Zelta Labs, Untrade Crypto Trading Challenge

TEAM 22

INTER IIT TECH MEET 12.0

AGENDA

1. Strategy Hypothesis
2. Performance Metrics
3. Robustness Analysis
4. ML Based Approach
5. Metrics & Results

Strategy Ideation

Intuition:

- BTC/USDT is trending and highly volatile market.
- Problem statement demands for a high risk-to-reward ratio.
- Focus on good trend strength and low volatility scenarios.
- Ensuring good trend strength means good returns.
- Ensuring low volatility means lower risk.

Strategy Hypothesis

Ideation of Entry Conditions for Long and Short trades:

- Indication of trend reversals:
  - Moving Average Convergence Divergence(MACD)

- Next question comes.... Confirmation of Trend Direction:
  - Exponential Moving Average of 200-period

- Well then, what if we get a reversal but the market is overbought or oversold:
  - Might indicate high volatility or maybe even consolidation
  - To prevent this, we use Relative Strength Index (RSI)

- To deal with mid-trend fluctuation :
  - Bollinger Bands' Width Condition:
    - Bollinger Bands Width = (UpperBand - LowerBand) / 20-period SMA(Close)
    - BBW_cond = N-period SMA(BBW) > M-period SMA(BBW), where N < M
    - If FALSE, confirms that the volatility is low

Primary Signals

Buy Signal:

- MACD line crosses above signal line below the baseline
- Close price is above EMA(200)
- RSI is between 35 and 70
- BBW_cond is FALSE

Sell Signal:

- MACD line crosses below signal line above the baseline
- Close price is below EMA(200)
- RSI is between 35 and 70
- BBW_cond is FALSE

Exit Conditions

When do we EXIT?

For Long Trades:

- RSI < 20
- Stop loss or Take profit is hit
- Stop loss = Close - sl_multiplier * ATR
- Take profit is implemented in either of two ways:
  - Take profit = Close * (1 + fraction), or Take profit = Close + tp_multiplier * ATR

For Short Trades:

- RSI > 70
- Stop loss or Take profit is hit
- Stop loss = Close + sl_multiplier * ATR
- Take profit is implemented in either of two ways:
  - Take profit = Close * (1 - fraction), or Take profit = Close - tp_multiplier * ATR

But is simply exiting trades at a good time enough?

But is simply exiting trades at a good time enough?

A wise yet greedy trader would say, NO!

So we create possible future signals for the next candle.

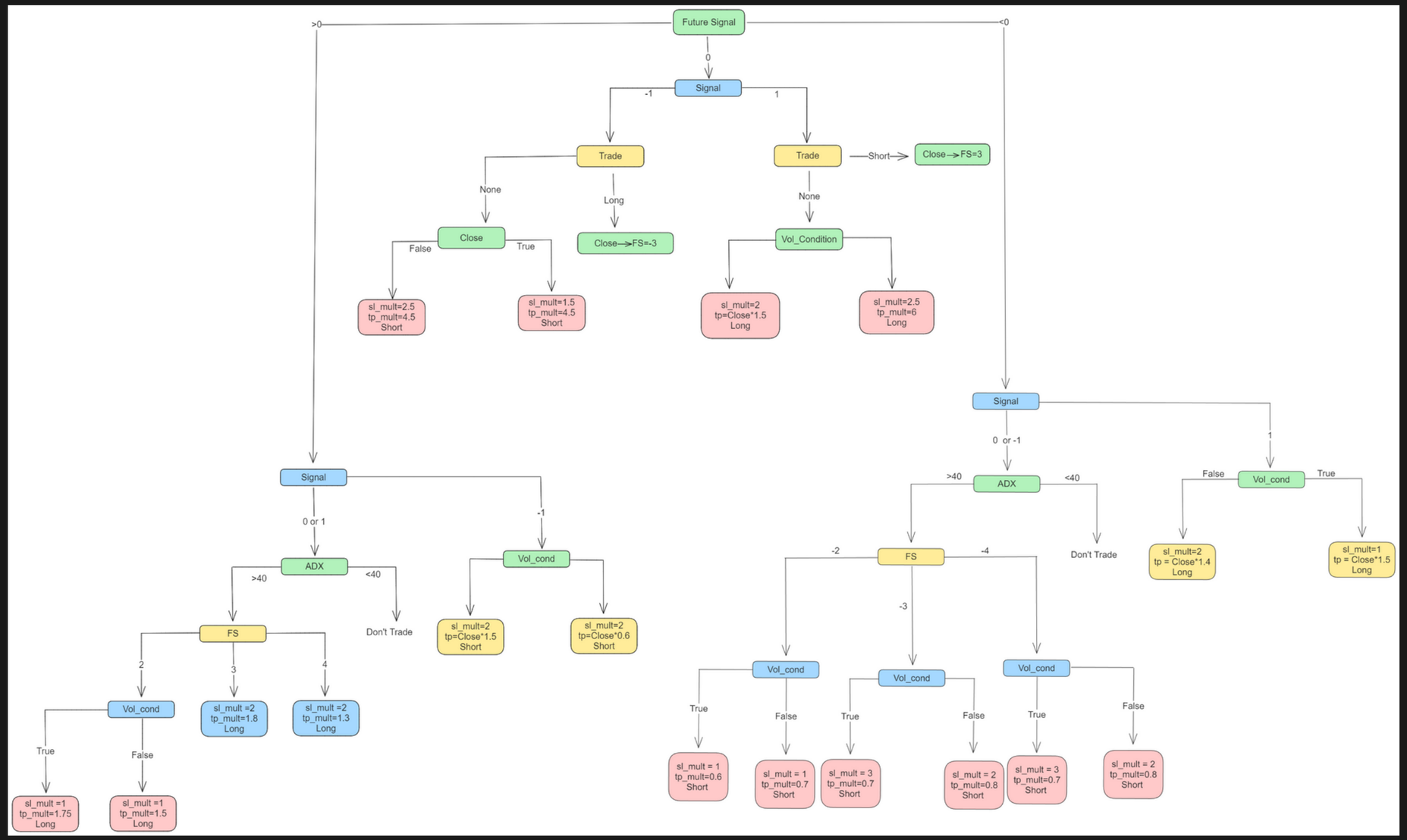
Two ways to create future signals:

1. When a primary signal is used to close a previous trade.
2. four conditions for generating a future signal and the stop-loss and take-profit:
    a. which exit condition closed the previous trade
    b. whether volume condition is true or not.
        i. Volume condition = 10-period sma (Close) > 50-period sma (close)
        ii. should be true for long future signal and false for short ones
    c. bbw condition is true
    d. adx < 35
        i. meaning the previous trend has weakened.
        ii. confirmation of trend reversal.

But since all future signals are not good, we trade only if:

- there is no primary signal in the opposite direction (if so, prioritise it) and,
- the ADX > 40, and if not then we set future signal = 0.

Flow Chart (excluding conditional exit conditions and Future signals)



FS = Future Signal

Performance Metrics:

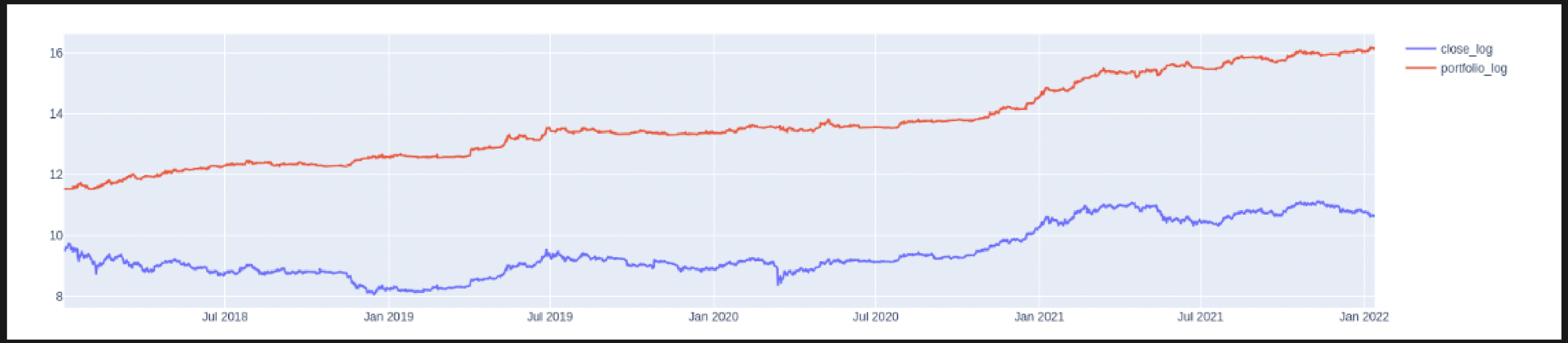
Overall Metrics

Metric	Value
Return [%]	10068.655103
Return (Ann.) [%]	**214.33091**
Sharpe Ratio	1.274289
Sortino Ratio	7.321155
Calmar Ratio	8.575679
Max. Drawdown [%]	**-24.992878**
Avg. Drawdown [%]	-2.568364
# Trades	287
Win Rate [%]	64.45993
Best Trade [%]	48.480858
Worst Trade [%]	-10.756674
Profit Factor	2.524239

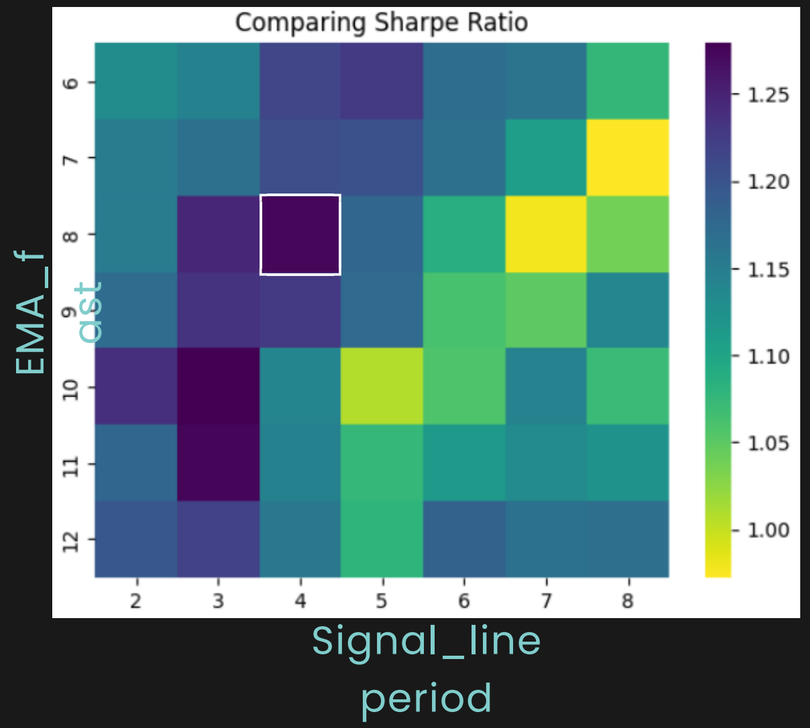
Year-By-Year Metrics

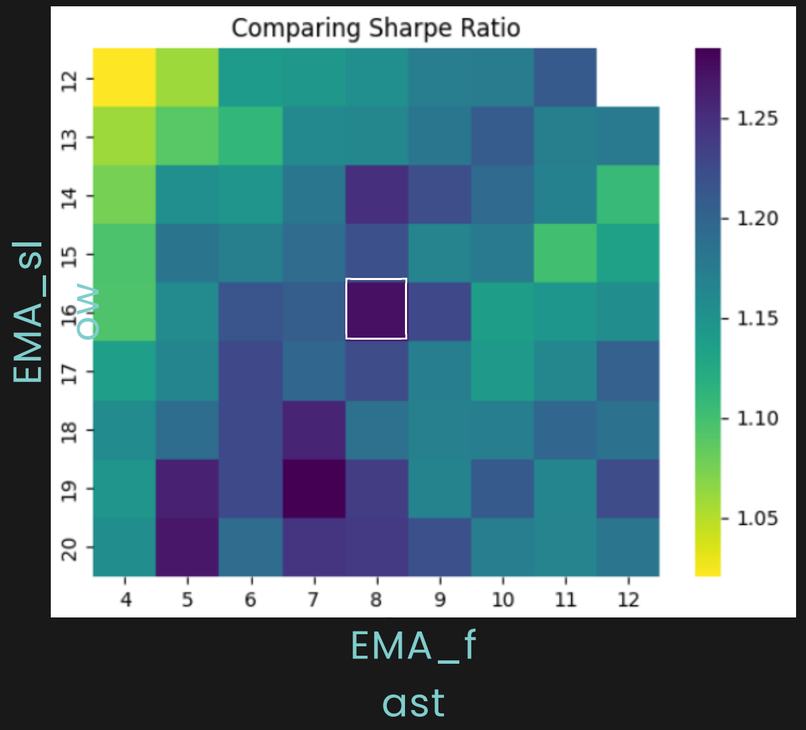
Metric	First Year	Second Year	Third Year	Fourth Year
Return [%]	193.95	103.25	324.16	216.25
Return (Ann.) [%]	189.70	101.70	319.19	212.33
Sharpe Ratio	1.26	1.04	1.51	1.37
Sortino Ratio	6.41	3.89	12.24	7.61
Calmar Ratio	9.76	4.48	13.51	9.97
Max. Drawdown [%]	-19.43	-22.70	-23.62	-21.30
Avg. Drawdown [%]	-2.70	-2.83	-1.99	-2.35
# Trades	88	72	62	65
Win Rate [%]	68.18	58.33	62.90	67.69
Best Trade [%]	21.33	48.48	45.08	46.35
Worst Trade [%]	-10.36	-10.40	-10.76	-9.78
Profit Factor	2.33	2.06	3.20	2.66

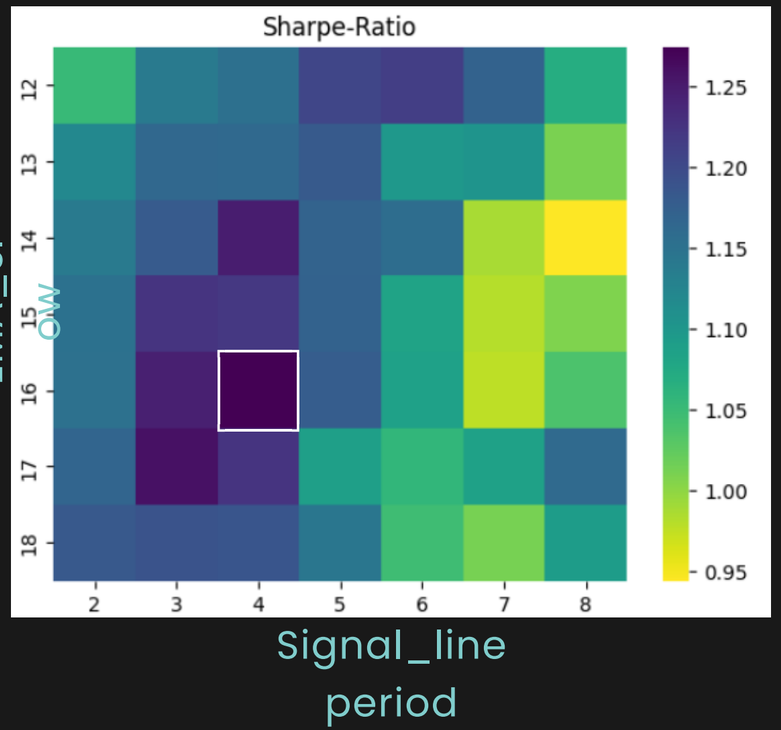
Performance Metrics:



Robustness of the strategy:

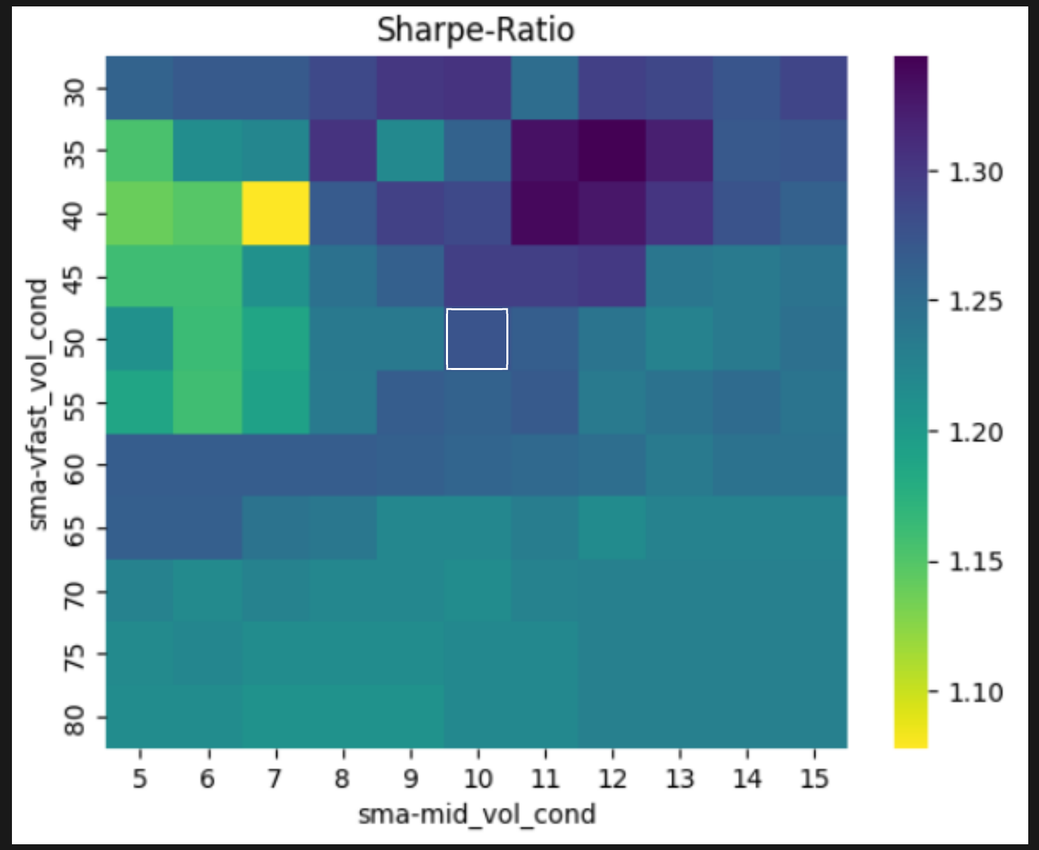


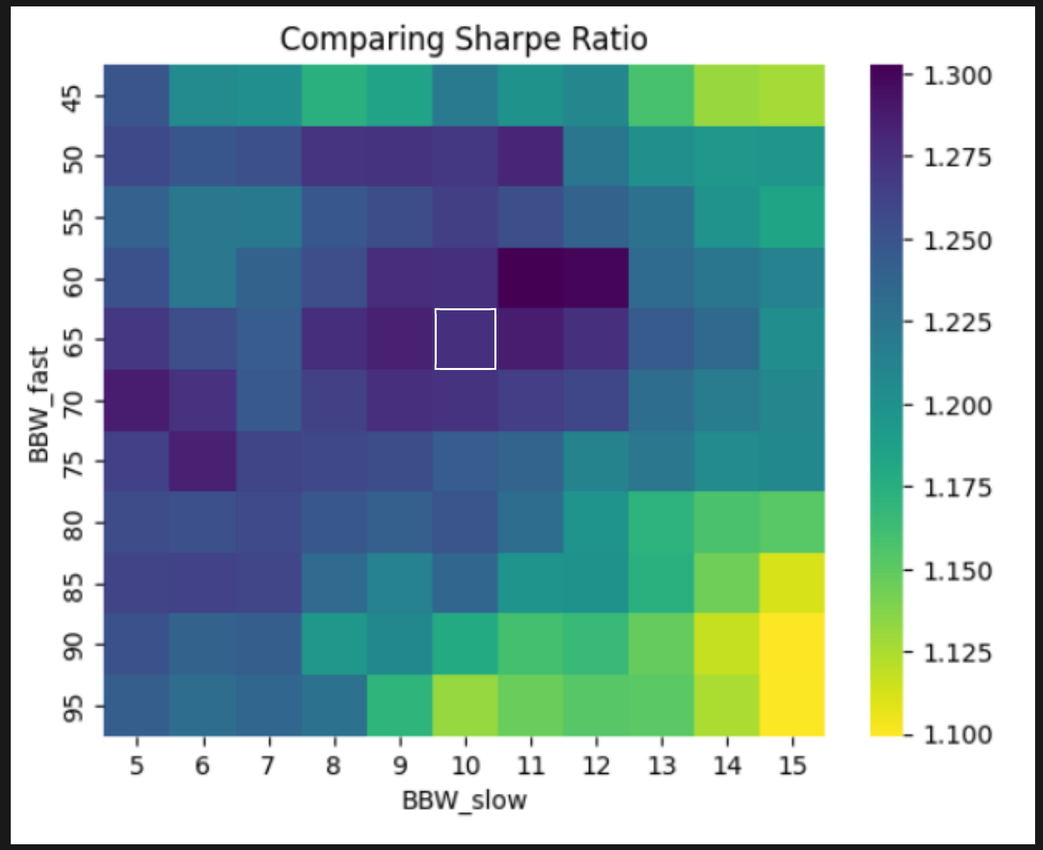




The heat maps made by varying the parameters of MACD show that the sharpe ratio fall drastically and falls in the approximate range of 0.95 and 1.3

Robustness of the strategy:





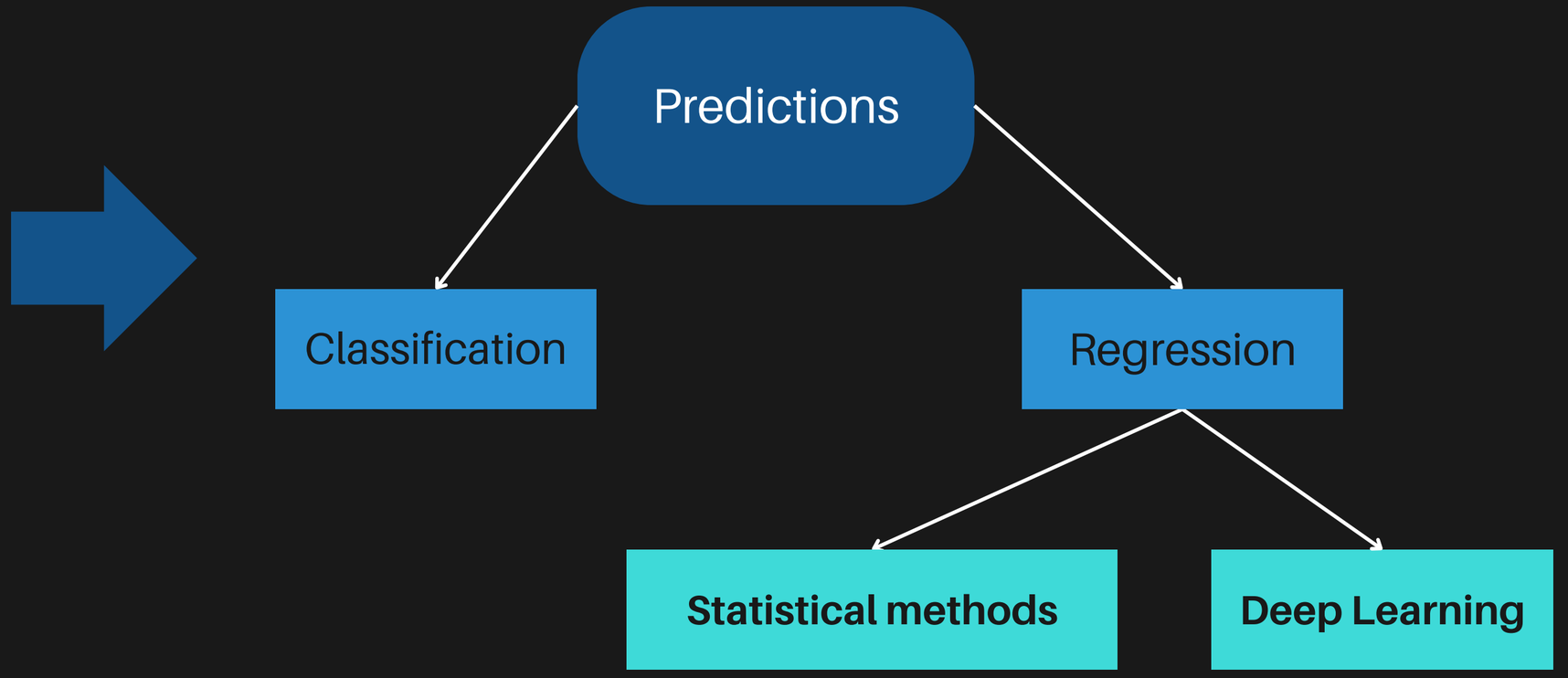
Heat maps created by varying the parameters of BBW_cond and vol_cond, we see that the sharpe ratio does not fall drastically and stays in the approximate range of 1 to 1.35

ML Based Approach

Why should we use ML?

- Extracting Underlying Hidden Patterns
- Quick Inference Time
- Integration with Traditional Models

How We used ML



CLASSIFICATION

Strategy Overview

- Utilizes a classification model to determine the relationship between SMA (window = 10) and EMA (window = 10).
- Signal generation based on the crossover of SMA and EMA.

Crossover Signals

- Long Trade Signal: EMA crossing over SMA.
- Short Trade Signal: SMA crossing over EMA

Model Performance

- XGBoost classifier achieved the best overall results, boasting an 83% accuracy on test data

Drawbacks

The ML model predictions though good and capable of producing results cannot be entirely relied upon to perform well in outsample testing due to their blackbox nature.

REGRESSION

Strategy

EMA Prediction

Used a deep learning model to predict EMA (window=10) for the next trading day.

Trading Conditions

Buy Criteria

Today's SMA (window=14) > Today's EMA (window=10). Quadratic interpolation of tomorrow's SMA (window=14) below predicted EMA.

Sell Criteria

Today's SMA (window=14) < Today's EMA (window=10). Quadratic interpolation of tomorrow's SMA (window=14) exceeds predicted EMA.

Trade Initiation

Trades executed when ADX indicator value exceeds 25.

METRICS & RESULTS

- Results were backtested on a test data of the last one year
- Initial amount : 100000
- commission = 0.1%.

Drawbacks:

- This strategy focuses solely on the signals of the ML model
- Hence, it might not give out any signals at all in some scenarios.
- Buy and hold trades might occur.
- Hence, we will fall prey to market risk and volatility.

Equity Final [$]	718804.37864
Equity Peak [$]	867720.21992
Return [%]	618.804379
Buy & Hold Return [%]	47.846698
Return (Ann.) [%	**567.05645675**
Max. Drawdown (%)	**-24.54%**
Avg. Drawdown (%)	**-2.14%**
# Trades	128.0
Win Rate (%)	50.78125
Best Trade (%)	24.339281
Worst Trade (%)	-10.966206
Avg. Trade (%)	1.651949

Thank you 

We are now open to questions