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Project Report

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1 Strategy 1: Volume Spike Reversal Strategy

1.1 Strategy Summary

This is a volume-spike momentum reversal strategy with ATR-based trailing stops and adaptive exit logic. It aims to:

- Enter trades on volume spikes aligned with momentum (candle color),
- Exit trades based on trend weakness (losing streaks or trailing stops),
- Reverse positions when a volume spike suggests a trend flip.

1.2 Entry Logic

Conditions:

- **Volume Spike:** Current volume $>$ mean $+ 1.5 \times$ std of past `volume_lookback` bars.
- **Candle Direction:**
  - Green candle (close $>$ open) $\Rightarrow$ open a long.
  - Red candle (close $<$ open) $\Rightarrow$ open a short.
- **Trailing Stop Setup:**
  - Long: trailing_stop = close $-$ ATR $\times$ multiplier
  - Short: trailing_stop = close $+$ ATR $\times$ multiplier

1.3 Exit Logic

For Long Positions

- 3 consecutive bad closes (each close $\leq$ previous close)
- Trailing stop hit (close $<$ trailing stop)
- Reversal: red candle $+$ volume spike $\Rightarrow$ reverse to short

For Short Positions

- 3 consecutive bad closes (each close $\geq$ previous close)
- Trailing stop hit (close $>$ trailing stop)
- Reversal: green candle $+$ volume spike $\Rightarrow$ reverse to long

Trailing Stop Updates:

- Long: max(trailing_stop, close $-$ ATR $\times$ multiplier)
- Short: min(trailing_stop, close $+$ ATR $\times$ multiplier)

1.4 Tunable Parameters

Parameter	Description
atr_length	ATR period (default: 14)
trailing_stop_multiplier	Multiplier for stop distance (default: 2.0)
volume_lookback	Rolling volume window (default: 11)
num_wrong_limit	Max losing streak before exit (default: 3)

1.5 Strategy Type

Trend-reversal momentum-following strategy using:

- Volume as a trigger filter
- Candle direction as momentum confirmation
- ATR-based stop for risk control and profit lock-in
- Reversal logic for capturing flips in trend

1.6 Assessment Metrics

```
Total Trades : 86
Leverage Applied : 1
Winning Trades : 40
Losing Trades : 46
No. of Long Trades : 44
No. of Short Trades : 42
Benchmark Return(%) : 325.632937277405
Benchmark Return(on $1000) : 3256.32937277405
Win Rate : 46.51162790697674
Winning Streak : 6
Losing Streak : 6
Gross Profit : 20305.99168431206
Net Profit : 18942.731383941085
Average Profit : 220.2643184179196
Maximum Drawdown(%) : 29.911684770803838
Average Drawdown(%) : 7.323541333741218
Largest Win : 6168.855879643483
Average Win : 1196.021535426746
Largest Loss : -2627.399652979823
Average Loss : -628.2202181114945
Maximum Holding Time : 37 days 00:00:00
Average Holding Time : 11 days 18:08:22.325581395
Maximum Adverse Excursion : None
Average Adverse Excursion : None
Sharpe Ratio : 3.130301398725924
```

Figure 1: Strategy 1

2 Strategy 2: EMA + MACD Momentum Strategy

2.1 Core Idea

This is a trend-following and momentum-based strategy that enters trades based on:

- MACD crossovers (momentum signal)
- EMA filter (trend confirmation)
- Bullish/Bearish candles (price confirmation)

ATR-based trailing stops and consecutive adverse close exit logic are used for managing risk.

2.2 Entry Conditions

Long Entry

- Price > EMA (trend is up)
- MACD line crosses above signal line (bullish momentum)
- Candle is bullish (close > open)
- $\Rightarrow$ Open long position

Short Entry

- Price < EMA (trend is down)
- MACD line crosses below signal line (bearish momentum)
- Candle is bearish (close < open)
- $\Rightarrow$ Open short position

2.3 Exit Conditions

Long Position

- Price falls below EMA
- MACD bearish crossover
- Close < trailing stop
- N consecutive closes down
- $\Rightarrow$ Close long (signal = -1)

Short Position

- Price rises above EMA
- MACD bullish crossover
- Close > trailing stop
- N consecutive closes up
- ⇒ Close short (signal = 1)

2.4 Indicators Used

- EMA (e.g., 100) – trend direction filter
- MACD (6, 19, 4) – fast crossover for entry timing
- ATR (14) – dynamic stop distance

2.5 Risk Management

- **Trailing Stop:** Based on ATR × multiplier (e.g., 2.0)
- **Wrong Move Limit:** Exit after N consecutive closes against position (e.g., 2)

2.6 Assessment Metrics

```
Total Trades : 93
Leverage Applied : 1
Winning Trades : 35
Losing Trades : 58
No. of Long Trades : 55
No. of Short Trades : 38
Benchmark Return(%) : 325.632937277405
Benchmark Return(on $1000) : 3256.32937277405
Win Rate : 37.634408602150536
Winning Streak : 4
Losing Streak : 6
Gross Profit : 5764.520050286566
Net Profit : 5313.186517008937
Average Profit : 57.131037817300395
Maximum Drawdown(%) : 28.985905815374096
Average Drawdown(%) : 8.539006915006937
Largest Win : 1197.9078255092306
Average Win : 319.91824718965063
Largest Loss : -385.19165892427566
Average Loss : -101.44745059704887
Maximum Holding Time : 21 days 00:00:00
Average Holding Time : 4 days 14:42:34.838709677
Maximum Adverse Excursion : None
Average Adverse Excursion : None
Sharpe Ratio : 3.4910985259932117
Sortino Ratio : None
```

Figure 2: Strategy 2

3 Strategy 3: Volume Spike + RSI Reversal Strategy

3.1 Strategy Summary

This strategy combines:

- Volume spikes for entry/reversal triggers
- RSI for confirming momentum direction
- ATR for dynamic trailing stop-loss
- Adaptive exits based on adverse moves and trend reversals

3.2 Entry Logic

Conditions to Enter (no open position):

- Volume spike: volume $>$ average $+ 1.5 \times$ std of last `volume_lookback` bars
- Candle confirmation:
  - Green candle $\Rightarrow$ consider long
  - Red candle $\Rightarrow$ consider short
- RSI Filter:
  - Long: RSI $\geq$ `rsi_entry_threshold_long`
  - Short: RSI $\leq$ `rsi_entry_threshold_short`
- Trailing stop initialized using ATR

3.3 Exit Logic

Long Position

- Reversal: volume spike + red candle + RSI $\leq$ short threshold $\Rightarrow$ reverse to short
- 3 consecutive closes $\leq$ previous close
- Trailing stop hit
- Trailing stop updated upward only

Short Position

- Reversal: volume spike + green candle + RSI $\geq$ long threshold $\Rightarrow$ reverse to long
- 3 consecutive closes $\geq$ previous close
- Trailing stop hit
- Trailing stop updated downward only

3.4 Tunable Parameters

Parameter	Description
atr_length	ATR period for stop distance (default: 14)
trailing_stop_multiplier	ATR multiplier for stop distance (default: 2.0)
volume_lookback	Rolling volume lookback window (default: 11)
num_wrong_limit	Max adverse candles before exit (default: 3)
rsi_entry_threshold_long	RSI threshold for long entry (default: 50)
rsi_entry_threshold_short	RSI threshold for short entry (default: 50)

3.5 Strategy Type

A momentum-driven reversal system combining:

- Volume (trigger)
- Candle direction (confirmation)
- RSI (momentum gate)
- ATR (risk and stop control)

3.6 Assessment Metrics

```
Total Trades : 54
Leverage Applied : 1
Winning Trades : 26
Losing Trades : 28
No. of Long Trades : 27
No. of Short Trades : 27
Benchmark Return(%) : 325.632937277405
Benchmark Return(on $1000) : 3256.32937277405
Win Rate : 48.148148148148145
Winning Streak : 6
Losing Streak : 5
Gross Profit : 14433.50584934075
Net Profit : 13655.389914469557
Average Profit : 252.8775910086955
Maximum Drawdown(%) : 32.23447611822988
Average Drawdown(%) : 9.001221746033806
Largest Win : 4773.17201097172
Average Win : 1244.6333611598063
Largest Loss : -2032.958903550343
Average Loss : -668.0384812744788
Maximum Holding Time : 45 days 00:00:00
Average Holding Time : 15 days 03:33:20
Maximum Adverse Excursion : None
Average Adverse Excursion : None
Sharpe Ratio : 4.430993607360364
Sortino Ratio : None
```

Figure 3: Strategy 3

tableStrategy Comparison Table (Ordered by Sharpe Ratio)

Metric	**Strategy 1 (Sharpe 3.13)**	**Strategy 2 (Sharpe 3.49)**	**Strategy 3 (Sharpe 4.43)**
Total Trades	86	93	54
Leverage Applied	1	1	1
Winning Trades	40	35	26
Losing Trades	46	58	28
Long Trades	44	55	27
Short Trades	42	38	27
Benchmark Return (%)	325.63	325.63	325.63
Benchmark Return ($1000)	3256.33	3256.33	3256.33
Win Rate (%)	46.51	37.63	48.15
Winning Streak	6	4	6
Losing Streak	6	6	5
Gross Profit	20305.99	5764.52	14433.51
Net Profit	18942.73	5313.19	13655.39
Average Profit	220.26	57.13	252.88
Max Drawdown (%)	29.91	28.99	32.23
Avg Drawdown (%)	7.32	8.54	9.00
Largest Win	6168.86	1197.91	4773.17
Average Win	1196.02	319.92	1244.63
Largest Loss	-2627.40	-385.19	-2032.96
Average Loss	-628.22	-101.45	-668.03
Max Holding Time	37 days	21 days	45 days
Avg Holding Time	11d 18h	4d 14h	15d 3h
Sharpe Ratio	3.13	3.49	4.43
Sortino Ratio	None	None	None