

## ABSTRACT

This study examines the application of Recurrent Neural Network (RNN) and Long Short-Term Memory (LSTM) models to predict Bitcoin prices in order to improve investment strategies. Given the high volatility and risk associated with Bitcoin investments, accurate price forecasting is crucial for strategic decision-making. This study uses quantitative methods, including experimental design and descriptive analysis, to evaluate the effectiveness of the models using historical Bitcoin price data over a four-year period from May 25, 2020 to May 25, 2024.

The findings show that the LSTM model outperforms the RNN model in terms of prediction accuracy, with lower error rates in both the training and testing phases. The performance of the models is evaluated using the Mean Absolute Percentage Error (MAPE) and Root Mean Square Error (RMSE) metrics. This study also explores the implications of these models on the Dollar Cost Averaging (DCA) investment strategy, with a monthly investment frequency over the period from May 25, 2020 to May 25, 2024, providing insights into the potential benefits and limitations of using machine learning for cryptocurrency investment optimization.

The results show that both models tend to underestimate the portfolio value and actual returns when applied to the DCA strategy. However, the RNN model shows slightly better performance in predicting returns for smaller investment amounts. This study emphasizes the importance of considering resource requirements when choosing between RNN and LSTM models, as the superior accuracy of LSTM requires higher computational demands.

Although both models provide valuable insights into Bitcoin price trends, this study emphasizes the need for caution when using these predictions as a basis for investment decisions. External factors that influence the cryptocurrency market must be considered in conjunction with model predictions. This study contributes to the development of literature on quantitative finance and investment management in the context of cryptocurrency markets.

**Keyword :** Bitcoin, Cryptocurrency, Machine Learning, LSTM, RNN, Dollar Cost Averaging, Investment Strategy.