Final Report: Cryptocurrency Liquidity Prediction

Project Summary:

This project aims to predict the liquidity ratio of cryptocurrencies using machine learning based on market metrics such as price, volume, and market capitalization.

Data Sources:

- Historical CSVs from CoinGecko

- Live crypto market data via CoinGecko API

Tech Stack:

- Python (pandas, scikit-learn, matplotlib, seaborn)

- RandomForestRegressor

- Flask (API)

- Streamlit (Frontend)

- CoinGecko API

Model Insights:

- Target Variable: liquidity_ratio = volume / market_cap

- Features: price, % changes (1h, 24h, 7d), market cap, volume, volatility

- Algorithm: Random Forest Regressor

Model Performance:

- R^2 Score: 0.38

- RMSE: ~0.376

- Model saved as crypto_liquidity_model.pkl

Deployment:

- Flask backend (`app.py`) exposes a `/predict` endpoint for API calls

- Streamlit frontend (`streamlit_app.py`) provides interactive UI using live data

Deliverables:

- Trained model file (.pkl)

- Flask and Streamlit apps

- EDA, HLD, LLD, Architecture PDFs

- GitHub-ready code package

Conclusion:

The system demonstrates the feasibility of using ML to estimate liquidity health of digital assets. It can be expanded with more features and retraining on real-time data for financial institutions or trading platforms.