Development of Financial Prediction System using Natural Lang Processing

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Abstract—In financial stock market, final prices modify day-to-day at the end of each meeting. These modifications occur because of many issues that disturb the prices of the stocks. In our implementation, we used K-means algorithm to accurately calculate final prices by applying a data mining methodology. We examine and identify the most influential factors of Dubai Financial Stock Market prices. The main aim of this process is to help depositors to plan their future stock chances precisely. Two algorithms namely supervised and unsupervised algorithms are used in this method. It provides an efficient mechanism for the highly available CPU intensive process of big data analysis with help of cloud computing framework for analyzing and predicting the market closing values on the basis on external factors.

Keywords—Financial Market, Natural Language Processing, Data Mining, Cloud Computing.

I. INTRODUCTION

A stock market or share market is the collection of consumers and retailers (also called shares) which represent ownership claims on businesses. These may include securities listed on a public as well as those only traded privately. Financial and stock markets are the driving-force for economic growth and stability as they significantly contribute to the flow of resources which leads to productive investment opportunities. Stock and securities prices frequently change in stock markets [1].

During particular times of the year, it is quite common to notice that stock prices are frequently appreciated every morning and this may take place several times during a given day for some stocks [2]. This indicates that stock prices are affected by many factors. However, the factors behind increases or decreases in the demand and supply of a particular stock could be due to company’s fundamentals, internal or external factors and other market behaviors. But to pinpoint to a specific factor due to the different conditions and scenarios that surround each stock market environment is a tough task. Different economy or market has its own demand and supply of a stock, M. Liebmann, M. Hedwig and D. Neumann have experimented with the dataset of NSE and BSE stock market prices. The main aim of this process is to help depositors to plan their future stock chances precisely. Two algorithms namely supervised and unsupervised algorithms are used in this method. It provides an efficient mechanism for the highly available CPU intensive process of big data analysis with help of cloud computing framework for analyzing and predicting the market closing values on the basis on external factors.

II. LITERATURE SURVEY

D. Kumar and S. Murugan have introduced a new method by combining time-series data with Artificial Neural Network (ANN) [1]. This prediction model is based on a feed-forward ANN with back propagation. The performance of the prediction model is analyzed using some factors. The key factor includes Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), and Mean Squared Error (MSE). This performance is calculated by BSE100 and NIFTY MIDCAP50.

K. Abhishek, A. Khairwa, T. Pratap and S. Prakash have developed a forecasting model for the Microsoft Corporation. This forecasting model includes a two-step procedure [2]. In first-step, ANN go through training with the genetic algorithm. This algorithm teaches the prediction model to identify the new trends. In a second step the results are obtained by analyzing the trained prediction model to the dataset.

M. Hagenan, M. Liebmann, M. Hedwig and D. Neumann have experimented with the dataset of NSE and BSE stock market prices. The text mining is evaluated by Chi-square and statistical parameter. This paper has surveyed on different methods to identify the new trends. In a second step the results are obtained by analyzing the trained prediction model to the dataset.

Arti Buche and Dr. M. B. Chandak discuss the text mining in stock market reviews of Economic Times and news data from social media [3]. They designed the word combination technique with German adhoc messages and stock prices. The text mining is evaluated by Chi-Based feature selection. The Support Vector Machine algorithm is used to predict the stock price. The classification accuracy is boosted by feedback based feature selection.

There is a general agreement that the basic external factors include government policy, instructions and guidelines, economy stability, inflation and other economic conditions, such as Gross Domestic Product, Money Supply, oil or gas or gold prices or environmental circumstances which could have direct links with the production of the company [5].

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Z. Khan, T. Alin and Md. A. Hussein highlighted the consequences in prediction of stock value [5]. The system is incorporated by backward propagation with artificial neural network. The general index (GI), net asset value (NAV), earnings per share (EPS) and volume of the market may affect the market movement. The system with this algorithm is experimented in BSE stock market.
III. METHODOLOGY

Various techniques have been used for predicting stock prices, ranging from traditional models to recent data mining and artificial neural network techniques. Most of the past literature related to predicting stock prices is centered on traditional models, such as time series and linear programming. Mostly time series is used for the prediction of stock prices. Previous study has concluded that the time series of closing prices have some patterns and could not be random. The approach must provide historical, current and predictive views of business operations.

The aim is to allow for the easy interpretation of big data. Identifying new opportunities and implementing an effective strategy based on insights can provide businesses with a competitive market advantage and long-term stability. The issues of data quality in predicting stock prices have an important role in improving the accuracy of the predicted class. The main factors that comprise data quality are accuracy, completeness, consistency, timeliness, believability and interpretability. Inaccurate, incomplete and inconsistent data are common-place properties of financial data.

The figure 1 provides an efficient mechanism for the highly available CPU intensive process of big data analysis with help of cloud computing framework for analyzing and predicting the market closing values on the basis on external factors. In dataprocessing, after flow to processing to maintain required data, it is restricted in cloud. In aggregation and compilation, data should be used through aggregation and compilation while using algorithm. In analysis and decision, the data analysis and making decision what type data we will manage should be done. After extracting feature using machine learning performance, we can predict value. Load Balancing is used of the high speed for acquired through website to manage and save to club when they internally load balancing [6, 7].

![System Architecture](image)

There is a general agreement that the basic internal factors influencing stock prices could be due to company performance, a change in management or ownership, the creation of new assets, earnings, dividends, etc.

On the other hand, some of the external factors include government policy, rules and regulation, economy stability, inflation, and other economic conditions, such as Gross Domestic Product (GDP), money supply, oil/gas/gold prices or environmental circumstances which could have direct links with the production of the company. Some other internal factors also include, earning per share, dividend per share, book values. However, the most important internal factors remain to be the earning per share (EPS), dividend yield (DY), and dividend per share (DPS). DY is a financial ratio that shows how much a company pays out in dividends (per year) relative to its share price. DY is calculated using the cash dividend divided by outstanding shares by closing price. The classing value detection system architecture in that we will be perform some following stages [6, 7].

1. **Preprocessing:** The data preprocessing step typically includes data cleaning, normalization or transformation and feature selection to prepare the data for examination. In that stage we will be perform the incoming raw data i.e. new we provide structure format and we will be used required data and another data are discarded as shown in Figure 1.

2. **Data Checking:** Reliability checking accuracy and find prediction and repeated data are detected and wrong data deleted.
3. **Data Storage Decision**: we need Naive Bayes algorithm as classifier [8, 9].

4. **Offline data storage**: In that database are stored for the used future purposed.

In Proposed system, we are taking input in two formats:

The K-means algorithm is one of the simplest clustering techniques and it is commonly used in medical imaging, biometrics, and any fields. The main advantages of k-means clustering is that it tell about your data rather than you having to instruct the algorithm about the data at the start [10].

**Algorithm I**: Data Acquisition and Filtration Algorithm

**Input**: Live Data Feed process data set

**Output**: Filter the data in key value pair and send this to further processing Mechanism

**Steps**:

1. Filter related data i.e. processed data. All other unnecessary data will be discarded.
2. Use suitable key value pair to divide the data.
3. The unprocessed data is to be transmitted directly without processing to the aggregation step.
4. The processed distinct data block is assigned and transmitted to appropriate processing steps in the Data Processing Unit.

This algorithm takes live RSS Feed Data and then filters and divides them into segments and performs approximation algorithm. In step 1, related details filtered out. And in step 2, filtered data are the association of different key value pairs and each pair is different numbers of sample, which results in forming a data block. In Next steps, these blocks are forwarded processing by Data Processing Unit as shown in Fig. 1 [10, 11].

**Algorithm II**: Processing and Calculation Algorithm

**Input**: Filtered Data

**Output**: Normalized News data into Numerical comparable form Along with Historical Values.

**Steps**:

1. For each event data, relevant Historical Data is extracted.
2. Normalize this for all the live feed.
3. Persist the data into data store and forward it[12, 13].

**IV. EXPERIMENTAL RESULTS**

For the performance evaluation of predicate closing price of financial market, the system is run on configuration having Windows 7 with 4GB RAM. This study builds a model for predicting the closing market value for the Nifty50 based on the Sentiment Analysis. In addition, this study assists investors in predicting the closing pricing in the future. This proposal is still open for future work to improve the prediction accuracy; that might be achieved by continuous data sampling, monthly or daily, and testing the data against the model. Model accuracy might also be enhanced by using more classifiers in the classification algorithm. Our proposed system gives best result than existing system as shown in graph 1.

**Graph 1: Experimental Graph.**

**Table 1: The Comparisons between Existing System and Proposed System**

| Sr. No. | Data                          | Existing System | Proposed System |
|---------|-------------------------------|-----------------|-----------------|
| 1       | Return on Investment (ROA)    | Yes             | No              |
| 2       | Dividend Yield (DY)           | Yes             | No              |
| 3       | Price to Book Value (P/BV)    | Yes             | No              |
| 4       | Price Earning (P/E) Ration    | Yes             | No              |
| 5       | Earnings Per Share (EPS)      | Yes             | No              |
| 6       | Cash Dividend                 | Yes             | No              |
| 7       | Net Income                    | Yes             | No              |
| 8       | Shareholder’s Equity          | Yes             | No              |
| 9       | Total Assets                  | Yes             | No              |
| 10      | Paid up Capital               | Yes             | No              |
| 11      | Outstanding Shares            | Yes             | No              |
| 12      | Book Value                    | Yes             | No              |
| 13      | Par Value                     | Yes             | No              |
| 14      | Closing Price                 | Yes             | Yes             |
| 15      | Date                          | Yes             | Yes             |
| 16      | Company Name                  | Yes             | Yes             |
| 17      | News Feed                     | No              | Yes             |
| 18      | Sentiment Analysis            | No              | Yes             |
| 19      | Live Data                     | No              | Yes             |
| 20      | Input Variations              | No              | Yes             |
| 21      | Input Changes                 | Quarterly       | Real-Time       |

The following Table 2 shows comparison between existing system and proposed system result in percentage.

Percentage = (Actual Value)/100

**Table 2: The Comparison between Existing System Result and Proposed System Result.**

| Day   | Actual Prediction | Existing System | Proposed System |
|-------|-------------------|-----------------|-----------------|
| Day 1 | 80%               | 92%             |                 |
| Day 2 | 84.5%             | 96.7%           |                 |
| Day 3 | 63%               | 67%             |                 |
| Day 4 | 71%               | 73.5%           |                 |
| Day 5 | 77.2%             | 76.78%          |                 |
V. CONCLUSIONS AND FUTURE WORK

In this paper, we have implemented the modified process for prediction of stock market closing values using K-Means algorithm. This study builds a model for predicting the closing market value for the nifty 50 based on the sentiment analysis to deliver an efficient instrument. This cloud computing framework for the highly available resources (like CPU) intensive procedure of big data analysis is effective to analyze & predict the market closing values. This system will be ready for use by potential investors. The authors can’t take any direct responsibility for profits and losses for the users occurring after applying our suggested process.

Certain enhancement can be the possible future work to make this system as the more accurate and user-friendly.

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