



TIKTOKENTIME

Intraday Trading with Sentiment Signals

PRESENTED BY

Ethan Yu Cai Justin Justin

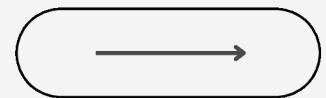




TABLE OF CONTENTS

01

RESEARCH OBJECTIVE

02

LITERATURE REVIEW

03

DATA

04

METHODOLOGY

05

OUTCOMES

06

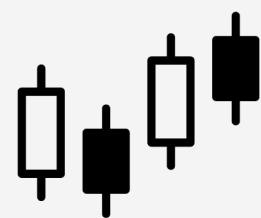
REFERENCES

01

RESEARCH OBJECTIVE



Analyze the impact of market sentiment on Bitcoin price



Combined with technical analysis



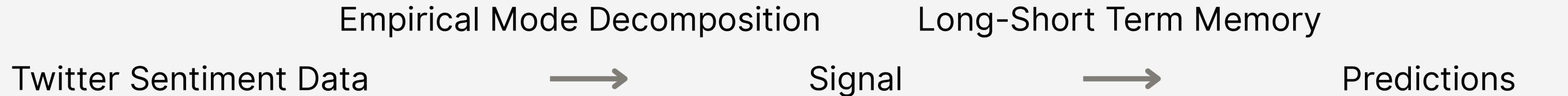
Aims to maximise returns in a medium trading environment
(execute trades every hour)



02

LITERATURE REVIEW

Arslan (2024)



Ider & Lessmann (2023), Vlahavas & Vakali (2024)

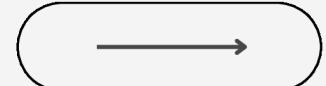
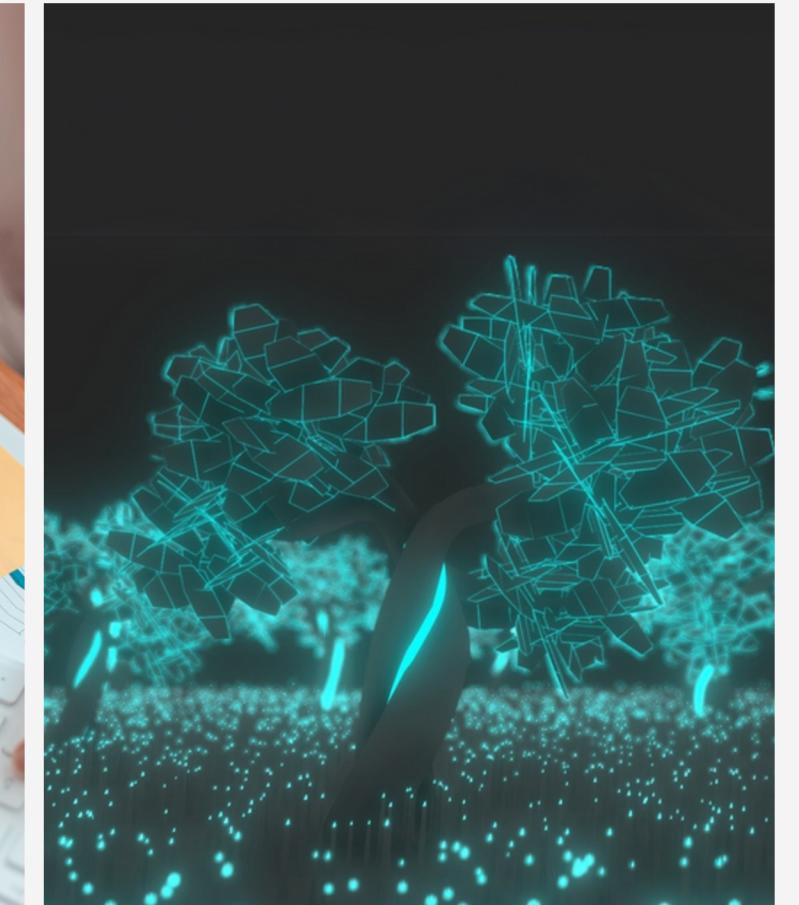
More Data Sources = More Accurate

Han et al. (2025)

XGBoost outperforms in short-term forecasting

Goyal & Welch (2008)

Equity Returns assessment over multiple horizons



02

LITERATURE REVIEW

Our Approach

We propose a comprehensive composite sentiment index generalisable to different sources in crypto space.

- 1.
- 2.
- 3.

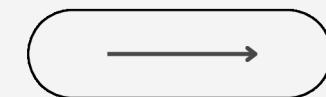
Reddit
Telegram
News

Complimented with a Multi-horizon Ensemble-style Decision Strategy



Our Contributions

- Novel sentiment indicator - Rigorously designed & Tuned
- A simple yet comprehensive Multi-horizon Ensemble-style Trading Strategy
- Example of Sentiment Indicator Performance with Strategy



03

DATASET

Post data sparse

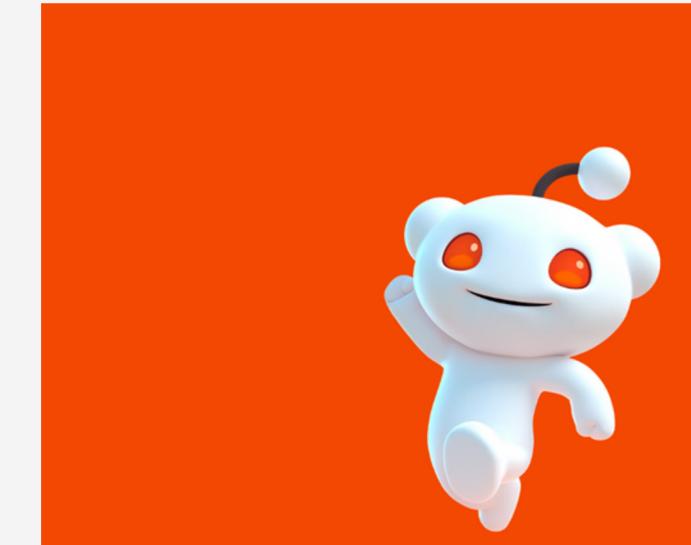
Ollama to extract text sentiment

Volume of activity represents public engagement

Popular Telegram Signal
Channels
Casual Traders looking for
guidance



01



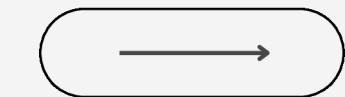
02



03



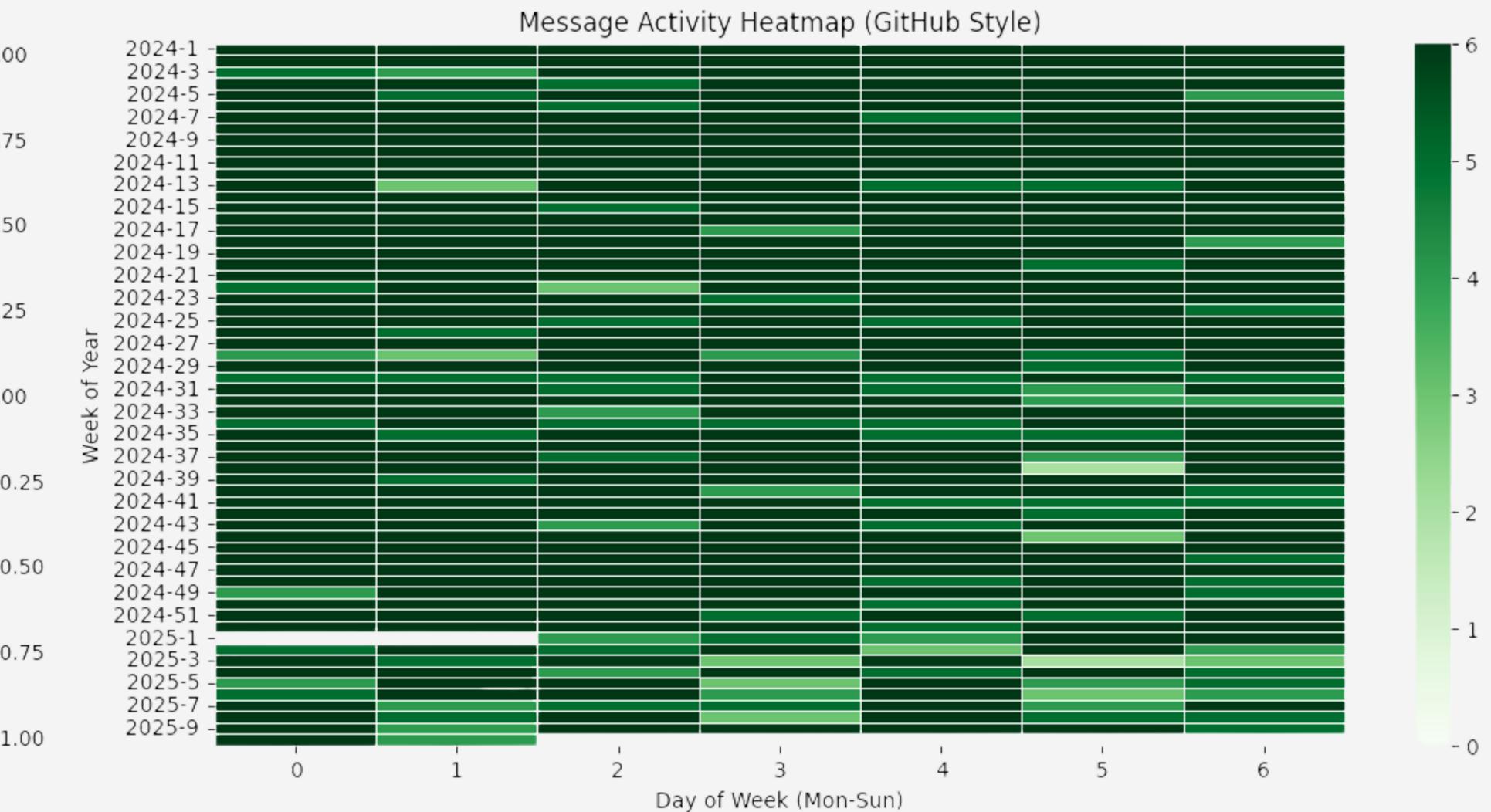
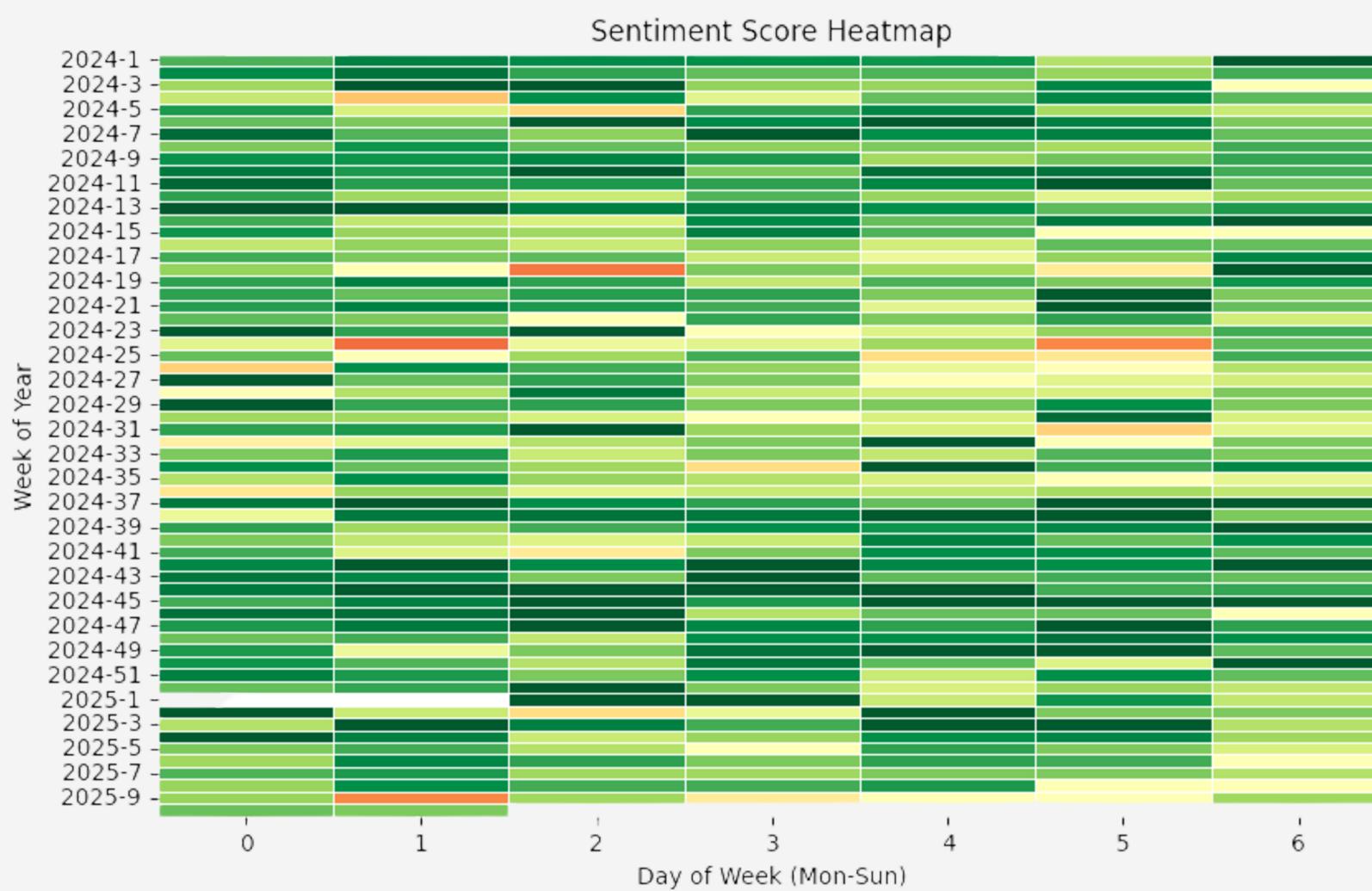
04



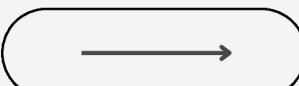
03

Exploratory Data Analysis

Telegram



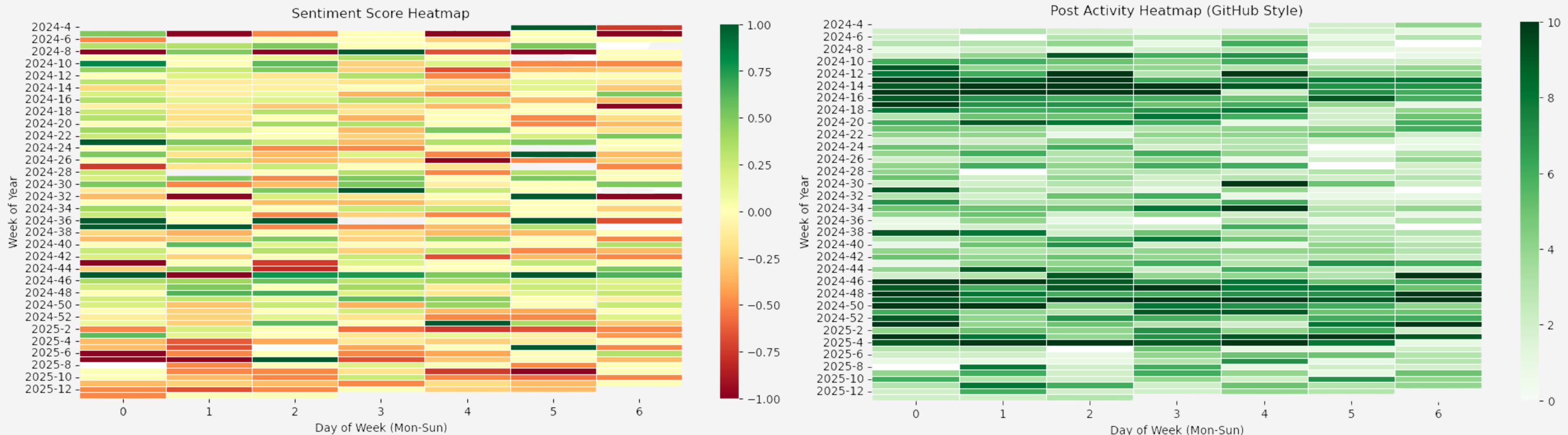
Overwhelmingly positive sentiment



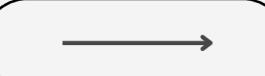
03

Exploratory Data Analysis

Reddit

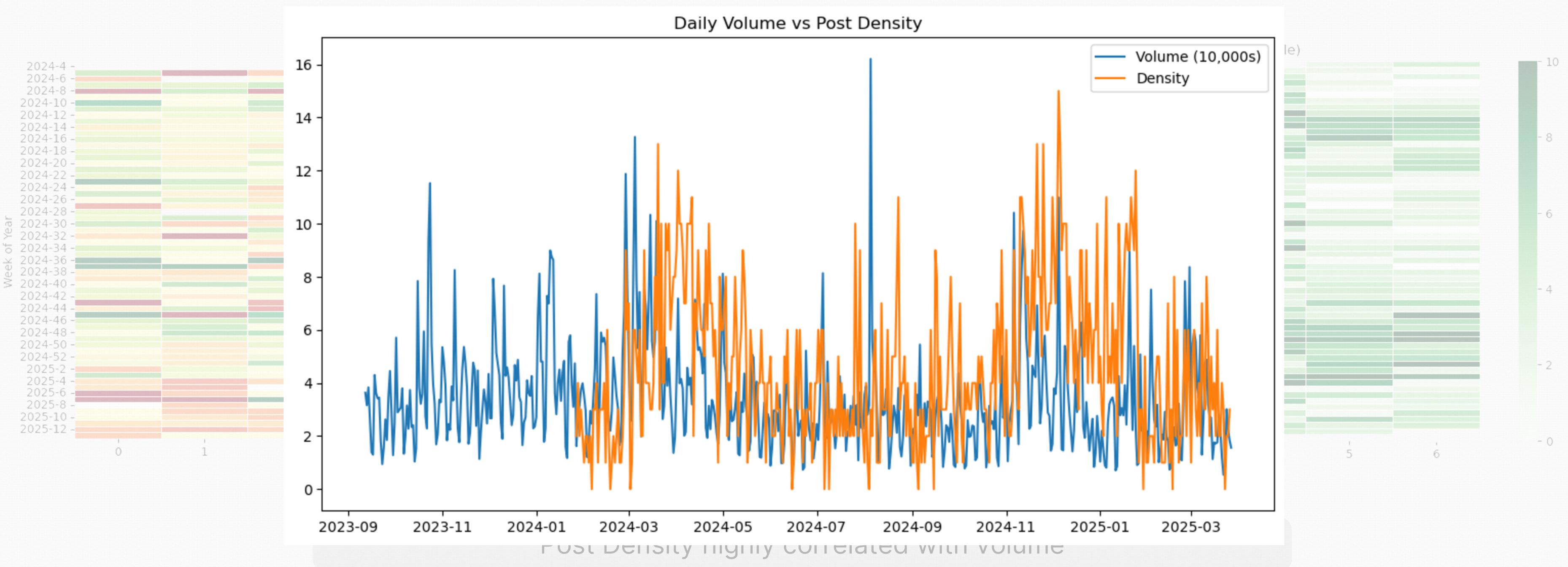


Post density highly correlated with volume
Modest polarity in sentiments



03

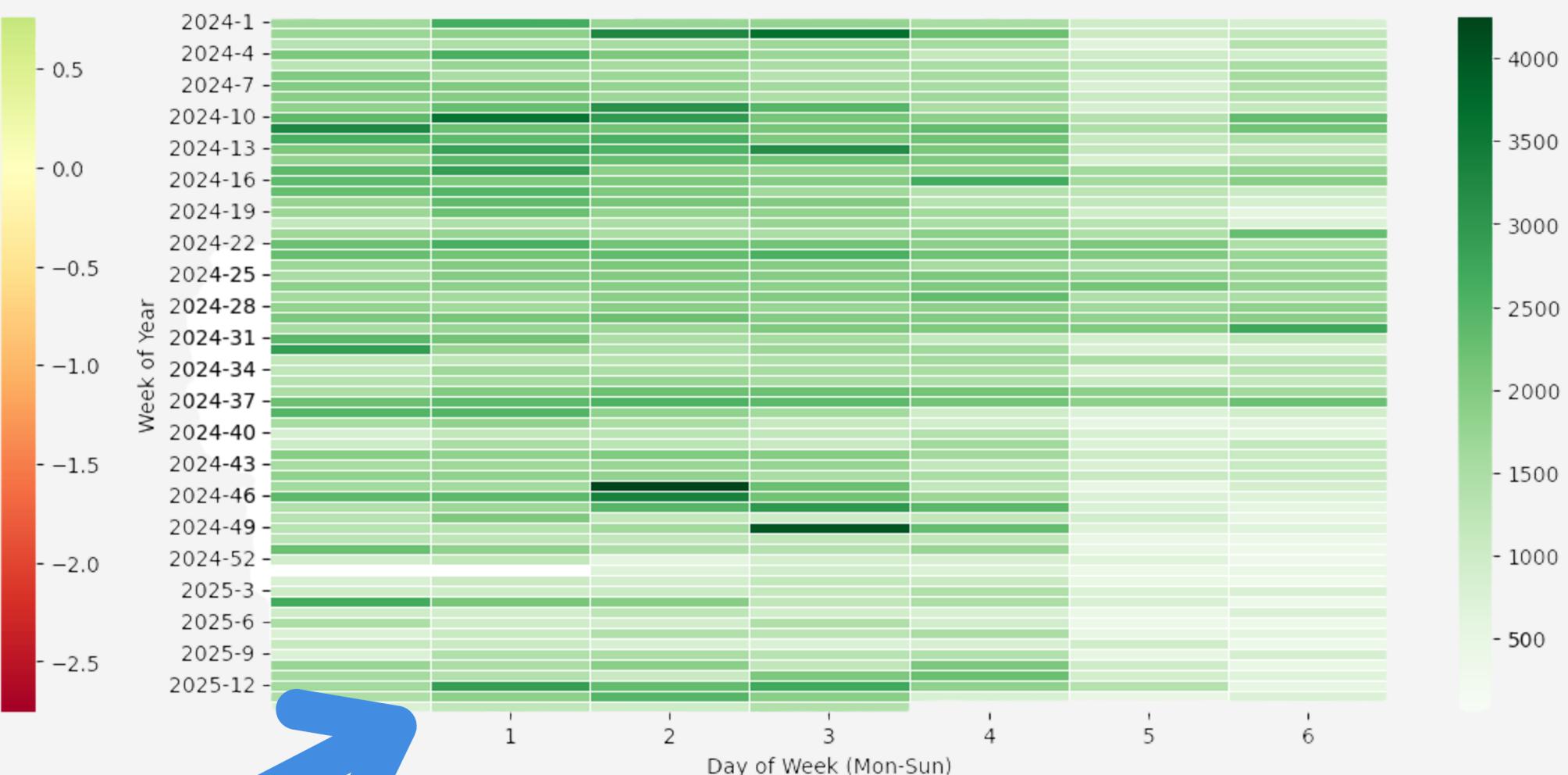
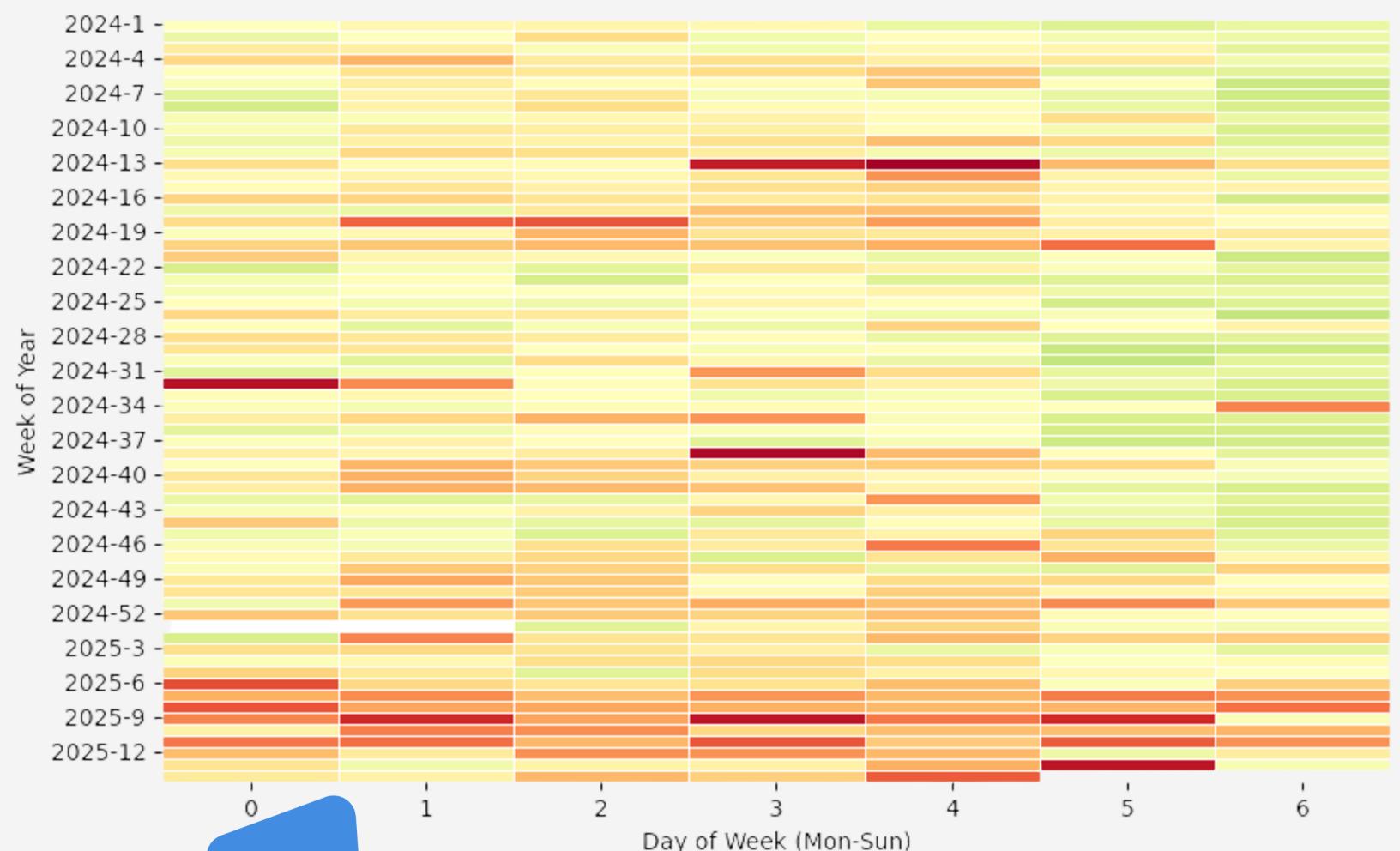
Exploratory Data Analysis



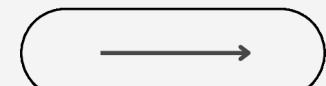
03

Exploratory Data Analysis

News



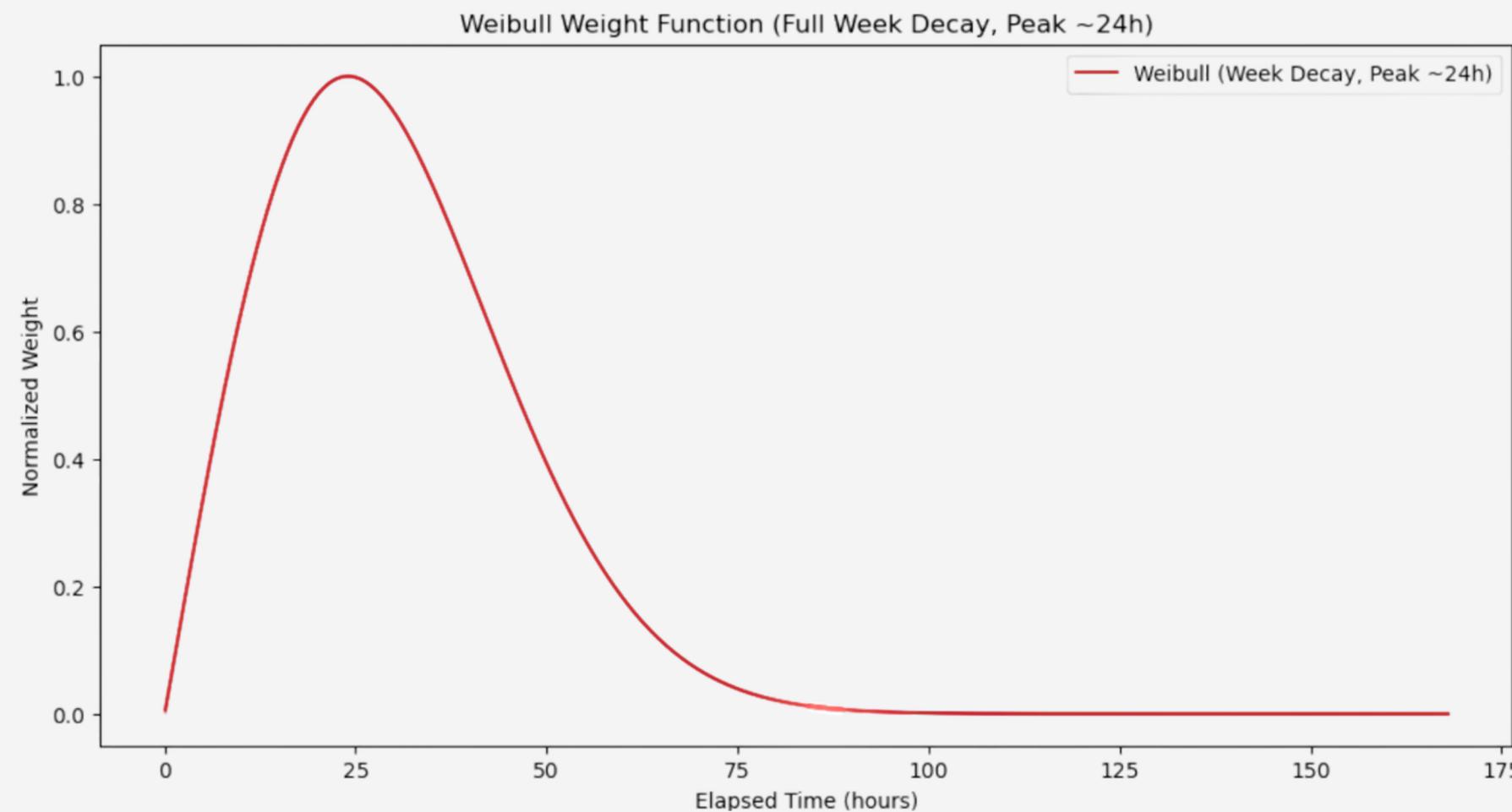
Mostly neutral with some very negative sentiments
Negative sentiments correlates with volume



03

SENTIMENT INDICATOR

Weibull DECAY



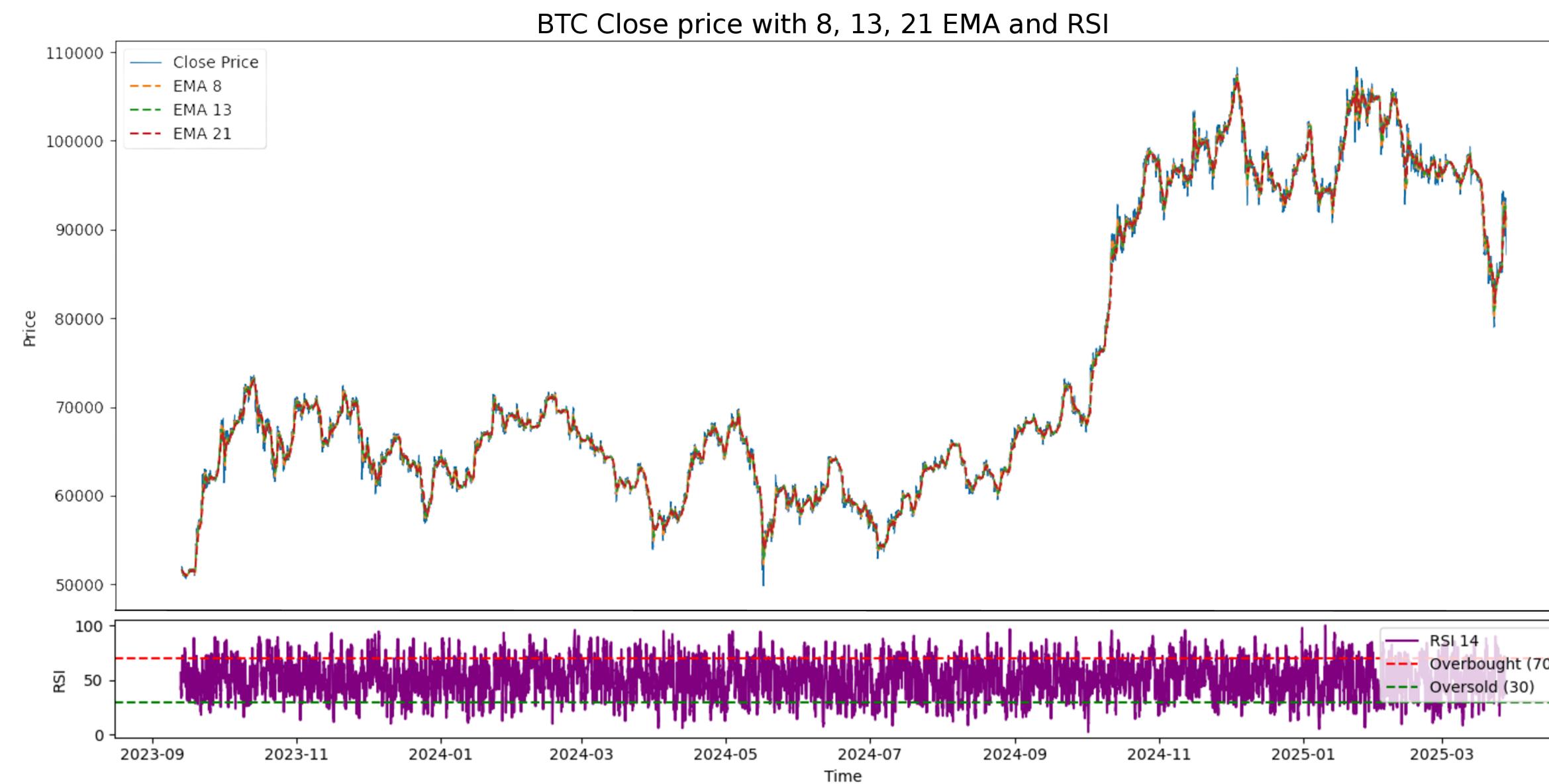
1. Sentiment Scores assigned
Positive = 1
Negative = -1
Neutral = 0
2. Each Post/Comment/News has effects that decays in a week
3. Highest effects (peak) at 24 hours
4. Effects summed across pieces of data



03

Exploratory Data Analysis

BTC Technicals

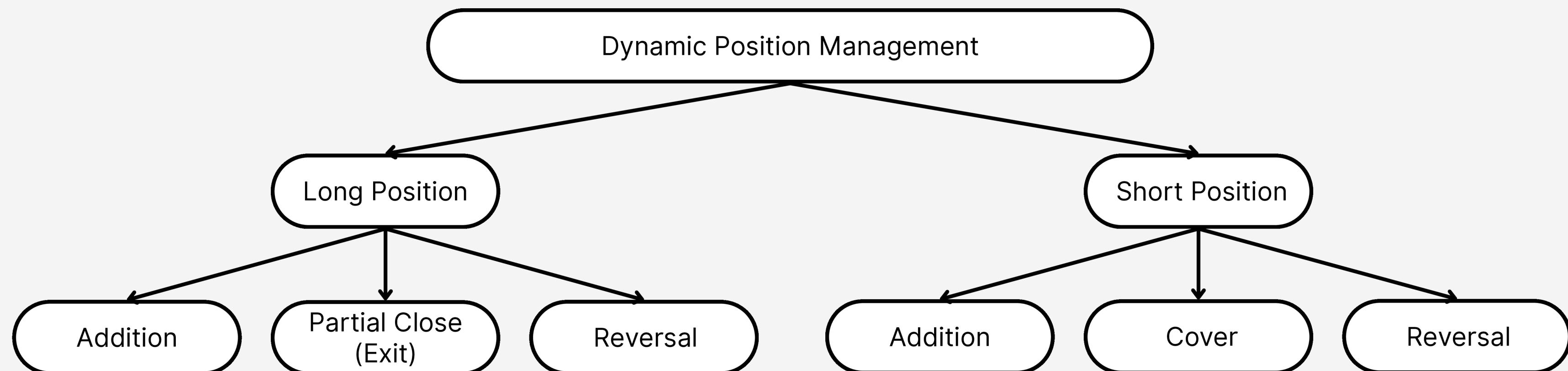


Engineered 27 common technical indicators - EMA, MACD, RSI, OBV, etc...



Trading Conditions

- We simulate margin trading with a maximum leverage cap of 2x the initial capital
- Orders are placed at the end of each hourly bar and executed at the next open
- One order is made on each bar given the model signal
- We experiment with transaction fees from 0.1% to 1%
- Risk free rate set at 4.3% (Roughly the % of the US 3 month treasury bills in Mar)

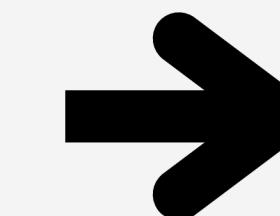


04

Forecasting Model: XGBoost

	Past Close	Past High	...	Target
Yt-6				[]
Yt-5				[]
...				
Yt				[]

A (7,37) DataFrame



0	...	251
---	-----	-----

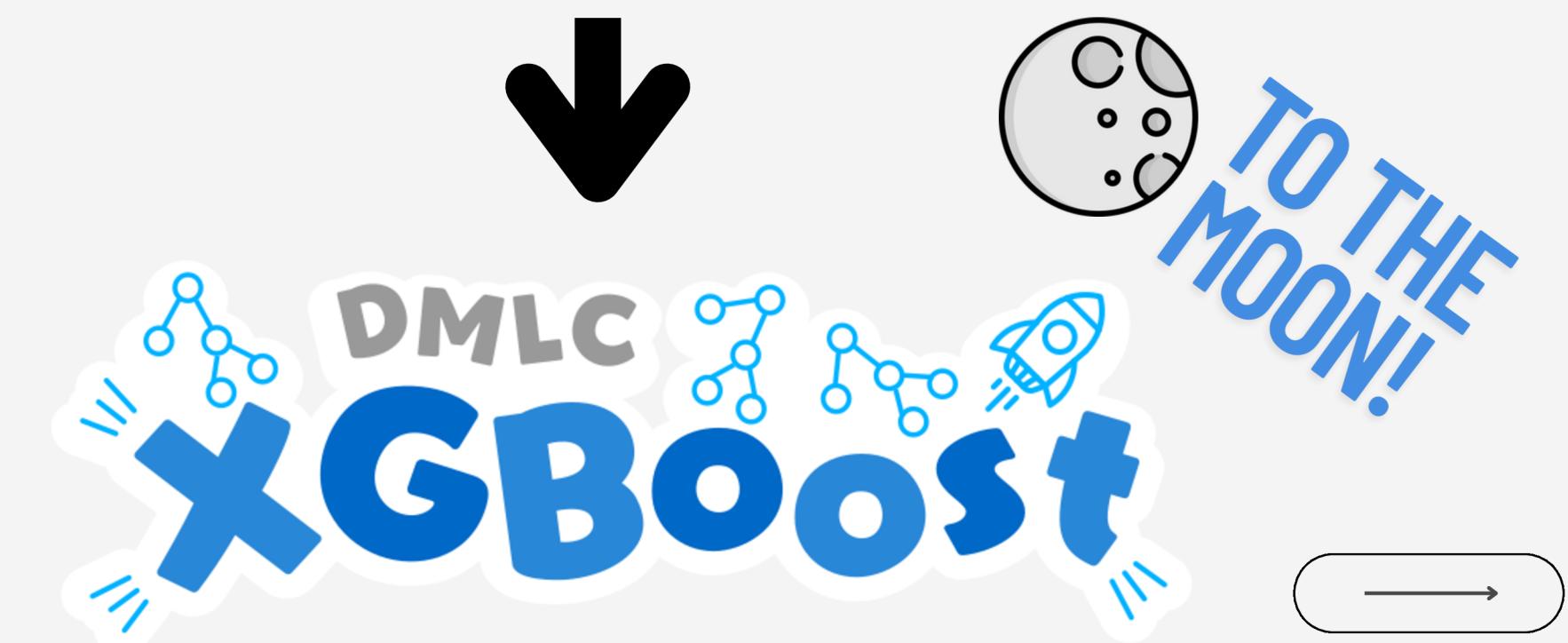
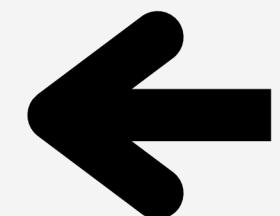
A (1,252) numpy.ndarray of inputs

close_y_t+1	close_y_t+2	close_y_t+4	close_y_t+8
-------------	-------------	-------------	-------------

A (1,4) numpy.ndarray of targets

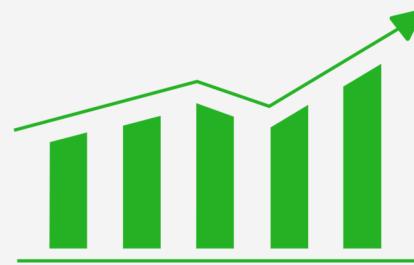
y_hat_t+1	y_hat_t+2	y_hat_t+4	y_hat_t+8
-----------	-----------	-----------	-----------

A (1,4) numpy.ndarray of outputs



04

Input Features



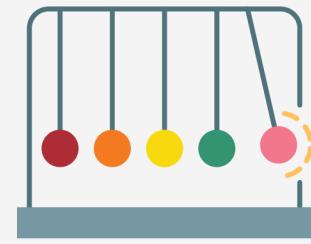
Trend
Indicators

- EMA
- SMA
- Golden Cross



Volatility
Indicators

- Bolinger Bands
- Average True Range



Momentum
Indicators

- MACD
- RSI
- %K%D Oscillation



Volume-based
Indicators

- OBV
- VWAP



Sentiment
Indicators

- Reddit Sentiment
- Telegram Sentiment
- News Sentiment

```
base_price_data = ['datetime', 'Close', 'Open', 'High', 'Low', 'VOLUME']

technical_indicators = [
    # Trend Indicators
    'EMA_8', 'EMA_13', 'EMA_21', 'EMA_Signal', 'EMA_short', 'EMA_long',
    'SMA20', 'SMA_50', 'SMA_200', 'GoldenCross_Signal',

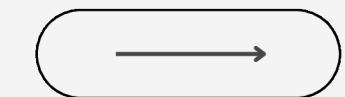
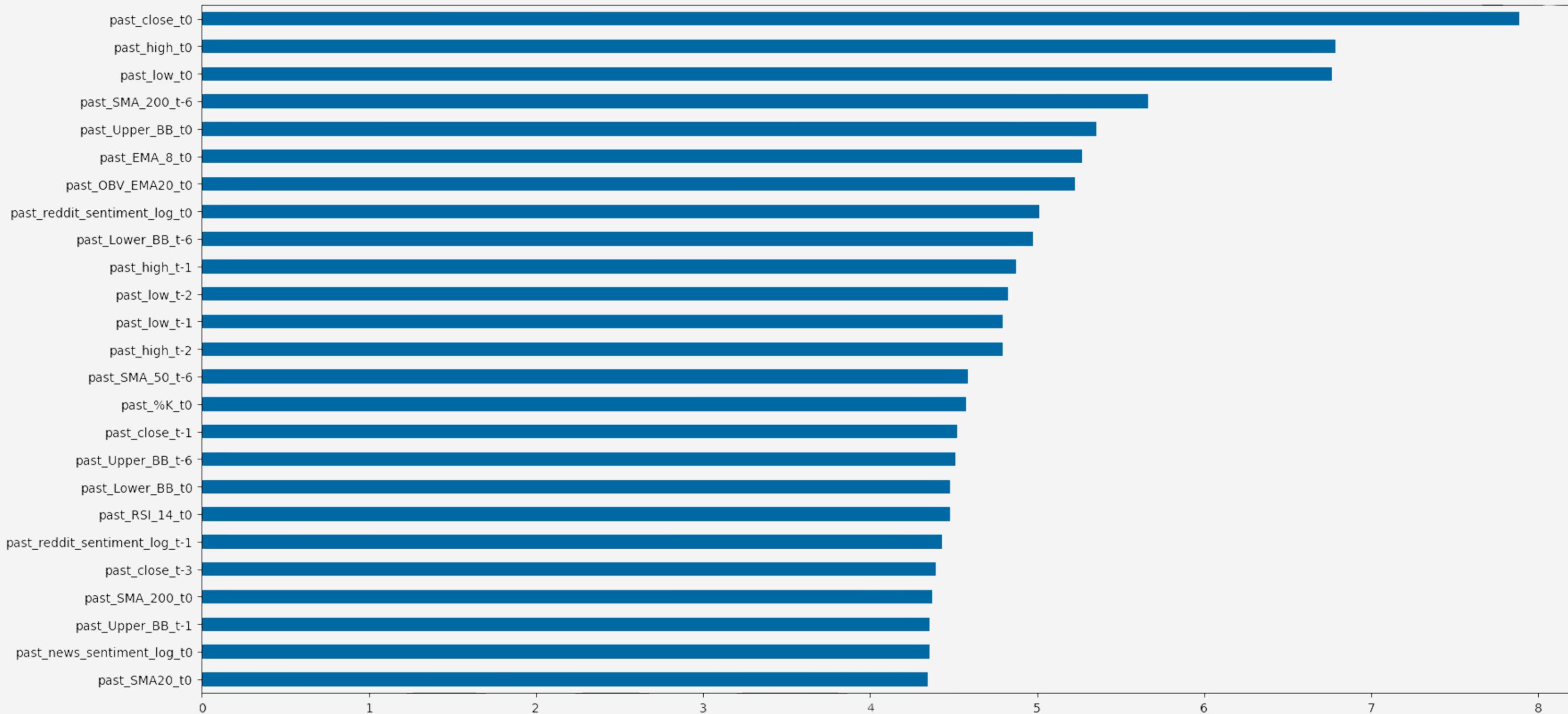
    # Momentum Indicators
    'MACD', 'Signal_Line', 'MACD_Signal', 'MACD_Hist',
    'RSI_14', 'BB_RSI_Signal', 'RSI_Signal',
    '%K', '%D', 'Stochastic_Signal',

    # Volatility Indicators
    'STD20', 'Upper_BB', 'Lower_BB', 'ATR', 'TR',

    # Volume-Based Indicators
    'OBV', 'OBV_EMA20', 'OBV_Signal', 'VWAP_Signal'
]
```

04

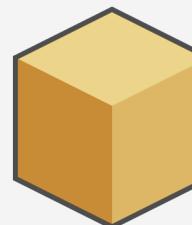
Feature Importance



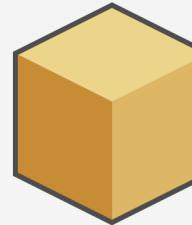
04

Multi-forecast Ensemble-style Decision

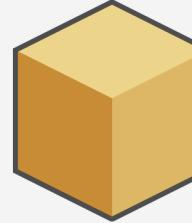
1-hour ahead Forecast



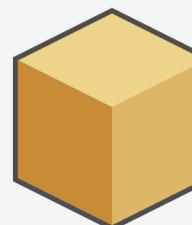
2-hour ahead Forecast



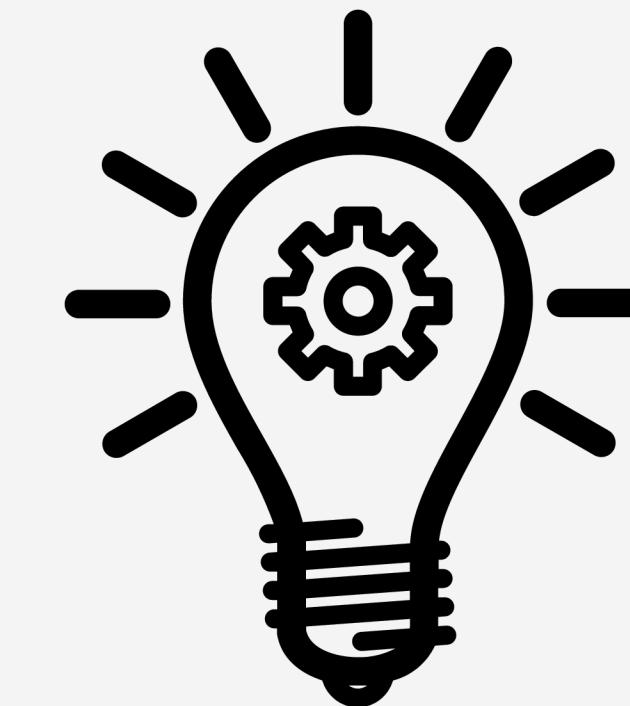
4-hour ahead Forecast



8-hour ahead Forecast



```
def trading_strategy:  
    if at least ¾ forecasts > current close:  
        | execute buy  
    else if at least ¾ forecasts < current close:  
        | execute sell
```



04

Strategy

```
class XGBoostStrategy(Strategy):
    def __init__(self, model, bet_size = 0.1, initial_data=None):
        super().__init__()
        self.model = model
        self.initial_data = initial_data
        self.bet_size = bet_size # 10% of cash ←

    def on_bar(self):

        temp_df = pd.concat([self.initial_data, self.data])

        features = self.sequencing_data(temp_df, window_size=6)

        predictions = self.model.predict(features)
        signal = self.determine_signal(predictions)
        if signal == 1:
            self.buy(
                "btc",
                size = round(self.bet_size * (self.cash) / self.close(), 8) ←
            )
        elif signal == -1:
            self.sell(
                "btc",
                size = round( self.bet_size * (self.cash) / self.close(), 8) ←
            )
        else:
            pass
```



04

Bet size Optimization



OPTUNA

- Used Optuna, an automatic hyperparameter optimization software framework for automated optimization of trade size.
- Conducted 100 trials to maximize the Sharpe Ratio
- Trials were done over the validation period from 1st Jan 2025 to 28th Feb 2025
- Optimized bet size resulted in **1% of available capital per trade** (0.010036924986373125).

04

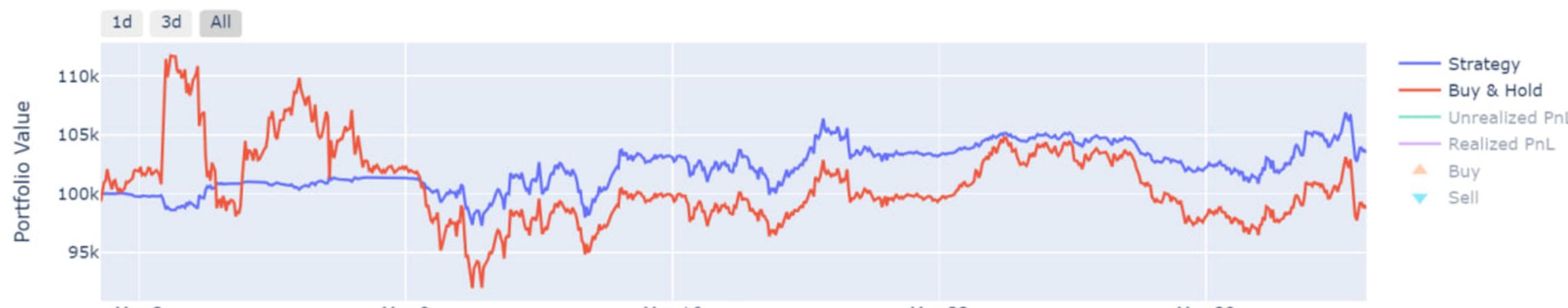
ASSESSMENT METRICS

Metric	Definition
Total Return (%)	The overall percentage gain or loss over the full time period
CAGR (%)	The smoothed annual return if the performance grew steadily each year
Volatility (%)	How much the returns fluctuate over time
Sharpe Ratio	Return earned per unit of risk taken
Max Drawdown (%)	The biggest drop from a peak to a low — shows the worst historical loss
Average Exposure (%)	The percentage of time the strategy was actively trading or invested
Number of Trades	Total count of buy and sell trades executed
Number of Buys	Number of times the strategy entered a long (buy) position
Number of Sells	Number of times the strategy exited or opened a short (sell) position
Win Rate (%)	Percentage of closed trades (exits and covers) that were profitable
Avg Profit per Trade	Average amount of profit earned per closed trade.
Final Unrealized PnL	Profit or loss on open positions not yet closed.
Final Realized PnL	Profit or loss from trades that have been completed.

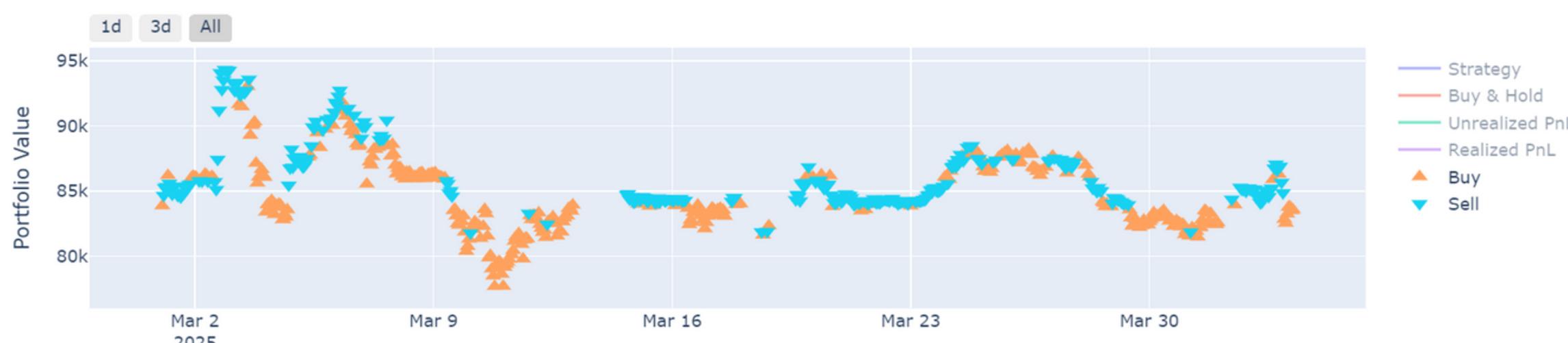
04

Back testing Strategy

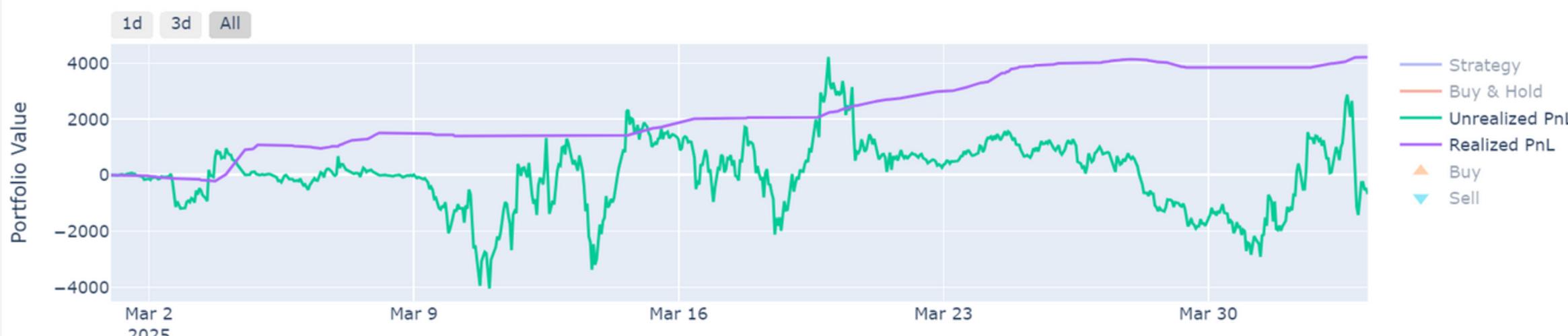
Strategy vs. Buy & Hold



Strategy vs. Buy & Hold



Strategy vs. Buy & Hold



Metric	Value
Total Return (%)	3.47
Buy-and-Hold Total Return (%)	-1.39
Average Exposure to Asset (%)	50.78
Strategy CAGR (%)	45.77
Buy & Hold CAGR (%)	-6.58
Strategy Volatility (%)	6.37
Buy & Hold Volatility (%)	12.80
Strategy Sharpe Ratio	7.18
Buy & Hold Sharpe Ratio	-0.52
Strategy Max Drawdown (%)	-5.21
Buy & Hold Max Drawdown (%)	-17.68
Number of Trades	668.00
Number of Buys	373.00
Number of Sells	295.00
Win Rate (%)	80.68
Avg Profit per Trade	14.29
Final Unrealized PnL	-682.46
Final Realized PnL	4215.03
Avg Holding Time (Closed Trades) (days)	10.96
Avg Holding Time (Open Positions) (days)	11.01

Final Portfolio Value	\$103465.72
Position Size	0.99429
Position Value	\$82867.84

05

OUTCOMES

Buy-and-hold
(Benchmark)

Metric	Sharpe Ratio	Total Return	CAGR	Volatility	Max Drawdown	Number of Buys	Number of Sells
Outcomes	-0.52	-1.39%	-6.58	12.80	-17.68	1	0
Metric	Sharpe Ratio	Total Return	CAGR	Volatility	Max Drawdown	Number of Buys	Number of Sells

Our
Strategy

Metric	Sharpe Ratio	Total Return	CAGR	Volatility	Max Drawdown	Number of Buys	Number of Sells
Outcomes	7.18	3.47%	45.77	6.37	-5.21	373	295
Metric	Sharpe Ratio	Total Return	CAGR	Volatility	Max Drawdown	Number of Buys	Number of Sells

Our Novelties

- Novel sentiment indicator - Rigorously designed & Tuned
- A simple yet comprehensive Multi-horizon Ensemble-style Trading Strategy
- Example of Sentiment Indicator Performance with Strategy

THANK YOU



Github

[4211-Group-BTC-Day-Trading](#)

NAME OF PROJECT

Low to Medium
Frequency Trading with
Sentiment

NAME OF GROUP

TIKTOKENTIME



REFERENCES

- Arslan, S. (2024). Bitcoin Price Prediction Using Sentiment Analysis and Empirical Mode Decomposition. Computational Economics.
<https://doi.org/10.1007/s10614-024-10588-3>
- Vlahavas, G., & Vakali, A. (2024). Dynamics between Bitcoin Market Trends and Social Media Activity. FinTech, 3(3), Article 3.
<https://doi.org/10.3390/fintech3030020>
- Ider, D., & Lessmann, S. (2023). Forecasting Cryptocurrency Returns from Sentiment Signals: An Analysis of BERT Classifiers and Weak Supervision (arXiv:2204.05781). arXiv.
<https://doi.org/10.48550/arXiv.2204.05781>

