

TRIBHUVAN UNIVERSITY INSTITUTE OF ENGINEERING

Kathmandu Engineering College
Department of Computer Engineering

Minor Project Proposal Report

On:

STOCK MARKET ANALYSIS AND PREDICTION

[Code No: CT 654]



By

Prasanna Dangol -73053

Shreejal K. Gupta -73073

Shreyanshu D. Kunwar -73075

Sujan Manandhar -73083

Kathmandu, Nepal

POUSH 2075

ACKNOWLEDGEMENT

Firstly, we are deeply grateful towards the **Department of Computer Engineering, Kathmandu Engineering College** for providing this opportunity to develop a Minor Project. We are very appreciative to our teachers for giving us such a platform to showcase our ideas.

We hope that through this project of ours, we will further be able to develop our programming techniques for better and improved skills. We would also like to record our appreciation towards **Er. Sudeep Shakya**, the **Head of Department of Computer Engineering**, **Er. Kunjan Amatya**, the **Deputy Head of Department of Computer Engineering**, **Er. Sharad Neupane**, our **Project Coordinator** and **Er. Nabin Neupane**, our **Year Coordinator**, whose constant guidance and support assisted us for the completion of our project successfully.

Thanks are also due to all our colleagues and everyone who has helped us out for the betterment of the project.

ABSTRACT

‘Stock Market analysis and Prediction’ as the name suggests, is a tool that is used to predict the rising and falling of the stock in real world time. Although the following can be a tedious process which most consider as unpredictable due to the persistent changes taking place in every moment, we intend to improve upon the predictability of the stock marketing scene through a set of carefully analyzed algorithms. For this, we selected a certain group of parameters which have a major impact in increasing or decreasing the aspects of market. Although stock market can never be predicted due to its enormous domain, through this project, we aim to implement ANN in the calculating of the correct stock investment.

Keywords: ANN, prediction, analysis, stock

TABLE OF CONTENTS

| | |
|--------------------------------------|-----|
| ACKNOWLEDGEMENT | ii |
| ABSTRACT..... | iii |
| LIST OF FIGURES | iv |
| LIST OF ABBREVIATIONS | v |
| CHAPTER ONE: INTRODUCTION..... | 1 |
| 1.1. BACKGROUND THEORY | 1 |
| 1.2. PROBLEM STATEMENT..... | 2 |
| 1.3. OBJECTIVES | 2 |
| 1.4. SCOPE OF THE PROJECT | 2 |
| 1.5. APPLICATIONS | 3 |
| CHAPTER TWO: LITERATURE REVIEW | 4 |
| CHAPTER THREE: METHODOLOGY | 6 |
| 3.1. Process Model..... | 6 |
| 3.1.1. Incremental Model: | 6 |
| 3.2. Block Diagram | 6 |
| 3.2.1. Project Requirements | 7 |
| 3.2.1.1. Hardware Requirements | 7 |
| 3.2.1.2. Software Requirements..... | 7 |
| 3.3. Gantt Chart..... | 8 |
| CHAPTER FOUR: EPILOGUE | 9 |
| 4.1. EXPECTED RESULT | 9 |
| REFERENCES | 10 |

LIST OF FIGURES

| | |
|---|---|
| Figure 1: Incremental Model Process | 6 |
| Figure 2: Incremental Software Development Life Cycle | 6 |
| Figure 3: Block diagram of proposed model | 6 |
| Table 1: Gantt Chart..... | 8 |

LIST OF ABBREVIATIONS

| | | |
|---------|---|---|
| ANN | : | Artificial Neural Network |
| FLANN: | | Functional Link Artificial Neural Network |
| LMS | : | Least Mean Square |
| MATLAB: | | Matrix Laboratory |
| NEPSE: | | Nepal Stock Exchange Limited |

CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND THEORY

Stock Marketing is a vast scene that can yield substantial amount of benefit if done in a correct manner. The goal is to invest in a stock that can give a profitable outcome in a certain duration of time. Stock Market prediction and analysis is the act of trying to determine the future value of a stock or any other financial instrument traded on an exchange. It is an important part of the economy and plays a vital role in the growth of the industry and commerce of the nation. A large variety of people (investors and industry) are involved in the stock market and always want to get a value for their money on both sides. The stock market is the primary source for any company to raise funds for business expansions and potential investors to place their capital to yield a profitable turnout.

The Nepal Stock Exchange Limited (NEPSE) is the only Stock Exchange of Nepal; the objective to impart free marketability and liquidity to the government and corporate securities by facilitating transactions in its trading floor through member, market intermediaries etc. It was established under the company act, operating under securities exchange act, 1983 and opened its trading floor on 13th January 1994.

As Stock Market is an ever-changing process and due to the involvement of a large number of companies with large set of data, it becomes very difficult to extract information and analyze their trend of work manually. Through our project, we tend to analyze and predict the patterns of the stock market which will help the potential investors to invest their funds in a reliable stock. This is done using the data of the stock market of the previous years to represent varying conditions and the statistics related to the marketing scene in a given time series to get the most profitable trade present at the moment.

1.2. PROBLEM STATEMENT

Stock Market has a very large prospect with the rise and fall of stock taking place at every stretch. It may be considered too uncertain to predict the value of stock due to huge fluctuations of the market. Predicting the stock market is not a simple task, mainly as a consequence of the randomness of a stock time series.

Timing is the most important factor when it comes to investing in a stock. Investing in a good stock, but at a bad time can have disastrous result, while investing in a stock at the right time yields a large profit. It is a major issue for financial investors of today to invest in a stock that is going to be worthwhile. So, this project will help the investors to have a detailed analysis of the ongoing stock marketing scene; improving their chances of investing in a profitable stock.

1.3. OBJECTIVES

The aims of this project are as follows:

- To provide a reliable analysis about stock to the user.
- To recognize a pattern in the stock market for financial investors to invest in the long-term as well as the short-term stocks.

1.4. SCOPE OF THE PROJECT

This project facilitates people to acknowledge themselves in the current stock marketing scene of Nepal. It also provides a platform for people who are unfamiliar with the current stock market but are looking to invest their funds in a reliable industry which can yield a substantial benefit.

The main feature of this project is to generate an approximate forecasting output and create a general idea for future values based on previous data by generating a pattern where the scope of the project does not exceed more than a generalized suggestion tool.

1.5. APPLICATIONS

The primary application of this project is to bridge communication between potential financial investors and different industries. The aim of the project is to help the investors make a rational and profitable decision through careful analysis of various data that is readily available to them. Moreover, the major application of this project is to assist people make swift, dependable and useful decision so that their investment produces a profitable outcome in Stock Market.

CHAPTER TWO: LITERATURE REVIEW

In the last few decades forecasting of stock returns has become an important field of research. In most of the cases the researchers had attempted to establish a linear relationship between the input macroeconomic variables and the stock returns.

ANN has evolved out to be a better technique in capturing the structural relationship between a stock's performance and its determinant factors more accurately than many other statistical techniques. In literature, different sets of input variables are used to predict stock returns. In fact, different input variables are used to predict the same set of stock return data. . Some researchers even preprocessed these input data sets before feeding it to the ANN for forecasting.

Wilson and Sharda studied prediction firm bankruptcy using neural networks and classical multiple discriminant analysis, where neural networks performed significantly better than multiple discriminant analysis. [1]

Min and Lee were doing prediction of bankruptcy using machine learning. They evaluated methods based on Support Vector Machine, multiple discriminant analysis, logistic regression analysis, and three-layer fully connected back-propagation neural networks. Their results indicated that support vector machines outperformed other approaches. Lee was trying to predict credit rating of a company using support vector machines. They used various financial indicator and ratios such as interest coverage ratio, ordinary income to total assets, Net income to stakeholders' equity, current liabilities ratio, etc. and achieved accuracy of around 60%. Predicting credit rating of the companies were also studied using neural networks achieving accuracy between 75% and 80% for the United States and Taiwan markets. [2]

Tsai and Wang did a research where they tried to predict stock prices by using ensemble learning, composed of decision trees and artificial neural networks. They created dataset from Taiwanese stock market data, taking into account fundamental indexes, technical indexes, and macroeconomic indexes. The performance of Decision Tree + Artificial Neural Network trained on Taiwan stock exchange data showed F-score performance of 77%. Single algorithms showed F-score performance up to 67%. [3]

Kim and Han used a genetic algorithm to transform continuous input values into discrete ones. The genetic algorithm was used to reduce the complexity of the feature space. This paper proposes a novel evolutionary computing method called a genetic quantum algorithm. Genetic Quantum Algorithm is based on the concept and principles of quantum computing such as qubits and superposition of states. Instead of binary, numeric, or symbolic representation, by adopting bit chromosome as a representation Genetic Quantum Algorithm can represent a linear superposition of solutions due to its probabilistic representation. As genetic operators, quantum gates are employed for the search of the best solution. [4]

The similar work in cash forecasting of a bank branch was implemented in MATLAB by Premchand and Ekta (2006). Neural networks are used to analyze the system. The system performs better than other systems based on time series. Its performance was also better than one of the available Excel Add-in for forecasting “Alyuda Forecaster XL 2.3”. This system can be scaled for all branches of a bank in an area by incorporating historical data from these branches. Such a system will help the bank for proper and efficient cash management.

Survey of existing literature reveals that there are different types of ANN models used for predicting the stock market. Many researchers noted that slight parameter changed causes major variations in the behavior of the network. So there is no theory which could be guideline for finding best network topology. Recently, Pratap and Ambika (2011) proposed trigonometric functional link artificial neural network (FLANN) model employs standard least mean square (LMS) algorithm with search-then-converge scheduling. The network could effectively calculate learning rate parameter that changes with time and may require less experiments to train the model. Here FLANN is used for long term as well as short term stock market prediction

CHAPTER THREE: METHODOLOGY

3.1. Process Model

3.1.1. Incremental Model:

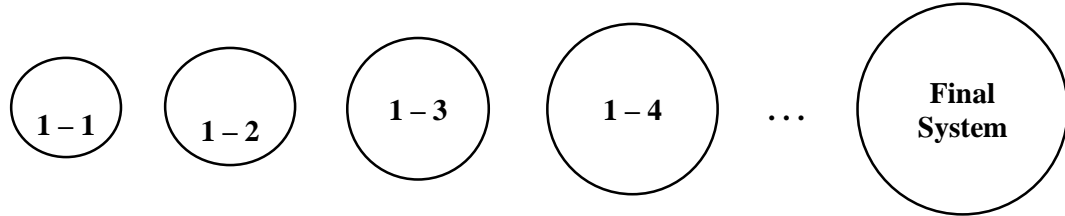


Figure 1: Incremental Model Process

Basic Process:



Figure 2: Incremental Software Development Life Cycle

The purposed method for developing the system consists of mainly three main steps. Firstly, data is collected and sorted for relevancy from various sources. Secondly, analysis is carried out on the collected data by examining the current market direction, tracking the industry group and specific companies after which the data is represented and scored accordingly. At last, an ANN is designed and a suitable algorithm yielding best accuracy is chosen to predict the stock value.

3.2. Block Diagram

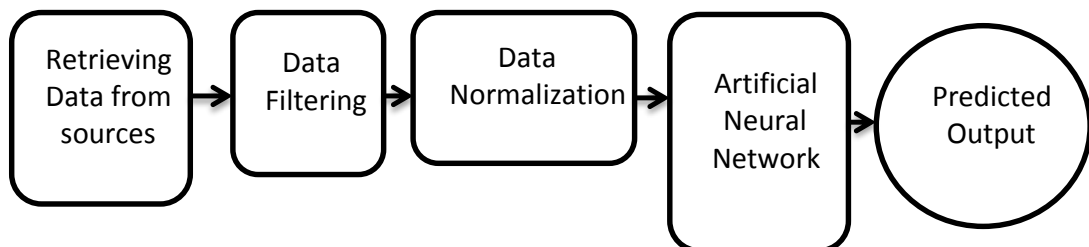


Figure 3: Block diagram of proposed model

First of all, a dataset is created for training the Artificial Neural Network. The collected data are arranged according to the format for the library we use for training.

The data is normalized before being input to the ANN. The input vectors of the training data are normalized such that all the features are zero-mean and unit variance. The target values are normalized using minmax function such that all the values are converted into the values within the range of 0 to 1. The minimum value is represented by 0 and the maximum value is represented by 1.

$$z = \frac{x - \min(x)}{\max(x) - \min(x)}$$

3.2.1. Project Requirements

3.2.1.1. Hardware Requirements

- Computer for processing
- Secondary Storage Device

3.2.1.2. Software Requirements

- a. Python
 - i. Machine Learning
 - ii. Pattern Recognition
- b. Operating System

3.3. Gantt Chart

| Project Activity | Weeks Number | | | | | | | | | | | | | | | | | |
|-----------------------------------|--------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Investigate Problem | | | | | | | | | | | | | | | | | | |
| Undertake problem analysis | | | | | | | | | | | | | | | | | | |
| Develop Requirement Specification | | | | | | | | | | | | | | | | | | |
| Software Design | | | | | | | | | | | | | | | | | | |
| Coding | | | | | | | | | | | | | | | | | | |
| Testing and Debugging | | | | | | | | | | | | | | | | | | |
| Deployment | | | | | | | | | | | | | | | | | | |
| Maintenance | | | | | | | | | | | | | | | | | | |

Table 1: Gantt Chart

CHAPTER FOUR: EPILOGUE

4.1. EXPECTED RESULT

We implement the application of ANN to the task of stock market prediction. Our initial analysis show significant correlation between different input parameter. The result obtained in most of the cases were precise.

The prediction is fairly accurate unless there is huge and sudden variation in the actual data which also proves the hypothesis that stock market are actually unpredictable.

The results will be displayed to users after the phase of prediction and analysis.

REFERENCES

- [1] R. L. Wilson and S. Ramesh, "Bankruptcy Prediction using Neural Networks," *Elsevier*, June, 1994.
- [2] J. MIn and Y. Lee, "The Prediction Model of Financial Crisis Based on the Combination Principle Component Analysis and Support Vector Machines," *Open Journal of Social Sciences*, vol. Vol.2, 2014.
- [3] K.-H. Tsai and J.-C. Wang, "External technology sourcing and innovation performance in LMT sectors: An analysis based on the Taiwanese Technological Innovation Survey," *Elsevier*, vol. 38, no. 3, 2009.
- [4] K.-H. Han and J.-H. Kim, "Genetic Quantum Algorithm and its Application to Combinational Optimization Problem".