

A Study on use of Artificial Intelligence for Stock Market Prediction - An Exploratory Research

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Abstract

Stock market predictions are driven both by data published by stock exchanges as well as human behaviour (behavioural finance). To a large extent human interventions in a decision making process may lead to wrong judgements there by resulting in losses to the investors. Institutional investments are more risky since it involves huge money of large no of investors. This has led to need for more predictive behaviour: which could best be achieved through artificial intelligence. Artificial intelligence helps in conceiving large quartiles of data there by making investment decisions more accurate. It summarizes the findings of systematic approach over building trade system and an application of artificial intelligence (mainly genetic algorithms and neural networks). To find out the best solutions while the use of artificial intelligence principles gives traders a powerful tool in building robust trading system. This study pertains to historical data as well as the conclusions derived from analysing other textual data including quarterly results and press release.

Keywords: - Behavioural finance, Artificial intelligence, genetic algorithms, neural networks, stock market prediction, predictive behaviour.

Stock Market in Global Scenario:

In present era of liberalization, Privatisation and globalisation the international investments and diversification of portfolio internationally is an important issue, especially in the time period when stock markets are highly volatile, normally people invest in the stock market with purpose of earning returns. An investor designs his portfolio in which he includes different stock or group of stock in sectorial basis to achieve his purpose of maximum returns with minimum risk. International diversification can be an option as rationale behind that stock returns within a country can be highly correlated because of similar investment but internationally conditions can different on account of economic, political system like tax, tariff. International stock conditions behaviours are entirely different. American stock market fluctuations can affect many EU countries and other countries. Gulf countries stock market effects on all other countries especially the petroleum products.

Stock Market in Indian Scenario

India is the fastest Growing country among other countries. Indian stock market will definitely influence in global scenario. Indian political system in such a way that the stock market fluctuations are predominantly focusing on economic environment.

Emerging markets are an alteration place for investment because of various reasons like open market system, liberal guidelines towards FDI & FII. At the time allocation of fund in internationally diversified portfolio, an investor would like to compare returns in market.

Indian markets are about three times more volatile as compared to other emerging markets and almost five times more than the volatile in developed markets functions on two major stock Exchanges BSE and NSE,

Players in Stock Market

There are many investor will predominantly invest in the stock market investors like:

- Sole Traders or Individuals
- Partnership Firms
- HUF's
- Companies
- Co-operative Societies
- Mutual Fund Companies
- Statutory Organisations.

Reasons for Investments

There are various reasons for investing in stock markets, it various from player to player depends on the attitude of the investors. Usually individual investors seeks for security from losing the money, where companies will expects more returns. But it is different in case of mutual fund companies because they need balance both risk and returns where there are dealing with others money. Fund managers always go for experts analysis regarding investments, so our paper is mainly concerned with stock market prediction which more suitable for the fund managers (mutual fund companies).

Trading Off between Risk and Returns

High risk is associated with greater probability of higher returns and lower risk with a greater probability of smaller returns.

This trade off which an investor faces between risk and returns consideration investment decisions is called the risk return trade off.

Techniques need for investment decision

In stock market investment an investor focuses on various investment decision like:

- Sensitivity analysis
- Scenario analysis
- Decision tree analysis
- Break even analysis
- Risk adjusted discount rate method
- Certainly equivalent analysis

How behavioural Finance Plays Major Role in Investment Decisions

Behavioural Finance is a relatively new field that seeks to combine behaviour and cognate psychological theory with conventional economics and finance to provide explanations for why people make irrational financial decision.

Human psychology plays an important role in how individual make investment decisions. Investors are more realistic in taking decisions they behave in such a way to make profit always.

Financial theory suggests investors to take rational decisions during the investments. The investors will necessarily analyse the risk during buy or sell of the same in various dimensions.

Role of Artificial Intelligence in Stock Market Prediction

Technology, Machines are a part of our humanity. We created them to extend ourselves and that is what is unique about human beings- Ray Kurzweil.

Tools of artificial intelligence in stock market prediction:-

1. Artificial Neural Network
2. Genetic Algorithm

Artificial Neural Network (ANN)

An Artificial Neural Network is an information processing model that rose from the desire to artificially stimulate as per the structure and functions of biological nervous system. It is made up of a large number of highly interconnected processing element working together to given problem specific solution. These elements are called as neurons, the network displays adaptive learning and linear in nature. ANN is used for applications specific to the needs like pattern recognition or data classification through the process of learning.

The first practical application of ANN was done in the late 1950’s by Rosenblate 1958 on the perception.

The neurons are the basic information processing unit of any neural network. It is made up of A set of links with weights W1, W2, W3, W4Wn.

A linear combines adding function for calculation the inputs with weights

$$U = \sum_j^m =$$

An activation function

$$Y = (v+b)$$

There are Three Types of Learning

Supervised Learning: in this type of learning, network is provided with input and output pairs to train the network. Once the training is completed the network would be able to map unseen input appropriately.

Unsupervised Learning: the network has to figure out a pattern with inputs provided without any external help.

Reinforcement learning: it is similar to supervised learning. It provides some kind of feedback that help in error calculation. However it would not provide exact target but instead would give a value based on system performance.

General implementations for predicting stock price using ANN

The input variables that are usually considered for the last date are

- Opening stock price
- High value of stock price
- Low value of stock price
- Stock value
- Closing price

Genetic Algorithm

Genetic Algorithm are problem solving method that mimic the process of natural evolution unlike ANN, designed to function like neurons in the concepts of natural selection to determine the best solution for a problem.

In the stock markets, genetic algorithms are most commonly used to find the best combination values of parameters in a trading sale, and they can be built into ANN models designed to pick stocks and identify trades.

How Genetic Algorithm works in stock market

Genetic Algorithm are created mathematically using vectors which are quantities that have direction and magnitude. The parameter for each trading rule are represented with one dimensional vector that can be thought as a chromosome in genetic terms. It also includes moving average convergence divergence (MACD), an exponential moving average (EMA).

Curve fitting are designing a trading system around historical data rather than identifying repeatable behaviour, it represents a potential risk for traders using genetic algorithm.

Bottom Line

Genetic algorithms are unique ways to solve complex problem by harnessing the power of nature. By applying these methods to predicting securities prices. Traders can optimise trading rules by identifying the best values to use for each parameters for given securities.

Strategies of Genetic Algorithm

Pairs trading

This is a long short ideally market neutral strategy enabling traders to profit from transient discrepancies in relatives value of close substitute. In this law of one piece can guarantee convergence of process.

Delta neutral strategy

It describes a portfolio of related financial securities in which portfolio value remains unchanged due to small changes in the value of underlying.

Strategies that only pertain to dark pools

It is an alternative trading system that are private in nature and thus do not interact to provide hidden liquidity to large blocks of securities. The dark pool trading plays anonymously with most orders hidden.

Objectives of the Study

- To access predictability of stock market by using neurologic approach
- To evaluate neural networks support vector machines.

Review of Literature

1. Application of Artificial Intelligence and Data Mining Techniques to Financial Markets (PETER KONCZ)

Here in this paper author explained about role of artificial intelligence data collecting and how artificial intelligence can be used in stock market predictions. This paper concluded with the tools which are used in data mining and financial markets, but no comparison of behavioural finance and implication of artificial intelligence tools.

2. The use of artificial intelligence in building automated trading system (Jan juricek)

This paper dealt with use of artificial intelligence in to improving the results of automated trading systems on stock markets. The article introduces the reader with the concept of long term success in trading in financial markets. It defines general fundamental and mainly technical approach of building automated trading system as well as its components, risk management, entry and exit strategy and money management. This work is focusing on systematic approach and components.

Conclusion

The paper is concluded that ,here we tried to focus on the tools of artificial intelligence (Neural Network and Genetic Algorithm) are more accurate predictors than behavioural finance. Implementation of these tools have been done in foreign stock markets, this paper is just a comparison of behavioural finance and artificial intelligence.