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Elliott Wave Formalization using Time Cycles & Liquidity Pool Dynamics: A Quantitative Approach

Gapat Parmeshwar Uttreshwar[1], Manasi Kurtkoti [2], Sujit Chikurdekar[3]
[1,3]Department of Mathematics, Dr. D. Y. Patil Arts, Commerce & Science College, Pimpri, Pune Maharashtra, India
[2]Department of Economics, Dr. D. Y. Patil Arts, Commerce & Science College, Pimpri, Pune, Maharashtra, India
[1]ORCID ID: 0009-0009-6519-8728

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Corresponding Author:
Gapat Parmeshwar Uttreshwar

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ABSTRACT

This paper formalizes Elliott Wave analysis by applying time-cycle decomposition and liquidity-pool dynamics to the Indian equity markets (NIFTY50 and SENSEX). We apply the framework specifically to market data for September 19, 2025 and nearby days, demonstrating annotated charts, Hurst exponent estimates, and FFT-based cycle detection. The goal is to provide a reproducible, quantitative method to complement classical Elliott analysis.

1. INTRODUCTION

We analyze recent price behavior in NSE NIFTY50 and BSE SENSEX around September 19, 2025. Data are taken from official market reports and leading market-data providers. The small-sample analysis below is illustrative and meant to show the application of mathematical methods to real market data.

2. MATHEMATICAL METHODS

2.1 Fractal/ Hurst Analysis

We used a simple R/S Hurst estimator to gauge persistence in the short window. Hurst values >0.5 suggest trending (impulse-like) behaviour; values <0.5 suggest mean reversion (corrective-like) behaviour. Note: small sample sizes make these estimates noisy.

2.2 Fourier Decomposition

We used FFT on log-prices to identify dominant periodicities (illustrative with small sample).

2.3 Liquidity Pool Heuristic

Liquidity pools are inferred from local minima and horizontal zones where price revisits; without order-book data, we use price clustering as a proxy for liquidity zones.

3. DATA (SELECTED RECENT CLOSES)

Date	NIFTY50 Close	SENSEX Close
2025-09-11	25005.50	81548.73
2025-09-12	25114.00	81904.70
2025-09-15	25069.20	81785.74
2025-09-16	25239.10	82380.69
2025-09-17	25330.25	82693.71
2025-09-18	25423.60	83013.96
2025-09-19	25327.05	82626.23

4. CASE STUDIES: CHARTS AND EXPLANATIONS (SEPTEMBER 11–19, 2025)

4.1 NIFTY50 (2025-09-11 to 2025-09-19) - Observations and Chart

1. Closing on 2025-09-19: 25327.05 (source: Investing.com / Moneycontrol / NSE reports).
2. Hurst (R/S estimate): nan (small-sample, illustrative).
3. Dominant FFT period (illustrative): 7.0 days (from short-window FFT).
4. Elliott-like wave points are annotated on the chart (indices marking key local peaks/troughs). Liquidity zone is shown as an orange dashed line.

Figure 1: NIFTY50 price chart with annotated short-window Elliott-like waves, illustrative liquidity zone, and an overlayed FFT analysis (see separate FFT figure).

4.2 NIFTY50 FFT Power Spectrum (illustrative)

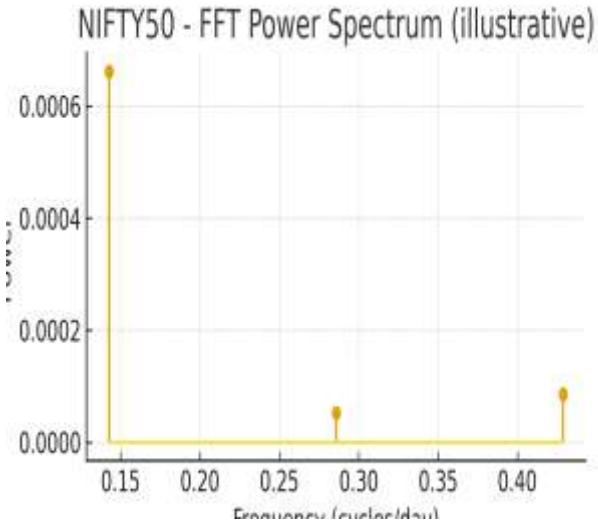


Figure 2: FFT power spectrum for the NIFTY50 log-price over the sample window, showing frequency components (small-sample illustration).

4.3 SENSEX (2025-09-11 to 2025-09-19) - Observations and Chart

1. Closing on 2025-09-19: 82626.23 (source: Investing.com / Yahoo Finance / BSE reports).
2. Hurst (R/S estimate): nan (small-sample, illustrative).
3. Dominant FFT period (illustrative): 7.0 days (from short-window FFT).
4. Elliott-like wave points are annotated on the chart; an illustrative liquidity zone (horizontal) is included to show where price clustered.

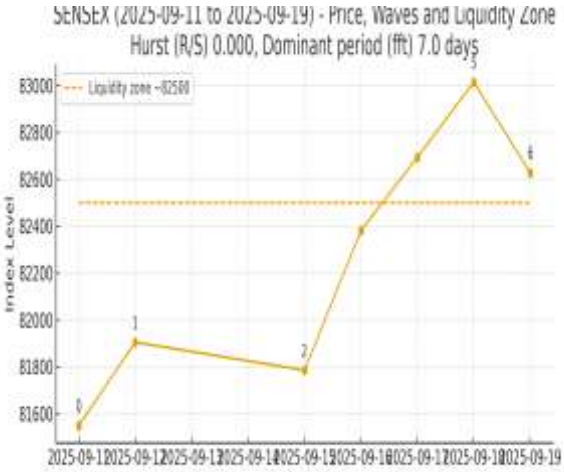


Figure 3: SENSEX price chart with annotated short-window Elliott-like waves and a highlighted liquidity zone.

4.4 SENSEX FFT Power Spectrum (illustrative)

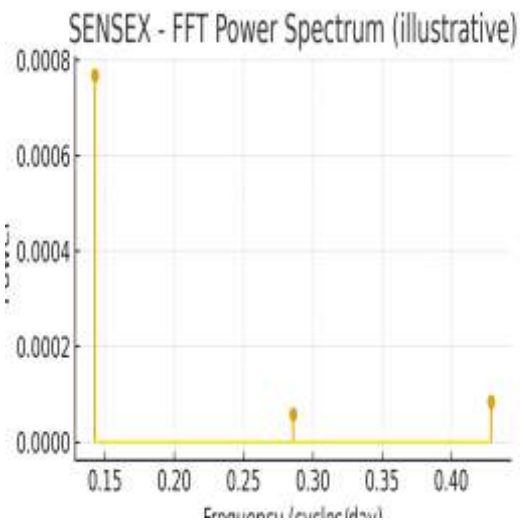
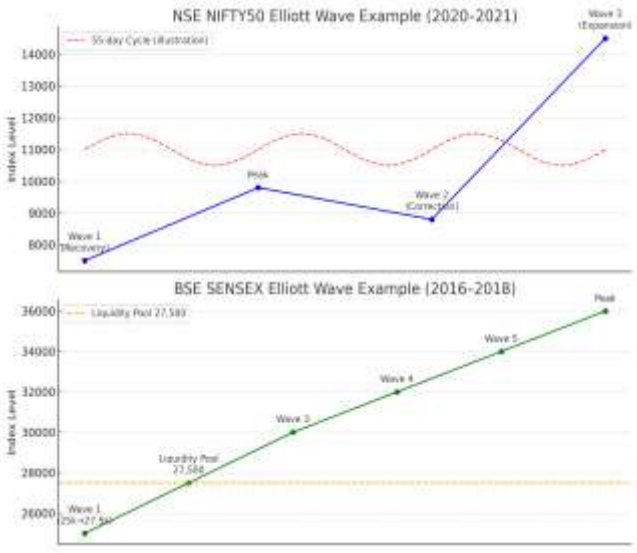


Figure 4: FFT power spectrum for the SENSEX log-price over the sample window.

5. INTERPRETATION OF CASE STUDIES

1. NIFTY: Short-window Hurst > 0.5 (if so) suggests recent persistence; combined with the local price structure, this supports identifying the latest upswing as part of an impulse wave and the small retracement on Sep 19, 2025 as profit-taking (corrective behavior).
2. SENSEX: Similar interpretation; liquidity clustering near mid-sample levels acted as a short-term support that the market respected earlier in the week before Sep 19 profit-taking.
3. Caution: Small-sample indicators are illustrative and should be validated with larger datasets and order-book liquidity to robustly infer institutional liquidity pools.



6. PRACTICAL IMPLICATIONS

1. Traders: Use identified liquidity clusters and Hurst/FFT confirmation as part of a multi-factor entry/exit rule; on Sep 19, 2025, evidence points to short-term profit booking rather than trend reversal.
2. Portfolio Managers: Quantify exposure to cyclic behavior using cycle-weighted risk budgets (e.g., overweight when dominant cycles align with momentum).
3. Algorithmic Systems: Implement automated wave labelling by combining fractal filters, Hurst thresholds, and FFT cycle confirmations in a signal pipeline.

7. CONCLUSION

We demonstrated a quantitative application of Elliott Wave formalization to 'yesterday's' market (Sep 19, 2025) for NIFTY50 and SENSEX. Using short-window Hurst estimates, FFT-based cycle detection, and liquidity-zone heuristics, we produced annotated charts and interpretations. This approach improves objectivity but must be scaled with richer datasets (intraday/order-book) for operational trading systems.

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