

# ABSTRACT

The volatile nature of Bitcoin and the broader cryptocurrency market presents significant challenges for investors, traders, and financial analysts. Accurate price prediction is essential for making informed decisions and managing investment risks. This project explores the use of three machine learning models—XGBoost, Logistic Regression, and Support Vector Machine (SVM)—to predict Bitcoin prices. These models were selected due to their robust performance in classification and regression tasks. The goal is to analyze their effectiveness by training on historical Bitcoin data, including price and technical indicators.

Model evaluation metrics such as Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and R<sup>2</sup>-score are used to compare their performance. Our findings reveal that ensemble methods like XGBoost outperform the traditional Logistic Regression and SVM in terms of prediction accuracy, making it a suitable model for volatile financial data like Bitcoin. This project contributes to the growing body of work in cryptocurrency price prediction and highlights the importance of machine learning in financial forecasting.

Cloud computing platforms like AWS, Google Cloud AI, and Microsoft Azure ML are utilized for large-scale data processing, model training, and deployment. These platforms ensure scalability and facilitate real-time predictions, making the system suitable for high-frequency trading environments. Additionally, visualization tools provide clear insights into predicted trends, aiding financial professionals in decision-making.