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Stock Market Prediction Using Time Series

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***Abstract*—**A stock market is a public market for the trading of company stock. It is an organized set-up with a regulatory body and the members who trade in shares are registered with the stock market and regulatory body SEBI. Since stock market data are highly time-variant and are normally in a nonlinear pattern, predicting the future price of a stock is highly challenging. Prediction provides knowledgeable information regarding the current status of the stock price movement. Thus this can be utilized in decision making for customers in finalizing whether to buy or sell the particular shares of a given stock. Many researchers have been carried out for predicting stock market price using various data mining techniques. The past data of the selected stock will be used for building and training the models. The results from the model will be used for comparison with the real data to ascertain the accuracy of the model.

Keywords*-Stock Market, Artificial Neural Networks, Arma*

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I. INTRODUCTION

From the beginning of time it has been man's common goal to make his life easier. The prevailing notion in society is that wealth brings comfort and luxury, so it is not surprising that there has been so much work done on ways to predict the markets. Various technical, fundamental, and statistical indicators have been proposed and used with varying results. However, no one technique or combination of techniques has been successful enough. With the development of neural networks, researchers and investors are hoping that the market mysteries can be unraveled. A stock market is a public market for the trading of company stock and derivatives at an agreed price; these are securities listed on a stock exchange as well as those only traded privately. It is an organized set-up with a regulatory body and the members who trade in shares are registered with the stock market and regulatory body SEBI. The stock market is also called the secondary market as it involves trading between two investors. Stock market gets investors together to buy and sell their shares. Share market sets prices according to supply and demand. Stocks that are in demand will increase their price, whereas as stocks that are being heavily sold will decrease their price. Companies that are permitted to be traded in this market place are called "listed companies".

Investors in stock market want to maximize their returns by buying or selling their investments at an appropriate time. Since stock market data are highly time-variant and are normally in a nonlinear pattern, predicting the future price of a stock is highly challenging. With the increase of economic globalization and evolution of information technology, analyzing stock market data for predicting the future of the stock has become increasingly challenging, important and rewarding. Prediction provides knowledgeable information regarding the current status of the stock price movement. Thus this can be utilized in decision making for customers in finalizing whether to buy or sell the particular shares of a given stock.

II. LITERATURE REVIEW

A share market could be a place of high interest to the investors because it presents them with a chance to learn financially by finance their resources on shares and derivatives of varied firms. it's a chaos system; that means the activity traits of share costs area unit unpredictable and unsure. to create some style of sense of this chaotic behavior, researchers were forced to search out a way which may estimate the result of this uncertainty to the flow of share costs. From the analyses of varied applied math models, Artificial Neural Networks area unit analogous to non-parametric, nonlinear, regression models. So, Artificial Neural Networks (ANN) actually has the potential to tell apart unknown and hidden patterns in information which may be terribly effective for share market prediction. If successful, will this will this could this may} be useful for investors and finances which can completely contribute to the economy. There are unit totally different strategies that are applied so as to predict Share Market returns. The securities market reflects the fluctuation of the economy, and receives 10 million investors' attention since its initial development. The securities market is characterized by bad, high-yield, thus investors are involved concerning the analysis of the securities market and making an

attempt to forecast the trend of the securities market. However, securities market is wedged by the politics, economy and plenty of different factors, let alone the quality of its internal law, like value (stock index) changes within the non-linear, and shares knowledge with high noise characteristics, so the normal mathematical applied mathematics techniques to forecast the securities market has not yielded satisfactory results. Neural networks will approximate any advanced non-linear relations and has hardiness and fault-tolerant options. Therefore, it's terribly appropriate for the analysis of stock knowledge. In dozens of neural network models that were suggests, researchers usually use the hop garden network. hop garden network is that the commonest feedback network model, it's one among the models that almost typically studied currently. The hop garden network is that the mono layer recognized by an equivalent vegetative cell, and is additionally a symmetrically connected associative network while not learning operates.

III. TIME SERIES PREDICTION

A time series is a sequence of data points made:

1) over a continuous time interval
2) out of successive measurements across that interval
3) using equal spacing between every two consecutive measurements
4) with each time unit within the time interval having at most one data point

Examples of time series are ocean tides, counts of sunspots, and the daily closing value of the Dow Jones Industrial Average.

Non-Examples: The height measurements of a group of people where each height is recorded over a period of time and each person has only one record in the data set.

Panel data is the general class, a multidimensional data set, whereas a time series data set is a one-dimensional panel (as is a cross-sectional dataset). Yet a data set may exhibit characteristics of both panel data and time series data. One way to tell is to ask what makes one data record unique from the other records. If the answer is the time data field, then this is a time series data set candidate. If determining a unique record requires a time data field and an additional identifier which is unrelated to time (student ID, stock symbol, country code), then it is panel data candidate. If the differentiation lies on the non-time identifier, then the data set is a cross-sectional data set candidate.

Time series are very frequently plotted via line charts. Time series are used in statistics, signal processing, pattern recognition, econometrics, mathematical finance, weather forecasting, intelligent transport and trajectory forecasting,[1] earthquake prediction, electroencephalography, control engineering, astronomy, communications engineering, and largely in any domain of applied science and engineering which involves temporal measurements.

Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values. While regression analysis is often employed in such a way as to test theories that the current values of one or more independent time series affect the current value of another time series, this type of analysis of time series is not called "time series analysis", which focuses on comparing values of a single time series or multiple dependent time series at different points in time.[2]

Time series data have a natural temporal ordering. This makes time series analysis distinct from cross-sectional studies, in which there is no natural ordering of the observations (e.g. explaining people's wages by reference to their respective education levels, where the individuals' data could be entered in any order). Time series analysis is also distinct from spatial data analysis where the observations typically relate to geographical locations (e.g. accounting for house prices by the location as well as the intrinsic characteristics of the houses). A stochastic model for a time series will generally reflect the fact that observations close together in time will be more closely related than observations further apart. In addition, time series models will often make use of the natural one-way ordering of time so that values for a given period will be expressed as deriving in some way from past values, rather than from future values (see time reversibility.)

Time series analysis can be applied to real-valued, continuous data, discrete numeric data, or discrete symbolic data (i.e. sequences of characters, such as letters and words in the English language[3]).

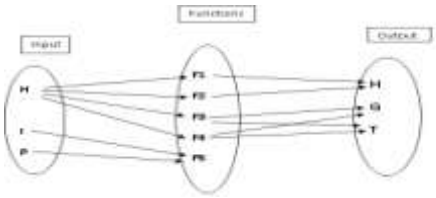
Prediction and forecasting

In statistics, prediction is a part of statistical inference. One particular approach to such inference is known as predictive inference, but the prediction can be undertaken within any of the several approaches to statistical inference. Indeed, one description of statistics is that it provides a means of transferring knowledge about a sample of a population to the whole population, and to other related populations, which is not necessarily the same as prediction over time. When information is transferred across time, often to specific points in time, the process is known as forecasting.

Fully formed statistical models for stochastic simulation purposes, so as to generate alternative versions of the time series, representing what might happen over non-specific time-periods in the future Simple or fully formed statistical models to describe the likely outcome of the time series in the immediate future, given knowledge of the most recent outcomes (forecasting).
Forecasting on time series is usually done using automated statistical software packages and programming languages, such as R, S, SAS, SPSS, Minitab, Pandas (Python) and many others.

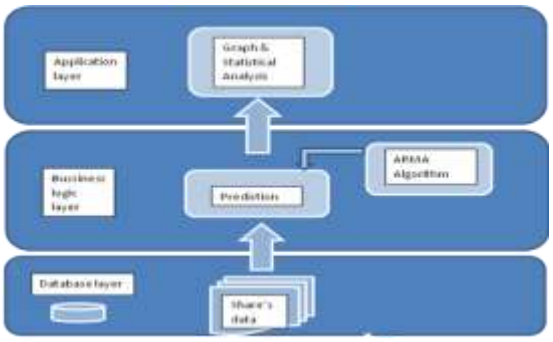
IV. MATHEMATICAL MODEL

Set Theory Analysis:
Let 'S' be the | Stock market prediction as the final set
S = {……
Identify the inputs as D , Q, I, P
S = {H, I, P, …
H = {H1, H2, H3,H4, …| 'H' given shares in the database }
I = {I1, I2, … |'I' gives user ID for login}
P= {P1, P2, … |'P' gives the respective password for login ID}
Identify the outputs as O
S = {H, I, P, G, S, …
H = {H1, H2, H3, H4, …| 'H' given shares in the database }
G = {G1, G2 …| 'G' gives the graphical analysis for prediction of share or shares that are selected }
T= {T1, T2 …| 'T' gives the statistical analysis for prediction of share or shares that are selected}



Identify the functions as 'F'
S = {H, I, P, G, S, F…
F = {F1(), F2(), F3(), F4(), F5()}
F1(H) :: Show share records
F2 (H) :: Select shares
F3 (H) :: Predict
F4 (H) :: generate analysis
F5(P, I) :: login

V. SYSTEM ARCHITECTURE



VI. PROPOSED SYSTEM

In the statistical analysis of time series, autoregressive–moving-average (ARMA) models provide a parsimonious description of a (weakly) stationary stochastic process in terms of two polynomials

The auto-regression
The moving average.

--Autoregressive model
The notation AR(p) refers to the autoregressive model of order p. The AR(p) model is written

$$X_t = c + \sum_{i=1}^{p} \varphi_i X_{t-i} + \varepsilon_t.$$

where φ are parameters, is a constant, and the c random variable Et is white noise.
Some constraints are necessary on the values of the parameters so that the model remains stationary

--Moving-average model
The notation MA(q) refers to the moving average model of order q:

$$X_t = \mu + \varepsilon_t + \sum_{i=1}^{q} \theta_i \varepsilon_{t-i}$$

where the θ1, ..., θq are the parameters of the model, μ is the expectation of (often assumed to equal 0), and the Et are white noise error terms.

A. ARMA Algorithm

1 Review: Time series modelling and forecasting
We want to estimate the parameters of an ARMA(p,q) model.
We will assume (for now) that:
1. The model order (p and q) is known, and
2. The data has zero mean.
If (2) is not a reasonable assumption, we can subtract the sample mean y bar,
fit a zero-mean ARMA model,
φ(B)Xt= θ(B)Wt,
to the mean-corrected time series Xt= Yt− y bar,
and then use Xt+ y bar as the model for Yt.

2. Parameter estimation
One approach:
Assume that {Xt} is Gaussian, that is, φ(B)Xt= θ(B)Wt, where Wtisi.i.d. Gaussian.
Choose φi, θjto maximize the *likelihood*:
L(φ, θ, σ2) = fφ,θ,σ2(X1, . . . , Xn),
where fφ,θ,σ2 is the joint (Gaussian) density for the given ARMA model.(c.f. choosing the parameters that maximize the probability of the data.)

3. Maximum likelihood estimator
Suppose that X1, X2, . . . ,Xnis drawn from a zero mean Gaussian ARMA(p,q) process. The likelihood of parameters φ ∈Rp, θ ∈Rq,σ2w ∈R+ is defined as the density of X = (X1, X2, . . . , Xn)′ under the Gaussian model with those parameters:
L(φ, θ, σw2) = 1 (2π)n/2 |Γn|1/2 exp−1 2X′Γ− n 1X,
where |A| denotes the determinant of a matrix A, and Γnis the variance/covariance matrix of X with the given parameter values.
The maximum likelihood estimator (MLE) of φ, θ, σw2 maximizes this
quantity.

4. Yule-Walker estimation

VII. OUTPUT

VIII. CONCLUSION

In this paper we use Time series prediction in order to predict the stock market trend. The system collect historical data to predict the values .The system only uses historical values to predict the values of the stock. This paper is providing the accurate value of the stock.

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