

Analysis and Evaluation of Technical Indicators for Prediction of Stock Market

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Abstract: - In stock market operations, the data computing logic and processing power can be harnessed to offer one a competitive advantage over the other. The stock markets over the years have provided excellent investment returns, but the amateur traders aren't able to take its advantage thanks to obsession changing market and losing money. During this research work, the principles of different technical indicators are applied on historic data of Indian Stocks segment to realize meaningful knowledge and insights within the sort of strategy, which can help users in taking proper buying or selling decisions while trading in that particular Stocks. This capability gives the choice trader a leading edge over novice traders. By following the right strategy, the user is really trying to attenuate the danger of a loss and increasing the probabilities of earning profits. This project will be focused on various Technical Indicators Strategies. It will comprise of five different indicators which are generally used in the Stock Market. This indicators will be plotted using Python as the basic programming language and will be using NumPy and Matplotlib libraries of python which will help us to plot the chart diagram of that particular technical indicator strategy. The motive of this project is to help the Retail Investors of the Share Market, as they are the individuals who are most prone to losses because they don't make use of technical indicators in their trading methodology.

Keywords: *Bollinger Band, Fibonacci Retracement, Moving Average Crossover, Nifty, Predictive Analysis, Python, Relative Strength Index, Stochastic Oscillator, Stock Market*

INTRODUCTION

Technical Analysis might be a trading discipline utilized to check ventures and distinguish trading openings by examining measurable patterns assembled from exchanging action, similar to value moment and volume. Technical Indicators are heuristic based signs created by the value, volume, as well as open interest of a security or agreement utilized by traders who follow specialized examination. By investigating historical information, technical analyst use indicators to anticipate future price developments.

This project will be centered on different Technical Indicators Strategies. It will include five unique indicators which are by and large utilized in the Stock Market. These indicators will be plotted utilizing Python as the fundamental programming language and will utilize NumPy and Matplotlib libraries of python which will assist us with plotting the graphs of that specific technical indicator methodology. The trading framework

in India just as in certain nations abroad is controlled here and there defective and hampered by those with enormous cash-flow

to suit their own advantages. For defeating this, we will be taking assistance of Technical Indicators so we can investigate the price value. With the assistance of Technical Indicators utilizing Python a trader can be protected and mint some cash from the stock exchange

FINANCIAL BACKGROUND KNOWLEDGE

This section contains the basic background concepts used in this paper. To recognize the concept, we will first be familiar with some keywords which are being used throughout this paper.

Moving Average Crossover: Moving Average Crossover, [1] the Golden Cross mirrors a genuine move in market assessment when bulls beat bears. It's framed when a medium-term moving normal, say a 50-day MA one very first moment, breaks over the drawn out moving normal, for example a 200-day MA. Notwithstanding, remember that moving averages are trending indicators, used to gauge directional energy.

Stochastic Oscillator: It is an indicator that quantifies the current value comparative with the value range over assortment of periods. This indicator was created by George Lane. Given the Stochastic Oscillators nature of a bound oscillator, it is considered valuable in assisting traders with recognizing when a resource is overbought or oversold. It is "bound", since its qualities are held inside a scope of somewhere in the range of 0 and 100.

$$\%k = \frac{\text{Today's Close} - \text{Lowest Low Over A Selected Period}}{\text{Highest Over A Selected Period} - \text{Lowest Low Over A Selected Period}}$$

Relative Strength Index: It is one among the preeminent generally utilized instruments in trader's handset. The RSI is an oscillating indicator which shows when a stock could be overbought or oversold. RSI is considered overbought when over 70 and oversold when less than 30. Go long when the marker moves from beneath to over the oversold line and Go short when the pointer moves from above to underneath the overbought line. The RSI is visualized with a single line and is bound in a range between 1 and 100, with the level of 50 being considered as a key point distinguishing an uptrend from a downtrend.

$$\text{First Average Gain/Loss} = \frac{\text{Sum Of Gains/Loss Over The Past 14 Periods}}{14}$$

$$\text{Average Gain/Loss} = \frac{13 (\text{Previous Average Gain/Loss}) + \text{Current Gain/Loss}}{14}$$

Fibonacci Retracement: With regards to stock market, the numbers used in Fibonacci retracements isn't numbers in Fibonacci's succession; all things being equal, they're gotten from numerical connections between numbers inside the grouping. Each number is roughly 1.618 occasions more noteworthy than the first number. This number 1.618 is called Phi or the "Golden Ratio". Fibonacci retracement levels are portrayed by taking high and depressed spots on a graph and denoting the key Fibonacci proportions of 23.6%, 38.2%, and 61.8% evenly to create a lattice.

Bollinger Bands: It is an oscillating indicator used to gauge market unpredictability. The upper band addresses overbought domain, while the lower band can show you when a security is oversold. When the moving average price approaches the lower band, the asset is considered oversold since it is trading at a relatively low price compared to its recent average. This logically is deemed a bullish signal because the price will likely rebound and retrace back to the moving average and vice-versa applicable when it touches the upper band.

EXISTING SYSTEMS

Prasetijo and Saputro researched [2] for Bollinger bands and Parabolic SAR indicators and applied them on Indonesia Stock Exchange. They created many strategies and studied them individually and found that only using Bollinger bands generates the best returns. The pure Bollinger Band strategy performs the best in average. It consistently provides profit for upside and sideways trends of 17.06% and 1.19% respectively.

J. Ranjani and A. Sheela [3] performed an organized comparative analysis on group usage of NumPy, SciPy, Matplotlib compared to MATLAB. Later they concluded that using combination of all three with the use of Python is providing better results as compared to MATLAB.

	Python	Matlab
• OpenSource	✓	⊘
• Free	✓	⊘
• Multiplatform	✓	⊘
• Fast Memory Management	✓	⊘
• GUI compatibility	✓	⊘
• Easily distributable	✓	⊘
• Interchangeable with non-numerical applications	✓	⊘
• Standalone scripting	✓	⊘
• Native matrix operators and functions	⊘	✓

Fig.1- Software specification of Python Vs MATLAB

Ricardo de Almeida [4] studied the implementation of Multi-Objective Optimization approach in technical indicators of stock market. Despite maximizing profit and minimizing the level of risk, this work also consider

minimization of number of trades, what has impact on transaction costs. Multi-objective optimization procedures are wont to generate a group of non-dominated solutions from where the investor can analyze the tradeoff between objectives and choose a solution that best fit its strategy. In this paper an algorithm based on Differential Evolution is employed to get Pareto fronts for every technical indicator.

Rama Krishna Yelamanchili [5] concluded that the stock markets and Oil and Gas stocks are independent from industrial productions. They conclude that industrial production won't help predict neither stock exchange movements nor stock returns. Also empirical results suggest that stock exchange indexes help to know contemporaneous stock returns but not future returns.

METHODOLOGY

Technical Indicators are numerical computations, which are plotted as lines on a price chart and may assist traders with recognizing certain signs and trends inside the market. [6] Regardless of whether you're interested about stock trading, commodities trading, it is regularly useful to utilize technical analysis as a piece of your technique – and this incorporates examining different technical indicators. Python has gotten one among the principal well known programming dialects for some Companies. Its effortlessness and vigorous displaying abilities make it an eminent apparatus for scientists, investigators, and dealers. Building a trading system with Python is currently conceivable, Stock business sectors create enormous measures of information that need huge loads of study and that is the place where Python helps too. Pandas-Datareader, NumPy, Matplotlib.pyplot, iPython, Statistics, Datetime, yfinance, get-all-tickers is the libraries used in this project. Libraries like Pandas simplify the method of knowledge visualization and permit completing sophisticated statistical calculations.

Instruments like scipy, numpy or matplotlib permit one to perform complex estimations and show the prompts a truly agreeable way. [7] With Python, coders don't have to assemble their devices without any preparation, getting a good deal on improvement projects. Python is generally used in quantitative account - arrangements that cycle and investigate huge datasets, huge monetary information. To make necessary statistical inferences, it becomes necessary to visualize the data and Matplotlib is one such solution for the python users. It is a very powerful plotting library useful for those working with python and numpy. The most used module of matplotlib us Pyplot which provides an excellent interface. All the methodologies are applied to the information from 2015-2021. The approach with the best yield is endorsed to the end user. We have in like manner applied the endorsed frameworks to the long stretches of January, February, March of the year 2021 to validate if the option philosophies work suitably and we have come to sensational results.

DIFFERENT TECHNICAL INDICATORS

Moving Average Crossover: When trying to plot the moving average crossover on the system, it is plotted using 50 MA and 200 MA. It can be explained by using the concepts of whenever the 50 MA breaks above 200 MA then the price of that particular stock increases as we can see in the image. Same 50 MA when breaks below 200 MA then the price of that particular stock decreases. For this purpose we have taken Nifty as an underlying security for performing the analysis.

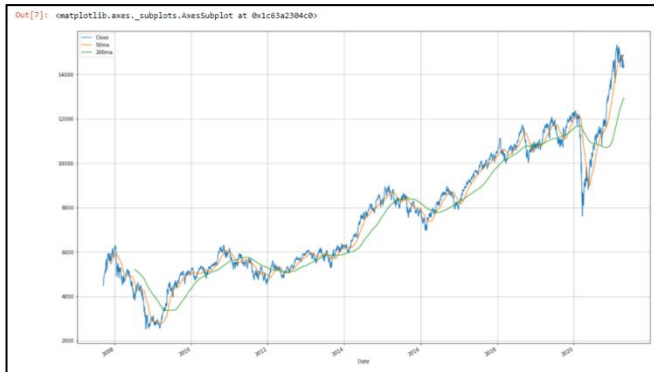


Fig.2. Moving Average Crossover Strategy Plotted by the system

Stochastic Oscillator: When doing the analysis of Stochastic Oscillator we will consider the MRF stock. Whenever the oscillator value touches the overbought region at that time then the stock prices may decrease in due time, same is applicable when the oscillator value touches the oversold region at that time the stock prices may increase.

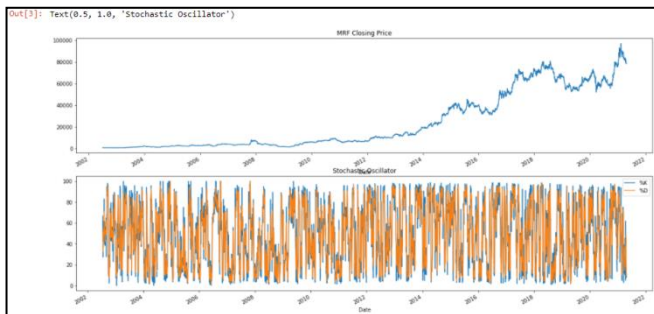


Fig.3. Stochastic Oscillator Strategy Plotted by the system

Bollinger Bands: When doing the analysis of Bollinger Bands we have taken Excel Industries stock into consideration for analysis. When the Bollinger band is in contracted state then the stock price moment remains in stagnant zone, but when Bollinger band goes into expansion state then the stock price can show some volatility in prices. And when the moving average cuts the stock price from above then stock price falls, while the stock price cuts the moving average from above then stock price rises.



Fig.4. Bollinger Band Strategy Plotted by the system

Relative Strength Index: When doing the analysis of Relative Strength Index we will consider the ITC stock. Whenever the RSI value touches the overbought region at that time then the stock prices may decrease in due time, same is applicable when the RSI value touches the oversold region at that time the stock prices may increase.

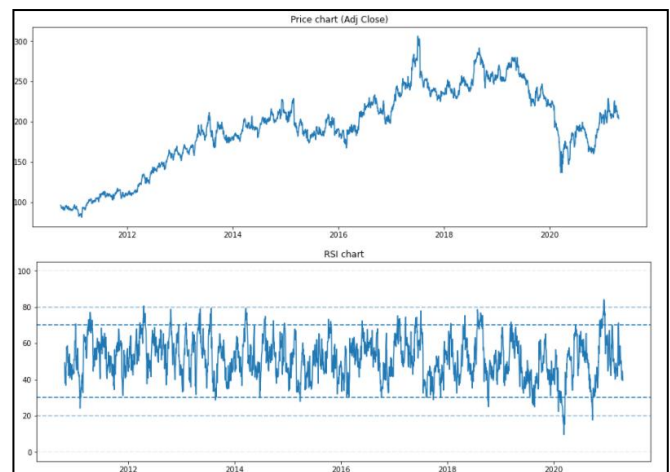


Fig.5. Relative Strength Index Strategy Plotted by the system

Fibonacci Retracement: When doing the analysis of Fibonacci Retracement we have used Abbott India stock for analysis. While plotting the Fibonacci levels the minimum level considered is 935 and the maximum level considered is 18679. Whenever the stock price falls down after the correction then Fibonacci levels acts as an important levels for the support level.

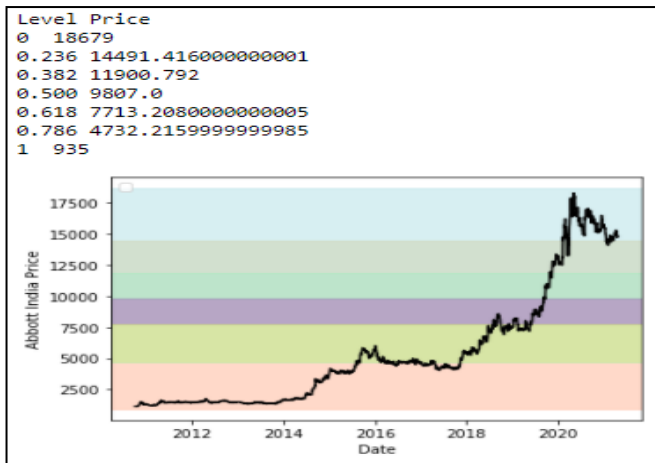


Fig.6. Fibonacci Retracement Strategy Plotted by the system

RESULT

To scrutinize the viability of the techniques proposed by our framework, we tried it on the long stretches of January, February, and March furthermore. The methodology recommended by our framework dealt with all the 3 months. The different techniques plotted by the framework gave a mean ROI of 11%, which is considered very acceptable and furthermore there was least danger taken while plotting.

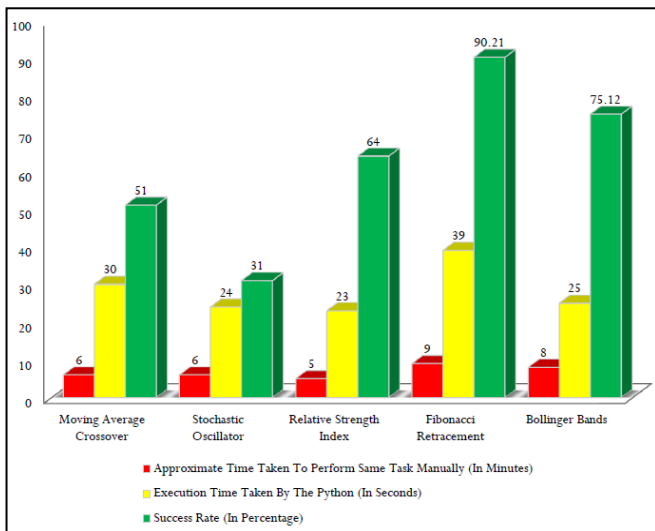


Fig.7. Comparative Analysis of Different Technical Indicators

The Fibonacci Retracement methodology plays out the best out of Five Technical Indicators that we have examined. Leading financial indicators have contemporaneous relationship with stock returns, however can't foresee the stock returns in short run. The capability of abundance returns utilizing enhanced settings for specialized indicators was shown by the outcomes got in a long term time of Indian Stock Market, which demonstrated that, all streamlined markers could create overabundance returns. Python is easy to use programming language additionally, the more reduced and discernible code is utilized by Python.

CONCLUSION

Technical Indicator Strategies are a major player across the stock market and will continue to dominate markets to replace human intensive tasks. Implementation of various strategies with the help of Python works well when the tasks are repetitive, frequent, human labor intense and can be expressed in crisp, unambiguous steps. This is proven by taking real world five Technical Indicator Strategies. The results are an indicator of the excellent gain the technology provides in terms of time saving and Profit rate, thereby reducing the number of Losses incurred in trading. In this project, we have created the strategies that are giving an edge over others and substantially reducing the risks. So in this manner, we have mitigated the essence of gambling. By using this research work, one can gain significant exposure to the Technical Indicator Segment and minimize the speculation risk. Once these strategies are tested rigorously for a longer duration, then these strategies can also be used for Currency and Cryptocurrency.

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