



HIGH LEVEL DESIGN (HLD)

Project Title

Cryptocurrency Volatility Prediction Using Machine Learning

1. Introduction

Cryptocurrency markets are highly volatile and unpredictable. Understanding and forecasting volatility is critical for traders, investors, and financial institutions. This project focuses on building a machine learning system to predict cryptocurrency volatility using historical market data.

2. Objective

The primary objective of this project is to design and develop a machine learning model that predicts cryptocurrency volatility based on historical OHLC prices, trading volume, and market capitalization.

3. System Overview

The system processes historical cryptocurrency data, performs feature engineering, trains a machine learning model, and predicts future volatility levels. The output helps identify periods of high market risk.

4. System Architecture

The system consists of the following components:

1. Data Ingestion Module
2. Data Preprocessing Module
3. Exploratory Data Analysis Module

4. Feature Engineering Module
 5. Model Training Module
 6. Model Evaluation Module
 7. Deployment Module (Optional)
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5. Technology Stack

- Programming Language: Python
 - Libraries: Pandas, NumPy, Scikit-learn, Matplotlib, Seaborn, TA
 - Machine Learning Model: Random Forest Regressor
 - Platform: Google Colab
 - Deployment Tool: Streamlit (Optional)
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6. Assumptions

- Historical market data is accurate and reliable
 - Market volatility follows statistical patterns
 - Past data can help predict future volatility trends
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7. Expected Outcome

- Accurate volatility predictions
- Better understanding of market risk
- A reusable machine learning pipeline for financial forecasting