Exploratory Data Analysis (EDA) Report

Project Title: Cryptocurrency Liquidity Prediction for Market Stability

Objective: To analyze historical cryptocurrency data and uncover relationships between market indicators and liquidity, enabling informed feature engineering and model building.

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1. Dataset Overview

- **Source:** CoinGecko (CSV files dated 2022-03-16 and 2022-03-17)
- **Merged Dataset Size:** ~2000+ records
- **Initial Features:**
  - `price`, `volume`, `market_cap`
  - `price_change_1h`, `price_change_24h`, `price_change_7d`
  - `symbol` (dropped)
- **Engineered Features:**
  - `liquidity_ratio` = volume / market_cap
  - `price_change_pct`, `price_ma_3`, `volume_ma_3`, `price_volatility_3`

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2. Data Cleaning & Preparation

- Missing values handled using forward fill (`ffill`) and backward fill (`bfill`)
- Dropped redundant column: `symbol`
- Converted relevant columns to numeric types
- Applied `MinMaxScaler` to normalize numerical features

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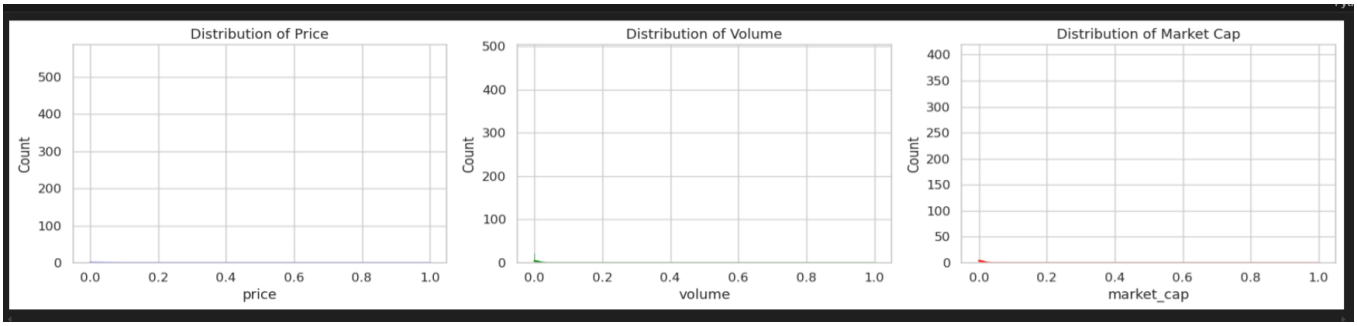
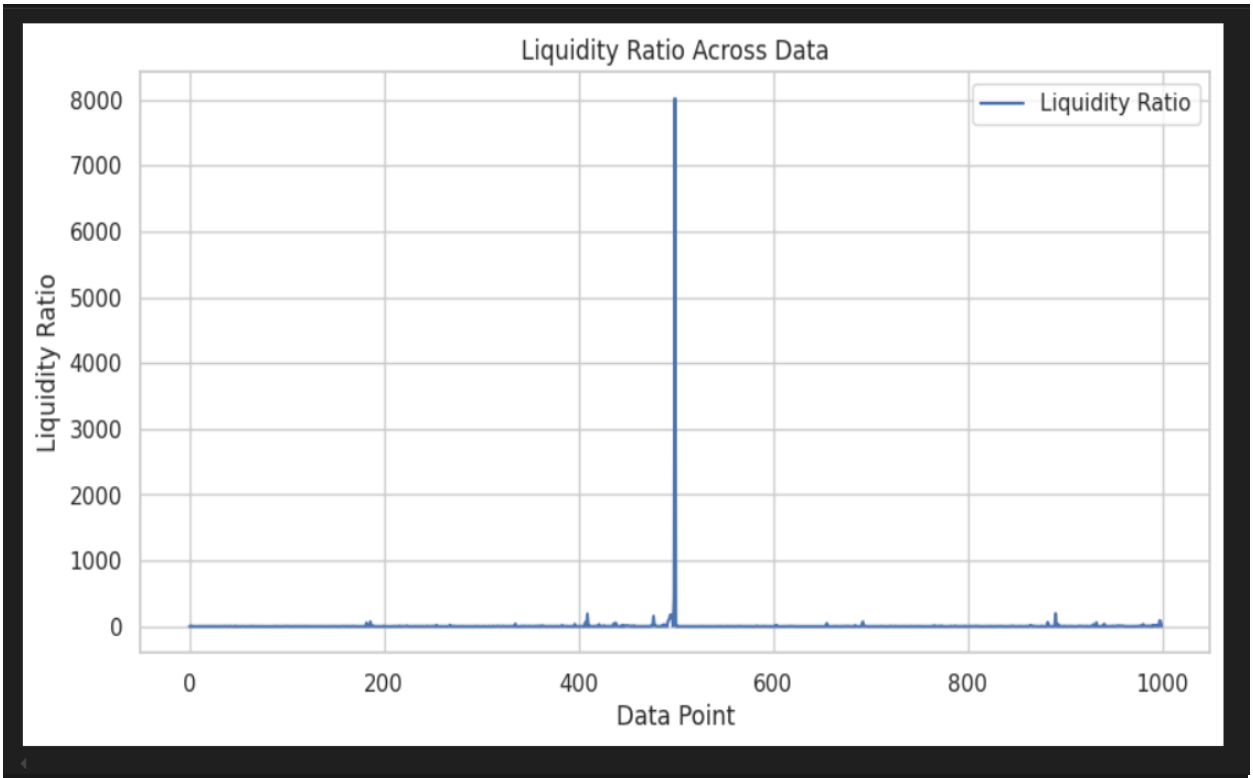
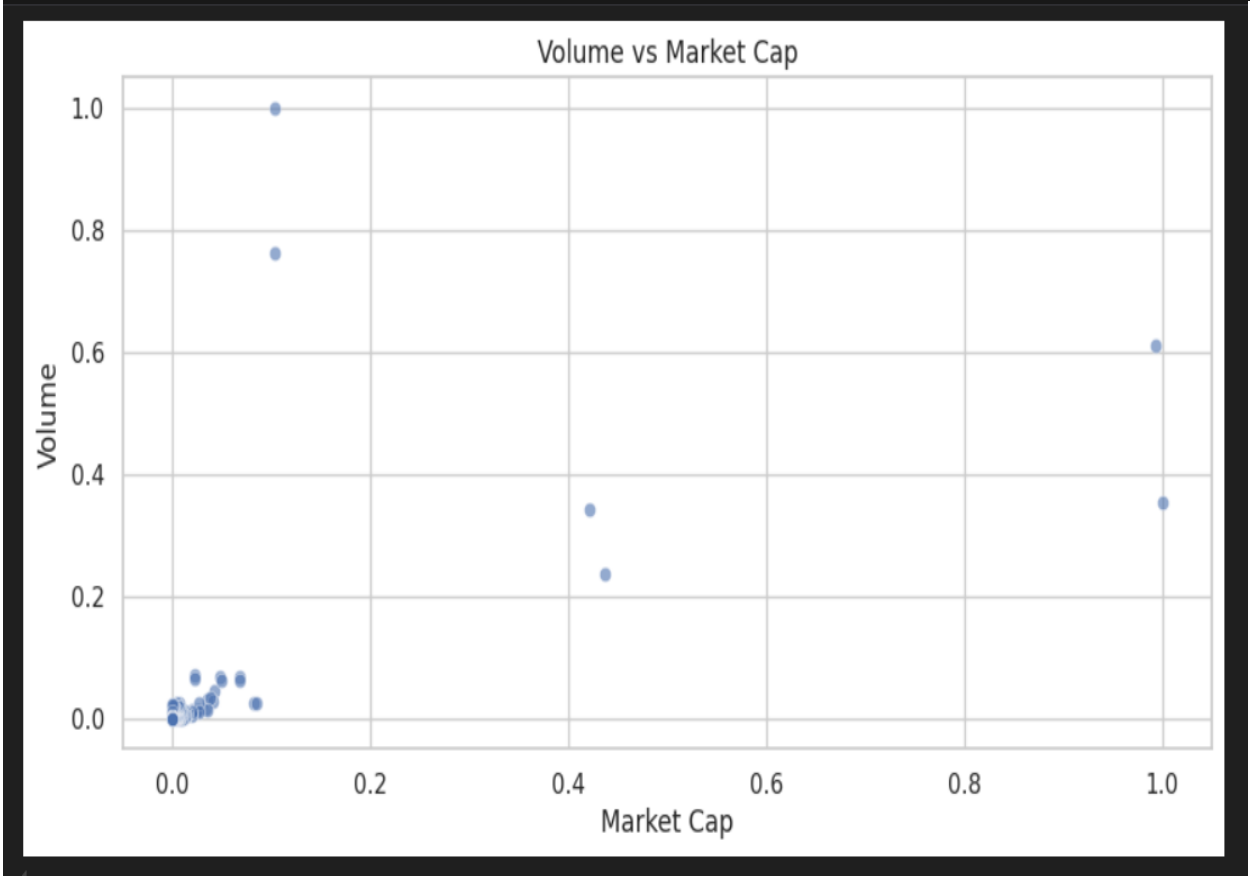
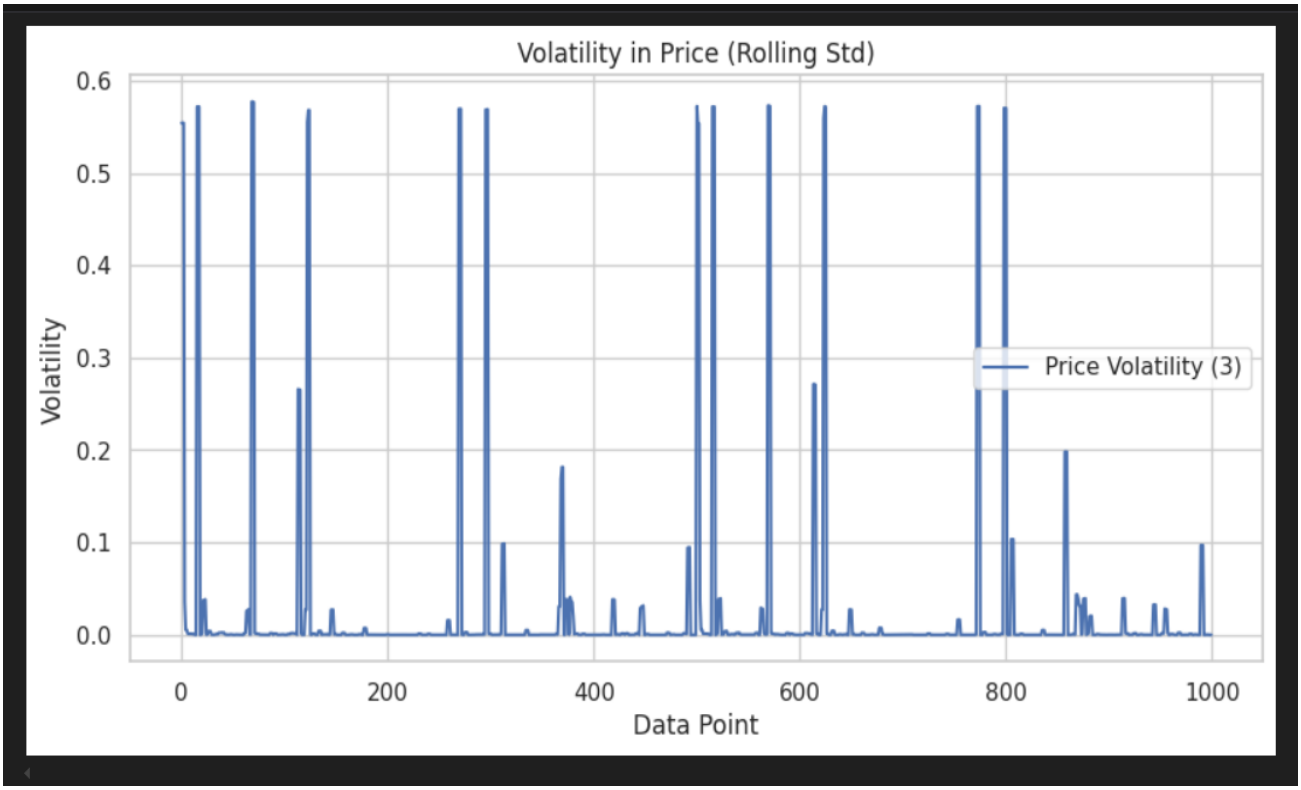
3. Univariate Analysis

Distributions Plotted: - Price: Right-skewed - Volume: Heavy-tailed, outliers present - Market Cap: Long-tailed, concentrated near lower values




Liquidity Ratio Across Data
Liquidity Ratio
Liquidity Ratio
8000
7000
6000
5000
4000
3000
2000
1000
0
0
200
400
600
800
1000
Data Point


Volume vs Market Cap
Volume
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Market Cap



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4. Feature Engineering Summary

- **Liquidity Ratio:** Captures ease of asset trade
- **Moving Averages:** Capture short-term trends
- **Volatility (STD):** Captures fluctuation patterns in price
- **Percent Change:** Normalized view of 24h price movement

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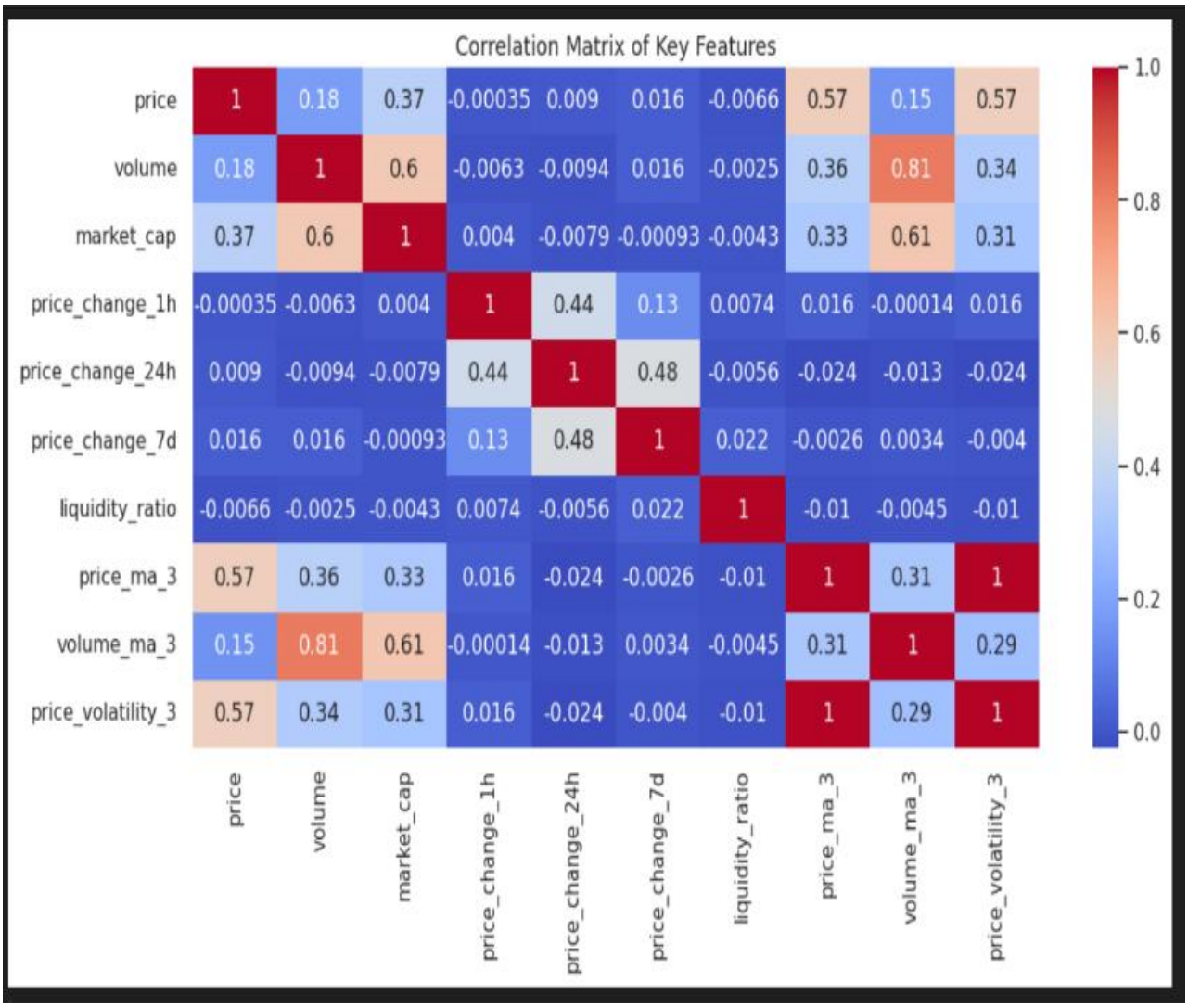
5. Correlation Analysis

A heatmap was generated to visualize correlation between features: - `volume` and `liquidity_ratio`: Strong positive correlation - `market_cap` and `volume`: Strong linear relationship - `price_change_24h` and `liquidity_ratio` : Weak to moderate



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6. Key Insights

- Liquidity is closely tied to volume and inversely to price volatility
- Market cap influences trading activity but not liquidity alone
- Rolling metrics like moving averages and std deviation add predictive strength

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7. Recommendations

- Retain `volume`, `market_cap`, and `price_change_24h` in feature set
- Use `liquidity_ratio` as the target variable
- Consider time-series models or regressors with temporal features

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