Quantitative Crypto Trading Strategies

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Introduction

Overview

This project presents two quantitative trading strategies tailored for cryptocurrency markets.

Strategies

- Volume Adjusted Momentum
- Quant Crypto Signals

Goal

Develop dynamic trading signals that outperform passive benchmarks such as buy-and-hold.

Data Collection and Preprocessing

Data

- Source: Binance API.
- Assets: BTC, ETH, ADA, BNB, DOT, MATIC.
- Period: January 2020 - June 2024.

Training and Validation

- Training Set: January 2020 - January 2023
- Validation Set: January 2023 - June 2024

Benchmark

- Strategy: Diversified buy-and-hold across all selected cryptocurrencies.
- Sharpe Ratio: 0.9
- Alpha: 0% (passive strategy)

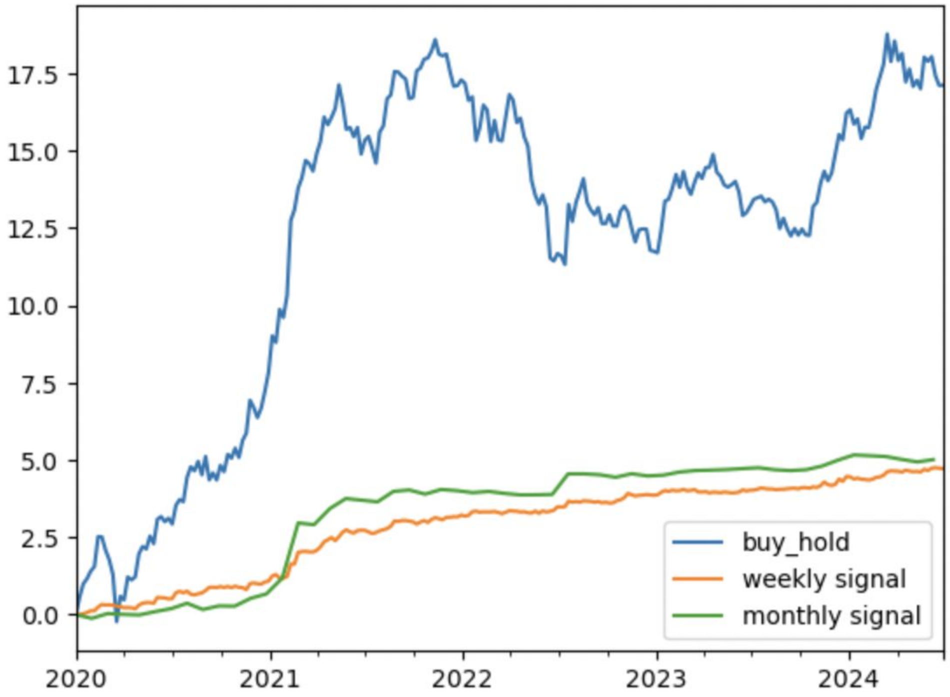
Strategy 1

Volume Adjusted Momentum

- Concept: Adjust price momentum signals based on trading volume deviations.
- Signal Construction: Returns scaled by deviations of volume from its rolling average.
- Hypothesis: Momentum adjusted by volume is more effective than price momentum alone.

Volume Adjusted Momentum Performance

- Monthly Signal Portfolio Sharpe Ratio: 2.67 (out-of-sample)
- Weekly Signal Portfolio Sharpe Ratio: 1.7 (out-of-sample)
- Benchmark Sharpe Ratio: 0.9
- Alpha: Consistently above 17.5% **after** accounting for (20 bps per trade) trading costs.



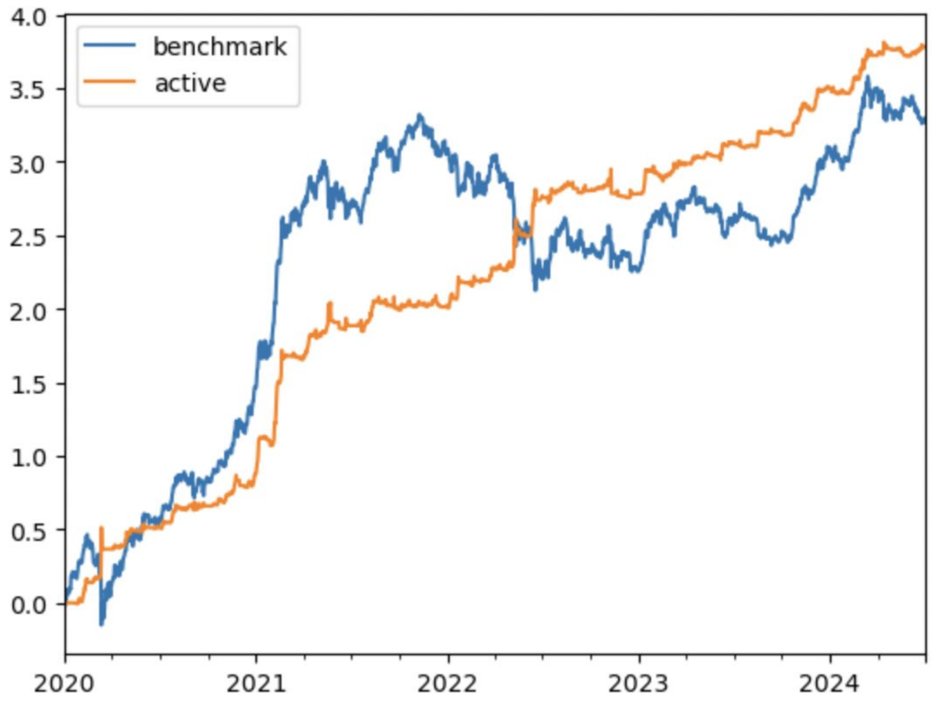
Strategy 2

Quant Crypto

- Concept: Capture long and short-term trends using signal-based entries and exits.
- Long Positions: Enter when prices break recent highs; exit when prices fall below shorter-term lows.
- Short Positions: Enter when prices break below recent lows; exit when prices recover.

Performance of Quant Crypto Strategy

- Sharpe Ratio (Out-of-Sample): 2.38
- Active Portfolio: Weights based on Sharpe ratio contributions.
- Benchmark Portfolio: Buy-and-hold approach.



Alpha Statistical Significance

Volume Adjusted Momentum

- Alpha: 0.0034
- Beta: -0.1468
- T-Statistics: Alpha: 2.09, Beta: -1.1
- R-Squared: 0.005

Quant Crypto

- Alpha: 0.0026
- Beta: -0.13
- T-Statistics: Alpha: 5.56, Beta: -9.86
- R-Squared: 0.056

Conclusion

- Both strategies, Volume Adjusted Momentum and Quant Crypto, demonstrate a systematic and robust approach to cryptocurrency trading.
- Significant alpha generation with superior Sharpe ratios compared to passive benchmarks.
- These strategies provide a solid framework for real-world quantitative trading in the volatile cryptocurrency markets.