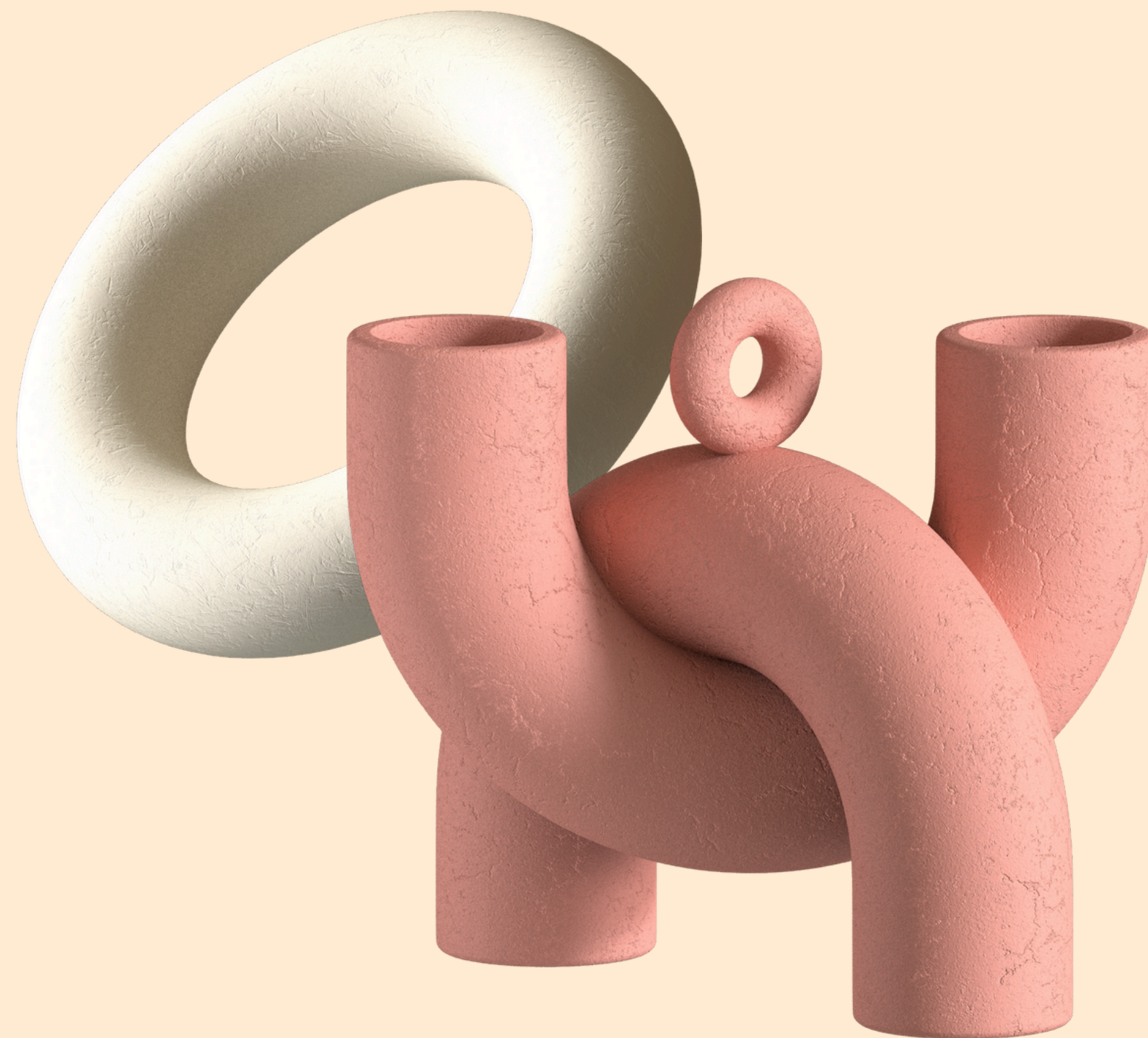# ALGO ALCHEMIST

SHUBH GARG

INTRODUCTION

In the dynamic world of cryptocurrency trading, crafting a profitable strategy requires careful consideration of technical indicators and risk management techniques. This report explores the backtesting results of a strategy combining the Supertrend and Double Exponential Moving Average (DEMA) indicators for ETH/USD trading.

Choosing the Right Indicators

Supertrend: This trend-following indicator leverages Average True Range (ATR) to generate buy/sell signals based on price and volatility. Its simplicity and responsiveness to trends make it suitable for capturing profitable opportunities.
DEMA: Unlike traditional moving averages, DEMA employs a double smoothing technique to react more swiftly to changing market trends. This allows for quicker entry points compared to standard moving averages.

Why Combine Supertrend and DEMA?

While both indicators offer valuable insights, they have limitations:
- Supertrend: It can generate excessive buy/sell signals during sideways markets, leading to unnecessary trades and potential losses.
- DEMA: Its responsiveness can result in false signals during volatile periods.
- Combining these indicators addresses these limitations. Supertrend's trend-following nature is complemented by DEMA's confirmation of price direction, potentially reducing false signals.

Implementation and Logic

Data Acquisition

: Historical price data for ETH/USD is downloaded using yfinance.

Indicator Calculation:

Supertrend is calculated with a period of 7 and multiplier of 3.
DEMA is calculated for two periods (20 and 50 days) to identify short-term and long-term trends.

Signal Generation:

- Buy signals occur when:
Supertrend indicates an uptrend (price closes below the Supertrend line).
Price is above the 20-day DEMA, confirming the uptrend.
- Sell signals occur when:
Price falls below the Supertrend line and the 50-day DEMA, suggesting a trend reversal.
Risk Management

Stop-Loss: A stop-loss is implemented to limit potential losses. It's based on ATR, automatically exiting the position if the price falls below a certain threshold (e.g., 2% below the entry price).
Backtesting Results

Backtesting Results

The following metrics evaluate the strategy's performance for the period 2021-01-01 to 2023-12-31:

- Gross Profit: $15.11
- Net Profit: $9.91 (after accounting for transaction costs)
- Total Closed Trades: 376
- Win Rate: 49%
- Max Drawdown: -63% (maximum peak-to-trough decline in equity)
- Gross Loss: -$5.20
- Average Winning Trade: $0.03
- Average Losing Trade: -$0.01
- Buy and Hold Return: 114% (return for simply holding ETH/USD)
- Sharpe Ratio: 4.81 (measures risk-adjusted return)
- Sortino Ratio: 27.66 (similar to Sharpe Ratio, but focuses on downside risk)
- Average Holding Duration: 0.34 days (average time a position is held)

The strategy achieved positive net profit despite a relatively low win rate. This suggests the strategy captured some large winning trades that outweighed the smaller losing trades. The Sharpe and Sortino ratios indicate good risk-adjusted returns, particularly considering the high volatility of the cryptocurrency market. However, the significant maximum drawdown highlights the potential for substantial losses during volatile periods.

Conclusion

This backtested DEMA + Supertrend strategy demonstrates potential for profitability in the ETH/USD market. However, it's important to acknowledge limitations:

Backtesting results may not reflect future performance.
The strategy is still under development and could benefit from further optimization.
Future improvements could include:

Adding a confirmation filter to further validate buy signals generated by Supertrend.
Optimizing indicator parameters (Supertrend period, multiplier, DEMA lengths) to potentially improve performance.
Incorporating additional indicators to capture other market dynamics.
By continuously testing, refining, and adapting the strategy, traders can potentially navigate the ever-changing cryptocurrency market with greater confidence.