

Optimizing Performance of Algorithmic Trading using Heikin-Ashi and Awesome Oscillator Techniques

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Abstract: The rise of e-business has had a profound impact on economy of the nations, and algorithmic trading has emerged as a vital component in electronic trading. Algorithmic trading utilizes computer programs to automate trading processes, providing benefits such as increased speed, efficiency, and the ability to analyze extensive data sets. In algorithmic trading, the Heikin-Ashi technique is valuable tool for identifying market trends and predicting future stock prices. By filtering out noise from the data, this technique provides a clearer understanding of the underlying trend, enabling more accurate predictions and informed decision-making. Additionally, the Awesome Oscillator serves as a market momentum indicator that compares recent market movements to historical patterns. By combining the traditional Heikin-Ashi technique with the Awesome Oscillator creates a powerful trading algorithm. This algorithm analyses the current market trend, identifies color patterns using Heikin-Ashi technique, and utilizes Awesome Oscillator to assess market momentum. This inclusive analysis provides intraday signals for buying or selling, enabling traders to capitalize on market opportunities. This study contributes to the practical trading scenario and has the potential to enhance the financial growth of the nation by leveraging the benefits of algorithmic trading in the e-business landscape. It facilitates faster and more efficient trading strategies, attracts investment, and enhances market liquidity.

Keywords: Heikin-Ashi technique, Awesome Oscillator technique, market momentum, intraday signal

I. INTRODUCTION

Stock market is central for the creation and development of strong and competitive economy. There exists a positive relationship between stock markets and economic growth, both in short as well as long run. Accurate prediction of stock market returns is very challenging due to volatility and non-linearity of financial stock market.[1]

Heikin-Ashi Technique

[2] [3]The Heikin Ashi is the visual technique that eliminates irregularities from a normal chart, offering a better picture of trends and consolidations. Just by looking at a candlestick chart, we get a good idea of market's status and its strength. It is useful for making candlesticks charts more readable and trends easier to analyse. Heikin Ashi charting technique is beneficial than traditional charting techniques because it uses modified formula based on two period moving averages. Traders uses Heikin Ashi charts to identify trends, reversal patterns, and potential entry or exit points in the market.[4]

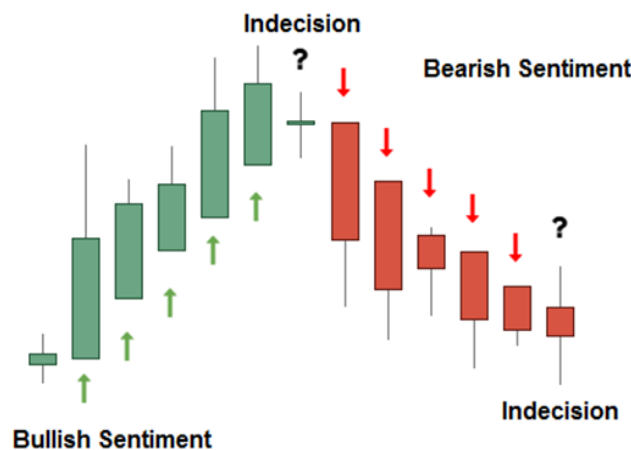


Fig 1. Sample Heikin-Ashi Chart

Awesome Oscillator Technique

The Awesome Oscillator (AO) is a technical indicator that helps traders to scale the market momentum and potential reversals. The Awesome Oscillator is calculated by taking the Simple Moving Average (SMA) of the median prices, that is the average of the high and low prices, over a certain number of periods and then subtracting the SMA of the median prices over a longer period. The oscillator fluctuates above and below a zero line. Traders interpret the signals based on the crossing of the zero line and the divergence between the oscillator and price.[5]

The research aims to address the limitations of using Heikin-Ashi and Awesome Oscillator techniques independently. While Heikin-Ashi candles are based on averages and may not reflect true prices, the Awesome Oscillator can generate false signals when used as a standalone indicator. The key objective of the study is to develop an algorithm that combines both techniques to overcome these limitations and provide more accurate intraday signals for buying or selling in the financial market.

By integrating the strengths of Heikin-Ashi and Awesome Oscillator, the algorithm aims to leverage the trend-spotting capabilities of Heikin-Ashi while utilizing the market momentum analysis provided by the Awesome Oscillator. This combination can potentially enhance the accuracy and reliability of the trading signals generated by the algorithm, leading to better decision-making and potentially improving financial growth in the context of e-business and electronic trading. Overall, the research focuses on creating a robust algorithm that integrates Heikin-Ashi and Awesome Oscillator techniques to provide more effective intraday trading signals and contribute to the practical trading scenario.



Fig 2. Awesome Oscillator for Market Momentum

II. RELATED WORK

[6] developed the Heikin Ashi stochastic RSI which can reflect in single number for trend generation and market momentum. The technique was used for NIFTY'S Index for a long-time frame and proven to be profitable.

[7]has performed comprehensive analysis of Vix Index data with Heikin Ashi Transformation. The study says that Heikin-Ashi Trasformation worked remarkably well in reducing noise of Input data and its effect can be improved using Vix Index data.

[8]presented that Hekin-Ashi technique when combined modern limit conditions can improve the trading efficiency and also atomate trading decisions.

[9] developed a new technical analysis indicator based on Heikin-Ashi candles, known as HA Stochastic (HASTOC) which can be used for trend generation and momentum in market. The new indicator performed well in terms of returns.

III. METHODOLOGY

The proposed framework incorporates the utilization of live stock market data from various APIs such as Yahoo Finance and Angle Broking etc.. The Heikin-Ashi Technique is applied to smoothen out the market movement, allowing for a clearer view of the underlying trend. Additionally, the Awesome Oscillator is used to identify market movement and assess market momentum.

By combining these two techniques, the framework enables the analysis of the market trend. The Heikin-Ashi Technique filters out noise from the data, providing a more accurate representation of the market's direction. The Awesome Oscillator complements this analysis by evaluating recent market movements in comparison to historical patterns, offering insights into market momentum.

Based on the comprehensive analysis of the market trend and momentum, the framework generates signals for buying or selling. These signals serve as indicators for traders to make informed decisions on whether to enter or exit positions in the market. The integration of live stock market data, the Heikin-Ashi Technique, and the Awesome Oscillator enhances the framework's ability to analyze the market and determine suitable trading actions.

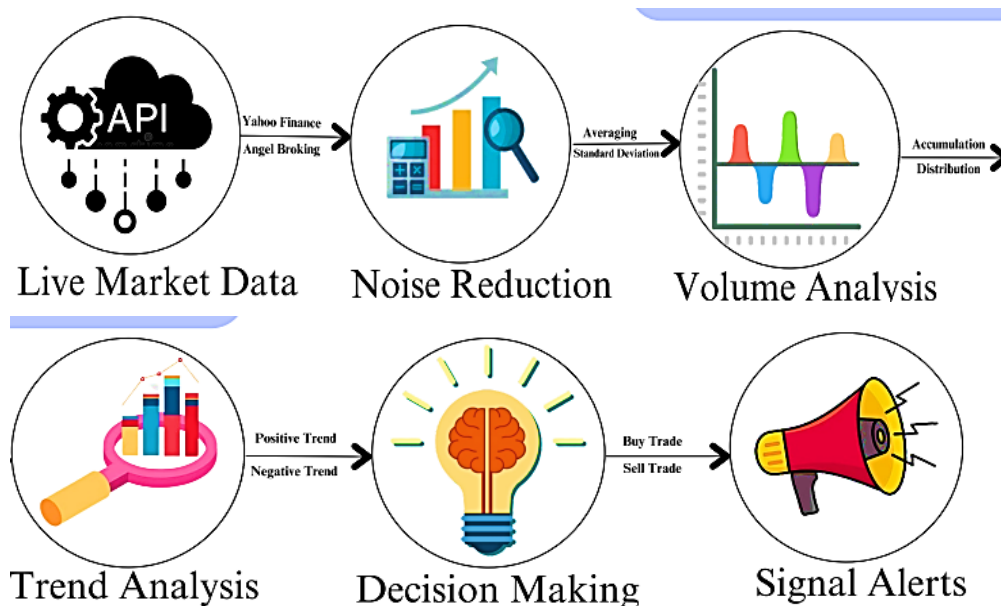


Fig 3. Process of Algorithmic Trading.

IV. RESULTS

In this section, we are presenting trading results that were obtained by our Algorithmic Trading Bot. The results presented in the Table 1. were obtained over the period of 4 Months. The green areas in the presented results indicate profitable days, while the red areas indicate loss-making days. With 79.59% of the days being profitable and only 20.41% resulting in losses, it suggests that the trading strategy has been successful in generating profits in the Futures and Options segment for intraday traders in short span of time.

TABLE I PROFIT AND LOSS FOR THE F&O

Date	Symbol	Quantity	Buy Value	Sell Value	Realized P&L	Total
05-01-2023	BANKNIFTY2350443100CE	25	5432.5	5957.5	525	
05-01-2023	BANKNIFTY2350443100PE	375	133731.2501	141892.5	8161.25	
05-01-2023	BANKNIFTY2350443200CE	75	10323.75	12935	2611.25	
05-01-2023	BANKNIFTY2350443200PE	725	76337.4997	81615.0002	5277.5	16575
12-01-2023	BANKNIFTY2350443300CE	725	99243.75	116513.7502	17270	
12-01-2023	BANKNIFTY2350443500PE	600	81948.75	71985	-9963.75	



12-01-2023	BANKNIFTY2351142900CE	350	81051.25	94356.2501	13305	
12-01-2023	BANKNIFTY2351143000CE	25	7258.75	8256.25	997.5	21608.75
19-01-2023	BANKNIFTY2351143100CE	1275	332282.5	313816.2499	-18466.25	
19-01-2023	BANKNIFTY2351143200CE	275	77580	85901.25	8321.25	
19-01-2023	BANKNIFTY2351143400CE	2525	573613.7501	598589.9999	24976.25	
19-01-2023	BANKNIFTY2351143500CE	250	21526.25	24736.25	3210	18041.25
09-02-2023	BANKNIFTY2351143500PE	350	83265.0001	75975.0001	-7290	
09-02-2023	BANKNIFTY2351143600CE	500	99177.5	108445	9267.5	
09-02-2023	BANKNIFTY2351143600PE	150	19388.75	24061.25	4672.5	
09-02-2023	BANKNIFTY2351843400CE	525	192931.2499	188401.2501	-4530	2120
16-02-2023	BANKNIFTY2351843500PE	100	19025	12010	-7015	
16-02-2023	BANKNIFTY2351843700CE	850	320931.2496	335557.4997	14626.25	
16-02-2023	BANKNIFTY2351843800CE	325	76715	83178.75	6463.75	
16-02-2023	BANKNIFTY2351843800PE	250	50842.5	45475	-5367.5	8707.5
23-02-2023	BANKNIFTY2351843900CE	400	39872.5	33402.5	-6470	
23-02-2023	BANKNIFTY2351844000CE	150	16973.75	18371.25	1397.5	
23-02-2023	BANKNIFTY2351844000PE	1475	214732.5003	228569.9997	13837.5	
23-02-2023	BANKNIFTY2351844100PE	1525	455469.9993	465933.7502	10463.75	19228.75
09-03-2023	BANKNIFTY2351844200CE	800	116907.5	124210	7302.5	
09-03-2023	BANKNIFTY2360143600CE	250	88328.75	89382.5	1053.75	
09-03-2023	BANKNIFTY2360143600PE	750	195785.0003	159660	-36125	
09-03-2023	BANKNIFTY2360144000CE	1750	399385.0002	380025	-19360	-47128.8
16-03-2023	BANKNIFTY2360144200CE	850	228654.9997	235186.2501	6531.25	
16-03-2023	BANKNIFTY2360144200PE	775	172886.2499	194396.2501	21510	
16-03-2023	BANKNIFTY2360144500PE	850	253587.4998	260868.7498	7281.25	
16-03-2023	BANKNIFTY2360843800CE	250	90442.5	94590	4147.5	39470
23-03-2023	BANKNIFTY2360843900CE	250	77902.5	80065	2162.5	
23-03-2023	BANKNIFTY2360844000PE	500	159012.5	165026.25	6013.75	
23-03-2023	BANKNIFTY2360844100CE	2775	800089.9997	806652.5008	6562.5	
23-03-2023	BANKNIFTY2360844100PE	1250	224950	237493.7503	12543.75	27282.5
06-04-2023	BANKNIFTY2360844200PE	325	72930	53186.25	-19743.75	
06-04-2023	BANKNIFTY2360844400PE	800	162557.5	169406.2496	6848.75	
06-04-2023	BANKNIFTY2361543900CE	1000	420270	432097.5	11827.5	
06-04-2023	BANKNIFTY2361544300PE	3050	963111.249	970023.7507	6912.5	5845
13-04-2023	BANKNIFTY23APR43000PE	225	43402.5	46496.25	3093.75	
13-04-2023	BANKNIFTY23APR43500CE	625	66461.25	70071.25	3610	
13-04-2023	BANKNIFTY23APR43600CE	825	260403.7499	273240	12836.25	
13-04-2023	BANKNIFTY23APR43700CE	325	123496.2502	127740.0001	4243.75	23783.75
20-04-2023	BANKNIFTY23APR43700PE	1850	493150.0003	517498.7505	24348.75	
20-04-2023	BANKNIFTY23APR43800CE	100	20365	22612.5	2247.5	
20-04-2023	BANKNIFTY23APR43900PE	1000	332467.5	347131.25	14663.75	
20-04-2023	BANKNIFTY23APR44000PE	500	159261.25	171695	12433.75	53693.75
Grand Total						189227.5

V. CONCLUSION

An enhanced accuracy and reliability of trading signals provided by the proposed framework can greatly benefit intraday traders in the Futures and Options segment. By improving the quality and accuracy of trading signals, traders can make more informed decisions and potentially increase their financial growth. The effectiveness of this framework relies on various factors, including the quality and accuracy of the live stock market data, the robustness of the algorithmic trading strategy, and continuous monitoring of market conditions.

VI. FUTURE ENHANCEMENT

1. **Regulatory Compliance:** As regulatory frameworks evolve, algo trading bots will need to adapt to comply with new rules and regulations. They may integrate compliance features to ensure transparency, fairness, and compliance with relevant financial laws.
2. **Social Trading Integration:** Social trading platforms allow users to follow and copy the trades of successful traders. Algo trading bots can leverage this concept by integrating social trading features, where users can follow and automatically replicate the trades executed by top-performing bots or traders.
3. **Multi-Asset Trading:** Algo trading bots will expand their capabilities beyond a single asset class. They will be designed to trade across various financial markets, including stocks, bonds, commodities, cryptocurrencies, and foreign exchange. This expansion will provide more opportunities for diversification and potentially higher returns.

REFERENCES

- [1] R. Sikarwar and M. Appalaraju, "The Impact of Stock Market Performance on Economic Growth in India," *Asian J. Res. Bank. Financ.*, vol. 8, no. 5, p. 49, 2018, doi: 10.5958/2249-7323.2018.00034.2.
- [2] D. Valcu, "Using The Heikin-Ashi Technique," *Tech. Anal. Stock. Commod.*, vol. 2, no. c, pp. 24–26, 2004.
- [3] R. Di Lorenzo, "Heikin Ashi," pp. 165–169, 2012, doi: 10.1007/978-88-470-2534-9_34.
- [4] W. Tchoudi, "Study of Heiken Ashi Candlestick for Noise Reduction," no. June, pp. 0–13, 2022, doi: 10.31730/osf.io/phejd.
- [5] S. Russell, "Comparing the Awesome Oscillator to a Time-Based Trade : A Framework for Testing Stock Trading Algorithms."
- [6] N. M. Kotecha, "Making Money with Heiken-Ashi Charts and Stochastics RSI An In-Depth Analysis on Nifty 50 Instrument," *Int. Res. J. Eng. Technol.*, vol. 07, no. 10, pp. 1076–1087, 2020.
- [7] N. Sharma and C. S. Chauhan, "Heikin-Ashi Transformation and Vix Index data for Stock Market Index Prediction and It's Effects," *Int. J. Sci. Res. Comput. Sci. Eng. Inf. Technol.*, vol. 5, no. 1, pp. 363–365, 2019, doi: 10.32628/cseit195195.
- [8] C. Păuna, "Smoothed Heikin-Ashi Algorithms Optimized for Automated Trading Systems," no. July, pp. 514–525, 2018, doi: 10.31410/itema.2018.514.
- [9] S. Roy Trivedi, "Technical analysis using Heiken Ashi Stochastic: To catch a trend, use a HASTOC," *Int. J. Financ. Econ.*, vol. 27, no. 2, pp. 1836–1847, 2022, doi: 10.1002/ijfe.2245.
- [10] <https://tradingstrategyguides.com/bill-williams-awesome-oscillator-strategy/>