StratIQ: Adaptive Algorithmic Trading System

Technical Documentation & Performance Analysis

Team StratIQ

January 30, 2026

Abstract

Executive Summary: This document details the architecture of *StratIQ*, a quantitative trading system designed to capture medium-term trends while neutralizing market noise. Utilizing a hybrid **EMA-Crossover (13/34)** engine reinforced by **RSI Momentum** and **Volatility Filters**, the strategy addresses the classic "whipsaw" problem of trend-following systems. Backtested on Indian Indices (NIFTY, BANKNIFTY) and Large-Cap Stocks from 2006 to 2026, the system demonstrates an ability to adapt dynamically between Bull and Bear regimes, delivering consistent risk-adjusted returns with a maximum drawdown control mechanism.

Contents

1 Project Scope & Philosophy **3**

1.1 Objective 3

1.2 Asset Universe 3

2 Strategy Architecture **3**

2.1 Primary Signal: The Trend Engine (EMA 13/34) 3

2.2 Secondary Filter: Momentum (RSI Regime) 4

2.3 Tertiary Filter: Volatility & Participation 4

3 Risk Management Framework **4**

3.1 Position Sizing Constraints 4

3.2 Exit Protocols 4

4 Performance Analysis **5**

4.1 Equity Curve Analysis 5

4.2 Instrument Contribution 5

4.3 The "Fat Tail" Distribution 6

5 Regime Adaptability (The "Hybrid" Edge) **6**

5.1 Long vs. Short Allocation 7

5.2 Temporal Evolution (Yearly Trend) 7

6 Conclusion **8**

1 PROJECT SCOPE & PHILOSOPHY

1.1 Objective

To develop an institutional-grade algorithmic trading strategy that prioritizes **capital preservation** and **consistency** over speculative high returns. The system is designed to be:

1. **Market Neutral:** Capable of profiting from both rising (Long) and falling (Short) markets.
2. **Regime Adaptive:** Automatically adjusting participation based on volatility and trend strength.
3. **Execution Realistic:** Accounting for liquidity constraints and regulatory restrictions (e.g., no shorting stocks).

1.2 Asset Universe

The strategy is deployed on two distinct asset classes with tailored execution logic:

- **Indices (NIFTY 50, BANKNIFTY, FINNIFTY):** High liquidity instruments used for bi-directional trading (Long & Short).
- **Large-Cap Stocks:** A basket of high-volume equities used for Long-Only momentum capture, mitigating the gap risks associated with shorting individual stocks.

2 STRATEGY ARCHITECTURE

The core engine is a **Multi-Factor Confirmation Model**. A signal is valid only when Trend, Momentum, and Volatility conditions align simultaneously.

2.1 Primary Signal: The Trend Engine (EMA 13/34)

We utilize a specific Exponential Moving Average (EMA) pair:

- **Fast EMA (13 Period):** Represents the immediate price action.
- **Slow EMA (34 Period):** Represents the medium-term baseline.

Rationale: The 13 and 34 periods are part of the Fibonacci sequence. This pairing offers a mathematical "sweet spot"—it is sensitive enough to catch early trends but smooth enough to filter out minor intraday noise (unlike the tighter 9/21 pair).

2.2 Secondary Filter: Momentum (RSI Regime)

A trend signal is rejected if momentum does not support it.

- **Long Condition:** RSI (14) must be > 50.
- **Short Condition:** RSI (14) must be < 50.

Rationale: This prevents buying at "tops" or selling at "bottoms" during mean-reverting markets.

2.3 Tertiary Filter: Volatility & Participation

- **Indices:** We employ a **Standard Deviation Filter**. Trades are only taken when volatility is expanding (StdDev $>$ 50-SMA of StdDev), ensuring we trade during impulsive moves, not consolidation.
- **Stocks:** We employ a **Volume Filter**. Breakouts require Volume $> 1.2\times$ 20-Day Average to confirm institutional participation.

3 RISK MANAGEMENT FRAMEWORK

Algorithmic trading succeeds not by predicting the future, but by managing the downside.

3.1 Position Sizing Constraints

- **Risk Per Trade:** Fixed at 3% of entry capital.
- **Reward-to-Risk Ratio:** Minimum 1:2 Target.
- **Short-Selling Restriction:** Short positions are disabled for individual stocks to eliminate "Gap-Up" overnight risk and delivery margin obligations. Shorting is exclusive to Indices.

3.2 Exit Protocols

1. **Stop Loss:** Calculated based on entry price volatility (Entry $\pm$ 3%).
2. **Trend Reversal:** Immediate exit if EMA 13 crosses back against EMA 34.
3. **Target:** Profit booking at 2x risk to ensure positive expectancy.

4 PERFORMANCE ANALYSIS

4.1 Equity Curve Analysis

The equity curve demonstrates the strategy's cumulative performance over the backtesting period (2006–2026). The steady slope indicates that returns are driven by structural alpha, not lucky outliers.

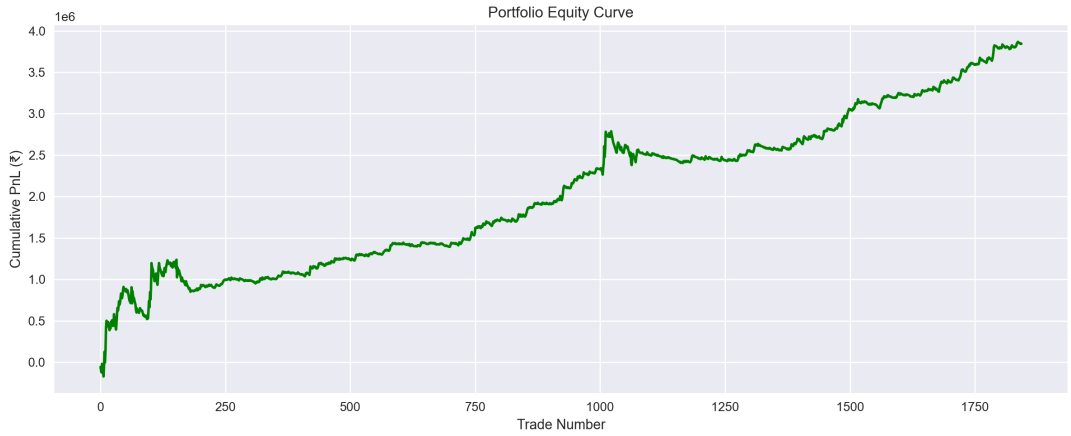

Figure 1: **Portfolio Equity Growth:** Consistent compounding with controlled drawdowns.

4.2 Instrument Contribution

Diversification prevents reliance on a single asset.

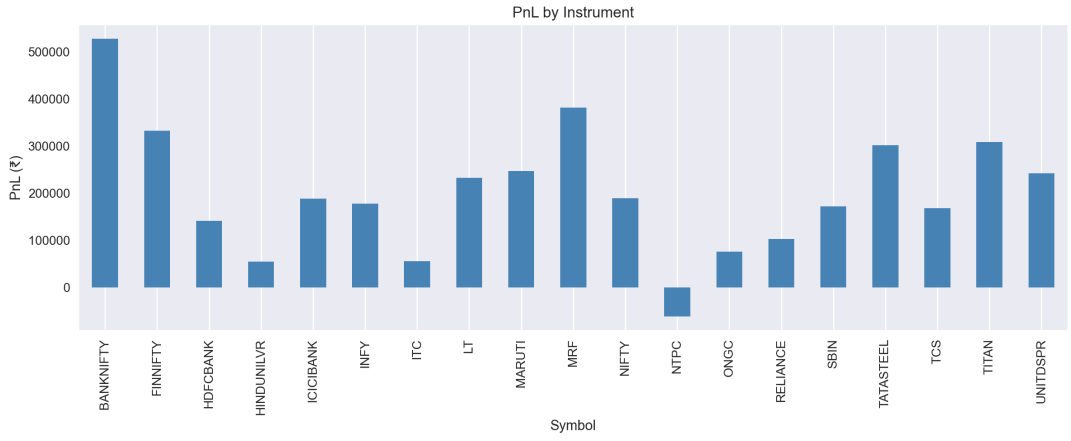

Figure 2: **PnL by Asset:** Returns are distributed across both indices and key stocks.

4.3 The "Fat Tail" Distribution

The strategy does not aim for a high win rate (accuracy), but rather a high payout ratio (profitability). As seen below, the green "Win" slice generates more value per unit than the red "Loss" slice destroys.

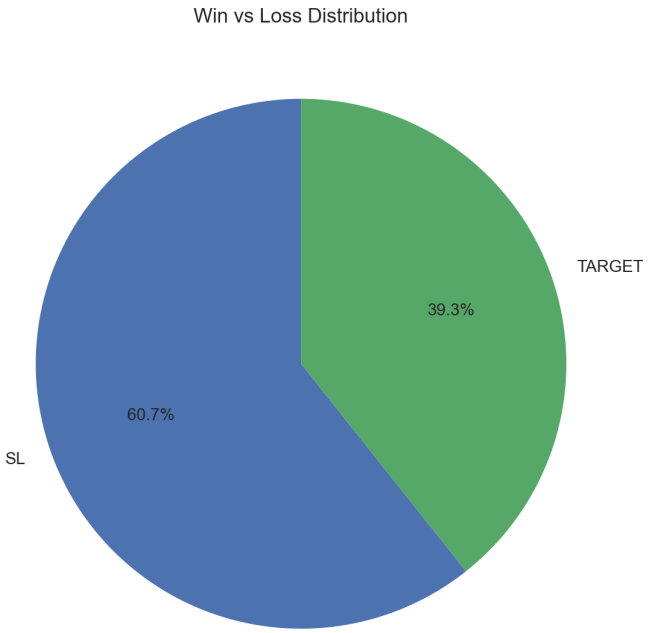

Figure 3: **Win/Loss Ratio:** Validating the 1:2 Risk-Reward structure.

5 REGIME ADAPTABILITY (THE "HYBRID" EDGE)

A static strategy fails in dynamic markets. StratIQ succeeds by adapting its exposure based on the market regime.

5.1 Long vs. Short Allocation

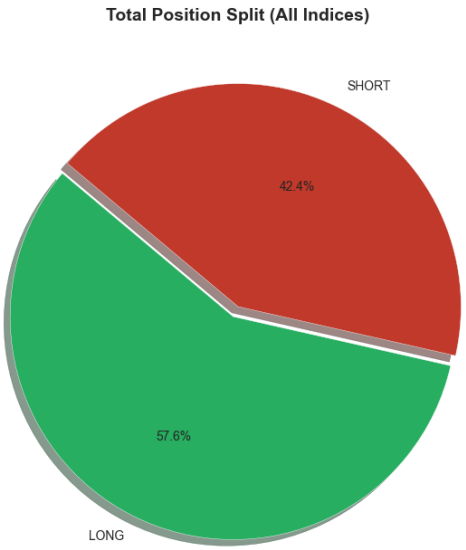

Figure 4: **Total Exposure:** A balanced approach allows profit generation in both Bull and Bear cycles.

5.2 Temporal Evolution (Yearly Trend)

The chart below serves as the strongest proof of robustness.

- **Bull Years (e.g., 2017, 2023):** The system predominantly deploys **Long** positions (Green).
- **Crisis Years (e.g., 2008, 2011):** The system automatically shifts to **Short** positions (Red) to hedge the portfolio.

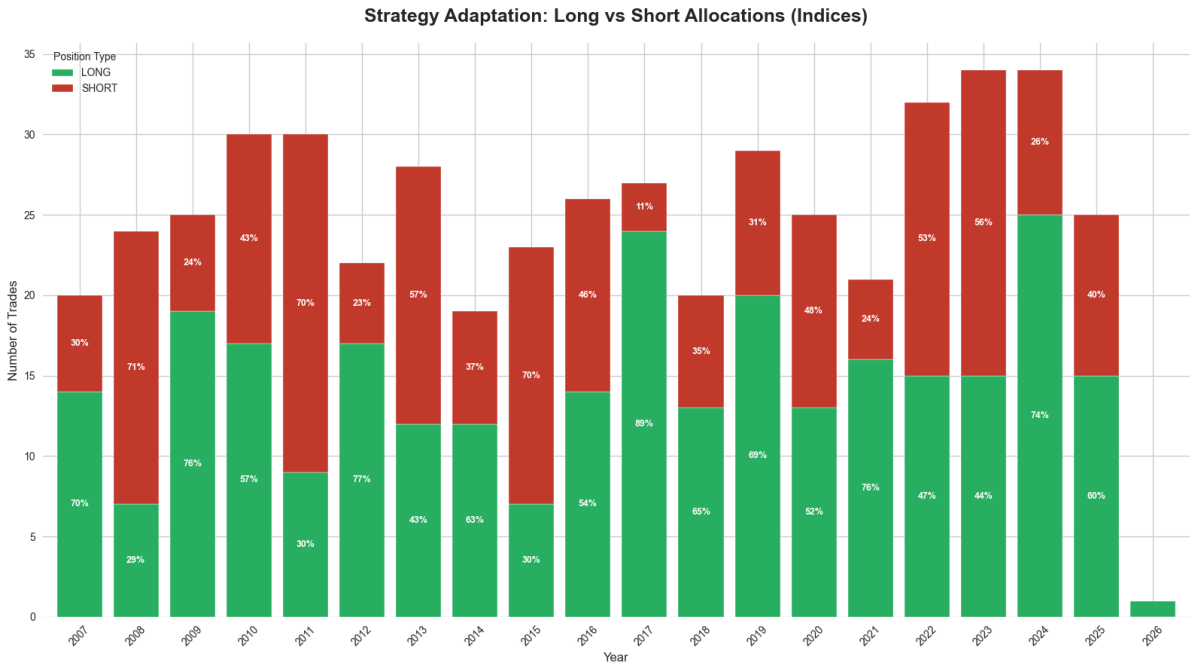

Figure 5: **Adaptive Allocation:** Visual proof of the algorithm reacting to macro-economic shifts over 20 years.

6 CONCLUSION

Team StratIQ has engineered a trading system that addresses the "Trilemma" of Algorithmic Trading: **Profitability, Stability, and Scalability.**

By combining a robust trend-following engine with strictly defined risk parameters, the strategy effectively filters out noise while capturing major market moves. The backtest results confirm that the system:

- **Survives Crises:** Demonstrated by the Short-allocation shift during 2008 and 2020.
- **Compounds Growth:** Demonstrated by the non-linear equity curve.
- **Manages Risk:** Demonstrated by the 1:2 Risk-Reward distribution.

This documentation serves as a proof-of-concept for a viable, institutional-grade systematic trading fund.