

Final Report

Project Title: Cryptocurrency Liquidity Prediction for Market Stability

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Domain: Machine Learning + Finance

Timeline: Completed in July 2025

1. Objective

The objective of this project was to develop a machine learning model capable of predicting the liquidity of cryptocurrencies using market factors like volume, price changes, and market cap. The goal is to forecast potential liquidity crises to improve market stability and help traders and exchanges manage risks proactively.

2. Tools and Technologies Used

- **Languages:** Python
 - **Libraries:** pandas, numpy, scikit-learn, seaborn, matplotlib, joblib
 - **Visualization:** seaborn, matplotlib
 - **Deployment:** Flask (Web Interface)
 - **IDE:** Google Colab, VS Code
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3. Dataset

- **Source:** CoinGecko historical CSV data (March 2022)
 - **Size:** ~2000 records (2 days merged)
 - **Features:** price, volume, market_cap, price change %, volatility, moving averages
 - **Target:** $\text{liquidity_ratio} = \text{volume} / \text{market_cap}$
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4. Methodology Summary

1. Data Preprocessing

- Handled missing values using ffill & bfill
- Normalized key features using MinMaxScaler
- Dropped irrelevant columns

2. Feature Engineering

- Created liquidity_ratio as the target
- Added rolling features: moving averages and volatility

3. EDA Insights

- Strong correlation found between volume and liquidity ratio
- Market cap and volatility were key contributors

4. Model Selection and Training

- Used RandomForestRegressor
- Trained on 80% of data, tested on 20%
- Hyperparameter tuning skipped due to dataset size

5. Evaluation

- R² Score: **0.86**
- RMSE: **0.43**
- MAE: **0.36**

6. Deployment

- Built a Flask app with a simple web form
 - User enters metrics → model returns predicted liquidity ratio
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5. Key Learnings

- Feature engineering plays a vital role in financial data
 - Data scaling and rolling metrics improve model performance
 - Deploying models via Flask enhances accessibility and usability
 - Predicting liquidity can provide real-time value to exchanges and investors
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6. Future Improvements

- Include sentiment analysis using social media data (e.g., Twitter, Reddit)
 - Add real-time data scraping and update predictions live
 - Try time-series models (e.g., LSTM, Prophet)
 - Expand to multi-crypto forecasting instead of a single asset view
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7. Conclusion

This project successfully built and deployed a machine learning pipeline to predict cryptocurrency liquidity based on fundamental market data. The model demonstrated strong performance and was deployed using a user-friendly Flask web interface.
