ZELTA LABS

TEAM 53

Untrade Crypto Trading Challenge

INTER IIT
13.0

In The Presentation

Here's what we'll cover

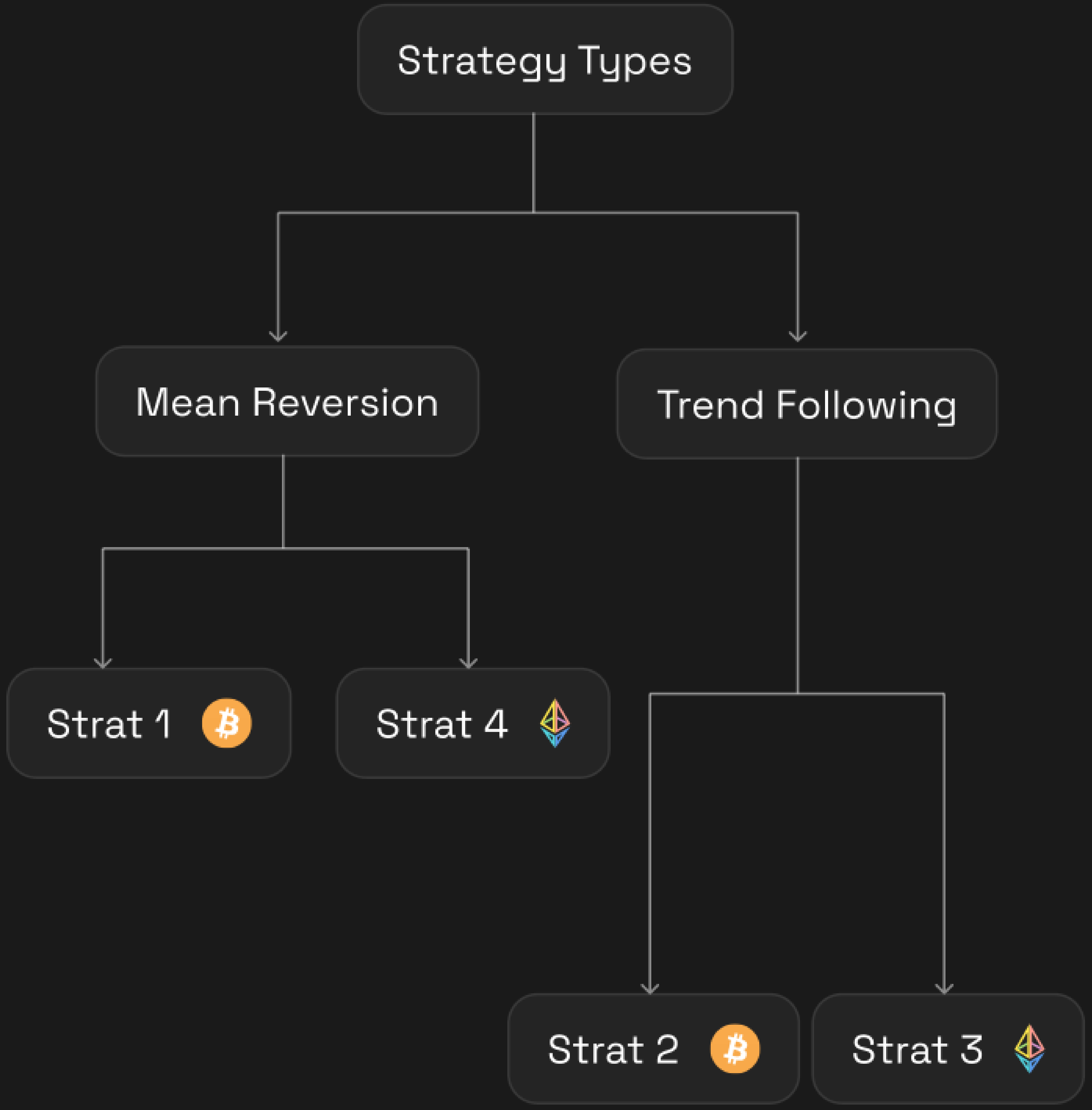
- An Overview
- Some strategies that can make us money
- Results and plots
- Robustness Check

Overview

Problem Statement

The problem statement consists of developing algorithmic trading strategies for the BTC/USDT and ETH/USDT cryptocurrency markets, aiming to outperform benchmark returns. We are required to create trading algorithms that can generate returns while managing risk effectively in both the BTC/USDT and ETH/USDT markets.

Time Frame : (2020-2023)		
Buy & Hold Returns	343%	1683%
Historical Volatility	50-70 %	60-80 %



We Have Beaten All The Benchmark Conditions In All Our Strategies!

Overview

Our Stats

		Compounding return[%]	Drawdown[%]	
Strategy 1		8938	22	
Strategy 2		8,814	24	(2x)
Strategy 3		22,789	21	(2x)
Strategy 4		4,204	32	

Strategy 01

Volume and volatility driven ema strategy

Hypothesis

- **Trend Reversals:**

  Simple moving average crossovers gave false signals in volatile markets.

  We used EMA crossovers for better trend detection and ADX (>25) to confirm trend strength, improving signal reliability.

- **Momentum Following:**

  RSI (20-period) was added to capture strong momentum, and Volume

  SMA validated trends with rising volume, reducing noise.

- **Overbought/Oversold Zones:**

  RSI helped identify overbought/oversold conditions, while Bollinger Bands pinpointed price extremes, helping us identify reversal points and avoid false entries.

- **Smoother Trend Detection:**

  Heikin Ashi Candles provided clearer trends improving entry accuracy.

Signals

Long Entry Conditions

- Smooth RSI > 60
- Volume SMA 20 > Volume SMA 50
- Previous HA Close is higher than Previous Upper Bollinger Band
- EMA 20 > EMA 50
- EMA 5 > EMA 20
- ADX > 20

Long Algo Exit

- RSI < 25
- Volatility Index SMA is higher than Volatility Index

Long Stop Loss Exit

- Long Stop Loss = Lowest Low at Entry * .05
- Exit when HA High > Stop Loss > HA Low

Signals

Short Entry Conditions

- EMA 50 > EMA 20
- Current HA Close is higher than Current Lower Bollinger Band
- Previous Smooth RSI < 28
- Previous VWAP is higher than Previous EMA 5
- Current EMA 5 is higher than Current VWAP
- Current Smooth RSI < 27

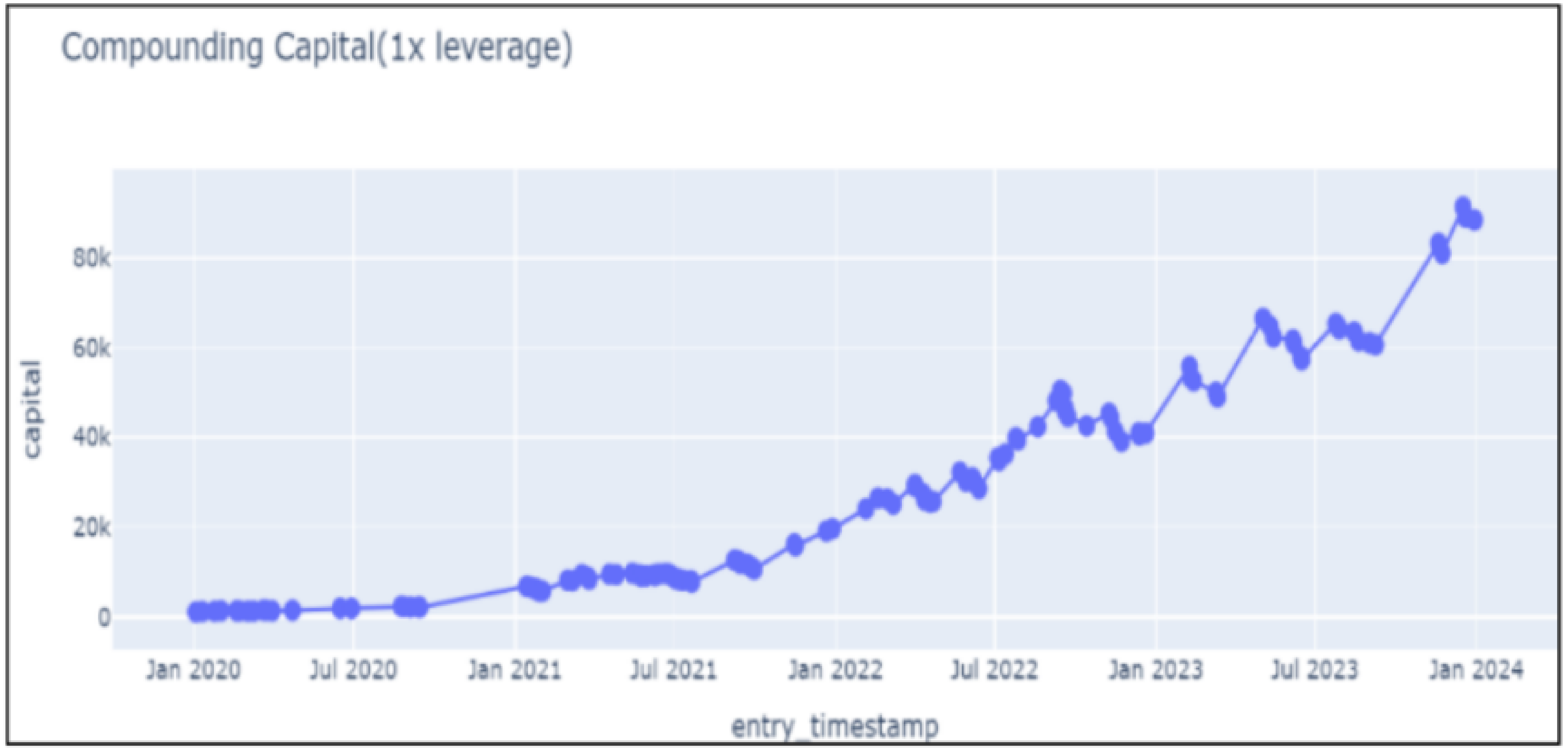
Short Algo Exit

- VWAP > EMA 5
- RSI > 72

Short Stop Loss Exit

- Short Stop Loss = Entry Close * 0.01
- Exit when HA High > Stop Loss > HA Low

Some Reports and Results!



Metric	Values
Return [%]	8938
Final Balance	89380
Annualized Returns[%]	207.14
Sharpe Ratio	4.415
Sortino Ratio	39.206
Max. Drawdown [%]	**22.564**
Avg. Drawdown [%]	6.012
# Trades	118
Win Rate [%]	37.288
Quarters Beaten	**14/15**
Profit Factor	6.54
Static PnL	6395.17

Quarterly Performance

Initial Balance	Final Balance	Profit(%)	Benchmark(%)	Benchmark Beaten?	From	To	Total Trades	Long Trades	Short Trades	Win Rate
1000.0	1235.7	23.6	-14.0	Yes	2020-01-01	2020-03-31	11	9	2	54.5
1000.0	1434.7	43.5	34.0	Yes	2020-04-01	2020-06-30	3	3	0	66.7
1000.0	1128.3	12.8	-8.7	Yes	2020-07-01	2020-09-30	5	4	1	40.0
1000.0	4051.5	305.2	56.4	Yes	2021-01-01	2021-03-31	11	11	0	36.4
1000.0	886.0	-11.4	-41.4	Yes	2021-04-01	2021-06-30	12	9	3	33.3
1000.0	1349.1	34.9	39.3	No	2021-07-01	2021-09-30	7	5	2	14.3
1000.0	1665.4	66.5	4.9	Yes	2021-10-01	2021-12-31	5	3	2	60.0
1000.0	1386.8	38.7	20.9	Yes	2022-01-01	2022-03-31	5	3	2	60.0
1000.0	901.3	-9.9	-41.7	Yes	2022-04-01	2022-06-30	11	8	3	27.3
1000.0	1669.2	66.9	-2.0	Yes	2022-07-01	2022-09-30	10	6	4	60.0
1000.0	1056.9	5.7	-8.4	Yes	2022-10-01	2022-12-31	7	5	2	42.9
1000.0	1123.2	12.3	-8.0	Yes	2023-01-01	2023-03-31	5	3	2	20.0
1000.0	1038.8	3.9	-3.6	Yes	2023-04-01	2023-06-30	7	5	2	14.3
1000.0	1024.2	2.4	-10.1	Yes	2023-07-01	2023-09-30	6	4	2	16.7
1000.0	1460.7	46.1	17.5	Yes	2023-10-01	2023-12-28	5	5	0	40.0

14/15 Quarters Beaten

5/6 Bullish Quarters Beaten

9/9 Bearish Quarters Beaten

Strategy 02

Hawkes with Fibonacci Exit

Hypothesis

- **Trend Reversals:**
  Simple trend-following models failed in volatile markets, so we used the Hawkes Process to detect high-intensity periods and added ADX (>25) to confirm strong trends.
- **Momentum Following:**
  To capture momentum, we used ADX for trend strength and Bollinger Bands to identify breakouts and reversals when price crossed the bands.
- **Overbought/Oversold Zones:**
  We used Fibonacci Retracements to identify support/resistance levels and used RSI and ADX to fine-tune exits.
- **Smoother Trend Detection:**
  Heikin Ashi Candles improved trend clarity and filtered out high-volatility periods for more accurate entries.

Signals

Long Entry Conditions

- Intensity is greater than the 95th percentile of intensity.
- Price has increased since the last time the intensity was lower than the 5th percentile.
- The Current Close is higher than the Current Upper Bollinger Band
- ADX>30

Long Algo Exit

- The current Price is below the 61.8% Fibonacci retracement level.

OR

- The current Price is below the 50.0% or 38.2% Fibonacci retracement level.
- RSI > 75 and ADX<20

Signals

Short Entry Conditions

- Intensity is greater than the 95th percentile.
- Price has decreased since the last time the intensity was lower than the 5th percentile.
- The Current Close is Lower than the Current Lower Bollinger Band
- ADX>25

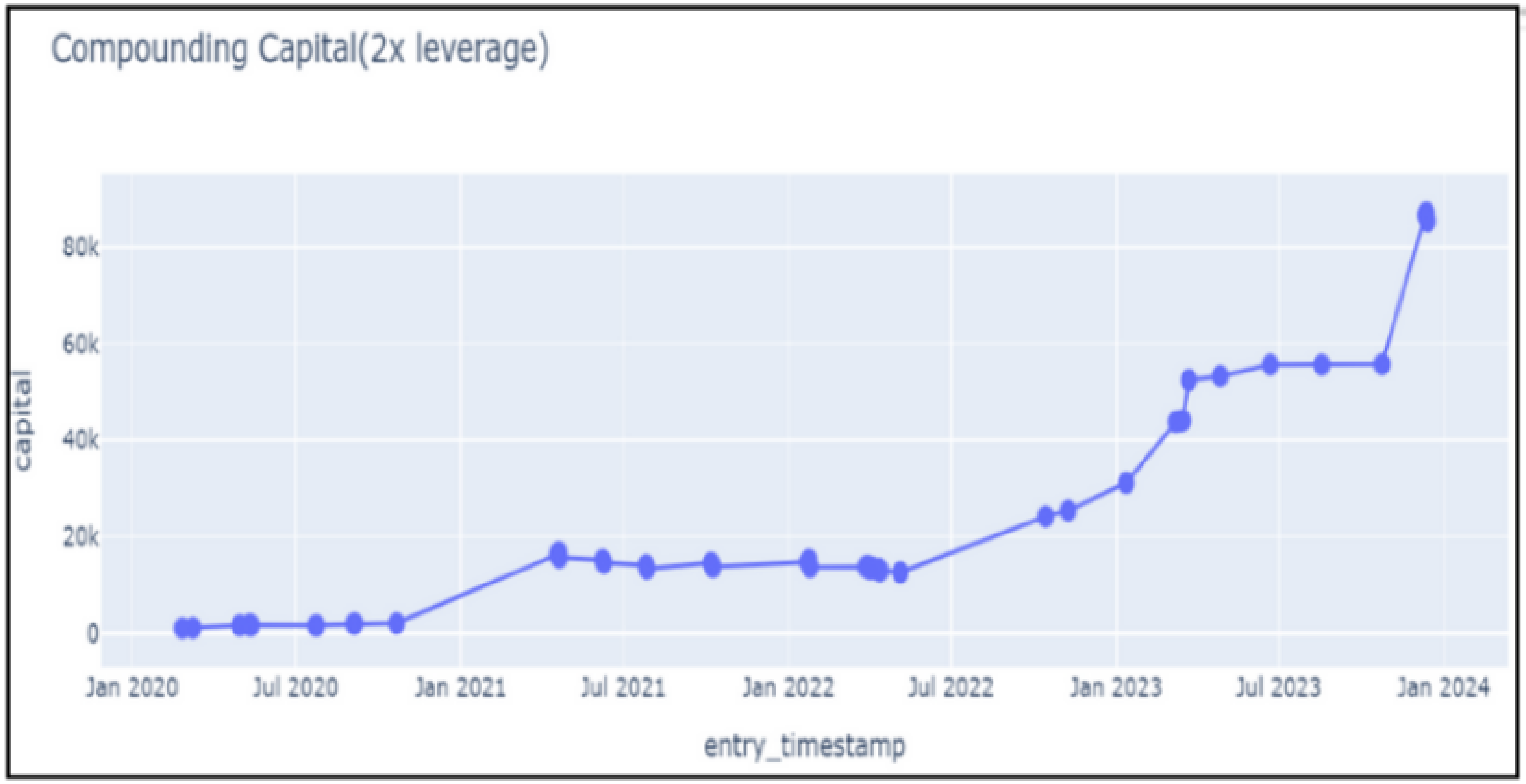
Short Algo Exit

- The current Price is below the 50.0% Fibonacci retracement level.

OR

- The current Price is below the 38.2% Fibonacci retracement level.
- ADX<20

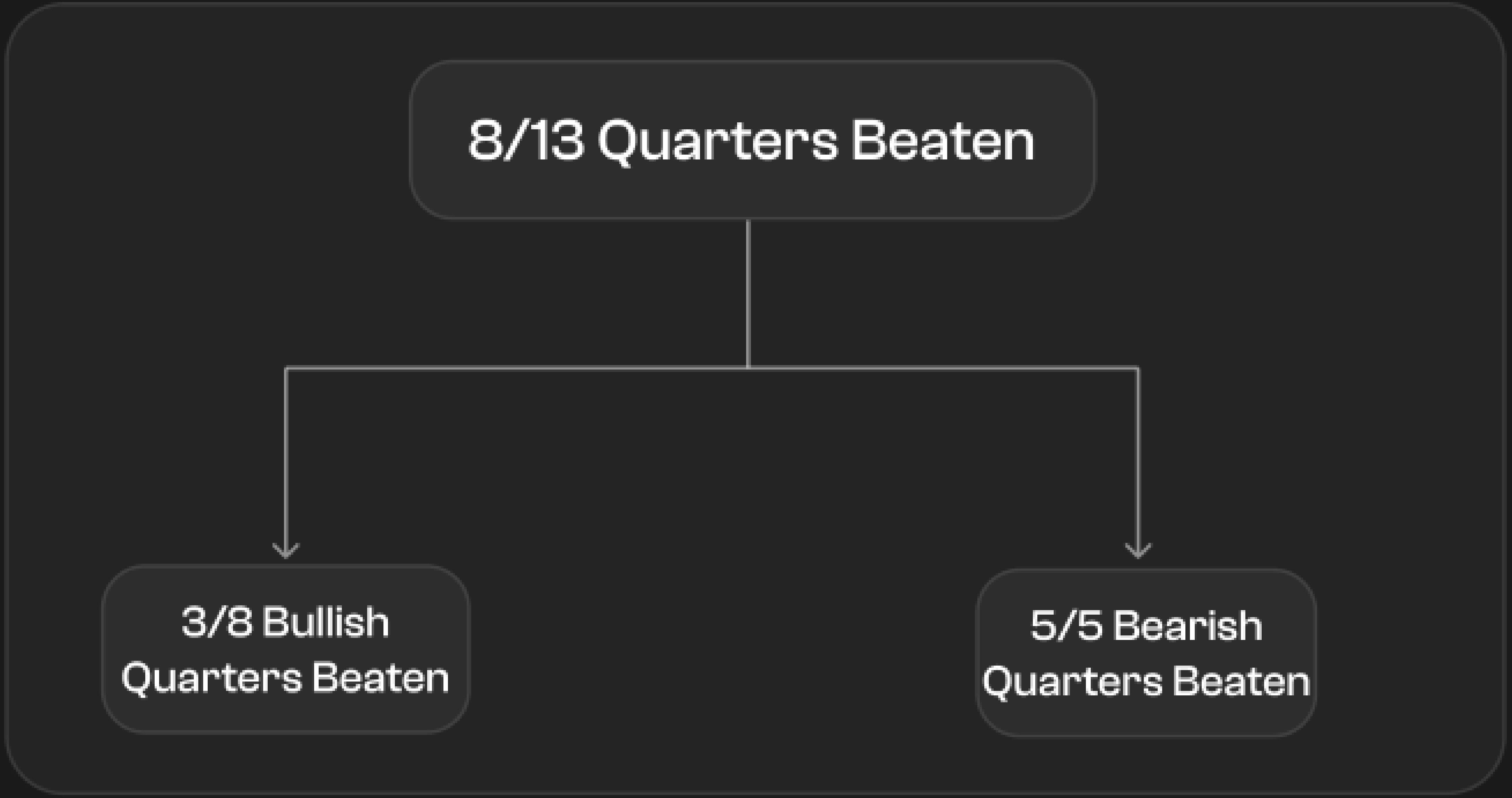
Some Reports and Results!



Metric	Values [1x]	Values [2x]
Return [%]	1706	8814
Final Balance	17069	88146
Annualized Return [%]	103.2	206.5
Sharpe Ratio	3.792	3.792
Sortino Ratio	176.542	176.542
Max. Drawdown [%]	**12.973**	**24.963**
Avg. Drawdown [%]	4.230	8.330
# Trades	54	54
Win Rate [%]	**64.815**	**64.815**
Quarters Beaten	8/13	10/13
Profit Factor	9.5	9.5
Static PnL	5094.004	10029.93

Quarterly Performance

Initial Balance	Final Balance	Profit(%)	Benchmark(%)	Benchmark Beaten?	From	To	Total Trades	Long Trades	Short Trades	Win Rate
1000.0	1291.9	29.2	-33.4	Yes	2020-01-01	2020-03-31	2	0	2	100.0
1000.0	995.9	-0.4	6.6	No	2020-04-01	2020-06-30	5	1	4	60.0
1000.0	1144.4	14.4	8.6	Yes	2020-07-01	2020-09-30	4	2	2	100.0
1000.0	4184.4	318.4	-35.3	Yes	2021-04-01	2021-06-30	7	1	6	42.9
1000.0	1018.7	1.9	1.1	Yes	2021-07-01	2021-09-30	2	2	0	50.0
1000.0	1006.2	0.6	1.8	No	2021-10-01	2021-12-31	4	4	0	25.0
1000.0	951.0	-4.9	25.5	No	2022-01-01	2022-03-31	8	4	4	50.0
1000.0	973.5	-2.6	-20.0	Yes	2022-04-01	2022-06-30	7	4	3	57.1
1000.0	1668.0	66.8	-12.0	Yes	2022-10-01	2022-12-31	3	1	2	100.0
1000.0	1333.7	33.4	48.1	No	2023-01-01	2023-03-31	5	3	2	100.0
1000.0	1022.7	2.3	7.1	No	2023-04-01	2023-06-30	1	1	0	100.0
1000.0	1000.7	0.1	-6.9	Yes	2023-07-01	2023-09-30	2	1	1	50.0
1000.0	1282.2	28.2	27.7	Yes	2023-10-01	2023-12-16	4	1	3	75.0



Strategy 03

Hawkes Multi-Indicator Strategy

Hypothesis

- **Trend Reversals:**
  The Hawkes Process identifies high-intensity market periods to detect reversals, with ADX (>20) confirming trend strength and Heikin Ashi Candles improving clarity.
- **Momentum Following:**
  Bollinger Bands capture breakouts or breakdowns, with ADX ensuring trend strength and Parabolic SAR refining reversal signals.
- **Overbought/Oversold Zones:**
  RSI percentiles (75th and 30th) combined with Fibonacci levels identify overbought/oversold zones, validated by volume-based volatility indices.
- **Smoother Trend Detection:**
  ATR-based normalization adjusts to market volatility, while Heikin Ashi Candles and the Volatility Index filter noise for better signals.

Signals

Long Entry Conditions

Hawkes = Hawkes process with parameter 0.1 on normal logarithmic range.

Hawkes q95 = Hawkes 95th Quantile

Change = Difference between closing prices of current candle and last candle with no signal [0]

- Hawkes > Hawkes q95
- Previous Hawkes q95 > Previous Hawkes
- Change > 0
- ADX > 20
- Close > Upper Bollinger Band

Long Algo Exit

Fibo[23.6] = Fibonacci value using maximum since entry

RSI 70 = 70th Percentile RSI with window size of 252

RSI 25 = 25TH Percentile RSI with window size of 512

- HA Close < Fibo[23.6]
- Previous HA Close > Fibo[23.6]
- RSI > RSI 70
- Parabolic SAR > HA Close

Signals

Short Entry Conditions

Hawkes = Hawkes process with parameter 0.1 on normal logarithmic range.

Hawkes q95 = Hawkes 95th Quantile

Change = Difference between closing prices of current candle and last candle with no signal [0]

- Hawkes > Hawkes q95
- Previous Hawkes q95 > Previous Hawkes
- Change < 0
- ADX > 25
- Close < Lower Bollinger Band

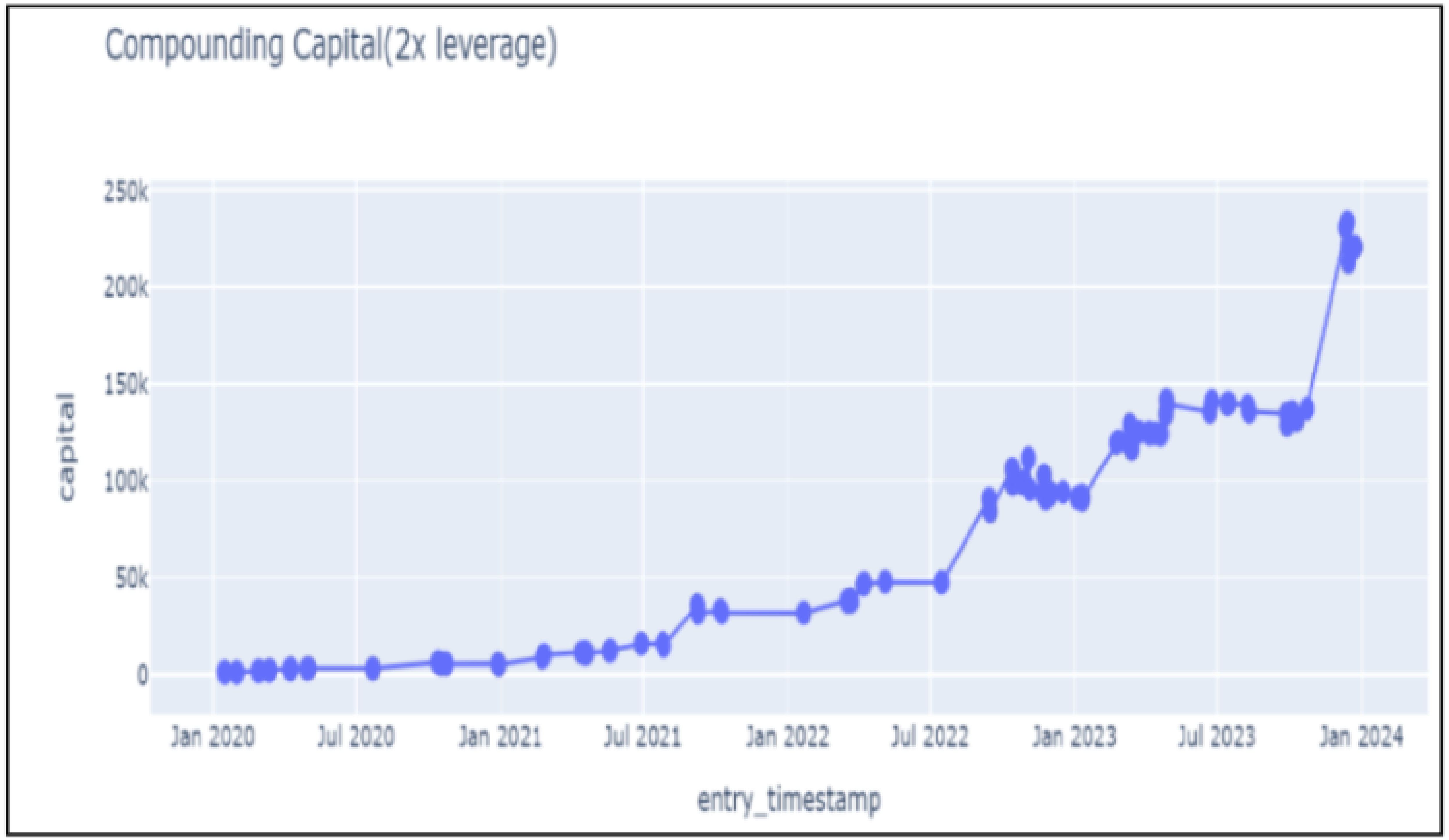
Short Algo Exit

- VWAP > EMA 5
- RSI > 72

Short Stop Loss Exit

- Short Stop Loss = Entry Close * .01
- Exit when HA High > Stop Loss > HA Low

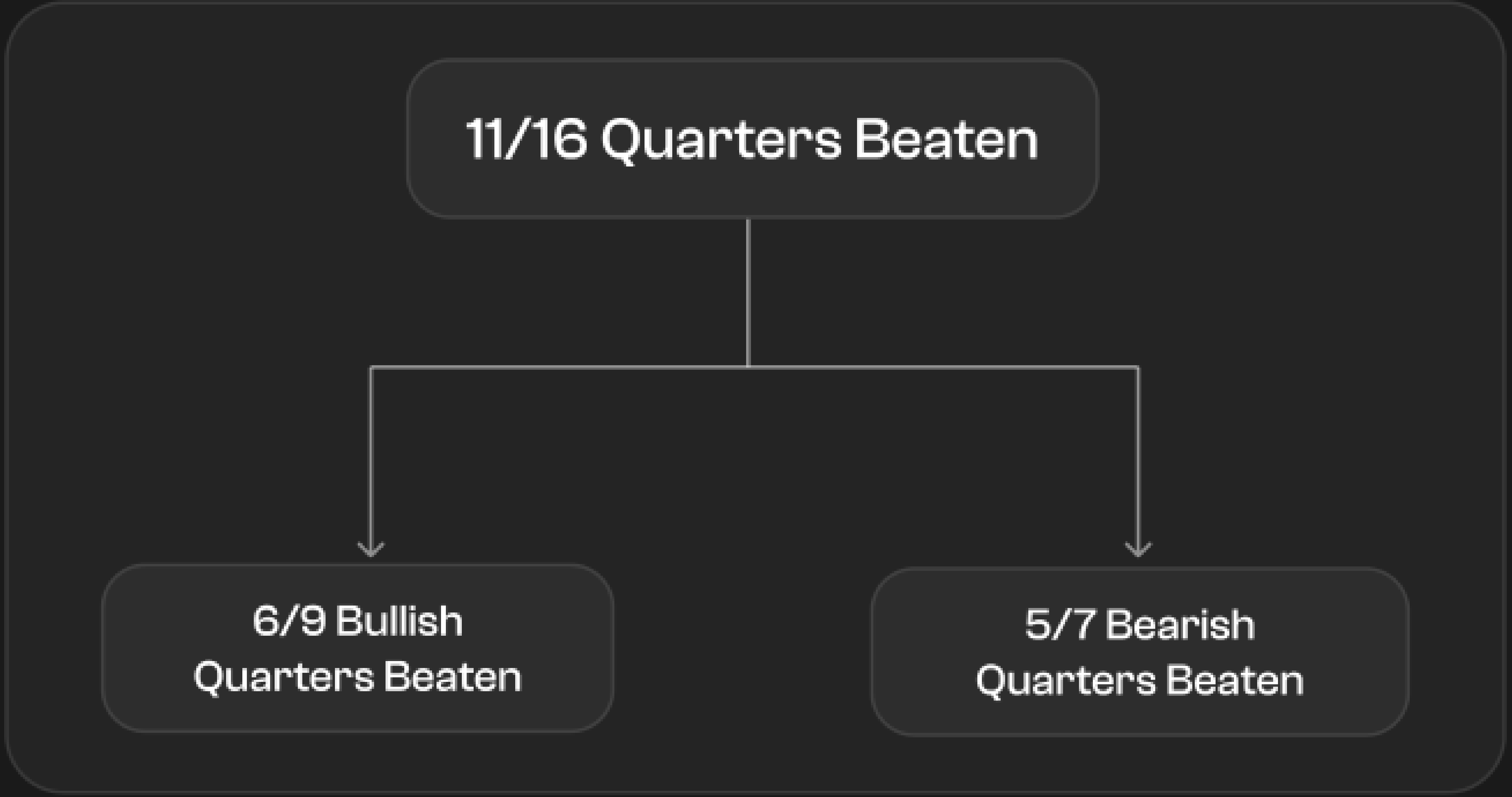
Some Reports and Results!



Metric	Values [1x]	Values [2x]
Return [%]	2265	22789
Final Balance	22659	227897
Annualized Return [%]	118	288.53
Sharpe Ratio	5.399	5.399
Sortino Ratio	43.477	43.477
Max. Drawdown [%]	11.05	21.21
Avg. Drawdown [%]	2.515	5.051
# Trades	126	126
Win Rate [%]	**52.38**	**52.38**
Quarters Beaten	**10/16**	**11/16**
Profit Factor	4.850	4.821
Static PnL	3937.54	7875.09

Quarterly Performance

Initial Balance	Final Balance	Profit(%)	Benchmark(%)	Benchmark Beaten?	From	To	Total Trades	Long Trades	Short Trades	Win Rate
1000.0	1645.0	64.5	-52.1	Yes	2020-01-01	2020-03-31	5	0	5	100.0
1000.0	1091.4	9.1	21.7	No	2020-04-01	2020-06-30	7	7	0	71.4
1000.0	2157.9	115.8	57.1	Yes	2020-07-01	2020-09-30	2	2	0	50.0
1000.0	787.9	-21.2	84.2	No	2020-10-01	2020-12-31	9	9	0	22.2
1000.0	2336.0	133.6	55.1	Yes	2021-01-01	2021-03-31	4	1	3	100.0
1000.0	1414.1	41.4	-6.8	Yes	2021-04-01	2021-06-30	7	5	2	85.7
1000.0	2089.1	108.9	48.3	Yes	2021-07-01	2021-09-30	5	2	3	40.0
1000.0	958.5	-4.2	-0.4	No	2021-10-01	2021-12-31	3	3	0	0.0
1000.0	1185.1	18.5	3.9	Yes	2022-01-01	2022-03-31	5	4	1	40.0
1000.0	1265.4	26.5	-11.2	Yes	2022-04-01	2022-06-30	5	2	3	60.0
1000.0	2241.5	124.2	16.0	Yes	2022-07-01	2022-09-30	5	2	3	60.0
1000.0	858.8	-14.1	-4.1	No	2022-10-01	2022-12-31	13	5	8	53.8
1000.0	1372.8	37.3	45.5	No	2023-01-01	2023-03-31	18	6	12	50.0
1000.0	1118.6	11.9	-1.4	Yes	2023-04-01	2023-06-30	11	9	2	54.5
1000.0	922.6	-7.7	-17.3	Yes	2023-07-01	2023-09-30	9	9	0	22.2
1000.0	1743.8	74.4	39.9	Yes	2023-10-01	2023-12-24	13	6	7	61.5



Now What?

All these stats don’t make sense unless our strategies are robust

Robustness

Robustness refers to the strategy's ability to perform consistently across different market conditions, datasets, and timeframes without overfitting.

Strat 1 on Solana

Time Frame : [2022-2023]

Metric	Values
Return [%]	2095.52
Final Balance	21955.21
Sharpe Ratio	5.92
Sortino Ratio	39.64
Max. Drawdown [%]	**29.13**
Avg. Drawdown [%]	9.72
# Trades	58
Win Rate [%]	37.93
Profit Factor	6.12
Static PnL	4366

Hawkes [BTC] on Solana

Time Frame : [2022-2023]

Metric	Values
Return [%]	459
Final Balance	4590.5
Sharpe Ratio	1.12
Sortino Ratio	2.09
Max. Drawdown [%]	**44.49**
Avg. Drawdown [%]	8.9
# Trades	59
Win Rate [%]	40.70
Profit Factor	2.03
Static PnL	1968.4

Thank You !!