

An Analytical Approach for Algo trading

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Abstract— Algorithmic trading, also called automated trading, black-box trading or algo trading, is the use of computers for entering trading orders, with an algorithm deciding on aspects of the order such as the timing, price and quantity of the order, or in many cases initiating the order without human intervention. Expert and intelligent systems provide the mechanics for both reacting to and affecting a financial market that is now significantly faster and operating across multiple time zones and markets. This paper presents a rule based trading approach for algo trading by incorporating the concepts of Elliott waves. The study consists of three phases. In the first phase, we select a technical indicator. In the second phase, we define the rules for conducting trade using the selected technical indicator. In the third phase we analyse the trend using Elliot waves. The study is aimed at adoption, deployment and development of an algorithmic trading system.

Index Terms— Algo Trading, Bear market, Bull market, Elliott Waves, Fibonacci Retracements, Fibonacci series, Moving Averages, Technical Indicators.

1 INTRODUCTION

ALGO TRADING is also called Black Box Trading. It uses mathematical models to code programs for automatic trading. These programs have direct access to market and order trades from market when certain conditions are met. Thus algo trading is a combination of finance, trading, maths and computer science. We use historical data to develop the program. Its widely adopted in India.

Its fast, efficient, precise and can do things that humans cannot perform. The results are very well predictable. Its data based and does not consider any human emotions. Since algo trading is a combination of finance, trading, maths and computer science the system will produce wrong output if the rules that relate these are wrong. Moreover, there is a lifespan for each system, after which, we need to monitor the current change in market and redesign the system. Its a tedious and expensive process. Knowledge of market, computer, programming skills, business management etc. is a must to develop algo trading. Algo trading can be employed by rich and influential traders. This mainly affects common traders who doesn't use algo trading. Algo trading can make 800 transactions per second. So now-a-days, its said algo trading "creates an unfair advantage" to members who use the software against ordinary investors who participate in trading.

Futures and option markets are considered fairly easy to integrate into algorithmic trading. Future market is a market wherein people trade with a contract signed for future that is based on certain asset value (stock, currency rate etc.) the stocks are priced and delivery is set at a particular time in the future time.

Liquidity is the commodities ability to be sold with minimum loss. By granting a trading option, we can supply liquidity. Options can be used to engage in future transactions. Determining investment strategies in the stock market is quite difficult since many factors, including political events, general economic conditions, and investors expectations influence the stock market. The stock market is essentially a non-linear, non-parameter system, and it is extremely hard to model with any reasonable accuracy. Although there have been numerous attempts in the past to predict the next trend, the best perform-

ers have traditionally been the ones who possess considerable knowledge of the markets. However, they are only human and are very limited in their capacity to assimilate information and spot subtle trends in the information, which may be the indicators of an imminent change in the value of market stock data.

For this reason, several researchers in finance and investment have begun to use information system fields, including expert systems and artificial intelligence technologies for predicting the stock market. Others have also predicted price movements in the stock market by using artificial neural networks.

2 THE ANALYSIS OF ALGO TRADING

2.1 Problem Description

Markets have entered an era where machines are rapidly replacing humans. Pro-programme-driven trades account for around 70 per cent of trading in the US and for 40 per cent in Europe. We in India are not far behind with one-third of trades in both cash and derivative segments of the National Stock Exchange driven by such programmed orders.

Two arguments put forth by supporters of algorithmic trading are that these trades improve liquidity. It is now estimated that 70 percent of trades are system-based. Computers can crunch past data and numbers to give you a better understanding of what kind of outcome to expect in the future. Most people can't glance at numbers and past data and tell what kinds of trends are forthcoming. Algorithmic trading systems are created to make sure that you don't miss anything. Algo trading was created to follow these markets and watch over trends based on timing, cost, and quantity. They crunch more data than humans can which will allow traders to trade more than they would with the use of these computers. The main advantage of using computers to base your trade decisions is the fact that they completely eliminate human error and trading based on emotions. You don't have to know much about trading to succeed when using these automated systems.

Investment strategies in stock market have gained unprece-

dedented popularity in major financial markets around the world because of

- dynamic fluctuations of the stock market. Studies based on rough set on the rule base where performed to develop real-time investment strategies using technical analysis in futures market.
- the influence of embedded noise and price fluctuations that confuse the interpretation of stock trends.

The methods previously suggested was:

- A novel stock trading method, called the Trading Decision Maker (TDM), based on price series smoothing to reveal important change-points [1].
- Tendency transition inference is used to identify the important change-points effectively [2].
- AlgoStudio and StrategyStudio launched by NSE.IT Limited, a software development branch of National Stock Exchange of India Limited (NSEIL).
- AIOTrade (formerly Humai Trader Platform) is a free, open source stock technical analysis platform built on pure Java.
- High-frequency trading (HFT), where the pro gramme that smells out opportunities and executes them the fastest, scores.
- algorithm that identifies price anomalies between price of an asset over different platforms or deviations from typical statistical relationship between assets and executes trades to exploit these differences.

2.2 Suggested Solution

In this paper a rule based trading approach is proposed using pro-log as the programming language. Elliot waves is finally employed to depict the trend in the market.

1) Rule Based Trading Approach Description Using Prolog

Logic programming is a programming paradigm based on mathematical logic. In this paradigm the programmer specifies relationships among data values (this constitutes a logic program) and then poses queries to the execution environment (usually an interactive interpreter) in order to see whether certain relationships hold. Putting this in another way, a logic program, through explicit facts and rules, defines a base of knowledge from which implicit knowledge can be extracted. This style of programming is popular for data base interfaces, expert systems, and mathematical theorem provers. Pro-log has no types.

There are two types of clauses: facts and rules.

A rule is of the form:

Head :- Body.

Clauses with empty bodies are called facts. An example of a fact is:

cat(tom).

2) Technical Indicators

Various technical indicators are used to indicate the trend in the market. It shows variation of price data or volume stock data with respect to time or some other parameter. It helps to make sound and profitable decision in trading. Various types

of technical indicators are:

- MA(Moving Averages)
- DMI (Directional Movement Indicator)
- MACD (Moving Averages Convergence Divergence)
- SMI (Stochastic Momentum Index)
- TRIX (Triple Exponentially Smoothed Moving Average)

In here we are using moving averages as the technical indicator. Its calculated as:

$$MA(t) = (X(t) + X(t-1) + \dots + X(t-k)) / k$$

k->period(also called as smoothing window/window)

a) Algorithm For Calculating Moving Averages:

Step 0: Input the current year

Step 1: take the historical data of price for 6 values say on Jan 1st, March 1st, May 1st, July 1st, Sept 1st, November 1st.

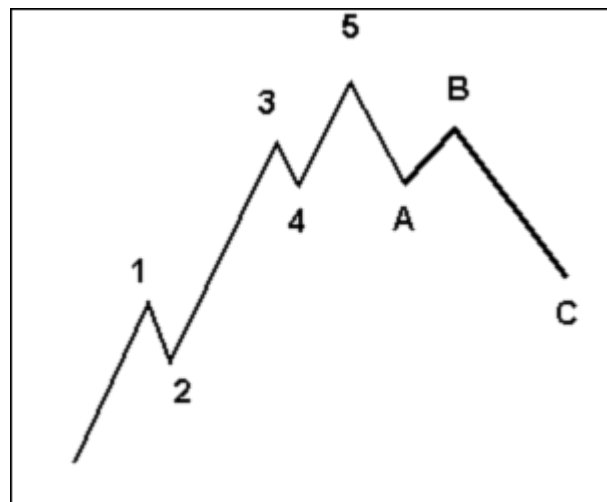
Step 2: Calculate the moving average value of the above data by using the above mentioned formula.

Step 3: Repeat the above steps for the previous 5 years from the current year.

Step 4: Plot the MA values in graph using Visual Prolog Features.

2.3 Using Elliot Waves To Depict Data And Analyze Trend

In Elliott model a wave is divided into classes and degrees. Classes is divided into impulses and corrections. Impulses go in the direction of primary trend. Corrections has 3 segments. It goes against the primary trend. Market prices alternate between an impulsive, or motive phase, and a corrective phase on all time scales of trend, as the illustration shows.



Impulses are 1,2,3,4,5 and corrections are A,B,C.

There are 8 different degrees. They are : Super cycle(indicates decades), Cycle(indicates several years), Primary (indicates months to couple of years), Intermediate(weeks to months), minor(indicates weeks), minutes(days), minuets(hours), subminu-

ettes(minutes).Traders select among these. Before plotting the graph, we need to consider the time period for which the process is monitored.

Let us consider characteristics of each wave:

- Wave 1: Happens when the market psychology is practically bearish. News are still negative. As a rule, it is very strong if it represents a leap (change from bear trend to the bull trend, penetration into the might resistance level, etc.). In a state of tranquility, it usually demonstrates insignificant price moves in the background of general wavering.
- Wave 2: Happens when the market rapidly rolls back from the recent, hard-won profitable positions. It can roll back to almost 100% of Wave 1, but not below its starting level. It usually makes 60% of Wave 1 and develops in the background of prevailing amount of investors preferring to fix their profits.
- Wave 3: Is what the Elliott's followers live for. Rapid increase of investors' optimism is observed. It is the mightiest and the longest wave of rise (it can never be the shortest) where prices are accelerated and the volumes are increased. A typical Wave 3 exceeds Wave 1 by, at least, 1.618 times, or even more.
- Wave 4: Often difficult to identify. It usually rolls back by no more than 38% of Wave 3. Its depth and length are normally not very significant. Optimistic moods are still prevailing in the market. Wave 4 may not overlap Wave 2 until the five-wave cycle is a part of the end triangle.
- Wave 5: Is often identified using momentum divergences. The prices increases at middle-sized trade volumes. At the end of the wave, the trade volumes often rise sharply.
- Wave A: Many traders still consider the rise to make a sharp come-back. But there appear some traders sure of the contrary. Characteristics of this wave are often very much the same as those of Wave 1.
- Wave B: Often resembles Wave 4 very much and is very difficult to identify. Shows insignificant movements upwards on the rests of optimism.
- Wave C: A strong decreasing wave in the background of general persuasion that a new, decreasing trend has started. In the meantime, some investors start buying cautiously. This wave is characterized by high momentum (five waves) and lengthiness up to 1.618-fold Wave 3.

2.4 Fibonacci Retracement

Numbers from the Fibonacci sequence surface repeatedly in Elliott wave structures, including motive waves (1, 3, 5). In finance, Fibonacci retracement is a method of technical analysis for determining support and resistance levels. Fibonacci

retracement is based on the idea that markets will retrace a predictable portion of a move, after which they will continue to move in the original direction.

In technical analysis, Fibonacci retracement is created by taking two extreme points (usually a major peak and trough) on a stock chart and dividing the vertical distance by the key Fibonacci ratios of 23.6%, 38.2%, 50%, 61.8% and 100%. Once these levels are identified, horizontal lines are drawn and used to identify possible support and resistance levels. Before we can understand why these ratios were chosen, we need to have a better understanding of the Fibonacci number series.

The Fibonacci sequence of numbers is as follows: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, etc. Each term in this sequence is simply the sum of the two preceding terms and sequence continues infinitely. One of the remarkable characteristics of this numerical sequence is that each number is approximately 1.618 times greater than the preceding number.

The Fibonacci ratios play an important role in the stock market, just as they do in nature, and can be used to determine critical points that cause an assets price to reverse. The direction of the prior trend is likely to continue once the price of the asset has retraced to one of the ratios listed above.

a) Algorithm for analysing the trend:

Step 0: Identify an important low point .

Step 1: Identify the correction and impulses.

Step 2: Identify if its wave 1,3, or 5 extensions

Step 3: Decide if bull or bear market as the repetitions will follow Fibonacci series.

Step 4: Enter your trades at low-risk points(when the larger trend has a high probability of resuming).

Step 5: Exit trade at high-reward points (when the larger trend has a high probability of ending or halting).

You can make the most of these two advantages of the Elliott wave analysis by entering at the start and exiting at the end of the corrective waves.

3 CONCLUSION

Employing automated trading strategies eliminates all influences from emotion driven human trading and allows a pure systematic trading approach. Algo trading describes the execution of electronic trading strategies involving extremely rapid capital turnover. It is characterized by the use of computer algorithms to analyze quote data and detect and exploit trading opportunities, with windows as short as milliseconds or even microseconds.

Algorithmic trading is carried out by hedge funds and proprietary trading groups, but can also be performed by an individual with a trading account with a broker. All that is needed is a reasonably good computer, a broker and a source of historical data. If you want to automate your algorithmic trading, that is, make your computer place orders for you, then you will also need good programming skills and an application programming interface (API) from your broker. The API typically includes libraries and documentation that allow you to connect your own program directly to the broker to automate order-placement, retrieve historical data, etc.

This study lead to analysis of an algorithm to perform trade

based on technical indicator analysis and used Elliott waves to depict the market behavior .

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