

INTER IIT TECH MEET 13.0



ZELTA
AUTOMATIONS



TEAM 44

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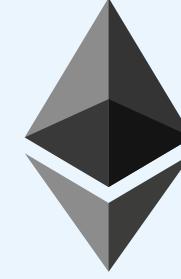


BTCUSDT Market Trends



- Cryptocurrencies, in general, are highly volatile assets. The Bitcoin market experienced a bear run from 2020 to early 2022, followed by a bull run in the latter half of 2022
- From 2022 until early 2025, the market remained extremely volatile, reflecting the challenges and uncertainty post-COVID recovery.

Image Reference: <https://www.tradingview.com/symbols/BTCUSDT/>



ETHUSDT Market Trends

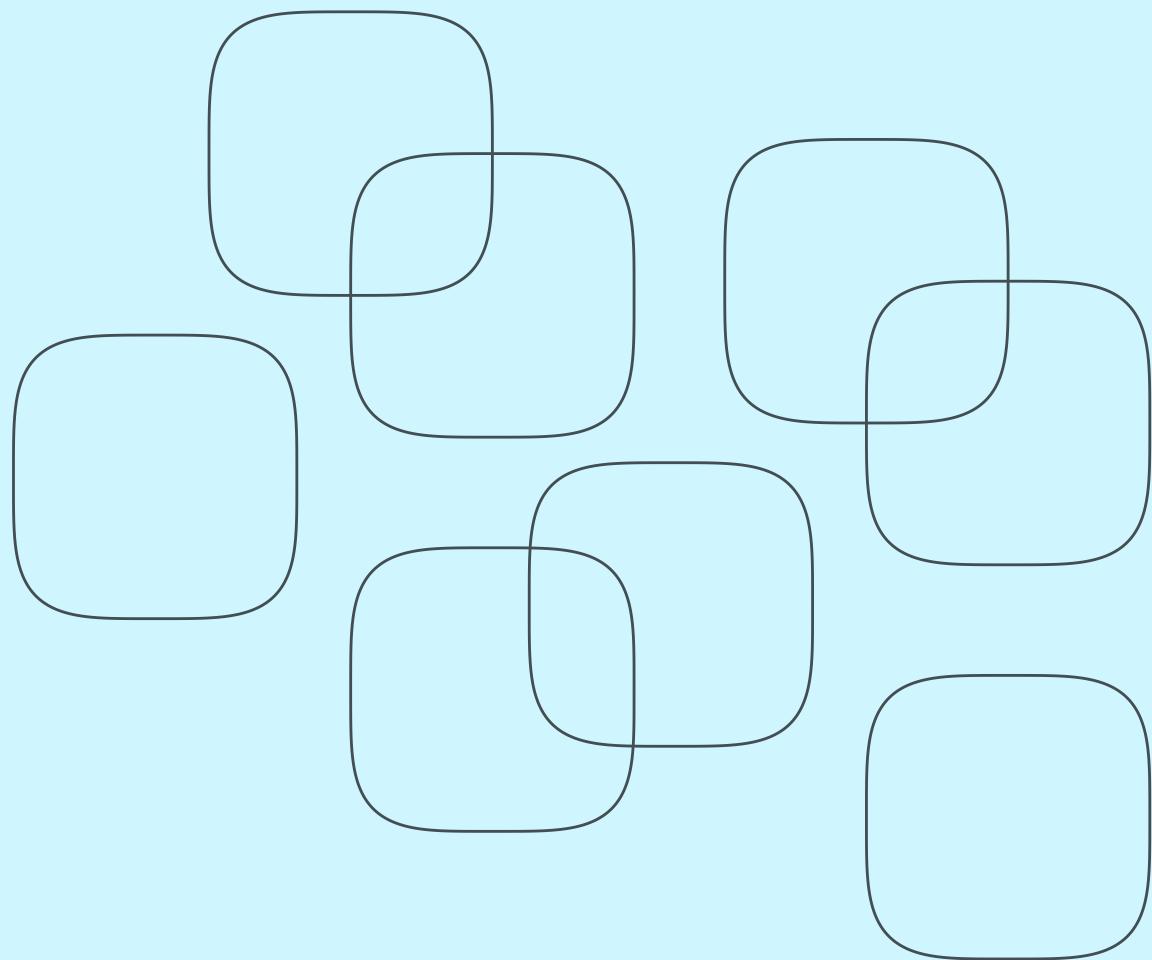


- The Ethereum market saw a bear run from 2020 to early 2022, followed by a strong bull run in late 2022. However, from late 2022 to early 2023, it faced heightened volatility, reflecting broader post-COVID recovery challenges and uncertainties in the crypto space.
- This combination of volatility and skewness in market behavior created amplified mispricing opportunities, enabling the potential for substantial short-term profits.

Image Reference: <https://www.tradingview.com/symbols/ETHUSDT/>

Indicators Explored

- 01 Exponential Moving Average
- 02 Price Volume Trend
- 03 Average Directional Index
- 04 Heikin Ashi Candles
- 05 Kalman Filters



• Exponential Moving Average (EMA)

$$\text{EMA}_t = \left(\frac{\text{Price}_t - \text{EMA}_{t-1}}{n + 1} \right) + \text{EMA}_{t-1}$$

- Recent price data is weighted more heavily, making it sensitive to current market conditions.
- Effectively identifies rapid market shifts and smooths out minor fluctuations for a clearer overall trend.

• Price Volume Trend (PVT)

$$\text{PVT}_t = \text{PVT}_{t-1} + \left(\frac{\text{Price}_t - \text{Price}_{t-1}}{\text{Price}_{t-1}} \right) \times \text{Volume}_t$$

- Combines price changes and volume to measure trend strength, adjusting cumulatively by percentage price change and volume.
- Aligns price direction with volume trends to enhance trade signal accuracy.

• Average Directional Index (ADX)

- Quantifies strength of a trend, with values from 0 to 100, where higher values indicate stronger trends.
- An ADX above 25 highlights strong momentum, helping traders focus on high-probability opportunities while avoiding weak trends.

• Heikin Ashi Candles

$$HA_{Close} = \frac{Open + High + Low + Close}{4}$$

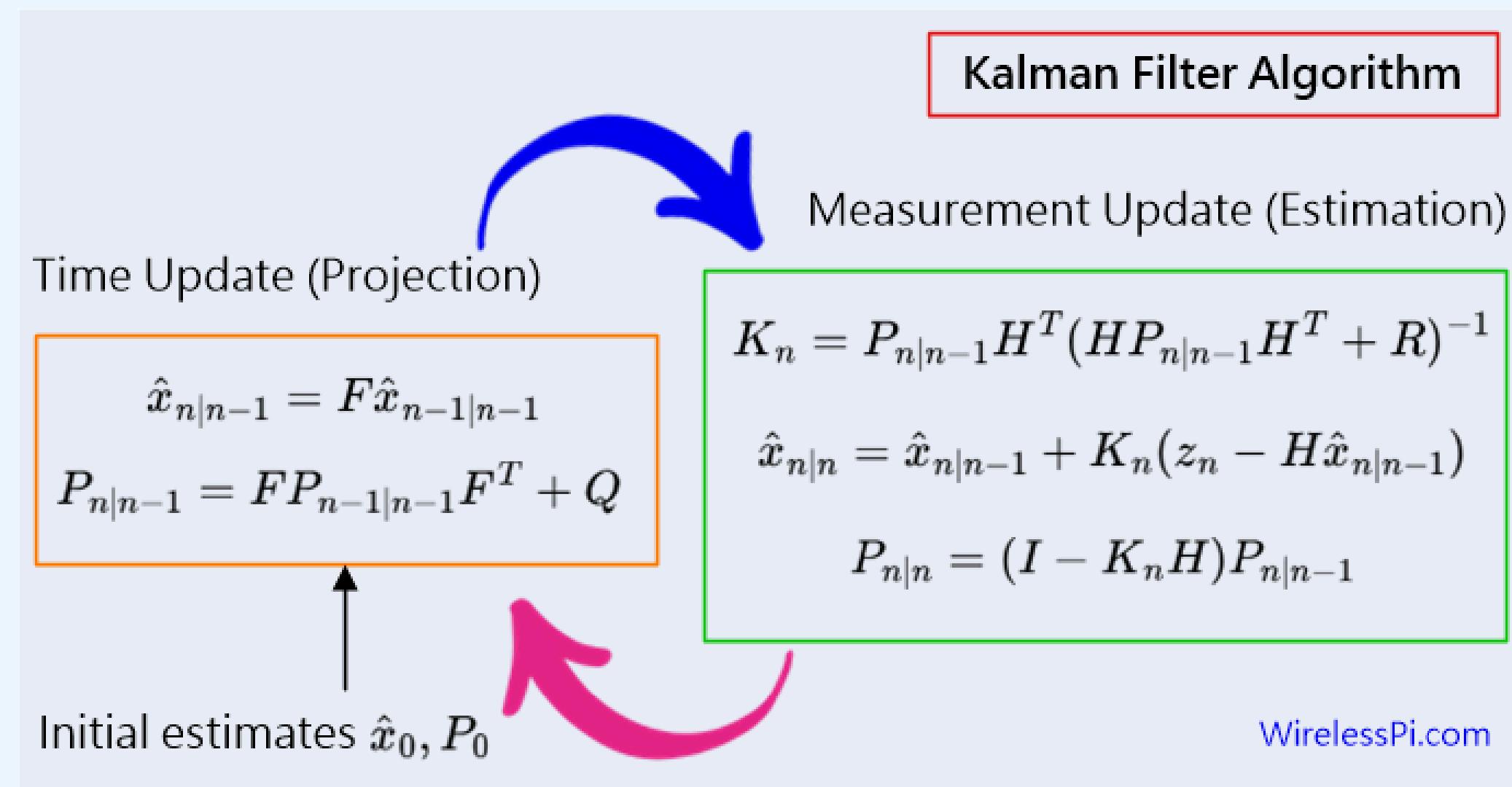
$$HA_{Open} = \frac{HA_{Open, \text{ previous}} + HA_{Close, \text{ previous}}}{2}$$

$$HA_{Low} = \min(Low, HA_{Open}, HA_{Close})$$

$$HA_{High} = \max(High, HA_{Open}, HA_{Close})$$

- Filter out market noise by averaging the open, close, high, and low prices, creating smoother trend representation.
- Helps in identifying the underlying market direction more clearly.

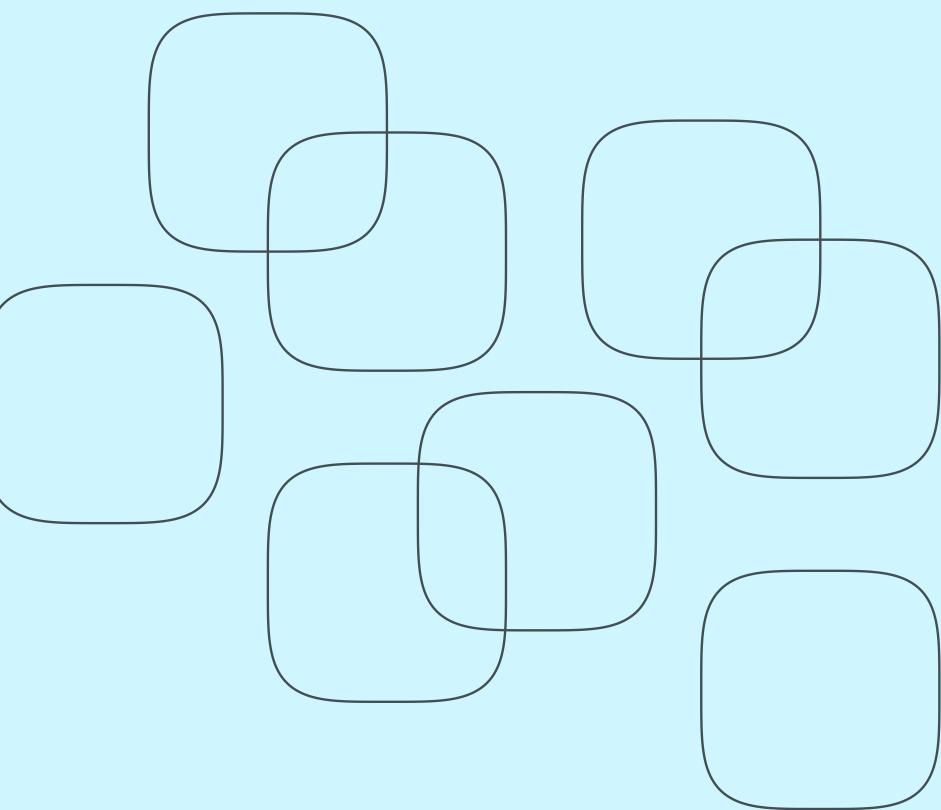
• Kalman Filter



- Recursive algorithm
- Smooths noisy price data, reducing market noise and helping to identify underlying trends for clearer analysis.
- Dynamically adapts to new data, minimizing the impact of volatile markets, and provides better entry and exit points.

Strategies Explored

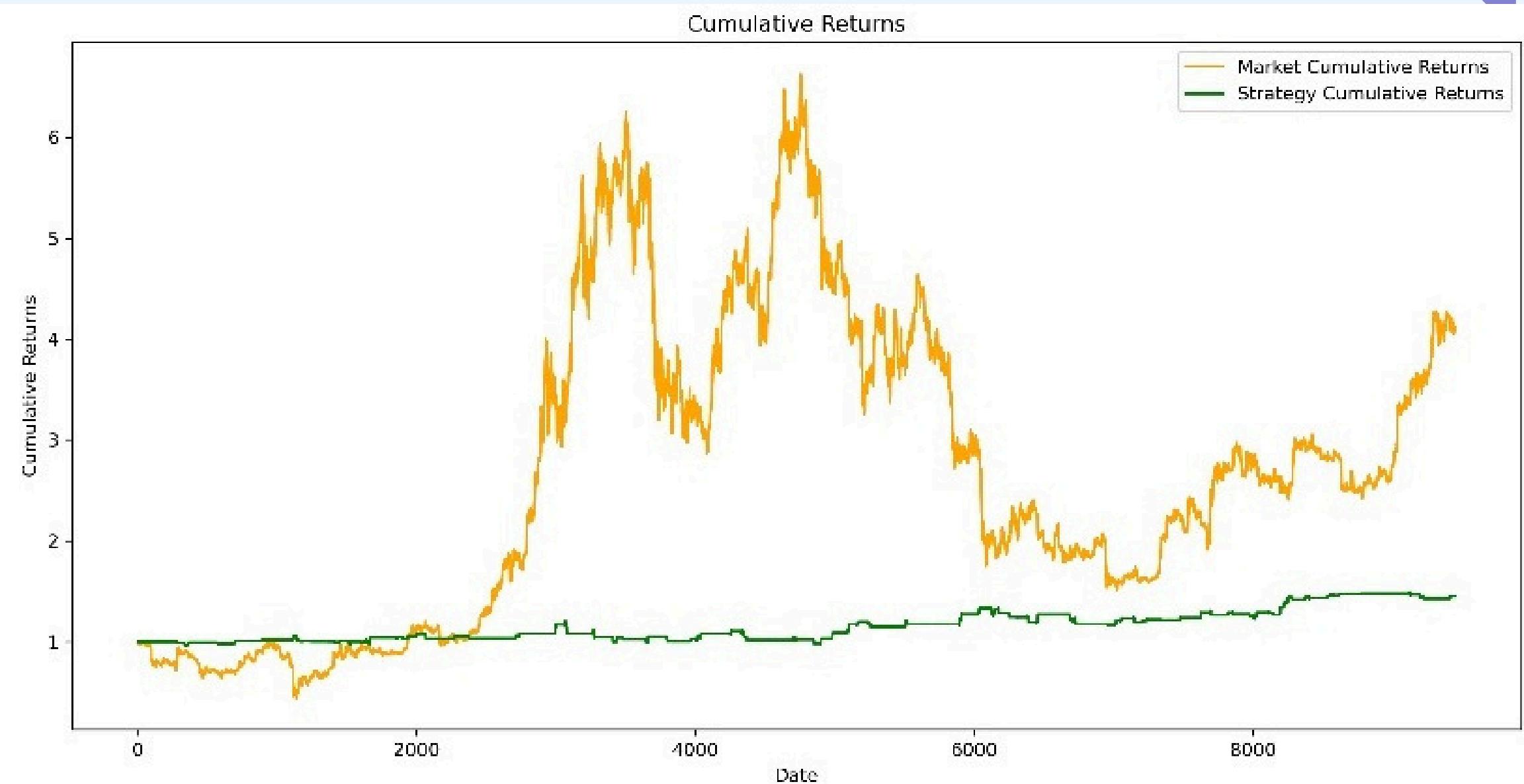
- 01 HA + Kalman
- 02 EMA + ADX
- 03 PVT + ADX



Heikin Ashi + Kalman

- Heikin-Ashi candlesticks are used to reduce noise in price data, providing a clearer view of trends and potential reversals.
- We chose short-term SMA of 60 periods and a long-term SMA of 300 periods are computed using HA close values.
- Short SMA crosses above the Long SMA, indicating a **bullish** trend.
- Short SMA crosses below the Long SMA, signaling a **bearish** trend.

BTC RESULTS

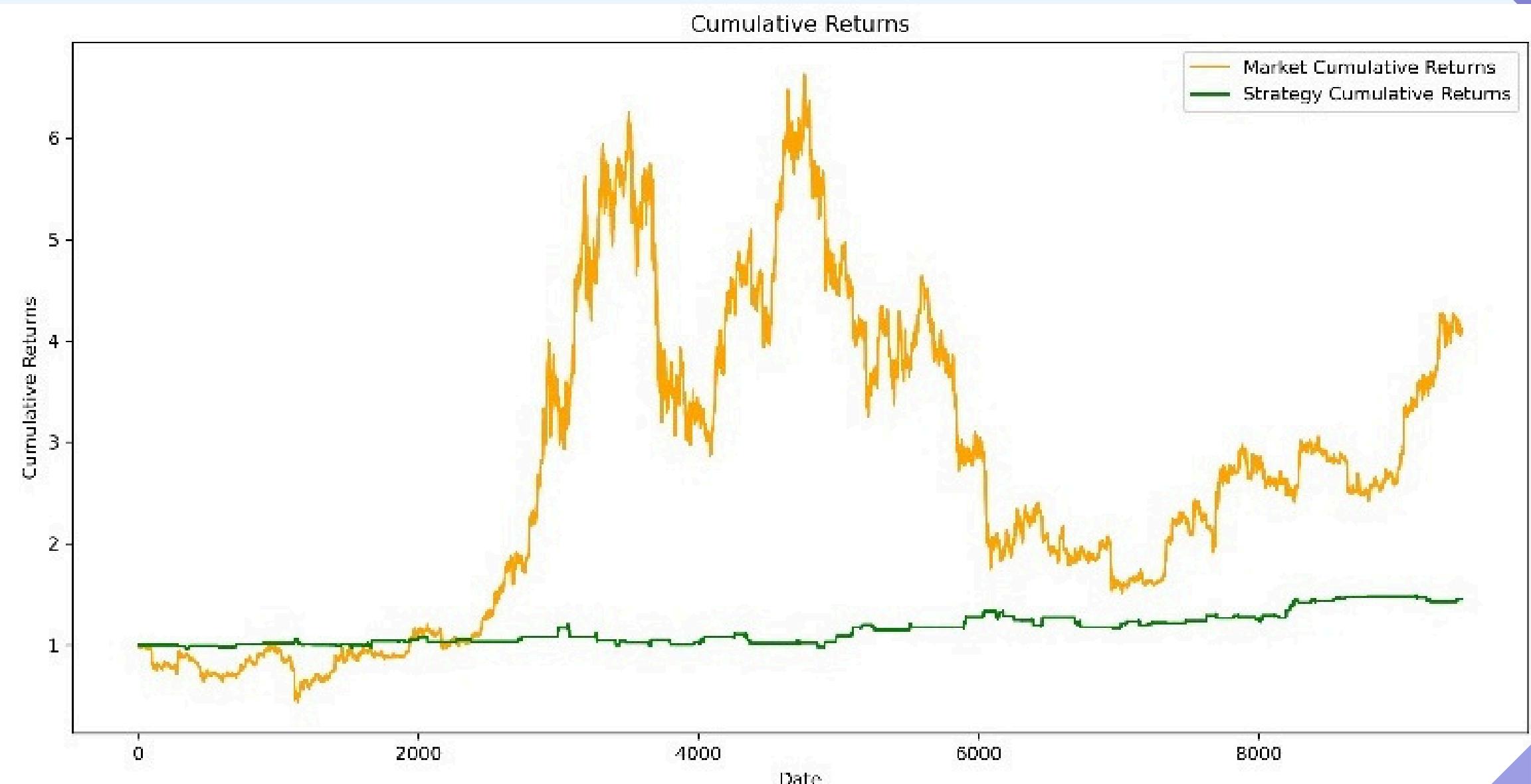


- Total Trades: 332
- Win Rate: 53.13%
- Static Returns: \$ 2036.18
- Benchmark: \$ 3,245.85
- Sharpe Ratio: 1.41
- Sortino Ratio: 3.32
- Maximum Drawdown: **51.41%**
- Average TTR: 41.91 days
- Benchmarks beaten: 5 out of 16

EMA + ADX

- This strategy combines EMA crossovers (9, 11, and 45 periods) with the ADX indicator to identify long and short trade opportunities.
- Long trades occur when **EMA9 > EMA11 > EMA45 and ADX > 15**, signaling a strong **upward** trend.
- Short trades occur when **EMA9 < EMA11 < EMA45 and ADX < 15**, indicating a weak or **downward** trend.

BTC RESULTS



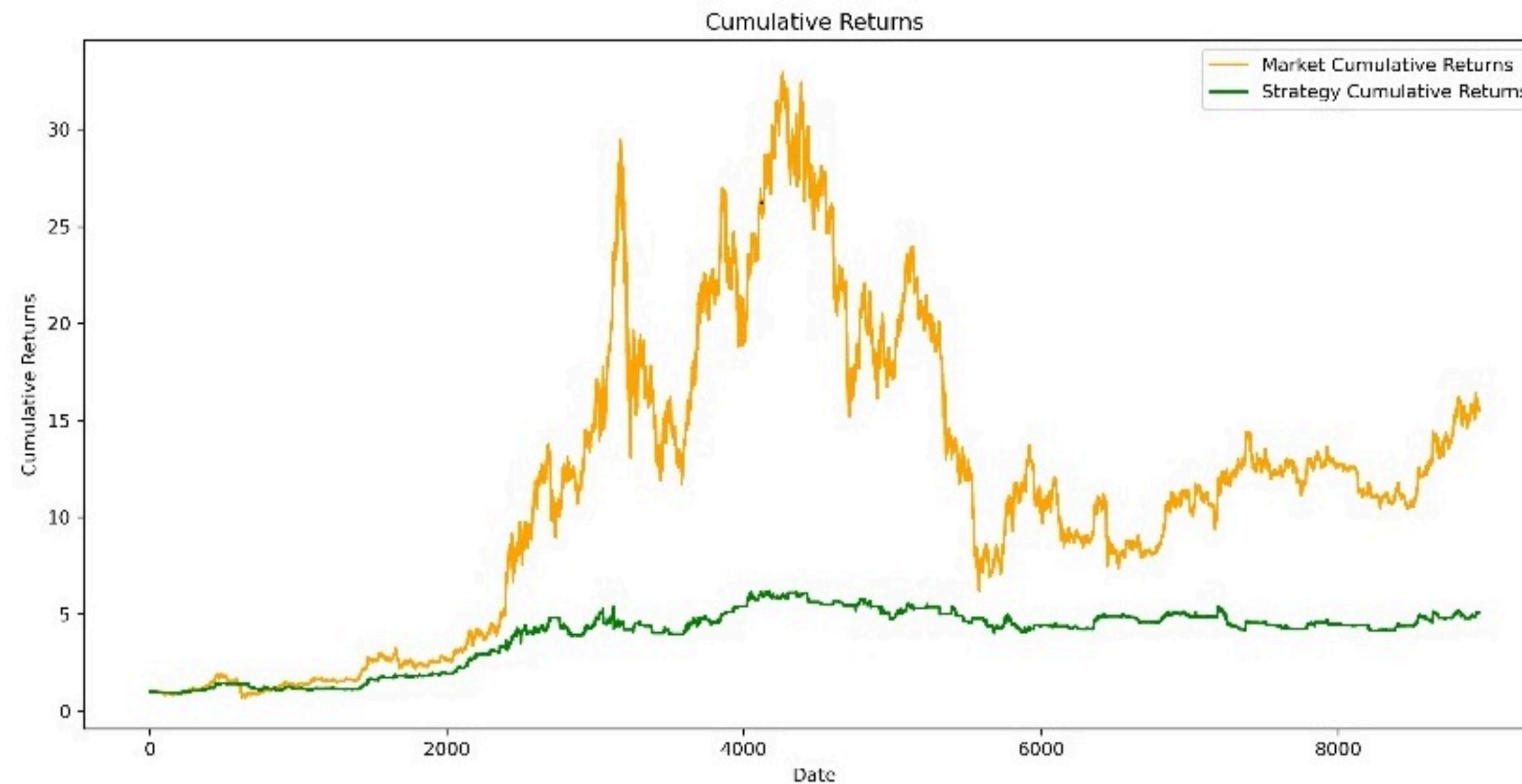
- Total Trades: 127
- Win Rate: 53.13%
- Compound Returns: \$ 4,890
- Benchmark: \$ 3,245.85
- Sharpe Ratio: **3.32**
- Sortino Ratio: 11.71
- MaxDrawdown: **33.92**
- Average TTR: 82.11 days
- Benchmarks beaten: 7 out of 16

EMA + ADX - BTC

Quarterly Performance

Initial Balance	Final Balance	Profit(%)	Benchmark(%)	Benchmark Beaten?	From	To	Total Trades	Long Trades	Short Trades	Win Rate
1000.0	1350.4	35.0	1.5	Yes	2020-01-01	2020-03-31	1	1	0	100.0
1000.0	772.6	-22.7	66.3	No	2020-04-01	2020-06-30	3	2	1	66.7
1000.0	1710.9	71.1	55.7	Yes	2020-07-01	2020-09-30	4	4	0	75.0
1000.0	1250.0	25.0	109.1	No	2020-10-01	2020-12-31	5	4	1	40.0
1000.0	2597.0	159.7	163.5	No	2021-01-01	2021-03-31	4	4	0	75.0
1000.0	1487.0	48.7	15.5	Yes	2021-04-01	2021-06-30	4	4	0	75.0
1000.0	1206.7	20.7	42.5	No	2021-07-01	2021-09-30	3	2	1	66.7
1000.0	1117.1	11.7	11.1	Yes	2021-10-01	2021-12-31	2	2	0	50.0
1000.0	978.1	-2.2	-69.0	Yes	2022-04-01	2022-06-30	3	3	0	33.3
1000.0	906.3	-9.4	25.4	No	2022-07-01	2022-09-30	2	2	0	50.0
1000.0	800.9	-19.9	-8.8	No	2022-10-01	2022-12-31	2	1	1	0.0
1000.0	1215.0	21.5	51.7	No	2023-01-01	2023-03-31	1	1	0	100.0
1000.0	951.1	-4.9	6.2	No	2023-04-01	2023-06-30	3	1	2	33.3
1000.0	978.7	-2.1	-13.2	Yes	2023-07-01	2023-09-30	1	1	0	0.0
1000.0	1345.0	34.5	30.5	Yes	2023-10-01	2023-12-13	3	2	1	100.0

ETH RESULTS

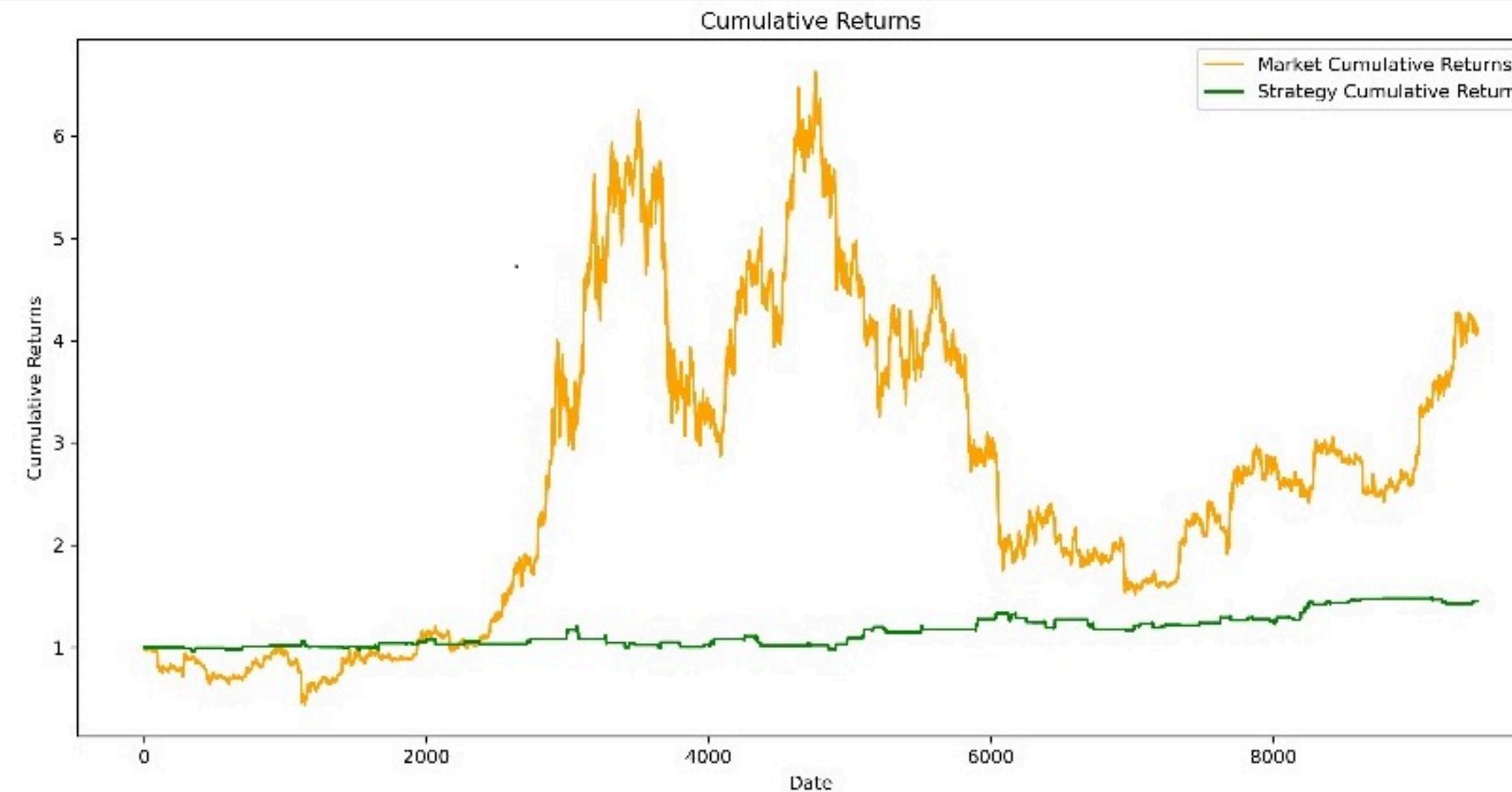


- Total Trades: 41
- Win Rate: 58.53%
- Compound Returns: \$ 11,545
- Benchmark: \$ 14,628.73
- Sharpe Ratio: **7.06**
- Sortino Ratio: 20.32
- MaxDrawdown: **31.82**
- Average TTR: 60.57 days
- Benchmarks beaten: 7 out of 16

PVT + ADX

- This strategy uses the Price Volume Trend (PVT) and a 200-period EMA for trend confirmation.
- Buy signals are generated when **PVT > EMA200** and **ADX > 15**, indicating a strong **upward trend**.
- Sell signals are triggered when **PVT < EMA200** and **ADX < 15**, signifying a weak or **downward trend**.

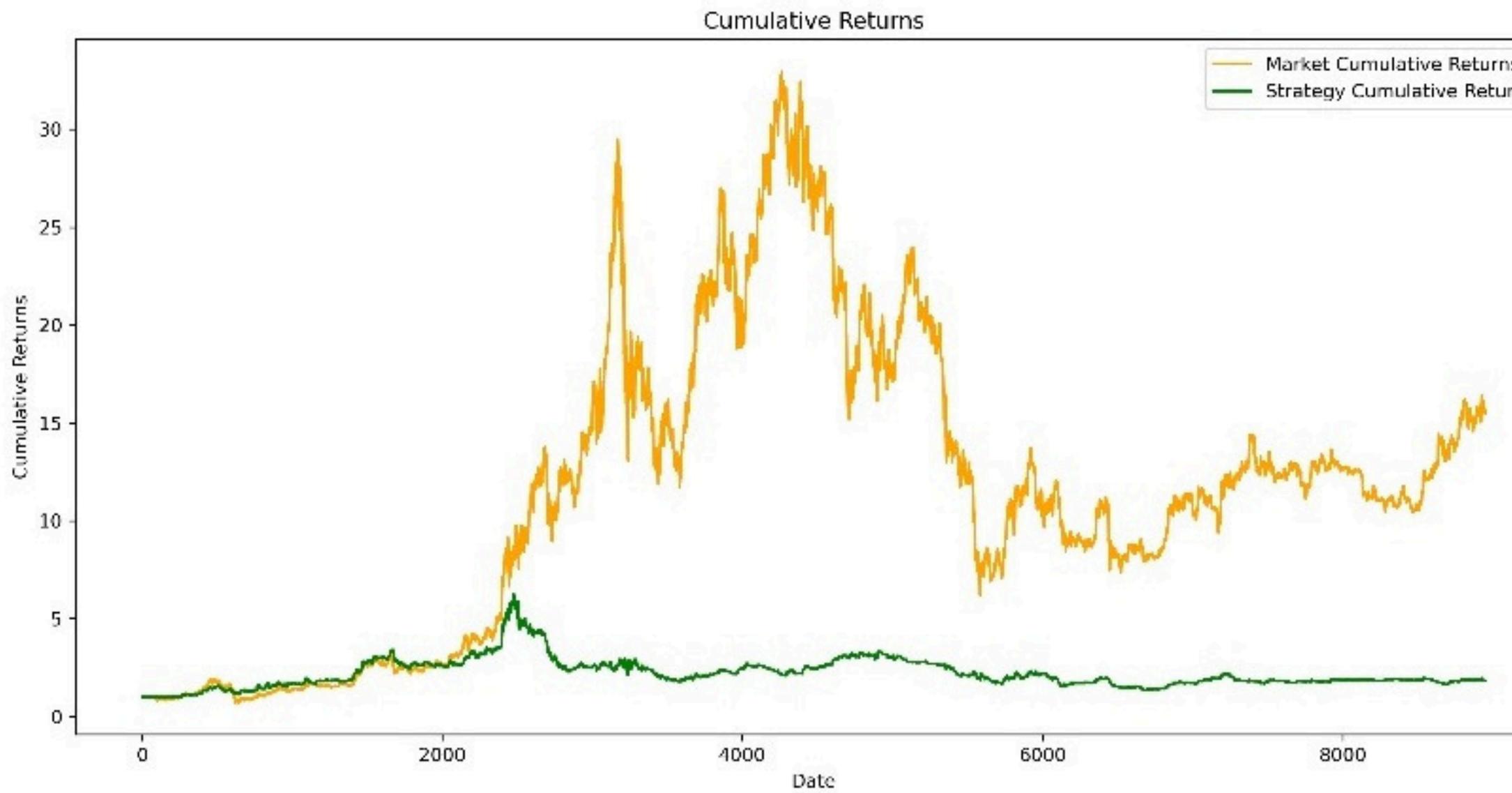
BTC RESULTS



Frequency : 1 day

- Total Trades: 11
- Win Rate: 54.54%
- Compound Returns: \$ 3,502
- Benchmark: \$ 3,256.32
- Sharpe Ratio: **7.80**
- Sortino Ratio: **44.48**
- MaxDrawdown: **28.27**
- Average TTR: 395 days
- Benchmarks beaten: 4 out of 8

ETH RESULTS



Frequency : 4 hr

- Total Trades: 175
- Win Rate: 58.53%
- Compound Returns: **\$ 22,003**
- Benchmark: \$ 14,470
- Sharpe Ratio: **7.06**
- Sortino Ratio: 20.32
- MaxDrawdown: **31.82**
- Average TTR: **24.79 days**
- Benchmarks beaten: 6 out of 16

PVT + ADX - ETH

Quarterly Performance

Initial Balance	Final Balance	Profit(%)	Benchmark(%)	Benchmark Beaten?	From	To	Total Trades	Long Trades	Short Trades	Win Rate
1000.0	1342.2	34.2	1.9	Yes	2020-01-01	2020-03-31	3	1	2	100.0
1000.0	1526.2	52.6	69.8	No	2020-04-01	2020-06-30	16	9	7	43.8
1000.0	1543.9	54.4	59.6	No	2020-07-01	2020-09-30	20	10	10	50.0
1000.0	1940.9	94.1	103.4	No	2020-10-01	2020-12-31	6	3	3	100.0
1000.0	1590.6	59.1	157.8	No	2021-01-01	2021-03-31	18	9	9	61.1
1000.0	1535.2	53.5	18.1	Yes	2021-04-01	2021-06-30	8	5	3	75.0
1000.0	1362.0	36.2	37.2	No	2021-07-01	2021-09-30	3	2	1	100.0
1000.0	1812.1	81.2	22.5	Yes	2021-10-01	2021-12-31	14	7	7	64.3
1000.0	931.9	-6.8	-11.8	Yes	2022-01-01	2022-03-31	7	4	3	42.9
1000.0	541.2	-45.9	-67.0	Yes	2022-04-01	2022-06-30	10	5	5	20.0
1000.0	1009.3	0.9	26.0	No	2022-07-01	2022-09-30	11	6	5	36.4
1000.0	845.4	-15.5	-10.0	No	2022-10-01	2022-12-31	7	4	3	57.1
1000.0	1512.7	51.3	52.5	No	2023-01-01	2023-03-31	7	4	3	71.4
1000.0	783.3	-21.7	5.9	No	2023-04-01	2023-06-30	18	10	8	38.9
1000.0	1139.9	14.0	-13.0	Yes	2023-07-01	2023-09-30	12	6	6	66.7
1000.0	1069.8	7.0	24.9	No	2023-10-01	2023-12-01	15	8	7	46.7

Risk Management

- All results correspond to time period from 2020-01-01 to 2023-12-31.
- Trailing Stop Loss (TSL) is employed in our primary strategies, with the stop-loss limit set at 5%, ensuring controlled risk and effective downside protection.
- Leverage is maintained at a conservative 1:1 ratio, indicating a low-risk approach that minimizes exposure.
- These strategies hence show resilience to market volatility, while maintaining steady performance during fluctuations.

Future Improvements

Leverage adjustment

- For the risk management, we can dynamically adjust leverage ratio according to the market trend.
- For a **bullish** market, the ratio can be set to **1:10 or 1:11**.
- For a **bearish** downtrend market, a leverage of **1:3 or 1:4** will suffice.
- When we tested our strategy by adjusting ADX threshold and the leverage, we have observed enormous profits in ETH market:

Leverage	Sharpe	Static Returns	Compound Returns	# of Benchmarks beaten
1:3	6.24	\$15,630	619x	12 / 16
1:11	6.24	\$58,913	43834x	12 / 16

Future Improvements

Indicator Hyper-parameter Tuning

Testing and fine-tuning the periods for EMA, SMA, and ADX to adapt to varying market conditions and asset types, enhancing signal accuracy.

Regime Classification Models

Using sequential prediction models to adjust strategy parameters or adding an additional layer for validating or invalidating trades, can reduce redundancy and improve efficiency.

Sentiment Analysis

Usage of news data for market prediction is a common practice. Explainability and Accuracy are major drawbacks.

Conclusion

- We provide the following final strategies:
 - **BTC/USDT : EMA + ADX - 4hr timeframe**
 - **ETH/USDT : PVT + ADX - 4hr timeframe**
- They showed excellent performance during backtesting with **sharpe ratio above 3.**
- With help of trailing stop loss, they showed low drawdowns and TTR values.
- These strategies when working with leverage give extraordinary results.



THANK YOU



Any Questions?



