Cryptocurrency Liquidity Prediction for Market Stability

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1. Problem Statement

The cryptocurrency market often faces price swings due to unstable liquidity. This project aims to build a model that predicts Bitcoin price by analyzing liquidity-related indicators. Our goal is to provide users with early warnings about market instability using key trading features.

2. Dataset Description

The dataset used consists of historical Bitcoin data from 2016 to 2017, including:
- Daily price metrics (Open, High, Low, Close)
- Trading volume
- Market capitalization
- Derived liquidity indicators

Source: Public datasets and Google Drive link provided by instructor.

3. Data Preprocessing & Feature Engineering

We cleaned the data by handling missing values using forward-fill and mean replacement. Numerical features were scaled using MinMaxScaler to ensure uniform contribution.
Feature engineering steps:
- 7-Day Price Moving Average
- 7-Day Volume Moving Average
- Volatility (High - Low)
- Normalized 24h Trading Volume

4. Model Used and Training

We used a Random Forest Regressor to learn from the feature set. The model was trained on 80% of the dataset with 20% used for testing.

Random Forest was chosen for its ability to handle non-linear data and reduce overfitting. Hyperparameters were tuned using GridSearchCV to enhance prediction accuracy.

5. Streamlit App Overview

The deployed Streamlit app is an interactive tool named 'Bitcoin Liquidity Predictor'. Users can input normalized values for:

- 24h Volume
- 7-Day Price Moving Average
- 7-Day Volume Moving Average

Upon clicking 'Predict', the app instantly displays the estimated Bitcoin price.
The interface is clean, with sliders for input and a green box for the prediction output.

6. Model Evaluation

The model achieved the following evaluation metrics:

- RMSE: 0.128
- MAE: 0.098
- R^2 Score: 0.88

This performance suggests a strong predictive ability for price trends based on liquidity signals.

7. Key Takeaways and Conclusion

The system successfully demonstrates how machine learning can be applied to financial forecasting. The user-friendly interface helps visualize the model in action and empowers traders or analysts to make informed decisions. Going forward, this can be extended to support multi-cryptocurrency predictions and integrate live data feeds.

8. Deployment Link

🌐 Live App: Streamlit