# STOCK PREDICTION THROUGH NEWS SENTIMENT ANALYSIS.

Prof. G. S. Mate
Department of Information Technology
Rajarshi Shahu College of Engineering, Tathawade,
Pune, India.
gsmatenew@gmail.com

Siddhant Amidwar
Department of Information Technology
Rajarshi Shahu College of Engineering, Tathawade,
Pune, India.
sid.amidwar@gmail.com

Rutuja Kulkarni
Department of Information Technology
Rajarshi Shahu College of Engineering, Tathawade,
Pune, India.
rutujakulkarni4545@gmail.com

Maitreyi Muthya
Department of Information Technology
Rajarshi Shahu College of Engineering, Tathawade,
Pune, India.
maitreyi2997@gmail.com

*ABSTRACT* - **Stock prices fluctuate very quickly with the change in world market economy. The stock prices are difficult to predict based on some expertise through previous trends and previous stock prices. Stock price movements tell the current market trends and business growth among other factors that could be considered to sell or buy stocks. To analyze the current shifts , new company's product information, business growth etc., we could take a look at the daily news which represents factual information about the companies which could eventually be used to predict the stock prices. This report is intended to present the proposed design and implementation of the "Stock Prediction through News Sentiment Analysis". The proposed design is for a system that will predict the change in the stock prices. Hence, we will be using news articles to forecast the change in stock indices. We have implemented this system by using sentiment analysis which is used to score single merged strings for articles and gives a positive, negative and neutral score for the string. Output of sentiment analysis is being fed to machine learning models to forecast the stock prices. This will help investors to either purchase or sell stocks.**

**Keywords: Machine Learning; Sentiment; Sentiment Analysis; Stock Market; stock price prediction; text mining; financial news.**

## I.    INTRODUCTION

Stock price fluctuation represents the current market trends and business growth that could be considered to sell or buy stocks. To analyze the current trends, new company's product information, business growth etc., we could take a look at the daily news which represents factual information about the companies which could be ultimately used to predict the stock prices. Hence, we will be using news articles to predict the change in stock indices rather than predicting the prices by historical stock prices.

Stock prices move up and down every minute due to fluctuations in supply and demand. If more people want to buy a particular stock, its market price will increase. Conversely, if more people want to sell a stock, its price will fall. This relationship between supply and demand is tied into the type of news reports that are issued at any particular moment.

Negative news will normally cause individuals to sell stocks. Bad earnings reports, poor corporate governance, economic and political uncertainty, as well as unexpected, unfortunate occurrences will translate to selling pressure and a decrease in stock price. Positive news will normally cause individuals to buy stocks. Good earnings reports, increased corporate governance, new products and acquisitions, as well as positive overall economic and political indicators, translate into buying pressure and an increase in stock price. For example, a hurricane making landfall may cause a

drop in utility stocks. Meanwhile, depending on the severity of the storm, insurance stocks could also take a hit on the news (or even climb higher if the expected damage is projected to be moderate). But it's difficult, if not impossible, to capitalize on news.

The impact of new information on a stock depends on how unexpected the news is. This is because the market is always building future expectations into prices. For example, if a company comes out with better-than-expected profits, the stock's price will likely jump. But, if that same profit was expected by a majority of investors, the stock's price will likely remain the same as the profit would have already been factored into the stock price. Thus, it's unexpected news – not just any news – that helps drive prices in both directions.

Sentiment analysis is used to extract opinion and remarks of users by classifying them as positive, negative and natural sentiment. Although there are a number of definitions about sentiment analysis in the literature, but in simple terms sentiment analysis is a technique used to extract intelligent information based on the person's opinion from raw data available on the internet. In this definition, the term opinion means a person's perspective about an object or issue; it can be positive as well as negative depending upon the type of sentiment.

The New York Stock Exchange is an American stock exchange which is the world's largest stock exchange by market capitalization of its listed companies. The NYSE is owned by Intercontinental Exchange, an American holding company that it also lists. There is high risk involved for investors because of more complexity of the stock market. The NASDAQ Composite, Dow Jones Industrial Average, and S&P 500 are three such prominent market indices that function within the US stock market. These three market indexes represent the stocks for NYSE (New York Stock Exchange). So there is a need to predict the stock market status for investors by using these three most important indicators that are NASDAQ Composite, Dow Jones Industrial Average, and S&P 500.

This project is intended to present the proposed design and implementation of the "Stock Prediction through News Sentiment Analysis". Here we will be using news articles to predict the change in stock indices. By using sentiment analysis which is used to score single merged strings for articles and gives a positive, negative

and neutral score for the string. Output is being fed to machine learning models to predict the stock prices which will help investors to either purchase or sell stocks.

## II.    LITERATURE REVIEW

1) Shashank Tiwari ; Akshay Bharadwaj ; Sudha Gupta," Stock Price Prediction Using Data Analytics" ,2017 International Conference on Advances in Computing, Communication and Control (ICAC3),Year: 2017,Mumbai, India.

- In this paper we have understood that the author proposes use of Data analytics to be used in assist with investors for making right financial prediction so that right decision on investment can be taken by Investors. Two platforms are used for operation: Python and R. various techniques like Arima, Holt winters, Neural networks (Feed forward and Multi-layer perceptron), linear regression and time series are implemented to forecast the opening index price performance in R.9 years of data is used. The accuracy was calculated using 2-3 years. The least amount of mean absolute percentage error that we got is1.81598342% for feed forward neural network using actual raw data as it is and the maximum error is 11.32847594% which is obtained using linear model with polynomial trend. The result obtained was the opening price of the stock and that too was average for a full month. So an improvement in this system can be achieved by forecasting the opening price of each day.

2) Ashish   Sharma ; Dinesh   Bhuriya ; Upendra Singh," Survey of stock market prediction using   machine   learning   approach",2017 International conference of Electronics, Communication and Aerospace Technology (ICECA),Year: 2017 , Volume: 2,Coimbatore, India.

- In this paper there is a well-known efficient regression approach to predict the stock market price from stock market data based. If stock market rises, then countries economic growth would be high. If stock market falls, then countries economic growth would be down. In other words, we can say that stock market and country growth is tightly bounded with the performance of stock market brokers and investors for investing money in the stock market. The prediction plays a very important role in stock market business which is very

complicated and challenging process due to dynamic nature of the stock market.

3) Vaanchitha Kalyanaraman ; Sarah Kazi ; Rohan Tondulkar ; SangeetaOswal "Sentiment Analysis on News Articles for Stocks" 2014 IEEE 8th Asia Modelling Symposium, Taipei, Taiwan.
In this paper there is a sentiment analysis on news articles to see its effect on stock prices. Dataset was from Bing API which gave links to news articles about a specific company. There is a specialized sentiment dictionary only meant to analyze stock articles. Two different machine learning algorithms were applied to the dataset and the accuracy of the two was compared. There is a comparison of predicted results with the actual change in the stock prices on the market.

4) **Yauheniya Shynkevich ; T.M. McGinnity ; Sonya Coleman ; Ammar Belatreche,"**Stock price prediction based on stock-specific news articles**" 2015 IEEE International Joint Conference on Neural Networks (IJCNN)**Killarney, Ireland.
- This paper uses the multiple kernel learning technique to effectively combine information extracted from stock-specific and sub-industry-specific news articles for prediction of an upcoming price movement. News articles are divided into these two categories based on their relevance to a targeted stock and analyzed by separate kernels. The experimental results show that utilizing two categories of news improves the prediction accuracy in comparison with methods based on a single news category.

5) Sunil Kumar Khatri ; Ayush Srivastava "Using Sentimental Analysis in Prediction of Stock Market Investment", 2016 5th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO),Noida, India.
- There is a analysis on sentiments collected from yahoo. They have trained the artificial neural network with the results and stock prices of five top I.T. companies to predict the return of investment for the future day. The network is being trained using 75% of data and 15 % of data is used for testing purpose while remaining 10% of data is used for validation.

## PROPOSEDSYSTEM

- Data is gathered from news as well as stock indices. News data is collected from NY Times and stock indices are collected from Yahoo finance website.
- The data which is gathered is then processed where article filtering is done from which only useful articles are taken.
- These articles are then merged with the stock indices to form a single string. This single string is then merged with the appropriate date.
- Sentiment analysis's is performed to get
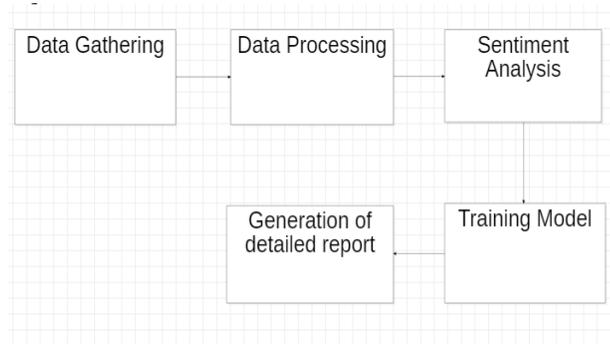


ehavior of the string through natural language processing.
- Output of the string is then fed to the machine learning model to get the predicted output.

**Figure 1: Block Diagram**

## III.    MODULES

➡ Data Gathering

- Two types of data are gathered which are stock indices and news data.
- Data of stock indices are collected from Yahoo finance website.
- News data are not easily available on the Internet for public use. The best openly available data which could be appropriately used in stock prediction is from the NY Times Archive API.

■ Data Processing

- Articles collected from the NY Times archive API contain the data in the form of categories represented by sections. Some of the sections contains some irrelevant categories of articles, which are not related to stocks at all, such as Biography, Obituary, and Schedule etc. Therefore, we have removed those kinds of articles from the lists. Article sections that are kept at the end for sentiment analysis are as follows: 'Business', 'National', 'World', 'Politics', 'Opinion', 'Tech', 'Science', 'Health' and 'Foreign'.
- After filtering out the relevant articles, a single string was formed from concatenating all the articles headlines for a single day. After getting the single string for a day, it was merged with appropriate date.

■ Sentiment Analysis

- The Natural Language Toolkit (NLTK) package in python is most widely used for sentiment analysis for classifying emotions or behavior through natural language processing.
- It is used to score single merged strings for articles and gives a positive, negative and neutral score of the string.

■ Training Model

- Output of sentiment analysis is being fed to the machine learning model to predict the stock prices.

## IV.    EXPERIMENTAL VALUES



**Figure 2: Data Collection**



**Figure 3: Data Set**

## V.    FUTURE SCOPE

We can include real time data for our system which will help people to predict in stocks. By doing this people will exactly know when to invest and when to sell. This will also tell us the growth of the company.

We would like to extend this research by adding more company's data and check the prediction accuracy. For those companies where availability of financial news is a challenge, we would be using twitter data for similar analysis.

## VI.    CONCLUSION

Finding future trend for a stock is a crucial task because stock trends depend on number of actors. We assumed that news articles and stock price are related to each other. And, news may have capacity to fluctuate stock trend. So, we thoroughly studied this relationship and concluded that stock trend can be predicted using news articles and previous price history.

In order to invest money in stock market for purchasing the shares it is very essential for the investors to predict the stock market condition.

If the news is positive, then we can state that this news impact is good in the market, so more chances of stock price go high. And if the news is negative, then it may impact the stock price to go down in trend.

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