SENSEX Price Fluctuation Forecasting Comparison Between Global Indices and Companies Making It

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ABSTRACT

This article describes how the stock markets form the pivot point in any economy and the health of the economy is depicted by the major indices of that market. These indices tell the overall working of the markets. SENSEX is the sensitivity index of Bombay Stock Exchange (BSE) and is one of the major stock indices traded in India which is impacted by a large number of global and domestic factors. A fall in the stock market of the United States of America or any other global market triggers a change in SENSEX as well. Thus, showcasing the high-end correlation between global markets. In this article, the authors are analyze and forecast the impact of major world indices on the SENSEX using ANN’s.

KEYWORDS

Artificial Neural Networks, Forecasting, SENSEX, Stock Market Index

INTRODUCTION

It is of critical importance for investors, financial analyst and financial planners to be able to make a forecast for the capital market index. There exist numerous forecasting models in the statistics but over a period of these models have started to reach their upper limit and models form machine learning have started to replace them. Many scholars like Ansari, Hamid, Huang, Kumar, Malik, Stansell, Trinkle, etc., have used the artificial neural networks quite frequently while studying the capital markets. There are two major reasons for the popularity of artificial neural networks in this field. Firstly, the artificial neural networks are driven from data i.e. they learn from the sample data. Thus, they don’t need any core hypothesis about the data. This type of model is known as universal function approximator, as said by Hornik and thus can do away with any severe misspecification complications because of wrong suppositions. Artificial neural networks are known to process extremely large amount of data. Second reason for popularity of artificial neural networks is that stock index data is extremely large, unstructured and difficult to model as price dynamics are unknown. All these factors work in favor of artificial neural network models.
Bombay Stock exchange is highly volatile and even prone to artificial demand creation. Also, BSE is highly correlated to global markets and any fluctuation in their indices impacts the BSE SENSEX. All the data of major global indices is in different currencies with varying exchange rates as well as in different time zones. Thus, there is extreme underlying complexity in the data making it fit for use in the artificial neural networks.

The rest of the paper is organized as follows. We first present a literature review which followed by an introduction to world major indices used in the study. After this, introduction to companies which make up the SENSEX is provided. Next section of the paper consists of the Data and methodology used in study followed by the results and conclusions.

LITERATURE REVIEW

In economics, the price volatility in the stock markets has been studied for a long time and the returns on different stocks has been debated for a long time. It was after the work on autoregressive conditional heteroscedasticity (ARCH) model by Eagle (1982) and work on generalized form of ARCH i.e. GARCH by Bollerslev (1986), that these models have strongly influenced the work on stock markets. White (1998); Christopher and William (1990), Ludger (1995), Huh et al. (2015), and many more have utilized the extensions in the GARCH models in their studies. In recent times, a lot of work is going on the stock markets in the emerging markets of pacific rim which are utilizing a set of different parametric models. The pioneers in using a changed parametric model are Talarposhti (2016), Robert (2013), Magdalena (2012) among many others.

It was White (1988) who used the artificial neutral networks for the first time to forecast the share markets. Ripley (1993) seems to be of the view that when a careful comparison of artificial neural networks is done with other methods in forecasting, there are chances that statistical methods may underperform to the artificial neural networks. Whereas, Sohn and Shin (2005) draws a conclusion from his work that it is highly unlikely that ANN’s will supersede the statistical methods and the applied statistic is highly unlikely to be reduced to an expert system.

Extremely large amount of work has been done to forecast price of a share in the stock markets. Pioneers in using Artificial Neural Networks for this among others include Sharma et al. (2015), Jonathan (2013), Kazem (2013), Zhong (2016), Hassan (2013), Patel (2015), Roberto (2015), Edolmen (1999), Abraham (2000), De Leone (2006), Aikan (1999), Lipinsk (2005), Xiaotam (2007), Keyong (2004), Garliauskas (1999), Bruce (2009), Karali (1997), Sftosos (2002). But at the same time, we also find the use of techniques like ARCH, GARCH, linear regression by researchers like Resto (2000); Dunis (2002); Sohn (2005), etc. But these techniques were used compare the result of artificial neural networks to these statistical methods.

In addition to the use of artificial neural networks and standard statistical methods, we have also found the use of Fuzzy logic based systems to generate a buy, sell and hold signal. The pioneer work in this field is done by Zhou and Dong (2004); Lin et al. (2002); Hiemstra (1994); Aisalakis et al. (2005); Kim et al. (2004); Carlson and Fuller (1996) and Mohammadin and Kingdam (2004) among others. We also find a few examples where genetic algorithms were used alongside Fuzzy logic to improve the accuracy of the fuzzy inference system.

THE INDICES

The SENSEX

According to (“Index View”, 2016), the S&P BSE SENSEX also known as BSE-30 or the SENSEX, is free-float market weighted index of 30 dominant and financially comprehensive companies listed on the BSE. SENSEX is published since 1st January 1986 and it is since then it is viewed as the beat of the Indian economy. SENSEX is taken as 100 on the base of 1st April 1979 with its base year
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