authors make a compelling case for the limitations of conventional time-series prediction models, particularly those relying solely on historical price data, and introduce a dual-prediction strategy that separately models macro market fluctuations and local price dynamics. These are then fused through a sentiment-guided mechanism based on embeddings derived from LLM-driven news analysis. The approach is innovative, particularly in its use of prompting strategies that simulate a “think-tank discussion” among fictional cryptocurrency traders to generate robust sentiment labels without the need for manual annotation.

The experimental results are extensive and demonstrate clear performance advantages over ten state-of-the-art baselines across various metrics (MAE, MSE, correlation), tested on a large and diverse dataset comprising 75 cryptocurrencies. The model consistently outperforms both traditional and deep learning methods, and its robustness is supported by multiple experimental repetitions and detailed ablation studies. However, several methodological details remain insufficiently documented. Specifically, the full structure and wording of the prompts used for LLM-based sentiment analysis are not provided. Since prompting design plays a critical role in the consistency and reliability of the sentiment labels, it would be important for the authors to include representative prompt templates. For example, they should show how many examples were provided in the few-shot block, the exact phrasing of the “trader voting” instructions, and whether any variations in sentiment label definitions (e.g., strong negative vs. mild

negative) were tested. Including ablations on different prompt formats (e.g., standard classification prompts vs. simulated expert discussion) could also shed light on how prompting choices influence performance.

In addition, the manuscript would be strengthened by the inclusion of a structured error analysis. For instance, the authors could identify cases where the model's predictions diverge significantly from actual prices, particularly for low-liquidity or high-volatility cryptocurrencies. Examining failure cases involving misleading news headlines, conflicting sentiment signals, sparse or missing news coverage, or abrupt market reversals would help reveal the limitations of the dual-prediction mechanism and its reliance on sentiment fusion. It would also be valuable to investigate whether the model tends to overfit to specific macro conditions or overreact to sentiment outliers. Such an analysis should ideally include a taxonomy of errors categorized by data type (e.g., technical indicators vs. news), market condition (e.g., bull vs. bear), and asset class (e.g., stablecoin vs. utility token). This would not only clarify under which market conditions CryptoPulse may underperform but also improve its interpretability and robustness in practice.

Finally, while the forecasting metrics are well reported, the study does not simulate trading strategies or quantify financial returns, which would be useful to assess practical value in real-world trading applications. In summary, the paper presents a strong technical contribution with significant originality and empirical support. Nonetheless, addressing the above concerns regarding methodological transparency, representative prompting strategies, and deeper failure mode analysis would substantially enhance the completeness and real-world relevance of the work.

Declarations

Potential competing interests: No potential competing interests to declare.