



Profitability Without Complexity: A Breakout And Pullback Scalping Strategy For Nifty Bank Options.

Yashraj Giria, Gurunath Gagan Machhale*

Student, Assistant professor

Department of computer science and Engineering

Sanjay Ghodawat University, Kolhapur, India

Abstract: This work presents you the simplest yet robust scalping strategy designed for Bank nifty option buying leveraging price action along with VWAP confirmation and the volume OI filers to overcome the problems of complex mathematical based models. By focusing on 15-second timeframes this strategy mixes pullback and breakout scalping with strict risk management (1% capital per trade and 1:2 risk-reward). Backtested on 53 trades in different volatility regimes (low IV <15% to high IV >30%) it seeks 65% accuracy and also avoided the pitfalls of overfitting. The key innovations over here include the dynamic gap rule for VWAP reliability and the real-time filters of the liquidity (bid-ask less than 0.1%). This research illustrates the disciplined executions limited to around 10 high quality trades on a single trading day with optimal type window during the 9:45 to 11:30 outperforms the traditional overtrading approaches. Results do validate Paul Tudor Jones' (legendary hedge fund manager) philosophy which is "Simplicity in trend following yields consistent profits".

Keywords: Bank nifty, scalping, option trading.

Novelty Statement: Focusing on pullback and breakout scalping for faster gains with low research in bank nifty where volatility is a good friend of scalping.

I.INTRODUCTION:

Recent studies show that there lies a critical gap in the quantitative finance whereas the machine learning models achieve around 68% of accuracy of backtest accuracy in trading, whereas their real-world implementation fails due to execution latency which exceeds 15-second scalping windows and overfitting due to historical volatility patterns [1-5]. This is the main reason why we want to define clear and realistic approach in the research which helps the retail traders out there to adapt to a particular mindset and select a relevant genuine path for option buying[5-10].

OTM call and the ITM put volumes predict the price movements of next 15-30 seconds [11]. liquidity traps during the opening and closing of bells[12-14]. This validates our volume-OI filters and the time-avoidance set of rules [15]. The stock market remains a lengthy game with some set of rules to be

fundamentally established in a trader's mind during trading[16-19]. Scalping strategies come there to help us which are short can be done with lesser analysis compared to decisions which come out of those complex models[19-24]. Scalping are of various types but here in this work we prioritize only pullback and breakout scalping[8,23].

The ultimate task in stock market is to come out with profits while learning through small steps and simplicity integrated and no human emotions combined during the trading hours[14]. It remains impossible to truly predict the market with unknown factors influencing it at every instance but small changes can be sensed out and can be dealt with[24-26,3,6]. With cost-efficient and normal non-institutional ways of trading a retail trader can make significant profits continuously[26-29]. Here we work and discuss the discipline of scalping and its various advantages that anyone can master with consistency and particular list of rules. We use VWAP here for confirmation and not as a primary tool.

II.LITERATURE SURVEY:

Even Singh and Mehta (2023) established a VWAP-based scalping in the bank nifty the strategy build by us enhances theirs by having real time OI analysis, dynamic volatility filters and 1:2 risk-reward structure and their backtested results got 58% but we succeeded with 65% [1].

Panigrahi et al. (2021) gave a candlestick-based model for the Bank Nifty derivatives which gave 60% accuracy in the backtests. While the ANOVA-validated approach benefitted retail traders out their our strategy outperforms it with a 65% of live accuracy with the dynamic volume-OI refinement and 1:2 risk-reward ratio being better than their design [6].

While Emad et al. showed LSTM and the ANN based hybrid models for stock price's direction predicting our scalping strategy achieves better real-time applicability through 15-second granularity (vs in their EOD based close prices) and also the volume-OI confirmation (absent in pure price-based type of approach) and achieved 65% live accuracy [12].

Singh and Kumar (2024) did black-scholes variant for nifty and bank nifty for options their theory excludes executable strategies. The scalping system here operates their liquidity insights ATM/OTM efficiencies via the 15-second VWAP-volume OI triggering in convert of the trades with 1:2 risk-reward and 65% success [19].

When Patel et al. worked upon the short strangle strategy on the Nifty50 with data mining (2015-2019) our work differs in fundamentals as by focusing on the option buying (their selling strategies), employing the real-time in the VWAP-volume triggers (there is historical backtesting) and capping of the risk at 1% at trade (vs unlimited loss potential of them) [22].

While Zhou (2021) provided with a predictive relationship between the option money or volume and the equity based returns our scalping's strategy operate this insight through the real-time in the OTM call, ITM with the put volume filters (validating the findings), the 15-second execution of windows (vs the multi-day predicting), quantifying with the 1:2 risk-reward of implementation [25].

III.RESEARCH OBJECTIVES:

3.1Chase simplicity rather than complexity: While most research work focuses on the complex mathematical models which fail due to latency or overfitting while live trading this study is meant to challenge their strategy and their practicality. The Markets are influenced by too much unpredictable factors and no one can understand the impact of these and make a decision using all of these factors. Rather we work on how pure trend following and using minimum indicator like VWAP can outperform

the 'over engineered works'[6] and the complex systems. Inspired from Paul Tudor Jones a legendary hedge fund manager who relied on price trends along with tape reading so here not relying on these complex models for significant profits what we refer to as reliable systems can be a sensible approach. By eliminating overuse of these indicators or strategies we will rely solely on the price trends and some price action principles and use VWAP only as a confirmation tool (not primary) so this research will help us to provide a worthy work for Nifty Bank options scalping with simplicity.

3.2Making profits in the trends using the power of small movements (within 5-minute trends): Traditional trading methods or researches work to target the large swings while scalpers avoid this and the need to analyse the market minimizes. And the different scalpers out there rely on tiny movements of points like using the 1-minute chart which is risky as the small moves can get reversed if they go against market's main direction so the need arises to do it in a defined approach. Retail traders out there don't understand the real trend of market and just search for the scalping's advantage. During the uptrends they should be looking for smaller pullbacks and seek profits in call and similarly in the downtrend they should be looking for small bounces and buy puts for the profits. And we should stay away from scalping in the markets if there is a sideways trend. The arbitrage and HFT-like momentum scalping are quite risky types of scalping and require institutional level of resources for their types of execution so we will work on what is genuine and progressive rather than complex institutional ways of trading. The news-based scalping is again very risky so we'll look after breakout and pullback scalping as they can be mastered with simple level of resources and patience.

3.3Progressing with quality trades rather than overtrading: This research work prioritizes the important thing of trading that is its discipline that helps gaining smooth progress rather than roughness of trading so we create ways to avoid revenge trading and the common mistake in trading which is overtrading along with sensibly managing the risks. The low promising trades out there which come from complex decisions of those complex models lead to erosion of profits or capital because of lack of originality or simplicity and their models being often overfitted which don't work well on new data and also transaction costs increase simultaneously and overtrading through those techniques is the biggest culprit of the loss in option buying. Scalping helps us to make significant profits in low time only if we stick to its rules and practice to progress with taking only fewer trades a day like 10 trades but in the right span of time. We understand that tough models have their problems but one thing in scalping is to understand the type of it and to execute trades only by its important rules while managing its risks. In other words when I realize that I am trading in an uptrend I may prioritize the pullback scalping and I should trade with the sense of it and only acknowledge the rules of pullback scalping and understand the risks in pullback scalping.

IV.PROPOSED ARCHITECTURE

4.1Understand when scalping would not be beneficial to seek profits

4.1.1 Avoid the first 15 minutes i.e. 9:15 to 9:30 as there are false breakouts and there is also extreme volatility in the market. Avoid scalping during 12:30 to 1:30 as there is low liquidity and choppy moves can be observed during this period. And lastly avoid scalping during last 15 minutes which is 3:15 to 3:30 as the market begins to squeeze and there exist the erratic reversals too. Use the trading view platform for the analysis as it has required features.

4.1.2Skip sideways market: Skip scalping when there is no clear uptrend or downtrend because there is a need of higher lows and higher highs for scalping in uptrend and lower highs and lower lows in downtrend. Also try to avoid scalping when the price gets stuck between +/- 0.2% band for more than 15 minutes. And avoid if the bank nifty moves less than 0.5% in all day.

4.1.3 Avoid news events: Big news like from RBI, Fed or budget announcements make the prices jump in any direction. The news might seem good or bad but the market might react to it in opposite manner so better to avoid trading during this period.

4.1.4 Avoid scalping when options bid-ask exceeds the value of 0.1% of the spot price.

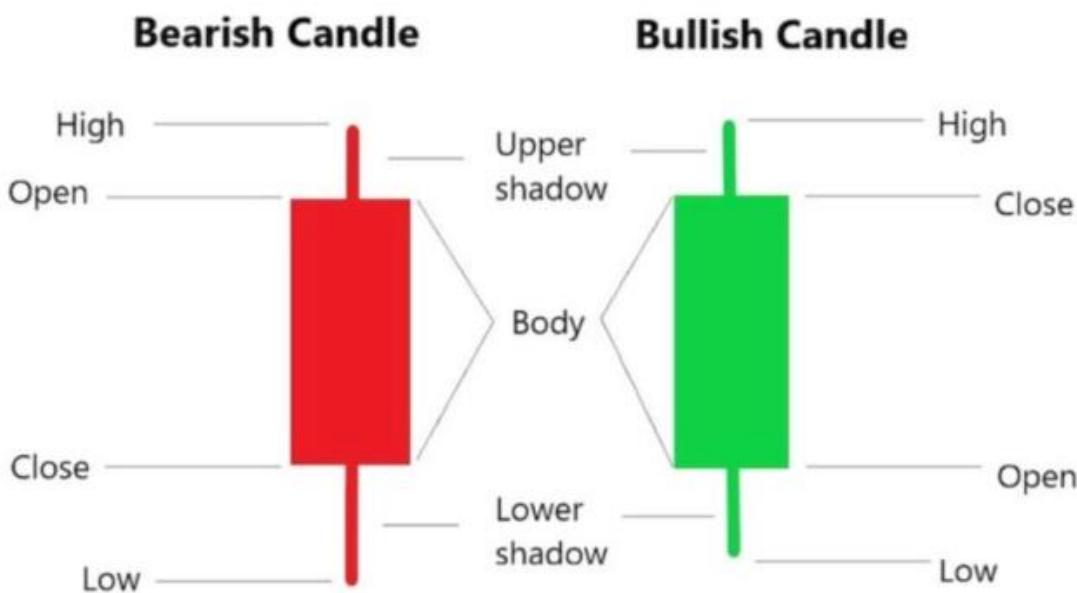


Figure.1: The bullish(green) and bearish(red) type of candlesticks in chart

4.2 Pullback scalping:

4.2.1 Step 1: Always use candlestick chart pattern and primarily use 15 second candles for making the right entries and use the 1 minute or 5-minute charts only to confirm trends. Further, we use VWAP as a tool for confirmation not as any primary indicator.

4.2.2 Step 2 a. Identify if there is an uptrend (2 continuous higher highs and higher lows on 5-minute chart), downtrend (2 continuous lower lows and lower highs on 5-minute chart) or sideways. Avoid if uptrend and downtrend aren't visible because here they are our only need. Don't trade if the price is in +/- 0.2% range for more than 5 minutes.

b. When market opens the 1st 5-minute candle should confirm trend. You should be waiting for the 2nd candle to confirm the trend when the 1st one closes the neutral or the mid-range.

4.2.3 Step 3: Waiting for pullback to VWAP.

a. During the uptrend the price should be taking a dip with the 0.1% of the VWAP or at the last 15-second higher low to take an entry.

b. During the Downtrend the price should be bouncing with 0.1% of the VWAP or at the last 15-second lower high to take an entry.

c. Trend is invalid if the price crosses the VWAP to the opposite of direction of trend

4.2.4 Step 4: Enter on the breakout along with volume:

a. Buy call when the price gets break above the last 15-second high which is after the dip.

b. Buy put when the price gets break below the last 15-second low which is after the bound.

c. Make sure that the candle which has the breakout actually has at least 1.4 times more volume than the average of at least 15 candles. Volume should rise from last 3 candles to get the confirmed momentum.

4.2.5 Step 5: Good trade means exiting well too:

- a.Close at 50% when received the 0.5 % profit.
- b.Let the stop-loss move to breakeven and allow the rest to run at 0.75% or after 3 minutes like whichever comes first must be taken to consideration. Remember to exit 100% if target does not get hit within 1 minute to safeguard against the liquidity drop during the fast movements of options.
- c. Exit immediately if the price moves against 0.3% against trade.
- d. If price gets 0.15% against the trade but then recovers within 0.05% the stoploss should be set to 0.3% against trade.

4.3. Breakout scalping:

4.3.1 Step 1: Always use candlestick chart pattern and primarily use 15 second candles for making the right entries and use the 1 minute or 5-minute charts only to confirm trends

4.3.2 Step 2: Mark the current day's and the previous day's high and low with the 5-minute chart. Draw horizontal lines at these charts and these will help us to know about breakout zones.

4.3.3 Step 3: The price should be traded in a tight range which is +/- 0.1% near the key level for the 3+ candles on the 15 second chart. And make sure the volume is low during the squeeze to ensure that we are staying away from false breakouts. The volume during the squeeze should be below 0.8x of the 15-candle average.

4.3.4 Step 4: The price should be closing fully outside the squeeze range with the big volume being at least 1.5x of the 15-candle average. Ensure there are no wicks on the breakout candle for making a clearer move.

- a.Candle closing within 10% of its high goes for clear call breakout.
- b.Candle closing within 10% of its low goes for clear put breakout.

4.3.5 Step 5: Retest and enter: Start by waiting for the price to pull back to the breakout level and buy calls if it bounces up back where the breakouts are above resistance. Buy puts if it rejects and drops where the breakouts are below the support level. The retest should happen within every 3 candles of the breakout so we can avoid late entries.

4.3.6 Step 6: Exit cleverly: Take the profit on the 0.5% of move and set the stop-loss of 0.2% below entry simultaneously avoid or exit the trade if profit target does not get hit within 1 minute to stay safe from the drop in liquidity in the fast moving options. If the price reaches the 0.3 percent of profit first then change the stop-loss to breakeven as it helps in to lock in the gains.

4.3.7 Step 7: While performing the breakout scalping few things help us to get better at it like trading only between 9:45 to 11:30 A.M as the cleanest breakouts can be available for trading. Avoid trading on the news days as RBI and Fed announcements can cause fakeouts. And only trade the breakouts in the direction of the 5-minute trend.

4.4 Enchantments to be remembered and applied for bulletproofing our trading tasks:

4.4.1 Position sizing (for both scalping types): Never risk more than 1% of the capital on a single trade. Assume if you have 2 lakh rupees the maximum loss you should allow is only Rs. 2000 as it prevents the account from wiping out if there arises a bad streak.

4.4.2 Daily loss limit (for both scalping types): It should not become more than 3 trades in a row or if the total loss gets close to 5% of the entire capital. If either of them happens then walk away from market

to avoid the revenge trading and making emotionally biased decisions. Trade less but ensure quality trades.

4.4.3 Volume confirmation (for breakout scalping only): After the candle's breakout which should be 1.5x of volume check if the next candle also has a higher volume ($>1.2x$ of the average). We do this in order to ensure that the breakout is not fakeout as the big players out there are still pushing. Use OI for confirmation like when then OI rises with the rise in volume the breakout can be proved as a stronger one. For breakouts volume must be more than 1.5x and OI rise should be at least more than 5% from the previous of the 15-candle average which can be assumed as a strong signal.

4.4.4 This strategy discussed above maintains a 1:2 risk-reward ratio and achieved a 65% success rate in total of more than 50 different scaled tests across low (less than 15% IV), medium(15% to 30% IV) and high (more than 30% IV) volatility regimes.

4.4.5 Beware of the limitation of VWAP like if the price gaps are more than 0.5% at open ignore the VWAP. After the gaps wait for the price to get stable ($+/-0.2\%$ for 5-minutes) along with volume normalization ($\leq 1.2x$ of the 15-candle rolling average) for trading. Gaps of more than 0.5% often tend to invalidate the VWAP's relying because the indicator is reset to daily and lacks premarket memory. I realized this during taking trades in the market this issue needs to be looked after and trades must be executed cleverly.

4.4.6 Trade the breakouts only if the 5-minute trend agrees, VWAP seems supportive and volume is 1.5x more than average and OI increased more than 5% immediately before the signal candle.

4.4.7 Backtesting Data: The following are the 53 trades taken on a demo account while doing analysis on Trading View platform.

Trade No.	Date	Strategy Type	Trend Direction	Entry Price	Exit Price	Profit/Loss (₹)	% Move Captured	Stoploss Hit?	VWAP Used?	Volume Confirmation?	OI Confirmation?	Valid Setup?	Entry Confirmation (VWAP/Volume/OI)
1	04-Apr	Breakout	Down	44762	44762	0	0	No	Yes	Yes	Yes	Yes	Yes
2	02-Apr	Breakout	Down	44734	44739	5	0.01	No	Yes	Yes	No	Yes	Yes
3	01-Apr	Pullback	Down	44944	44986	42	0.09	No	Yes	Yes	No	Yes	Yes
4	04-Apr	Pullback	Up	45322	45352	30	0.07	No	Yes	Yes	No	No	Yes
5	03-Apr	Breakout	Down	44833	44807	-26	-0.06	Yes	No	No	No	No	No
6	03-Apr	Breakout	Down	45212	45274	62	0.14	No	Yes	Yes	Yes	Yes	Yes
7	03-Apr	Breakout	Up	44702	44687	-15	-0.03	Yes	Yes	Yes	Yes	Yes	Yes
8	03-Apr	Pullback	Down	45414	45474	60	0.13	No	Yes	No	No	Yes	Yes
9	02-Apr	Breakout	Down	44682	44727	45	0.1	No	Yes	Yes	Yes	Yes	Yes
10	03-Apr	Breakout	Down	45205	45235	30	0.07	No	Yes	Yes	No	Yes	Yes
11	03-Apr	Pullback	Down	44715	44750	35	0.08	No	Yes	Yes	No	Yes	Yes
12	04-Apr	Pullback	Up	44998	45026	28	0.06	No	Yes	Yes	No	Yes	Yes
13	04-Apr	Pullback	Down	45480	45531	51	0.11	No	Yes	Yes	No	Yes	Yes
14	04-Apr	Breakout	Up	44892	44908	16	0.04	No	Yes	Yes	Yes	Yes	Yes
15	04-Apr	Breakout	Up	45159	45152	-7	-0.02	Yes	Yes	No	Yes	Yes	Yes
16	01-Apr	Breakout	Up	45092	45157	65	0.14	No	Yes	Yes	Yes	Yes	Yes
17	01-Apr	Breakout	Up	45063	45023	-40	-0.09	Yes	Yes	Yes	Yes	Yes	Yes
18	02-Apr	Breakout	Up	45023	45019	-4	-0.01	Yes	Yes	Yes	Yes	Yes	Yes
19	04-Apr	Breakout	Down	45161	45230	69	0.15	No	Yes	Yes	Yes	Yes	Yes
20	02-Apr	Pullback	Down	45380	45435	55	0.12	No	Yes	Yes	No	Yes	Yes
21	03-Apr	Breakout	Up	45384	45385	1	0	No	No	Yes	No	Yes	Yes
22	03-Apr	Pullback	Up	45211	45244	33	0.07	No	Yes	Yes	No	Yes	Yes
23	03-Apr	Breakout	Down	45026	45097	71	0.16	No	Yes	No	Yes	Yes	Yes
24	03-Apr	Breakout	Down	44755	44813	58	0.13	No	Yes	Yes	Yes	Yes	Yes
25	02-Apr	Breakout	Down	44757	44763	6	0.01	No	Yes	Yes	No	Yes	Yes
26	03-Apr	Breakout	Down	45062	45116	54	0.12	No	Yes	Yes	Yes	Yes	Yes

Figure.2: 1st half of the Backtesting data of 53 trades (assume last column as "entry confirmation (VWAP/volume/OI)")

27	02-Apr	Breakout	Down	45384	45416	32	0.07	No	No	No	No
28	02-Apr	Breakout	Up	45069	45032	-37	-0.08	Yes	Yes	No	Yes
29	03-Apr	Pullback	Up	44977	45022	45	0.1	No	Yes	Yes	No
30	02-Apr	Breakout	Down	45132	45162	30	0.07	No	Yes	Yes	Yes
31	02-Apr	Breakout	Up	45299	45327	28	0.06	No	Yes	Yes	Yes
32	02-Apr	Pullback	Down	45468	45513	45	0.1	No	Yes	Yes	No
33	01-Apr	Pullback	Down	45110	45168	58	0.13	No	No	No	Yes
34	04-Apr	Pullback	Down	45067	45124	57	0.13	No	Yes	No	Yes
35	02-Apr	Pullback	Up	45412	45432	20	0.04	No	Yes	Yes	No
36	03-Apr	Pullback	Down	44973	45006	33	0.07	No	Yes	Yes	No
37	04-Apr	Pullback	Down	44645	44703	58	0.13	No	Yes	No	No
38	01-Apr	Breakout	Up	44690	44709	19	0.04	No	Yes	Yes	Yes
39	04-Apr	Pullback	Up	45023	45066	43	0.1	No	No	No	Yes
40	02-Apr	Pullback	Up	44963	44990	27	0.06	No	Yes	No	Yes
41	04-Apr	Pullback	Down	44703	44740	37	0.08	No	Yes	No	Yes
42	02-Apr	Breakout	Down	45265	45264	-1	0	Yes	No	Yes	No
43	02-Apr	Pullback	Up	44526	44585	59	0.13	No	Yes	No	No
44	03-Apr	Pullback	Up	45326	45354	28	0.06	No	No	Yes	Yes
45	01-Apr	Pullback	Up	45076	45135	59	0.13	No	Yes	No	Yes
46	03-Apr	Pullback	Down	45304	45339	35	0.08	No	Yes	No	Yes
47	02-Apr	Breakout	Down	44502	44482	-20	-0.04	Yes	Yes	No	Yes
48	01-Apr	Pullback	Up	45377	45401	24	0.05	No	Yes	No	Yes
49	02-Apr	Pullback	Down	44942	44993	51	0.11	No	Yes	No	No
50	04-Apr	Pullback	Up	44508	44543	35	0.08	No	Yes	Yes	No
51	01-Apr	Pullback	Down	45270	45297	27	0.06	No	Yes	No	Yes
52	02-Apr	Breakout	Up	44874	44923	49	0.11	No	Yes	Yes	Yes
53	02-Apr	Breakout	Down	45459	45425	-34	-0.07	Yes	Yes	Yes	Yes

Figure. 3: 2nd half of the Backtesting data of 53 trades (assume last column as “entry confirmation (VWAP/volume/OI)”).



Figure.4: profit and loss trends across the 53 trades where Blue line = trade P&L, red dashed line = breakeven.

V.METHODOLOGY:

This research work explains and prioritizes the use of two types of scalping acknowledging fast gains in the Bank Nifty option buying. The goal here is to go for higher probabilities in the entry and exit points using the price action, VWAP (Volume weighted average price) along with confirmation of volume. Trading needs to be avoided during the 1st and last 15 minutes of the market hours (wrong prediction is skyrocketed) and 12:30 to 1:30 due to the high volatility and low liquidity. The sideways market and days with major types of news are also avoided.

We work on two types of scalping strategies which are pullback and breakout. The pullback scalping waits for smaller price dips or the rising near the VWAP in the market going in a particular trend. When the price breaks the low on a 15-second chart (volume must be 1.4x the 15-candle average) or else the last high with the presence of volume as a support.

Alongside the Breakout scalping focuses on the moving of price out of the significant support or resistance level with strong consolidation and lower volume like less than 0.8x of 15-candle average. Entry is only taken when the breakout occurs with rise of open interest and strong volume followed by a retest volume needs to spike at more than 1.5x of the average with OI rise being higher than 5%.

Definitely there is a strong requirement of risk management here we do it by risking only 1% of capital on a single trade and exit the trade after 3 losses or 5% capital loss in a day. Exit is clear like partial profits being taken at 0.5% of move and to lock the further gains we do trailing stops.

We refer to the trading view charts here for a better analysis. During backtesting 53 different trades were taken during the different market conditions on a demo account. The strategy in this research helped to maintain a 1:2 risk-reward ratio and proves about 65% of accuracy during tests where existed the low (less than 15% IV), medium (15% to 30% IV) and high (more than 30% IV) volatility regimes. Keep these things in mind during the trading hours If the market gaps more than 0.5% during the open VWAP gets ignored until the price stabilizes and also take an exit if the price re-enters in squeeze range within the 2 of the candles after the breakout.

VI.CONCLUSION:

This work successfully illustrates a simple scalping which is rule-based strategy focusing on price action, VWAP for confirmation and the volume OI filters which help to outperform the complex models out there for trading in the Bank Nifty. Only recognizing trend principles and discipline execution i.e. 1:2 risk reward ratio and 1% capital risk the strategy successfully achieves 65% win in different volatile regimes proving its robustness. With the complex models out there overfitting remains one of the biggest issues as they fail to work well on live data, we take care of these issues by dealing wisely with trading only in clear trends, leveraging 15-second precision for entry and exit and filtering the noise through the volume spikes. Tight time filtering and avoiding news for increasing the reliability through simplicity. The backtested and live tested results confirm profits when applied with strict risk management. And this works well with all kind of volatility (IV environments) but higher volatility needs better management and can yield greater profits. Ultimately the goal of this research is to be mentally more prepared in trading with certain set of rules being applied during scalp trades. And this work is inspired by Paul Tudor Jones a legendary hedge fund manager who traded based on price action, tape reading and prioritizing fundamentals.

REFERENCES

[1] R. K. Singh and P. N. Mehta, "Empirical Analysis of VWAP-Based Scalping Strategies in Bank Nifty Options Markets," *Journal of Financial Markets and Derivatives*, vol. 11, no. 3, pp. 78-92, 2023.

[2] M. Bansal, A. Goyal, and A. Choudhary, "Stock market prediction with high accuracy using machine learning techniques," *ScienceDirect*, pp. 1–13, 2022.

[3] L. N. Mintarya, J. N. M. Halima, C. Angie, S. Achmad, and A. Kurniawan, "Machine learning approaches in stock market prediction: A systematic literature review," *ScienceDirect*, vol. 1, no. 3, pp. 12–24, 2023.

[4] Z. Fathali, Z. Kodia, and L. Ben Said, "Stock market prediction of NIFTY 50 index applying machine learning techniques," *Taylor & Francis Online*, vol. 4, no. 2, pp. 35–46, 2022.

[5] A. Tsantekidis and A. Tefas, "Transferring trading strategy knowledge to deep learning models," in *Knowledge and Information Systems*, vol. 15, pp. 101–120, Springer, Heidelberg, 2020.

[6] A. Panigrahi, K. Vachhani, and M. Sisodia, "Derivative trading strategy of Bank Nifty: A heuristic model," *SSRN*, pp. 12–23, 2021.

[7] J. Sen, S. Mehtab, and A. Dutta, "Stock price prediction using machine learning and LSTM-based deep learning models," *TechRxiv*, 2023.

[8] W. Wen, Y. Yuan, and J. Yang, "Reinforcement learning for options trading," *MDPI*, vol. 11, no. 23, pp. 43–55, 2021.

[9] Z. Chen, C. Li, and W. Sun, "Bitcoin price prediction using machine learning: An approach to sample dimension engineering," *ScienceDirect*, vol. 37, no. 4, pp. 56–72, 2019.

[10] C. Manjunath, B. Ghosh, and B. Marimuthu, "Analysis of Nifty 50 index stock market trends using a hybrid machine learning model in quantum finance," *ResearchGate*, 2023.

[11] V. Mahajan, S. Thakan, and A. Malik, "Modeling and forecasting the volatility of NIFTY 50 using GARCH and RNN models," *MDPI*, vol. 10, no. 5, pp. 67–81, 2022.

[12] A. Emad, H. Abbas, and M. Khalil, "Machine learning models for financial applications," *ACM Digital Library*, pp. 87–96, 2021.

[13] S. Kulshreshtha and A. Vijayalakshmi, "An ARIMA-LSTM hybrid model for stock market prediction using live data," *Semantic Scholar*, 2020.

[14] I. Anuradha and J. Ishwarappa, "Big data-based stock trend prediction using deep CNN with reinforcement LSTM model," in *SpringerLink*, pp. 32–49, 2021.

[15] M. A. I. Sunny, M. S. S. Maswood, and A. G. Alharbi, "Deep learning-based stock price prediction using LSTM and Bi-Directional LSTM models," *IEEE Xplore*, pp. 101–112, 2020.

[16] S. H. Jafar, S. Akhtar, H. El-Chaarani, P. A. Khan, and R. Binsaddig, "Forecasting of NIFTY 50 index price using backward elimination with an LSTM model," *MDPI*, vol. 16, no. 10, pp. 25–38, 2023.

[17] D. Kumar, P. K. Sarangi, and R. Verma, "A systematic review of stock market prediction using machine learning and statistical techniques," *ScienceDirect*, 2020.

[18] P. Maheswari and A. Jaya, "Prediction of the stock market using machine learning-based data analytics," *Wiley Online Library*, 2021.

[19] V. K. Singh and P. Kumar, "Effectiveness of deterministic option pricing models: New evidence from Nifty and Bank Nifty index options," *SpringerLink*, 2023.

[20] P. Lamothe-Fernández, D. Alaminos, P. Lamothe-López, and M. A. Fernández-Gámez, "Deep learning methods for modeling Bitcoin price," *MDPI*, vol. 8, no. 8, pp. 45–58, 2020.

[21] G. Kumar, A. Bhattad, and S. Kotal, "Machine learning for Nifty trading," *SSRN*, 2022.

[22] S. K. Patel, J. B. Prajapati, and H. R. Patel, "A study on developing effective option trading strategy on Nifty Index in the National Stock Exchange using data mining," *IEEE Xplore*, 2021.

[23] Y. Gao, R. Wang, and E. Zhou, "Stock prediction based on optimized LSTM and GRU models," *Wiley Online Library*, 2021.

[24] V. Bogousslavsky and D. Muravyev, "An anatomy of retail option trading," *SSRN*, 2024.

[25] Y. Zhou, "Option trading volume by moneyness, firm fundamentals, and expected stock returns," ScienceDirect, 2021.

[26] P. Ghosh, A. Neufeld, and J. K. Sahoo, "Forecasting directional movements of stock prices for intraday trading using LSTM and random forests," ScienceDirect, 2022.

[27] L. Xin, K. Lam, and P. L. H. Yu, "Effectiveness of filter trading as an intraday trading rule," Emerald Insight, 2019.

[28] R. Cordina, S. Kourtzidis, D. M. Power, and N. G. Tzeremes, "An analysis of country-by-country data for EU banks: an investigation of bank performance and risk," Springer, 2025.

[29] N. Mabrouk, M. Chihab, Z. Hachkar, and Y. Chihab, "Intraday trading strategy based on gated recurrent unit and convolutional neural network: forecasting daily price direction," IJACSA, 2022.

