**International Academy of Science,
Engineering and Technology**
Connecting Researchers; Nurturing Innovations
**IASET**

# STOCK MARKET PREDICTOR

## S. S. GHADI[1], J. H. KHAMBATY[2], M. K. JHAVERI[3] & S.NAIR[4]

[1,2,3]Student, Department of Computer Science, DJSCOE, Vile-Parle (W), Mumbai, India

[4]Faculty, Department of Computer Science, DJSCOE, Vile-Parle (W), Mumbai, India

## ABSTRACT

Stock markets are highly fluctuation and hence are generally extremely tough to predict. Technical Analysis is the most reliable method for stock market prediction as it helps predict with a great amount of accuracy. Technical Analysis basically consists of analyzing price charts of various stocks and predicting future stock market trends based on the patterns identified during the analysis. According to technical analysts, all the factors including fundamental factors are taken into account and included by the price of the stock. One of the main obstacles of technical analysis being widely accepted as an efficient stock market prediction method is its subjective nature i.e. the various geometric shapes and patterns formed in charts. We will be using various chart patterns and indicators to help in accurate and better stock market trend predictions.

**KEYWORDS:** Stock Market, Patterns, Moving Average

## INTRODUCTION

Technical analysis is one of the most reliable methods for prediction of stock market trends i.e. bullish or bearish trends. Technical analysis basically means analyzing charts. Technical analysts believe that the company's fundamentals, along with broader economic factors and market psychology, are all priced into the stock, removing the need to actually consider these factors separately. Technical analysis uses chart patterns and indicators to identify current market trends. Once the trend is established, future price movements are highly likely to follow that trend. We will be using chart patterns such as Head and Shoulders, Double Tops and Bottoms, Triangle and indicators such as Moving Average Convergence Divergence.

### Chart Patterns

A chart pattern is a distinct formation on a stock chart that creates a trading signal, or a sign of future price movements. Chartists use these patterns to identify current trends and trend reversals and to trigger buy and sell signals.

The main idea is that certain patterns get repeated many times, and that these patterns have a high probability of movement in a certain direction. Based on the chart pattern trends, investors can identify good trading opportunities. We will be using the following chart patterns:

### Head and Shoulders

Head and shoulders is a reversal chart pattern that when formed, signals that the security is likely to move against the previous trend.

**Figure 1: A Head and Shoulders Pattern**

In the above figure we observe that there are two versions of head and shoulders patterns. The one on the left is a chart pattern that is formed at the high of a upward trend and on the right is a chart pattern that is formed at the low of a downward trend.

### Double Tops and Bottoms

This chart pattern is another well-known pattern that signals a trend reversal - it is considered to be one of the most reliable and is commonly used. These patterns are formed after a sustained trend and signals that the trend is about to reverse.

The pattern is created when a price movement tests support or resistance levels twice and is unable to break through. This pattern is often used to signal intermediate and long-term trend reversals.
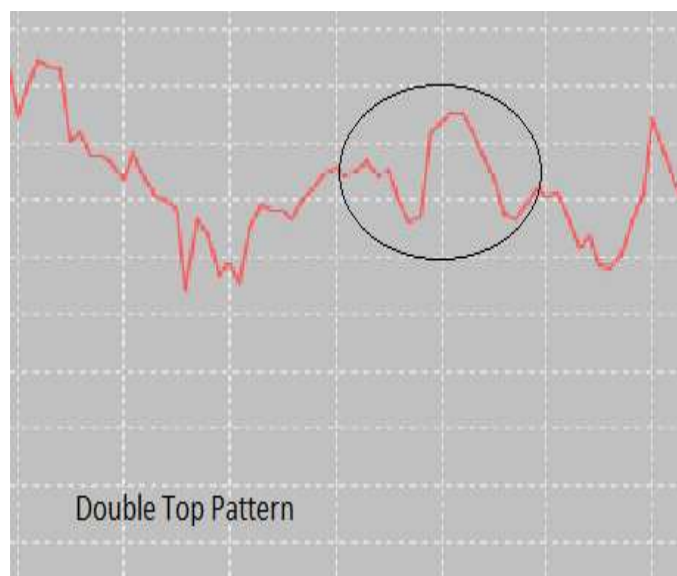


**Figure 2: A Double Top Pattern**

### Triangle

The three types of triangles, which vary in construct and implication, are ascending and descending triangle.
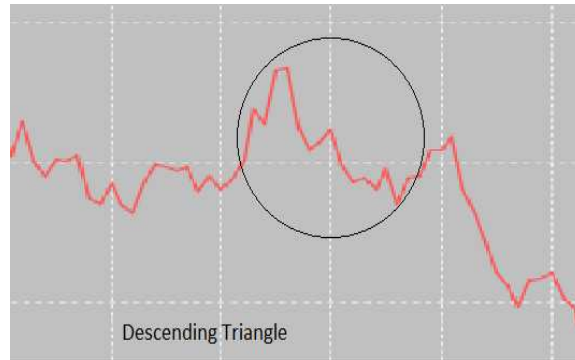
**Figure 3: A Descending Triangle Pattern**

Ascending triangles represent a bullish pattern where traders look for a breakout in the upward direction while descending triangles represent a bearish pattern where traders look for a breakout in the downward direction.

*Moving Average*

Moving averages are used to smooth the price data to form a trend following indicator. They do not predict the price direction, but rather define the current direction [3].

The two most widely used moving averages are:

*Simple Moving Average*

A Simple Moving Average is formed by calculating the average price of the stock over a specific number of days. Most moving averages are based on closing price. A 5-Day moving average is the five day sum of closing prices divided by five [1].

*Exponential Moving Average*

EMA reduces the lag by applying more weightage to recent prices. The weightage applied to most recent prices depends on the number of periods in the moving average.

*Moving Average Convergence Divergence [1]*

MACD is technical analysis indicator. It used to detect changes in the strength, direction, momentum, and duration of a stock market trend. The MACD is calculated by subtracting the 26-day exponential moving average (EMA) from the 12-day EMA [4]. A nine-day EMA of the MACD, called the "signal line", is then plotted on top of the MACD, functioning as a trigger for buy and sell signals. Signal line is plotted using 9 days EMA of MACD [2].
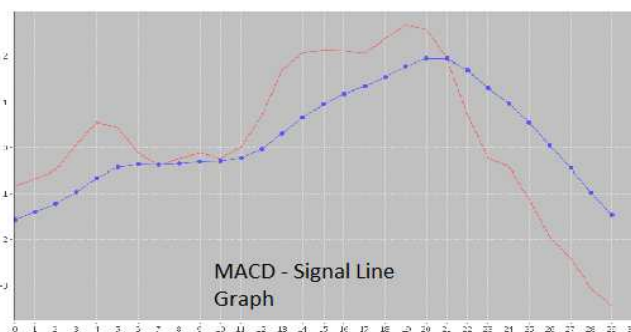


**Figure 4: MACD – Signal Line Graph**

## EXISTING WORK

### *Apriori Algorithm*

Apriori Algorithm is a classic algorithm for frequent item set mining and association rule learning over transactional databases. It proceeds by identifying the frequent individual items in the database and extending them to larger and larger itemsets as long as those itemsets appear sufficiently often in the database. The frequent itemsets determined by Apriori can be used to determine association rules which highlight general trends in the database: this has applications in domains such as market basket analysis. Apriori uses a "bottom-up" approach, where frequent subsets are extended one item at a time (a step known as candidate generation), and groups of candidates are tested against the data [7]. The algorithm terminates when no further successful extensions are found.

### *UMining Algorithm*

In UMining the authors described a unified framework for utility based measures for mining itemsets. Utility based measures use the utilities of the patterns to find the user's goals. A utility based measure takes into consideration both the statistical and the usefulness aspects of the raw data [4]. Later, in the knowledge discovery process, the utilities are used in one of the three following ways: (i) the measures are used to prune the uninteresting patterns to improve the mining efficiency. (ii) The patterns are ranked based on their usefulness or (iii) the utilities are compared after mining process is completed. Using a combination of above mentioned methods, UMining algorithm finds the desired itemsets.

### *FP-Growth Algorithm*

The FP-Growth Algorithm is a highly efficient and compact algorithm for frequent itemsets mining without candidate set generation [3]. In phase I, the FP-tree is constructed via the following steps: (i) the database is scanned once and the frequent itemsets are collected. (ii) For each frequent transaction in the database, a node is created in the FP tree. In phase II, the bottom-up algorithm is used to extract frequent itemsets from the FP-tree by pattern fragment growth.

### *UP-Growth Algorithm*

The UP-Growth is one of the efficient algorithms to generate high utility itemsets depending on construction of a global UP-Tree [1]. In phase I, the framework of UP-Tree follows three steps: (i).Construction of UP-Tree. (ii). Generation of final Transaction Weighted Utility (TWU) from UP-Tree. (iii). Identify high utility itemsets using PHUI. The construction of global UP-Tree is as follows, (i).Discarding global unpromising items (DGU strategy) to eliminate the low utility items and their utilities from the transaction utilities. (ii). Discarding global node utilities (DGN strategy) during global UP-Tree construction. By DGN strategy, node utilities which are nearer to UP-Tree root node are effectively reduced. The TWU helps to compute all itemsets utility with the help of estimated utility. Finally, identify high utility itemsets (not less than minimum threshold value) from TWU values.

### *Improved UP-Growth Algorithm*

Improved UP-Growth algorithm generates high utility itemsets in two phases (Global and Local). Although DGU and DGN strategies used in UP-Growth algorithm are efficient enough to reduce the number of candidates in Phase 1 (i.e., global UP-Tree), they cannot be applied during the construction of the local UP-Tree (Phase-2). Instead use, DLU strategy (Discarding local unpromising items) to discarding utilities of low utility items from path utilities of the paths and DLN strategy (Discarding local node utilities) to discarding item utilities of descendant nodes during the local UP-Tree

construction. By this modification, performance will increase when compared with existing UP-Tree construction thereby improving the performance of UP-growth algorithm [2]. An improved utility pattern growth is abbreviated as IUPG.

## PROBLEM STATEMENT

When a person wants to invest his money in the stock market, he usually requires the assistance of a broker to help him invest in good stocks. Many businesses invest lots of money in custom software's to help them predict stock market trends.

These solutions typically require a lot of money and technical know-how to make informed decisions. The customer does not understand the intricate workings of the stock market and may make rash decisions and invest in poor stocks.

We propose a solution that detects stock market trends and predicts the movement of these stocks in the future. Chart patterns are highly reliable methods to predict trends and the Exponential Moving Average provides a method to predict upcoming trends. This software is transparent in its working and provides users with graphs to view the performance of the stock. It is also simple in design by telling the user whether a certain stock is expected to perform well or poorly in the upcoming days.

## PROPOSED SYSTEM

In this section, we first introduce our proposed system which uses technical analysis to predict the future trends of stocks. We are using chart patterns and moving average convergence divergence to analyze and predict the future trends of stocks.

The main idea in using Chart Patterns is that certain patterns get repeated many times, and that these patterns have a high probability movement in a certain direction. Based on the chart pattern trends, investors can identify good trading opportunities. There are two main types of chart pattern, namely reversal and continuous. In reversal, a prior trend reverses its direction upon completion of trend. In continuous pattern, a trend will continue once the pattern completes. We will be considering the closing prices of the stocks to analyze the trends.

We will be using the following chart patterns and indicators:-

### *Head and Shoulders pattern and Inverse Head and Shoulders pattern*

Head and Shoulders are made up three parts, consisting of three tops where the middle high is above the higher points on either side. Our algorithm checks whether the last price move in a particular stock is the final penetration of a neckline in a head or shoulders formation. If, on day 'n', the price move is downward, the algorithm tries to identify the entire head and shoulders pattern.

- Identify the lowest price in each of the 3 last clusters of prices that are between -3% and 3% of the trade price at day n. The 3 lowest prices in each cluster and the last trade price is used to calculate the starting and end points of the shoulders and the head in the formation.

- Check that none of the clusters has prices below -3% of the price at day n. The price range between -3% and 3% constitute the neckline of the formation.

- Check whether the prices moved above 20% of the trade price at day n between the first and second point and

third point and day n. The top values between these two sets of points constitute the shoulders of the formation.

- Check whether the highest point between the second and third point is at least 40% above the trade price at day n and higher than the highest value of the other two tops. This forms the head part of the formation.

If these conditions hold, the agent has identified a head and shoulders formation and returns a sell signal. Similarly, when the price move at day 'n' is in the upward direction, the algorithm tries to identify an inverse head and shoulders pattern.

### *The Double Top and Bottom patterns*

Double top and bottom formations are chart patterns made up of two consecutive price moves followed by reactions back to the initial starting point of the advances. The two tops or bottoms that make up the pattern need not be exactly same, only in the same general price vicinity. A double top is considered completed when prices move below the threshold low between the two tops of the formation. A double bottom is completed when prices move above the threshold high value between the two bottoms of the formation.

The double top and bottom agent checks for a double extremes formation determined by the stock trade price move the last day. If this direction is downward, then we try to identify a double top pattern. This is done using the following steps:

- Identify if there exist two prior trade days with trade price at most 1% lower than that of day n but with prices being at least 25% higher than that of day 'n', in between them.

- Check whether the difference in length of the time period between each of the two minimum points and the highest value between them does not exceed 30%.

If the above two conditions are met, then a double top pattern is identified and sell signal is generated. Similarly, a double bottom is identified when two bottoms are formed in the same manner as above and a buy signal is generated.

### *Descending Triangle and Ascending Triangle patterns*

The descending triangle is a bearish formation that usually forms during a downtrend as a continuation pattern. Two or more comparable lows form a horizontal line at the bottom. Two or more declining peaks form a descending trend line above that converges with the horizontal line as it descends. A descending triangle gets completed when the price of a stock keeps on dropping. The following steps are used to identify a descending triangle pattern:

- The algorithm first finds out the values in 1% range of the price of day 'n' and stores their positions in array 'x'. Then, starting from the last position stored in that array we find the highest maximum value.

- Next we consider another position from the array 'x' such that it comes after the first maximum position. From this position we then find another maximum value which is less than the previous maximum value. Similarly, we find the next maximum value in the series.

- Once these maximum values are obtained, the algorithm detects that three triangular patterns are formed such that the peak of the successive triangle is less than its predecessors.

If the above conditions are met, the algorithm detects a descending triangle pattern and generates a sell signal.

Similarly, an ascending triangle pattern can be detected by finding a pattern which contains successively increasing series of minima values, and based on this pattern the algorithm generates a buy signal.

*Moving Average Convergence Divergence*

Moving average convergence Divergence indicator is one of the simplest and most effective momentum indicators available. The MACD turns two trend-following indicators, moving averages, into a momentum oscillator by subtracting the longer moving average from the shorter moving average. We will be considering 26-day EMA (Exponential Moving Average) as the longer moving average and 12-day EMA as the shorter one. As a result MACD offers the best usage of trend following and momentum.

Formula for Exponential moving Average:

EMA (yesterday) = closing price (yesterday)*k + EMA (previous day)*(1-k)

Where k=2/ (Time period + 1)

Based on the MACD values obtained we calculate the 9-day EMA of MACD values. The graph of 9-day EMA values acts as the signal line. As a moving average of the indicator, it trails the MACD and makes it easier to spot MACD turns. The MACD fluctuates above and below the zero line as the moving averages converge, cross and diverge. The algorithm looks for signal line crossovers and tries to generate signals.

Based on the movement of MACD line with respect to the Signal line, the algorithm generates signals using the following method:

- A bullish crossover occurs when the MACD turns up and crosses above the signal line. If a bullish trend is observed then a buy signal is generated.

- A bearish crossover occurs when the MACD turns down and crosses below the signal line. If a bearish trend is observed then a sell signal is generated.

Crossovers can last a few days or a few weeks, it all depends on the strength of the move.

## RESULTS

Based on the proposed system MACD and Signal line values were calculated for past one year. Based on the latest 30 values (from March 18th, 2014 to April 17th, 2014) we predicted the future price movement of the stock of 430 companies with an accuracy of 63.1% for an upcoming period of 2 days.

## CONCLUSIONS

Thus, using technical analysis methods such as chart patterns and MACD indicator, we were able to predict the future price movement of stocks.

## REFERENCES

1. Fredrik Larsen, Automatic stock market trading based on Technical Analysis, Norwegian University of Science and Technology Department of Computer and Information Science, Feb2007.

2.   K. Senthamarai Kannan, P. Sailapathi Sekar, M. Mohamed Sathik and P. Arumugam, Financial Stock Market Forecast using Data Mining Techniques, International Multi Conference of Engineers and Computer Scientists, Mar 2010.

3.   Andrew W. Lo, Harry Mamaysky, Jiang Wang, foundations of technical analysis: computational algorithms, statistical inference, and empirical implementation, March 2000.

4.   S Abdulsalam Sulaiman Olaniyi, Adewole, Kayode S.,  Jimoh, R. Gstreams, Stock Trend Prediction Using Regression Analysis – A Data Mining Approach, ARPN Journal of Systems and Software, July 2011.