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Applicability of Prediction Techniques in the Stock Market-A Chittagong Stock Exchange Perspective

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ABSTRACT: **Predicting stock market movement is a challenging job in most of the bourses in the world. Researchers are incessantly trying to improve the techniques and methods to predict the stock market movement in a more accurate and scientific manner. This paper aims to test the applicability of widely used prediction methods in Chittagong Stock Exchange (CSE). To test the methods CSE-30 monthly index has been considered from 2008 to 2012. Popular methods like Least Square Regression Method, ARIMA, GARCH and ANN are employed. Research finds that all the techniques fail to predict the movement of stock prices to a greater extend. The reason behind the failure of all the techniques is the inefficient nature of the market.**

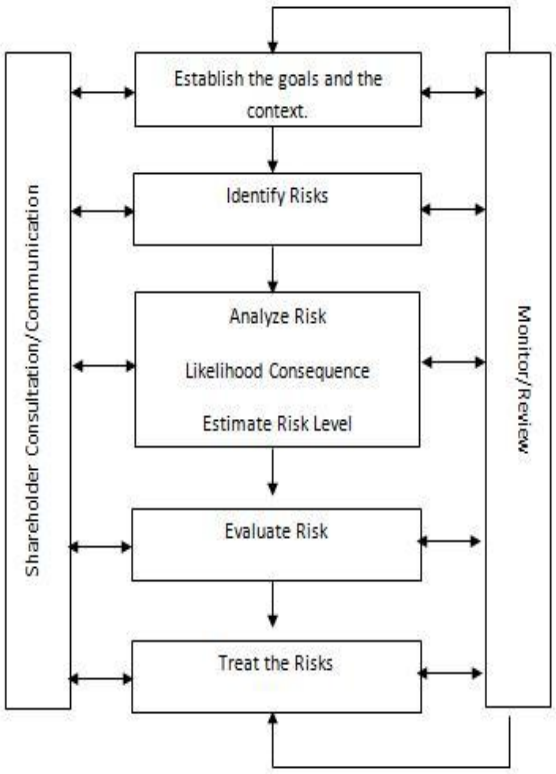
Key Words: CSE, Stock Index, Predictions.

1. INTRODUCTION

Stock market is a very risky sector for uncertain returns. Stock returns do not remain constant over time. Volatility in the stock market derives from economic events specific to individual firms and economic events that affect every firm in the economy. Investors face difficulty in managing risk associated with firms which come from the economy itself. The collection of all individual risks is called market risk. This market risk gives birth of volatility. Investors can manage risk by choosing appropriate stocks. Few investors are risk taker and few are risk averse. Usually it is a very nature of most of the investors to maximize return at lower risk but risk and return go hand on hand that is why in the real sense it is somehow impossible to ensure satisfactory return at low risk. An investor needs to manage both firm specific risk and market risk simultaneously. Firm specific risk can be diversified by investing in various stocks. But this does not help to reduce market risk. Market risk can be managed in two folds. First, investing in different types of assets, and second, selling stocks that have high market risk and buying stocks having low market risk. However, diversification of risk in traditional method is always costly and inconsistent. Risk can be managed by taking care of few issues like earnings per share (EPS), total debt, relative price strength, profit margin, industry leader, volumes etc. (bdstock). Risk is so important for the companies that they pay hefty amount to the experienced risk managers (Hillson, 2002). AS/NZS 4360:2004 prescribed the following steps to manage the risks.

> The success of the investor depends on the accurate prediction capacity.

a. Establish the goals and the context: This is a very important step. Here the context is established to define and set objectives of the given problem. Risk factors are classified in to strategic and operational segment. Strategic risk covers economic, environmental, legal, social, and public issues whereas operational risk covers human resource, reputation, technological, and other relevant strategic issues.
b. Identify Risks: At this stage, group discussion and brain storming are conducted to generate ideas. Only relevant and important ideas are picked for the further process. Risk is categorized in major four areas like financial, physical, ethical and legal. Risk is identified examining previous activities and events.
c. Analyze Risk: Here, threats are identified and rated according to the likelihood of occurrence. Risks are rated as extreme, high, moderate, and low.



Source: AS/NZS 4360:2004
Figure: The steps in risk management.

d. Evaluate Risk: At this stage, risk is either accepted or rejected based on the tolerance level. Issues like importance of risk management, potential or actual losses that may arise out of risk, benefits and opportunities of taking risk, degree of control on risk, etc are taken into consideration for the evaluation of risk. When an investment is supposed to experience a significant risk, it is marked as unacceptable risk.

e. Treatment of Risks: Risk can be reduced, avoided, shared, or retained. Decisions are made through proper calculations and idea contemplations to balance cost and effect.

Nature of stock market risks:

1. Systematic Risk: This type of risk cannot be managed and influences a large number of assets. It is literally impossible to protect oneself from such risk. Examples include inflation, interest rates, unemployment, political events, trade policy etc.
2. Unsystematic risk: This type of risk is specific risk and affects a very small number of assets. Diversification is the only way to protect from unsystematic risks. Examples include labor unrest, wage related problems, material crisis, etc.
3. Political Risk: Political risk refers to financial risks when a country's government changes its policies. This type of risk is very common in the developing countries.
4. Interest Rate Risk: This risk comes into scene when the rate of interest changes frequently and significantly. This risk affects the value of bonds.
5. Credit or Default Risk: Credit or default risk is such a risk when a company or an individual is unable to pay the contractual interest or principal on its debt obligations. Credit risk is very low for government bonds and very high for corporate bonds.
6. Country Risk: This is the state of a country when it cannot honor its financial commitments. It harms the performance of all other financial instruments in that country and other countries with which it has relations. Country risk is associated with stocks, bonds, mutual funds, options, and other futures that are issued within the country.
7. Foreign-Exchange Risk: When a person invests in a foreign country, the fluctuation of exchange rate between the countries is termed as foreign-exchange risk. This risk is associated with all the instruments issued by the other countries except the domestic country.
8. Market Risk: Market risk represents the volatility of the stock prices. Market risk specially affects stocks and options.

To be successful in the stock market, an investor should have profound knowledge and experience on stock market prediction techniques. Stock market prediction is the process of determining the future value of a company's stock or other financial instruments. Yield in stock market is highly depended on the successful prediction ability of stock prices. Successful Prediction again hugely depends on the efficiency of the market. An efficient stock market makes the prediction process easier. The astounding growth of investment in stock market is a good sign of economic progress. Stock market prediction has become an important research topic for the intensified competition in this sector and complexity in products. Researchers, academicians, professionals and different concerned bodies are continuously enriching this field by innovating reliable and scientific methods to predict the stock market movement. Most of the cases, brokers prefer to use technical trading rules to buy and sell the stocks.

Different artificial intelligence methods are also used to serve the purposes. Stock market analysis falls into the following two categories.

i. Fundamental Analysis
ii. Technical Analysis

Fundamental Analysis:

The basic assumption of this approach is that human society needs capital to make progress and if profit is earned it should be rewarded with additional capital and result in a surge in stock price. Analysis of financial statements is a basic tool for fundamental analysis. Different ratios like Profitability Ratio, Market Based Ratio, Liquidity Ratio, Activity Ratio, Financial Stability Ratio, Cash Sufficiency Ratio, Cash Flow Efficiency Ratio etc are used to measure the strength and potentiality of a company. Apart from this, top-down analysis is also used to analyze the stock market from a holistic viewpoint. The top-down investor starts his or her analysis with global economics, including both international and national economic indicators, such as GDP growth rates, inflation, interest rates, exchange rates, productivity, and energy prices. He or she narrows his or her search down to regional/industry analysis of total sales, price levels, the effects of competing products, foreign competition, and entry or exit from the industry (Hirt & Block, 2011). On the other hand, the bottom-up investor starts with specific businesses, regardless of their industry/region.

Technical Analysis:

This is forecasting of future financial price movement based on the past price movements. It does not result in absolute predictions rather it helps analysts to know what is "likely" to happen to prices over time. Technical analysts use bar charts of market trends and turning points to develop price forecasts. A technical analyst uses price, volume, and open interest to predict price movements. Various charts are used for technical analysis

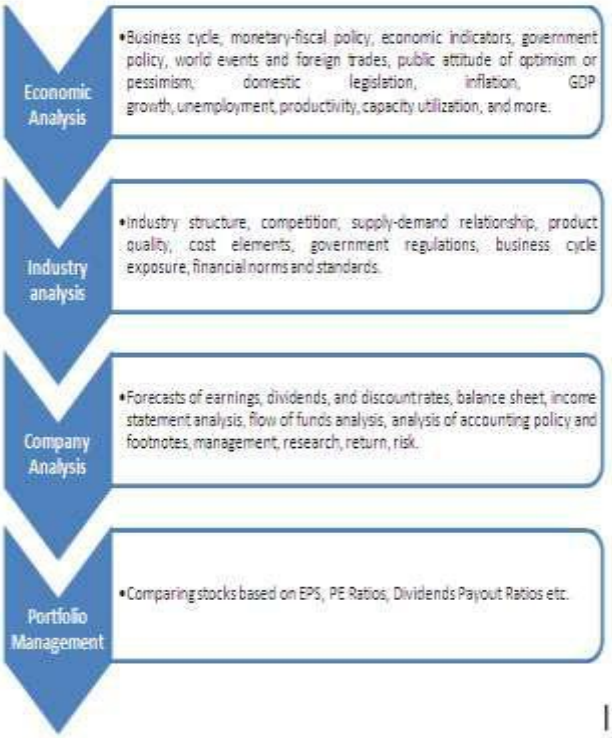


Figure: Top-down valuation process
Source: Hirt & Block, Fundamentals of Investment Management, 2011

Chart Type	Typical Applications
Area	Cumulated totals (numbers or percentages) over time
Column / Bar	Observations over time or under different conditions; data sets must be small
Segmented Column / Bar	Proportional relationships over time
Frequency Polygon	Discrete frequency distribution
Histogram	Discrete frequency distribution
Line, Curve	Trends, functional relations
Pie	Proportional relationships at a point in time
Scatterplot	Distribution of data points along one or two dimensions
Map	Typically used for geographical data; can also be used for parts of devices, human or animal bodies

2. CAPITAL MARKET SCENARIO OF BANGLADESH:

Capital market of Bangladesh started to flourish through the establishment of Dhaka Stock Exchange after the independence. Earlier it was known as East Pakistan Stock Exchange. The development of capital market was geared up after the establishment of another stock exchange in Chittagong, Chittagong Stock Exchange in 1995. Formation of Investment Corporation of Bangladesh in 1976 unleashed the opportunity for professional portfolio management institutions. There are several capital market intermediaries in Bangladesh.In last two decades, capital market witnessed number of institutional and regulatory advancements which has resulted diversified capital market intermediaries. The only depository system Central Depository Bangladesh Ltd (CDBL) was formed in 2000 which conducts its operations under Depositories Act 1999, Depositories Regulations 2000, Depository (User) Regulations 2003, and the CDBL by-laws. Under SEC (Stock Dealer, Stock Broker & Authorized Representative) Rules 2000, these entities are licensed and they are bound to be a member of any of the two stock exchanges. At present, DSE and CSE have 238 and 136 members respectively. Merchant Banker & Portfolio Manager institutions are licensed to operate under SEC (Merchant Banker & Portfolio Manager Rules) 1996 and 45 institutions have been licensed by SEC under this rules so far. Asset Management Companies (AMCs) are authorized to act as issue and portfolio manager of the mutual funds which are issued under SEC (Mutual Fund) Rules 2001. There are 15 AMCs in Bangladesh at present. Credit Rating Companies (CRCs) in Bangladesh are licensed under Credit Rating Companies Rules, 1996 and now, 5 CRCs have been accredited by SEC. Investment Corporation of Bangladesh (ICB) is a specialized capital market intermediary which was established in 1976 through the ordainment of The Investment Corporation of Bangladesh Ordinance 1976. This ordinance has empowered ICB to perform all types of capital market intermediation that fall under jurisdiction of SEC. According to rules, all asset backed securitizations and mutual funds must have an accredited trusty and security custodian. For that purpose, SEC has licensed 9 institutions as Trustees and 9 institutions as custodians.

3. LITERATURE REVIEW

Stock market is a place where shares of publicly held companies issued and traded through exchanges and or over the counter markets. Companies can collect capital from this market and investors can park their savings at a higher rate of return. Return is positively related to risk. Higher the return, higher the risk and vice-versa. Risk is the effect of uncertainty on objectives (Standards Australia, 2000). Risk varies from industry to industry and stocks to stocks. Risk scenarios can be of three types viz., risk versus probability; risk versus threat; and all outcome versus negative outcomes (Hillson & Murray, 2007). Poterba and summers (1998) found the weak degree of predictability based on prior information. There are several variables that explain the behavior of the stock market behavior like short term interest rates (Campbell, 1991), high quality bond yields (Fama and French, 1989), stock market volatility (French, Schwert, and Stambaugh, 1978), consum,ption wealth ratio (Lettau and Ludvigson, 2001), Eurodollar-U.S Treasury spread (Ferson and Harvey, 1993), book to market ratios (Kothari, and Shanken, 1987), dividend payout and price earnings ratios (Lamont, 1998), measure based on analysts' forecasts (Lee, Myers, and Swaminathan, 1999), and dividend yields (Campbell and Shiller, 1988). Researchers also found that the above methods fail due to flawed methodologies or use of poor assumptions (Valkanov, 2003). Another way to understand the pulse of market is to read it's sentiment. The market sentiment and the return on stocks are correlated. Sentiment is any erroneous belief that individuals have about an economic variable, such as asset price (Zhang, 2008). Investors' behavior often leads to fluctuations in asset prices, with no justifiable rationale (Shiller, 1984). The actual cause of price fluctuations is the difficulty in valuating companies as investors have different mind sets (Baker and Wurgler, 2006). Gaining profit is one of the important objectives of investment in stock market (Jnani & Hadi Zadesh, 2001). The actual return on stocks is seen as the reflection of the previous share prices (Shabahang, 2008). Investors invest considering the rate of return and asset risk So, investors want specific instruments to calculate adequately projects as well as firms to become quite sure in predicting the appropriate required rate of return of portfolios (Sterada & Sera, 2006). People are saving oriented and they invest in stocks, bonds, futures, land, bank deposits etc (Zhou, 2010; Chen et all., 2011; Zhang, 2009). According to them, risk can be divided according to their nature: technical risk, credit risk, market risk, operational risk, decision making risk, etc., The academic field of financial economics is generally unable to predict the behavior of financial markets. The attempts are countless but with limited success. Research about the predictability of returns and market efficiency often uses sophisticated models but is unable to provide clear generalizations. The literature is rich with examples and is widely available to researchers. Some of the research such as Poterba and summers (1988) was able to detect a weak degree of predictability based on prior information. Other research found that some variable can explain future stock markets behavior. Examples of such variables include short-term interest rates (Campbell, 1991), yield spreads between long-term and short-term interest rates and between low- and high quality bond yields (Fama and French, 1989), stock market volatility (French,

Schwert, and Stambaugh,1987), Eurodollar-U.S. Treasury (TED) spread (Ferson and Harvey, 1993), book-to-market ratios (Kothari and Shanken, 1997), dividend-payout and price-earnings ratios, measures based on analysts' forecasts (Lee, Myers, and Swaminathan, 1999), consumption-wealth ratio (Lettau and Ludvigson, 2001), and dividend yields (Campbell and Shiller, 1988). However many research paper criticizes the literature mentioned above and rejects its findings on statistical grounds. They argue that the methodologies are often flawed or use poor assumptions. Example of such papers are Valkanov (2003), Ferson, Sarkissian, and Simin (2003), Ang and Bekaert (2003), and Goyal and Welch (2003). Benjelloun (2011) found that financial markets are guided through awareness. What we call the certain investors are a group of people or institutions that are confident about the outcome of their investments. It is them who maneuver the market and all outcomes result from their choices and level of confidence. This theory has many implications. First, current prices are reflection of previous thoughts not current fundamentals. That is, the past and only the past explains what is happening now. Second, a financial crisis is a result of luck of certainty. Third, any two stocks are either perfectly correlated or totally unrelated. Finally, given the current research method it is impossible to test scientifically whether a trader can generate high profits consistently. To solve this problem he found one factor and one factor only can explain everything. That factor was called the market portfolio. In this paper we also defend the idea that one factor guides and explains the market; this factor is collective consciousness. It is not some sort of a portfolio but rather a set of powerful thoughts and beliefs.

4. MODERN PREDICTION TECHNIQUES

Widely used modern prediction techniques can be broadly classified in the following ways;

a) ***Hidden Markov Model (HMM):*** HMM is a probabilistic model of linear sequence. It is a kind of conceptual tool to construct a complex model by drawing a perceptive picture. HMMs are highly applicable in predicting speech, handwriting, gesture recognition, bioinformatics and stock movement. It is a generalized mixture model where hidden variables which control the mixture component to be selected for each observation.

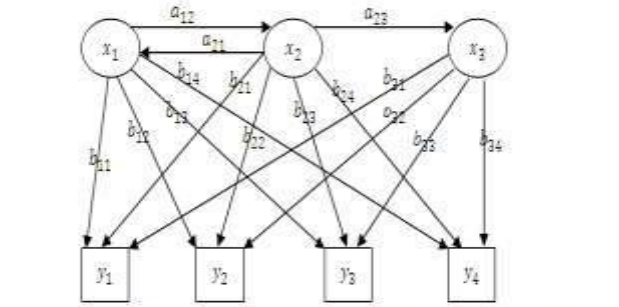


Figure: Probabilistic parameters of a Hidden Markov Model.

b) ***Adaptive Nero Fussy Inference System (ANFIS):*** It is a hybrid nero-sugeono-type fuzzy inference system. This technique provide a method for the fuzzy modeling procedure to learn information about data set in order to compute the function parametersthat best allow the associated fuzzy inference system to track the given input/out data. In the stock market, ANFIS is the widely used prediction technique. This is a linear function and the final result is a weighted average of each rule's output.

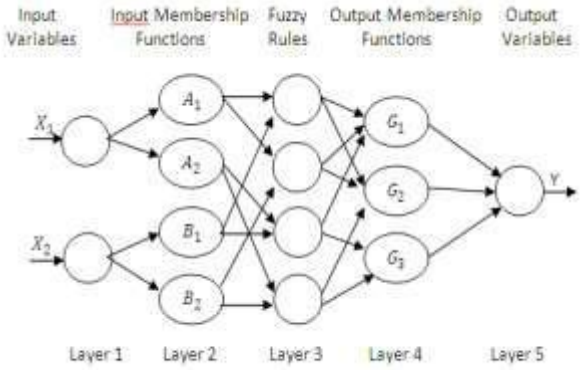


Figure: General ANFIS Architecture

c) ***Genetic Algorithm (GA):*** Genetic Algorithms are general purpose parallel search techniques for solving complex problems. GAs work by repeatedly modifying a population of a artificial structure through the application of generic operations. It can be run based on fitness information and does not require gradient information at all.

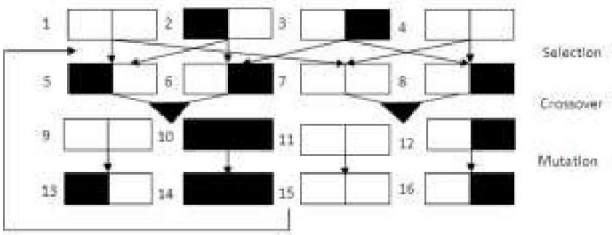


Figure: Genetic Algorithm consisting of-from top to bottom-selection, crossover, and mutation stages.

d) ***Data Mining (DM):*** Data mining is the process of analyzing the data from different perspectives and converting the data into useful information that can be used to take valuable decisions in retail, financial, communication, and marketing organizations. It finds correlations among several variables in large relational database. Various software like' Oracle', 'Teradata', 'Advanced Scout' etc are available to conduct data mining process. Major elements of data mining include Extraction of data, Storing of data, Data access, Data analysis, and Data presentation.

e) ***Time Series Analysis:*** Time series is an ordered sequence of values of a variable at equally spaced time intervals. The usage of time series is twofold. First, is to obtain an understanding of the underlying forces and structure that produced the observed data. Second, is to fit a model and proceed to forecasting, monitoring or even feedback and feedforward control. This method is applied in stock market analysis, economic forecasting, budgetary analysis, sales forecasting, inventory studies, workload projections, utility studies, census analysis etc. There are many models of time series like, ARIMA, Multivariate model, Exponential Smoothing, Random Walk, Moving Average, Regression Method etc.

5. STATEMENT OF THE PROBLEM

Stock market always remains volatile for its very own nature. Investors need to predict the future movement of stock prices using all the available tools and techniques invented by researchers in different time. The tools and techniques have their own nature of projection ability. Users need to use the right tool for the right case. This paper will investigate the prediction capacity of different techniques in the Chittagong Stock Exchange.

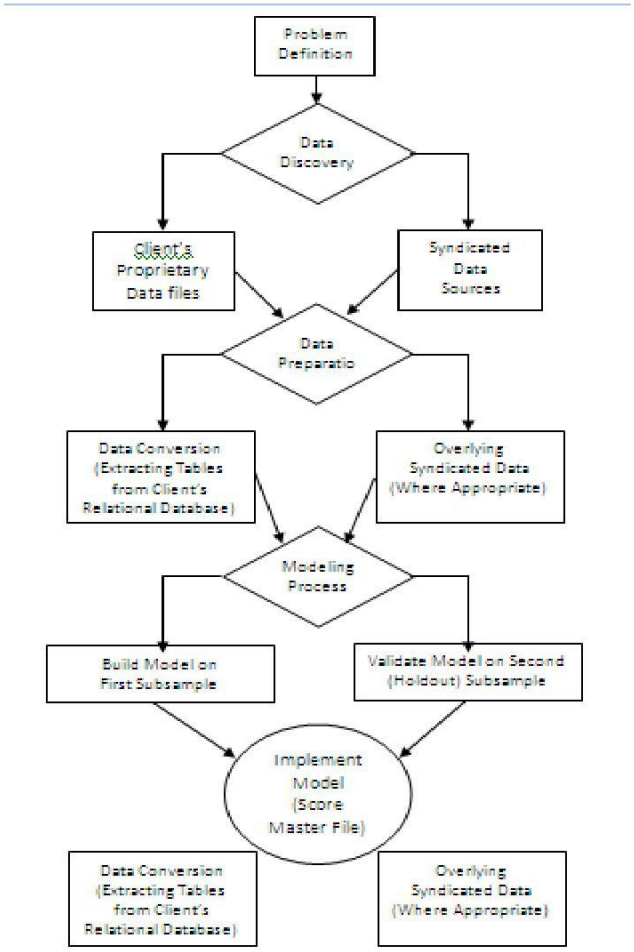


Figure: Typical data mining process for predictive modeling

6. RATIONALE OF THE STUDY

Companies use stock market as an important source of capital for various purposes like reconstructions, modernizations, expansions etc. An efficient stock market indicates healthy trading activity and strength in the country's economy. Increasing stock indices is a sign of economic growth. Abnormal association of risk in this sector always creates bottleneck in the development of this sector. However, appropriate measurement of risk and efficient management of the same can help in overcoming this problem. Therefore, knowledge of risk measurement and risk management is very important to excel of art of investment in stock market.

7. RESEARCH METHODOLOGY

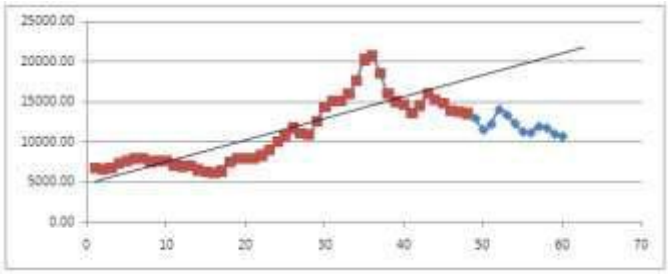
In order to conduct this research, five year CSE 30 monthly index has been considered from 2008 to 2012. Different models like Linear Regression, Exponential Smoothing,

Moving Average, Autoregressive Integrated Moving Average, and Generalized Autoregressive Conditional Heteroskedasticity will be used to test the prediction capacity. Augmented Dickey Fuller unit root test will be run to check the stationarity of the data. If data are found to be stationary only then the GARCH will be applied.

8. RESEARCH FINDINGS

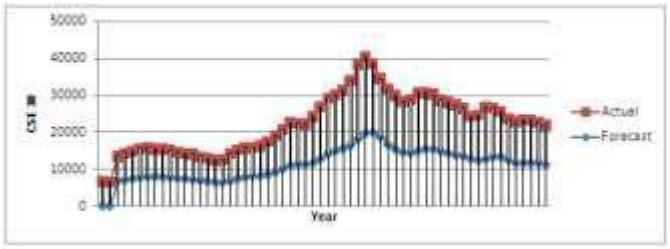
a) Linear Regression Model:

Regression analysis is a statistical tool for the investigation of relationships among the variables. It helps to understand how the typical value of depended variable changes when any one of the independent variable is varied, while other independent variables remain fixed. CSE 30 index from January, 2008 to December, 2011 have been processed to get the trend line (based on red square) and the line has been extended to the right to see the probable situation. The actual situation is shown at the blue square. The trend is upward and the actual values are downward.



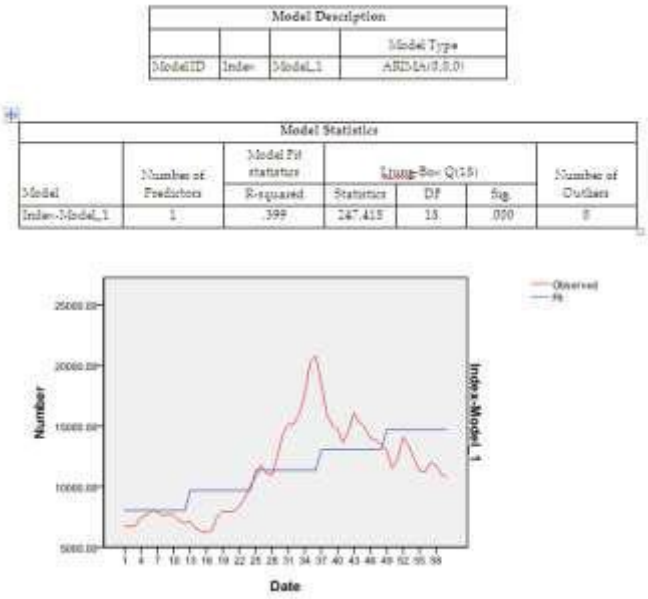
b) Exponential Smoothing:

Exponential smoothing assigns weights that exponentially decay. The forecast is a weighted average of the actual indices from the previous period and the forecast from the previous period (2008 to 2012). Alpha is the weight that is applied to the actual indices for the previous period. A value is assigned for the smoothing constant, alpha. If the value is not assigned, an assumed value is based on the number of periods of indices history that is specified in the processing option. equals the smoothing constant that is used to calculate the smoothed average for the general level or magnitude of indices. Values for alpha range from 0 to 1. Damping factor is 20%, the figure below shows, the difference between predicted and actual indices is very high in 2009 to 2011 and it is somehow manageable in early 2008 and at the end of 2012.



c) Autoregressive Integrated Moving Average (ARIMA):

ARIMA is the determination of the order of differencing needed to stationarize the series. The model referred to as an ARIMA (p,d,q) model where p is autoregressive term, d is number of nonseasonal differences and q is number of lagged forecast error in the prediction equation that refer to the order of the autoregressive (AR), integrated (I), and moving average (MA). When one of the three terms is zero, it is usual to drop 'AR', 'I' or 'MA' from thr model. Example include (0,1,0), and (0,0,1)



Model Description

			Model Type
ModelID	Index	Model_1	ARIMA(0,0,0)

Model Statistics

Model	Number of Predictors	Model Fit statistics	Ljung-Box Q(18)			Number of Outliers
		R-squared	Statistics	DF	Sig.	
Index-Model_1	1	.399	247.415	18	.000	0

ARIMA (0,0,0) model implies no differencing and no AR or MA terms, only a constant term. This is just the 'mean' model. So, regression with ARIMA (0,0,0) errors different from linear regression and this model is an ordinary regression. R square 0.399 indicates that the variables are moderately correlated. The graph generated under ARIMA refuses the prediction possibilities to a greater extend.

d) Generalized Autoregressive Conditional Heteroskedasticity (GARCH)

In order to ensure the stationarity of the data, first of all let us we need to check the stationarity by using Augmented Dickey Fuller unit root test as follows;

Let us take the null hypothesis that unit root exist against alternative hypothesis that there is no existence of unit root;

: $\partial=0$

H_1: $\partial\neq0$

Decision rule:

If t*>ADF critical value, then null hypothesis is accepted i.c., unit root exist

If t*<ADF critical value, then null hypothesis is rejected i.c., unit root does not exist.

Augmented Dickey-Fuller Unit Root Test on D(tseries)

Null Hypothesis: D(tseries) has a unit root
Exogenous: Constand and linear Trend
Lag Length: 1 (Automatic Based on AIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-26.218192	0.000000
Test critical values:	1% level	-3.965712	
	5% level	-3.413617	
	10% level	-3.128834	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(tseries,2)
Method: Least Squares
Date: 5/24/2014 Time: 12:38:03 PM
Included observations: 1196 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(tseries(-1))	-1.053559	0.040566	-26.218192	0.000000
D(tseries(-1),2)	0.077767	0.028872	2.694189	0.007155
C	16.583130	14.607171	1.135273	0.256489
@trend	-0.021534	0.021137	-1.018784	0.308512

R-squared	0.496465	Mean dependent var	-0.029320
Adjusted R-squared	0.118814	S.D. dependent var	354.944607
S.E. of regression	252.166180	Akaike info criterion	13.901551
Sum squared resid	75808660.248843	Schwarz criterion	13.918564
Log likelihood	-8309.127612	F-statistic	391.754320
Durbin-Watson stat	2.002423	Prob(F-statistic)	0.000000

Since the absolute computed ADF test-statistic (26.2181) is smaller than the critical "tau" (-3.97, -3.41, -3.12 at 1%. 5% and 10% significant level, repectively), thus we can conclude that we can reject the . That means CSE-30 series is stationary series.

GARCH(2,1) estimation of 6940.6642

Method: ML - BFGS with analytical gradient
date: 05-24-14
time: 17:11
Included observations: 1197
Convergence achieved after 7 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
omega	12137001	111102552.8	0.109241	0.913011006
alpha_1	0.01813	6.083639719	0.00298	0.997622178
beta_1	0.92608	5.437813688	0.170304	0.864771217
beta_2	0.018032	8.446346223	0.002135	0.998296576

Log Likelihood	-12793.3		
Jarque Bera	56.42415	Prob	5.59330359
Ljung-Box	747.7688	Prob	0

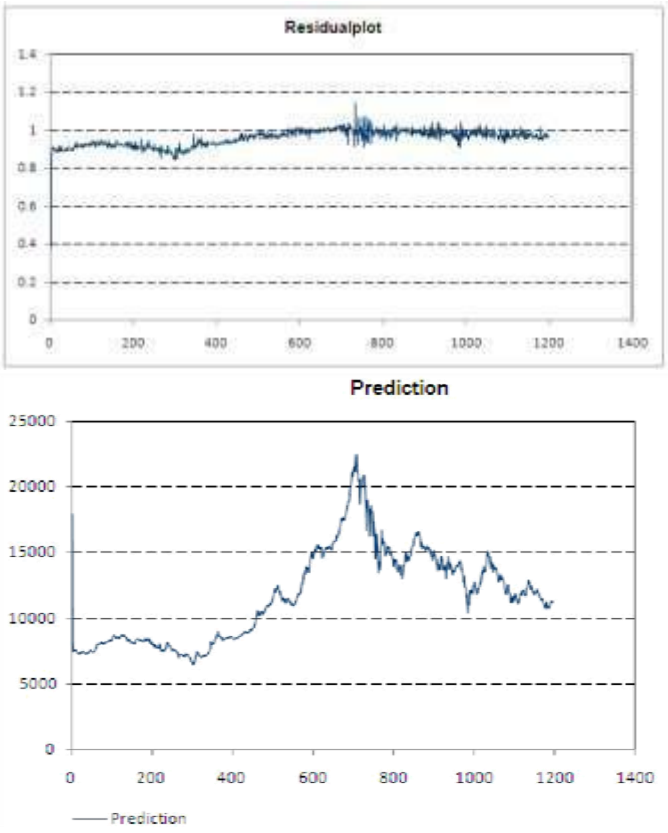
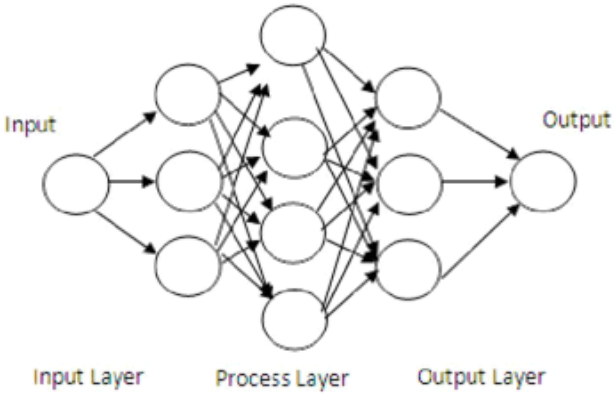


Figure: Software generated residuals and prediction patterns under GARCH.

It is evident that the prediction capacity of GARCH in CSE is not satisfactory at all as the standard error is very high (above 5) and the probability of prediction the same is very high (above 90%).

e) ***Artificial Neural Network (ANN)*:** Neural networks are combination of simple elements operating in parallel. These elements are instigated by biological nervous systems. The connections between elements extensively determine the network function. Several neural sets are trained to predict future movement of stock prices. ANN is trained to solve problems that are difficult for conventional computers or human beings.



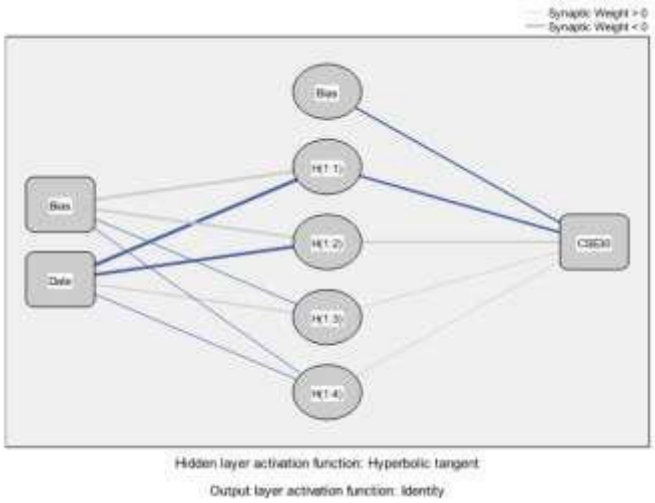
Case Processing Summary

		N	Percent
Sample	Training	824	68.7%
	Testing	375	31.3%
Valid		1199	100.0%
Excluded		0	
Total		1199	

Network Information

Input Layer	Covariates	1	Date
		Number of Units[a]	1
		Rescaling Method for Covariates	Normalized
Hidden Layer(s)		Number of Hidden Layers	1
		Number of Units in Hidden Layer 1[a]	4
		Activation Function	Hyperbolic tangent
Output Layer	Dependent Variables	1	CSE30
	Number of Units		1
	Rescaling Method for Scale Dependents		Standardized
	Activation Function		Identity
	Error Function		Sum of Squares

a. Excluding the bias unit

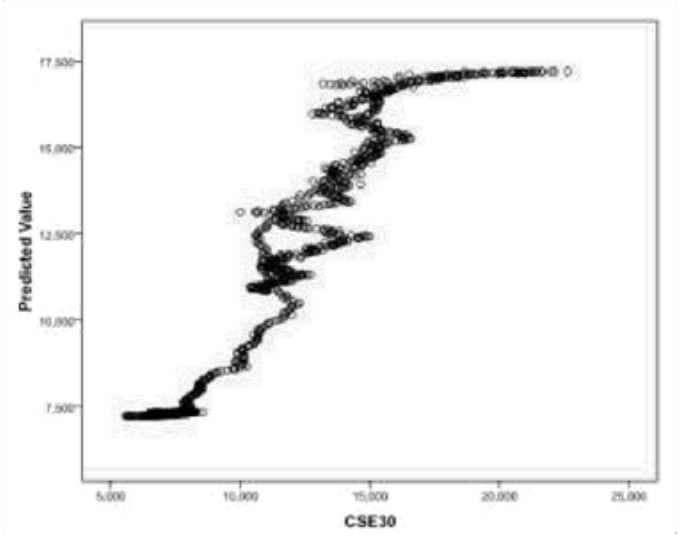


Model Summary

Training	Sum of Squares Error	38.698
	Relative Error	.094
	Stopping Rule Used	1 consecutive step(s) with no decrease in error[a]
	Training Time	0:00:00.280
Testing	Sum of Squares Error	15.772
	Relative Error	.084

Dependent Variable: CSE30

a. Error computations are based on the testing sample.



Under this technique, 824 values have been trained and 375 values have been tested using 4 hidden layers. The result obtained indicates that ANN is not successful in predicting the future movement of CSE 30.

9. CONCLUSION

In this paper, Least Square Regression Model, Exponential Smoothing, Autoregressive Integrated Moving Average (ARIMA) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and Artificial Neural Network

(ANN) have been used to predict the value of stock in the next day by using the previous data. It is observed that in CSE the degree of volatility is very high. No technique can predict the trend successfully and literature review clearly indicates that the responsible factors are systematic in nature like inflation rate, interest rate, law and order situation, illiteracy of investors, rumors, inefficient stock market, lack of transparency, less control of law enforcing authority over the behavior of market participants etc. However, if these issues are addressed properly, it is expected that the CSE may become an efficient market very quickly and different prediction techniques can properly be used to achieve the goal with greater accuracy.

FURTHER WORK

This same work can be taken with Adaptive Nero Fussy Inference System, Genetic Algorithm, Hidden Markov Model etc.

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