

## **Final Report**

### **Cryptocurrency Volatility Prediction Using Machine Learning**

#### **1. Introduction**

Cryptocurrency markets are highly volatile due to rapid price fluctuations and speculative trading. This project aims to analyze and predict cryptocurrency volatility using historical market data and machine learning techniques.

#### **2. Objective**

The objective of this project is to build a machine learning model capable of predicting cryptocurrency volatility using historical price, volume, and market capitalization data.

#### **3. Dataset Description**

The dataset contains daily historical records for multiple cryptocurrencies, including Open, High, Low, Close prices, trading volume, and market capitalization.

#### **4. Methodology**

The methodology includes data preprocessing, feature engineering, exploratory data analysis, model training, and evaluation.

#### **5. Feature Engineering**

Key engineered features include daily returns, rolling volatility, moving averages, and liquidity indicators.

#### **6. Machine Learning Model**

A Random Forest Regressor was used to model the relationship between market features and volatility levels.

#### **7. Model Evaluation**

The model was evaluated using Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and  $R^2$  Score. The results highlight the challenging nature of volatility prediction.

#### **8. Results and Insights**

The model demonstrates reasonable prediction error while emphasizing the inherent unpredictability of cryptocurrency markets.

#### **9. Conclusion**

This project successfully demonstrates an end-to-end machine learning pipeline for cryptocurrency volatility prediction and provides valuable insights into market behavior.

## 10. Future Scope

Future enhancements may include deep learning models, sentiment analysis, and real-time deployment.