Chapter 1

Introduction

In share market, historic data holds the essential memory for predicting future direction. Prediction of stock price is regarded as one of the most challenging tasks in the analysis of financial time series data. Different data analysis techniques have been used to predict future stock price based on different properties of data.

There are two main approaches used in analyzing the movements of share price- the fundamental approach and the technical approach.Technical analysis is more on the side of economic patterns whereas fundamental analysis focuses on financial valuation.

A person who follows the fundamental approach (known as the fundamental analyst) would be more concerned about the fundamental factors. His aim would be to arrive at the true worth of the share based on the current and the future earning capacity of the company. If he finds that the share is quoted below its true worth, he would be buying and if he finds that the share price is higher than its true worth, he would be moving out.

A technical analyst, on the other hand, is concerned with the direction of the movement. He would be buying if he sees that the main trend (or the underlying direction of movement) is rising and would be moving out as he finds trend in reverse direction. His approach is based completely on the analysis of the demand-supply equation. If the demand is greater than its supply the prices would be expected to rise, prompting the analyst to buy. On the same count, if the supply exceeds its demand, the prices would be expected to move downwards.

1.1 Analysis of Financial Time Series Data

Financial time series data is sequence of financial data measured at successive points in time space at uniform time intervals, for example, daily closing value of stock.
Financial time series analysis comprises methods for analysing financial time series data in order to extract meaningful statistics and other characteristic of data. By analysis of financial time series data, we can review and evaluate company's financial condition. In this way we get understanding of financial health of company and enabling more effective decision making.
Financial time series forecasting is the use of a model to predict future value based on previously observed values.
Financial analysis is also an evalutive method of determining past, current and projected performance of company. Several data analysis techniques commonly used as part of financial analysis including fundamental analysis and technical analysis.

1.1.1 Fundamental Analysis

Fundamental analysis is measurement of future price movements of a stock by looking at business economic factors known as fundamentals. It includes economic analysis, industry analysis and company analysis. This type of investing assumes that the short-term market is not very good, but that stock price will correct itself in the long run.
Fundamental analysis looks at financial statements, including balance sheets, cash flow statements and income statements to determine a company's intrinsic value. Intrinsic value in options is the in-the-money portion of the option's premium. We buy stocks when price falls below intrinsic value. Fundamental analysis is a long term approach of investing. Fundamental analysis is researching fundamentals. It can include anything related to economic well being of a company. It includes everything from company's market share to quality of its management.
Various fundamental factors can be grouped in to following two categories.

Quantitative Fundamental Analysis

The biggest source of quantitative data is financial statement such as revenue, profit, asset etc. It measures and expresses the results in quantitative format.

Qualitative Fundamental Analysis

It is related with quality or character of fundamentals such as quality of company's board members and key executives, company's brand name, patent and technology.

1.1.2 Technical Analysis

Technical analysis uses past price movements to predict future price movements. It focuses on the market prices themselves, rather than other factors that might affect them. The principle here is that history repeats itself.

Technical analysis is a method of evaluting securities by statistically analysing their historical trading data. Predictions of futuristic activities can be seen by using various charts and tools of historical prices and volume.

Price pattern can be used as a trading rule to buy (just after the security price is very low) and to sell (just after security price is very high).

Technical analysis looks only at charts, as it considers that all of a company's fundamentals are reflected in the stock price. It looks at models, based on price and volume transformations, such as the relative strength index, moving averages, regressions, business cycles, stock market cycles and chart patterns. We first consider pattern analysis part and later we observe the actual valuation.

Main concept used for technical analysis is DOW theory. DOW theory suggests that the market is in upward trend if one of its averages advances above a previous important high and if both the averages dip below previous important lows it regarded as an indicator of downward trend.

We discuss the use of technical indicators for prediction of buy or sell signals of Bombay stock Exchange (BSE) data. The use of Moving Average, Exponential Moving Average, Relative Strength indicator, Typical Price, Percentage Volume Indicator is explained along with trading bands.

A comparison between Bollinger and new generalized band [Paul and Vijay(2014)] is also presented.

1.1.3 Forecasting

Not only pattern of the data but also important is the future value of the stock. Depending upon the nature of the series of data, various forecasting models are available in the literature, see

Tsay (2009) for time series models and Fletcher (2009) for machine learning models.
We apply Autoregressive Moving Average (ARMA) and Artificial Neural Network (ANN) on agriculture data. ARMA is useful for prediction of future value for linear stationary time series while ANN is useful for predicting future price for non linear time series data. Finally, a comparison in the RMSE (root mean square error) values is presented.

The thesis is organised as follows.
Chapter 2 covers the approach of technical analysis. BSE daily closing price is used, as an example, to explain various technical indicators. We explain briefly, the artificial neural network (ANN) in Chapter 3. In Chapter 4, applications of ARMA and ANN are given. Various agricultural data is considered for forecasting and the errors occurred by ARMA and ANN are finally compared.