

Design and Backtest of a Market trading Strategy

So , the strategy used is **Trend following strategy**

A trend-following strategy seeks to capture gains by identifying assets that are moving in a consistent direction (uptrend or downtrend) and riding that momentum until signs of reversal appear. Instead of predicting tops or bottoms, the strategy reacts to market strength and follows the flow.

This strategy is long-only and aims to re-enter during strong uptrends and exit at take-profit or stop-loss levels.

Indicator used	Purpose
EMA 20 & EMA 50	Trend detection
MACD & MACD Signal Line	Momentum & Entry timing
ADX	Trend strength filter
ATR (Average True Range)	Volatility-based risk management

ENTRY CONDITIONS

First is when,

EMA20>EMA50 , confirms short-to-medium term uptrend

& MACD>MACD_SIGNAL, MACD crossover (MACD > signal) shows bullish momentum

& ADX > 15, filters for strong trends only

Another entry condition is used that is when,

$EMA_{20} > EMA_{50}$ ONLY ! , this will make the re-entry in the market when we are riding the uptrend its possible that after one entry we don't get to re-enter because MACD crossover is not taking place or the uptrend is not that strong so we are applying another buy signal so that we gain continuous profit in the uptrend whether its small or big.

One more buying signal that we have used is quite interesting that is ,

$Macd < macd_signal$, it might seems weird to hear but yes when checked on the stock prices this condition found to show better results than the normal crossover , MACD is a lagging indicator. Sometimes, when it gives a bullish signal ($MACD > Signal$), the best part of the move is already underway or even ending. Buying slightly before the crossover (i.e., when $MACD < Signal$ but closing the gap) can:

~Give **early entry**.

~Capture more of the trend before confirmation.

In the strategy, we're using multiple indicators:

If **$EMA(20) > EMA(50)$** and **$ADX > 15$** , we already know we're in a strong uptrend.

So even if $MACD < Signal$, the market context may still favor buying.

This becomes a filtered contrarian entry , we're buying on weakness *within strength*.

EXIT CONDITION

we are using only one selling signal when ,

$EMA_{20} < EMA_{50}$ & $MACD < MACD_SIGNAL$ which is the ideal case and we are not adding the signal when $ADX < 15$, as we do not want to wait for the downward signal to grow strong then exit the position if we suspect a decrease in prices we sell , just to avoid losses.

ATR was used to dynamically calculate stop-loss and take-profit levels

We devised the formula for stop loss and take profit as

$\text{take_profit} = \text{entry_price} + 4 * \text{atr}$

$\text{stop_loss} = \text{entry_price} - 2 * \text{atr}$

the values are taken on which we were getting better results .

AND yes the use to **talib** and **backtesting** did saved a lot of work we can compute ema , macd, macd_signal , atr directly using **talib** no need of writing the formula or defining the functions

backtesting provide platform to perform backtest directly on our strategy with interactive graph which help to analyse the strategy more easily like where to increase the trade when to prevent yourself from buying or selling.

THE STRATEGY IS MAINLY FOCUSED ON GETTING HIGHER RETURNS WHILE KEEPING YOURSELF FROM NOT GETTING INTO MAJOR LOSSES, AS WE ARE ENTRYING AND EXITING THE MARKET OFTENLY WE CAN SEE A LARGE NUMBER OF TRADES.



PERFORMANCE MATRICS

Exposure Time [%]	86.014551
Equity Final [\$]	384086.385623
Equity Peak [\$]	404027.288943
Return [%]	284.086386
Buy & Hold Return [%]	188.261522
Return (Ann.) [%]	31.540377
Volatility (Ann.) [%]	31.201496
Sharpe Ratio	1.010861
Sortino Ratio	2.148627
Calmar Ratio	1.34758
Max. Drawdown [%]	-23.405191
Avg. Drawdown [%]	-3.812948
Max. Drawdown Duration	624 days 00:00:00
Avg. Drawdown Duration	33 days 00:00:00
# Trades	129
Win Rate [%]	55.03876
Best Trade [%]	13.953067
Worst Trade [%]	-8.772305
Avg. Trade [%]	1.052008
Max. Trade Duration	96 days 00:00:00
Avg. Trade Duration	12 days 00:00:00
Expectancy [%]	1.168678
SQN	2.005214

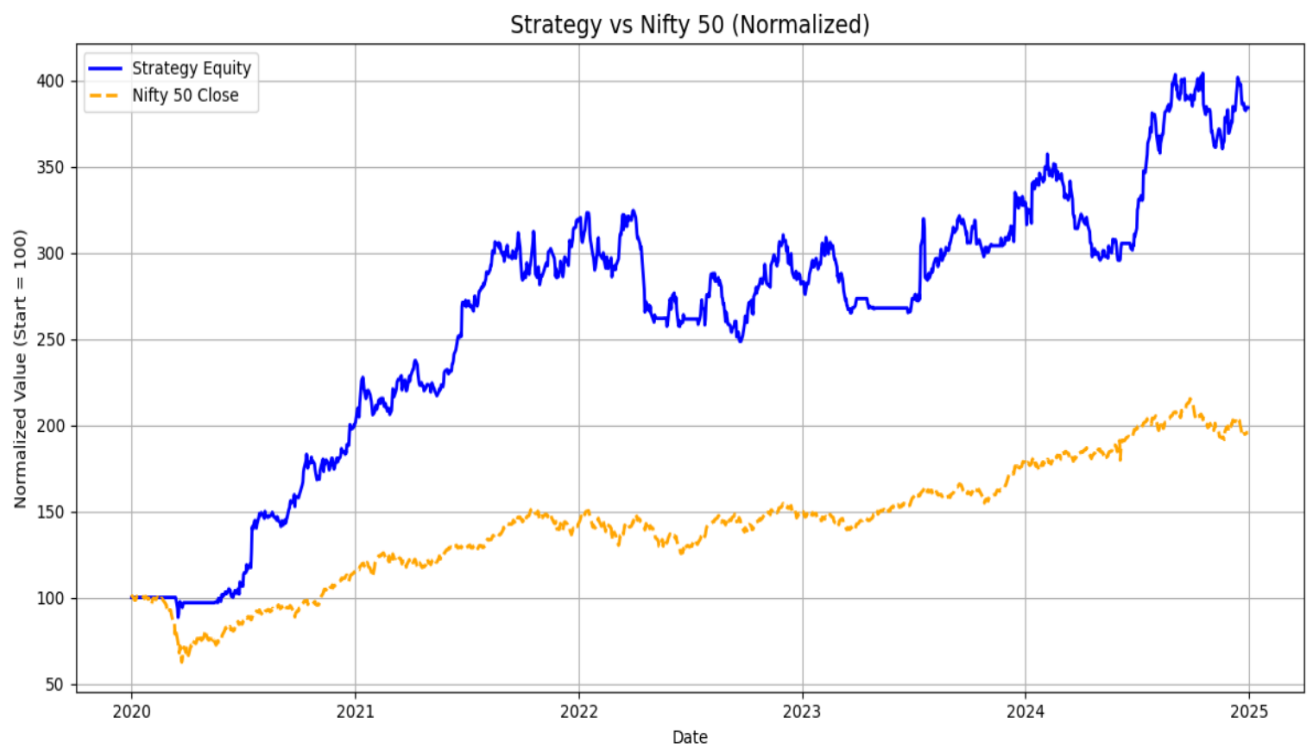
Profit Factor 1.942523

Average Profit per Winning Trade: 10375.01

Average Loss per Losing Trade: -7802.41

Maximum Profit in a Trade: 32900.98

Maximum Loss in a Trade: -26666.81



Some india-related metrics

Strategy CAGR: 30.91%

Nifty CAGR: 14.19%

Alpha (vs Nifty): 16.71%

Beta (vs Nifty): 0.46

Correlation with Nifty: 0.37

