📈 Fractal-VTSI Volatility Strategy: Backtest, Analytics, and Visualization

A Python-based backtesting framework combining Fractal-based signals with a custom Volatility Triggered Strategy Index (VTSI) to identify profitable trade opportunities in Indian stock markets.

- by N.B.CHESAN

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🧠 Project Overview

Adaptive Trend-Following

Combines Price Action (Fractals) and Volatility Shifts (VTSI) for high-probability entries.

Strategy Application

Applied to handpicked NSE stocks (2020-2024) and evaluated with key performance metrics.

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🚀 Features

Fractal Detection

Identifies bullish and bearish fractals.

VTSI Computation

Calculates and filters Volatility Triggered Strategy Index.

Performance Metrics

Generates Return, Volatility, and Sharpe Ratio.

Automated Export

Exports metrics to Google Sheets and CSVs.

Power BI Dashboard

Interactive analysis and visualization.

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📌 Strategy Explanation

Fractal Detection

Identifies local bottoms (bullish) for long signals and local tops (bearish) for short signals on price charts.

VTSI (Volatility Triggered Strategy Index)

A custom index that confirms strong directional momentum based on price volatility and trend acceleration, filtering out noise.

Entry Conditions

Trades are initiated when a bullish fractal appears AND the VTSI crosses either the +0.7 or +0.6 threshold, indicating strong upward momentum.

Exit Conditions

Positions are closed when a bearish fractal appears OR if a trade is already open. All trades are initiated at the same day's closing price.

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📊 Target Stocks

NSE-listed equities selected for backtesting based on consistent volatility and trend reversals.

🔸 VTSI > 0.7 Threshold

- ADANIENT.NS
- ADANIPOWER.NS
- HINDALCO.NS
- M&M.NS

🔸 VTSI > 0.6 Threshold

- JSWSTEEL.NS
- TATAMOTORS.NS
- RELIANCE.NS

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📈 Result Metrics

Total Return	Net return over 4 years	**154 %**
Annualized Return (%)	CAGR-style growth rate	**26%**
Annualized Volatility (%)	Risk (std dev of daily returns)	**16.38%**
Sharpe Ratio	Risk-adjusted return	**1.615**

Metrics are uploaded to a **Google Sheet** for visualization.

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📁 Output & File Handling

Generated Data Files

The system automatically produces detailed CSVs for trade entries (fractal_signals_.csv) and overall performance metrics (summary_metrics.csv).

Sample Data Access

A sanitized sample of daily backtest results is readily available for review on our **GitHub repository**.

Comprehensive Download

For convenience, all seven generated CSV files can be downloaded together in a single archive: **Fractal-VTSI-CSVs.zip**.

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Power BI Dashboard

This interactive report summarizes the Fractal-VTSI strategy, providing comprehensive insights into stock trends, portfolio value, and identified trade opportunities.

Stock Price Trends

Visualize historical stock performance from 2020 to 2023, observing key market movements.

Portfolio Growth

Track the cumulative value of all executed trades, showcasing overall portfolio expansion.

Key Performance Metrics

Access crucial metrics including total portfolio value and a breakdown of long and short trade counts.

Dynamic Filtering

Utilize interactive controls to focus on specific stocks, enabling in-depth individual analysis.

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Overall Observations

Strong Risk-Adjusted Returns

Strategy shows strong returns on high-momentum stocks.

Trend Continuation Profits

Most profits from phases where fractal and volatility triggers align.

VTSI Threshold Impact

Lower thresholds (0.6) offer more signals; higher (0.7) favor quality.

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📌 Key Takeaways

Average Return

154% - With an Annualized Return rate of **26%**.

Top Performer

M&M.NS delivered the highest final portfolio return.

Safest Bet

JSWSTEEL.NS recorded the highest Sharpe Ratio.

Most Stable

ADANIPOWER exhibited the lowest volatility.

Most Active

TATAMOTORS.NS generated the highest number of trade signals.

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