STOCK MARKETPRECDICTION USING DEEP LEARNING

ABSTRACT

The neural network, one of the intelligent data mining technique that has been used by researchers in various areas for the past 10 years. Prediction and

analysis of stock market data have got an important role in today's economy. The various algorithms used for forecasting can be categorized into linear (AR, MA, ARIMA, ARMA) and non-linear models .In this paper, we are using four types of deep learning architectures i.e M Recurrent Neural Networks (RNN) for predicting the stock price of a company based on the historical prices available. Here we are using day-wise closing price of two different stock markets, National Stock Exchange (NSE) of India and New York Stock Exchange . The network was trained with the stock price of a single company from NSE and predicted for five different companies from both NSE and NYSE. It has been observed that CNN is outperforming the other models. The network was able to predict for NYSE even though it was trained with NSE data. This was possible because both the stock markets share some common inner dynamics. The results obtained were com- pared with ARIMA model and it has been observed that the neural networks are outperforming the existing linear model

CHAPTER 1

INTRODUCTION

Stock market is a place where shares or stocks of a firm are traded. It can be split into two components:

• primary market
• secondary market

Primarymarket is where new issues are introduced to the market through Initial Public Offerings. Secondarymarket is where investors trade securities that they already own. Stock market is having a highly fluctuating and non-linear time series data. A time series is a set of data measured over time to acquire the status of some activity [6]. Linear models like AR, ARMA, ARIMA [9][10] have been used for stock market forecasting. The only problem with these models are, that they work only for a particular time series data, i.e the model identified for a particular company won't perform well for another. Due to the equivocal and unforeseeable nature of stock market, stock market forecasting takes higher risk compared to other sectors. It is one of the most important reason for the difficulty in stock market prediction. Here is where the application of deep-learning models in financial [4] forecasting comes in. Deep neural network got its name due to the use of neural network architecture in DL models. It is also called as ANN. ANNs are good approximators and they are capable to learn and generalize from experience. Practical application of ANN in

forecasting problems is very successful due to the following characteristics:
• ANN's are good function approximators, so the input and output relationship can be examined by them even if the data set is very complex.
• ANN's can identify new test samples even if they have not been used during the training of network. For the past few decades, ANN has been used for stock market prediction. Comparison study of different DL models of stock market prediction has already been done as we can see in [1]. CoskunHamzacebi has experimented forecast- ing using iterative and directive methods [6].

AjithKumar Rout et.al made use of a low complexity recurrent neural network for stock market prediction [7].Yunus Yetis et.al applied ANN to predict NASDAQ's (National Association of Securities Dealers Automated Quotations) stock value with given input parameter of stock market [12]. Roman et.al performed an analysis on multiple stock market return using Back propagation and RNN [13]. Neini et.al con- ducted a comparison study between Feed Forward MLP an Elman Recurrent Network for predicting stock value of company [18]. Mizuno et.al applied neural networks to technical analysis as a prediction model [15]. Guresen in 2011 had conducted a study to know about the effectiveness of ANN in stock market forecasting [19]. In [20], they explored the interdependency between stock volume and stock price on a certain number of nifty 50 listed companies. In [21], Batres-Estrada explains about different applications of DL models on time series analysis. X Ding et.al in [22] con- ducted a study on combination of Natural language processing (NLP) and financial time series analysis. In [23], they used ML algorithms like Least Square Support Vector Machine (LSSVM) and Particle Swarm Optimization (PSO) for stock market prediction. In [24], Kim et.al proposed a different approach for stock market prediction. i.e They intro- duced a Genetic Algorithm(GA) for discretization of features in ANN for stock price forecasting.In [25], deals with multi-stage fuzzy inference and wavelet transform for forecasting stock trends. Here the short-term features present in the stock trend is described using wavelet transform.

Stock market is characterized as dynamic, unpredictable and non-linear in nature. Predicting stock prices is a challenging task as it depends on various factors including but not limited to political conditions, global economy, company's fifinancial reports and performance etc. Thus, to maximize the proffit and minimize the losses, techniques to predict values of the stock in advance by analyzing the trend over the last few years, could prove to be highly useful for making stock market movements

Traditionally, two main approaches have been proposed for predicting the stock price of an organization. Technical analysis method uses historical price of stocks like closing and opening price, volume traded, adjacent close values etc. of the stock for predicting the future price of the stock. The second type of analysis isqualitative, which is performed on the basis of external factors like company profifile, market situation, political and economic factors, textual information in the form of fifinancial new articles, social media and even blogs by economic analyst Now a days, advanced intelligent techniques based on either technical or fundamental analysis are used for predicting stock prices. Particularly, for stock market analysis, the data size is huge and also non-linear. To deal with this variety of data effifffificient model is needed that can identify the hidden patterns and complex relations in this large data set. Machine learning techniques in this area have proved to improve effifffifficiencies by 60-86 percent as compared to the past methods

1.1 OBJECTIVE

The objective is to predict the stock prices in order to make more informed and accurate investment decisions. A stock market prediction is described as an action of attempting to classify the future value of the company stock or other financial investment traded on the stock exchange. The forthcoming price of a stock of the successful estimation is called the Yield significant profit. This helps you to invest wisely for making good profits.

1.2 EXISTING SYSTEM

1.2.1 DISADVANTAGES OF EXISTING ALGORITHM

- have a very significant effect on an organization�performance. This paper proposed a technique to reveal the performance of a company.

- The technique deployed in the paper is used to find the relationships between the frequencies of email exchange of the key employees and the performance of the company reflected in stock values.

- In order to detect association and non-association relationships,this paper proposed to use a data mining algorithm on a publicly available dataset of Enron Corp.

- The EnronCorporation was an energy, commodities, and services company based in Houston, Texas whose stock dataset isavailable for public use.

DISADVANTAGE

- The existing system fails when there are rare outcomes or predictors, as the algorithm is based on bootstrap sampling.

- The previous results indicate that the stock price is unpredictable when the traditional classifier is used.

- The existence system reported highly predictive values, by selecting an appropriate time period fort heir experiment to obtain highly predictive scores.

- The existing system does not perform well whent here is a change in the operating environment. It doesn''t focus on external events in the

- environment, like news events or social media. It exploits only one data source, thus highly biased.

1.3 PROPOSED SYSTEM

● Stock Price Prediction using machine learning helps you discover the future value of company stock and other financial assets traded on an exchange.

● The entire idea of predicting stock prices is to gain significant profits. Predicting how the stock market will perform is a hard task to do.

● There are other factors involved in the prediction, such as physical and psychological factors, rational and irrational behavior, and so on. All these factors combine to make share prices dynamic and volatile.

● This makes it very difficult to predict stock prices with high accuracy.

ADVANTAGE:

● Stock markets help companies to raise capital.

● It helps generate personal wealth.

● Stock markets serve as an indicator of the state of the economy.

● It is a widely used source for people to invest money in companies with high growth potential.

block diagram:
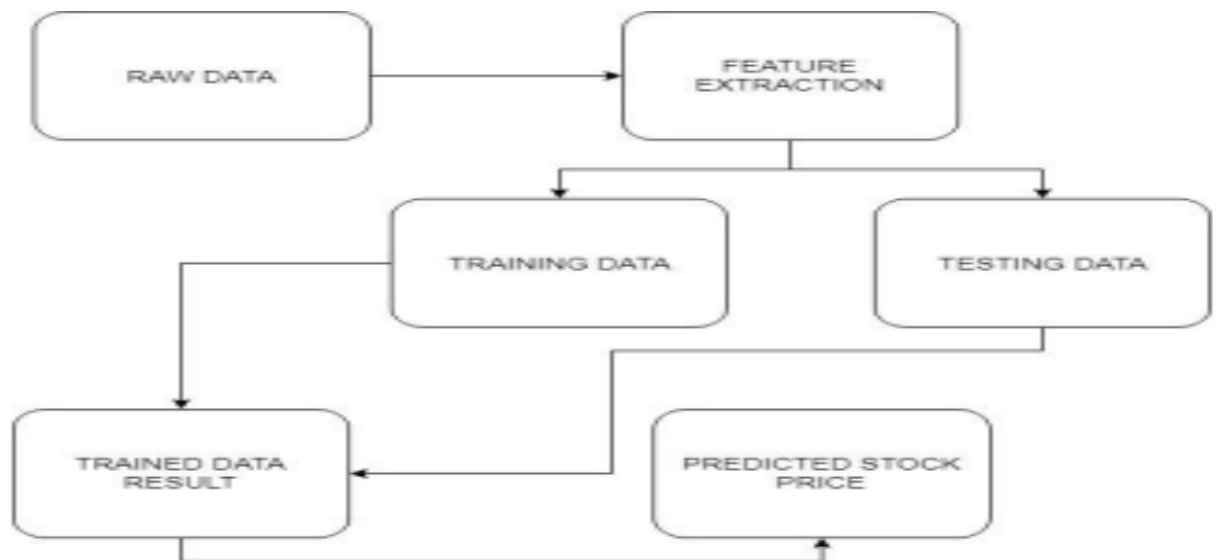
CHAPTER 2

LITERATURE SURVEY

2.1 Stock Prices Prediction Using Machine Learning and Deep Learning Techniques (with Python codes)

Introduction

Predicting how the stock market will perform is one of the most difficult things to do. There are so many factors involved in the prediction – physical factors vs.psychological, rational and irrational behavior, etc. All these aspects combine to make share prices volatile and very difficult to predict with a high degree of accuracy.

Can we use machine learning as a game-changer in this domain? Using features like the latest announcements about an organization, their quarterly revenue results, etc.,machine learning techniques have the potential to unearth patterns and insights we didn't see before, and these can be used to make unerringly accurate predictions.

In this article, we will work with historical data about the stock prices of a publicly listed company. We will implement a mix of machine learning algorithms to predict the future stock price of this company, starting with simple algorithms like averaging and linear regression, and then move on to advanced techniques like Auto ARIMA and LSTM. The above-stated machine learning algorithms can be easily learned from this ML Course online.

The core idea behind this article is to showcase how these algorithms are implemented. I will briefly describe the technique and provide relevant links to brush up on the concepts as and when necessary. In case you're a newcomer to the world of time series, I suggest going through the following articles first:

- A comprehensive beginner's guide to create a Time Series Forecast
- A Complete Tutorial on Time Series Modeling
- Free Course: Time Series Forecasting using Python

Understanding the Problem Statement

We'll dive into the implementation part of this article soon, but first it's important to establish what we're aiming to solve. Broadly, stock market analysis is divided into two parts – Fundamental Analysis and Technical Analysis.

- Fundamental Analysis involves analyzing the company's future profitability on the basis of its current business environment and financial performance.
- Technical Analysis, on the other hand, includes reading the charts and using statistical figures to identify the trends in the stock market.

As you might have guessed, our focus will be on the technical analysis part. We'll be using a dataset from Quandl (you can find historical data for various stocks here) and for this particular project, I have used the data for 'Tata Global Beverages'. Time to dive in!