Final Report

Generated by Ayan Kundu

Project Title: Cryptocurrency Liquidity Prediction for Market Stability

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Executive Summary

This project aims to predict cryptocurrency liquidity to enhance market stability using historical trading data. The focus is on understanding liquidity dynamics through engineered features such as moving averages, volatility, and liquidity ratios. After exploratory data analysis, predictive modeling techniques were applied to build an effective forecasting system.

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1. Data Overview

- **Files Used:** coin_gecko_2022-03-16.csv, coin_gecko_2022-03-17.csv
- **Source:** Dataset
- **Merged Records:** 992
- **Key Columns:** 'coin', 'symbol', 'price', '1h', '24h', '7d', '24h_volume', 'mkt_cap', 'date'

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2. Data Cleaning

- Missing values removed using **dropna()**
- Duplicate records dropped using **drop_duplicates()**
- Type conversions (e.g., date to datetime, numeric columns to float64)

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3. Feature Engineering

- **Price Moving Average (2-period):**
- df['price_MA_2d'] = df['price'].rolling(window=2).mean()
- **Market Cap Moving Average (2-period):**
- df['market_cap_MA_2d'] = df['mkt_cap'].rolling(window=2).mean()
- **Volatility:**

- df['volatility'] = (df['24h'] - df['1h']).abs()
- **Liquidity Ratio:**
- df['liquidity_ratio'] = df['24h_volume'] / df['mkt_cap']

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4. Exploratory Data Analysis (EDA)

- **Price Trend:** Line plot showing historical Ethereum price fluctuations.
- **Correlation Heatmap:** Identified strong correlations between market cap, volume, and price.
- **Descriptive Stats:** Provided insights into central tendency and spread.

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5. Model Building

- **Train-Test Split:** tested using train_test_split()
- **Models Used:**
    - Linear Regression (baseline) ○ Random

    Forest Regressor (final model)
- **Libraries:** sklearn, joblib, pandas, matplotlib, seaborn

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6. Final Prediction Check (Compare Actual vs Predicted)

	Actual Liquidity	Predicted Liquidity	Error
0	0.051516	0.053734	-0.002219
1	0.080784	0.068837	0.011947
2	0.064324	0.067555	-0.003231
3	0.153632	0.156490	-0.002859
4	0.010830	0.011185	-0.000356
5	0.123382	0.131801	-0.008419
6	0.219153	0.189631	0.029522
7	0.007353	0.007230	0.000122
8	0.003577	0.004392	-0.000816
9	0.141715	0.142974	-0.001258

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7. Model Saving

- Final model saved using Joblib:
- joblib.dump(rf_model, 'models/ crypto_liquidity_rf_model.pkl')

8. Deployment

- Simple **Streamlit** interface
- Load model and predict liquidity using user inputs

Conclusion

This project successfully built a model to predict cryptocurrency liquidity using feature engineering and machine learning techniques. The insights gained are valuable for traders, investors, and regulators aiming to stabilize volatile crypto markets. Future enhancements could include real-time data ingestion, deep learning models, and dashboard deployment.