High-Level Design (HLD)

Project Name: Cryptocurrency Liquidity Prediction for Market Stability

Objective:
Predict future liquidity of cryptocurrencies based on historical and real-time market data using machine learning models.

1. System Components

1.1 Data Ingestion Module

• Collect historical crypto data (price, volume, market cap) via CoinGecko CSV file.

• Store data as CSVs in /data/raw/
.
1.2 Preprocessing & Feature Engineering

• Clean missing values, remove outliers.

• Engineer time-based features, rolling statistics, volatility indicators
.
• Store processed data in /data/processed/.

1.3 Exploratory Data Analysis (EDA)

• Visualizations: volume trends, price movements, liquidity indicators.

• Generate and save EDA report in /reports/ EDA_Workfiow_Report.pdf

1.4 Modeling & Evaluation

• Algorithms: Random Forest, XGBoost, or LSTM (for time-series).

• Hyperparameter tuning using GridSearchCV

• Save best model to /outputs/models/.

1.5 Prediction Engine

• Load trained model

• Predict liquidity score or label for future date inputs

• Output stored in /outputs/predictions/.

1.6 Web Application (UI)

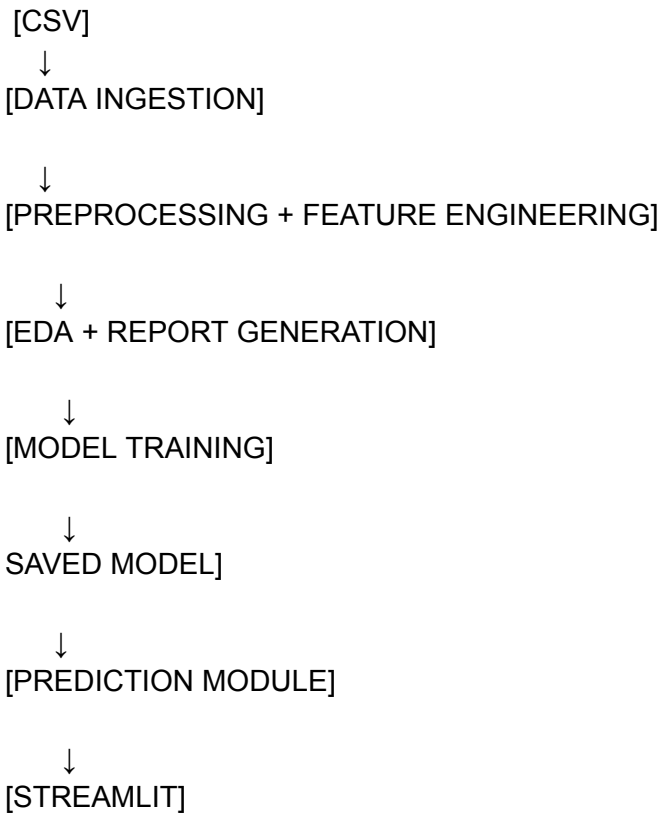
• Frontend using Streamlit

• User input: Date or crypto token

• Output: Predicted liquidity and confidence level

• Main app in app.py

2. Data Flow Diagram



3. Tools & Technologies

Component	Tool/Library
Data Collection	CoinGecko csv

Processing	Pandas, NumPy
Visualization	Matplotlib, Seaborn
Modeling	Scikit-learn, XGBoost
Web App	Streamlit
Reporting	PDF, Markdown
Version Control	Git + GitHub

4. Key Deliverables

• Clean & processed dataset

• EDA Report (reports/EDA_Workfiow_Report.pdf)

• Trained and validated model (outputs/models/)

• Prediction script

• Streamlit interface

• Final Project Report

• README with usage instructions