CHAPTER IX

CONCLUSIONS AND FUTURE WORK

9.1 CONCLUSIONS

This thesis attempted to achieve three objectives:

1. To provide evidence that the stocks have a correlation with the sentiments in the news items by building a real time system to predict the future stock price of a company.
2. To establish a system which gives overall performance of a financial institute based on technical and sentiment analysis.
3. To build a system that would analyze and predict the variations in stock prices over a timeline, based on the sequence of events.

All these objectives have been fulfilled and are explained in each of the chapters. The first and foremost objective is to provide the evidence for the correlation between the stock values and the sentiments in the news articles. The study was done for a particular year. The system that predicts the next day’s stock value using the sentiment score of the news articles published on the same day and stock prices, was built. The system uses artificial neural network for predicting the future. A corpus based approach has been adopted to extract the sentiment score of the news articles. The empirical results that depict the correlation between the news articles and the stock values are shown.

The second objective is to measure the financial health of a company. This is achieved by using a hybrid approach. The investors who want invest in the company needs to the outlook of the company to check whether that company is performing consistently or not. The work carried out gives overall health of the company by combining the technical and sentiment analysis.

Moving average indicator is considered for the technical analysis since many of the researchers proved it to be the efficient indicator. For sentiment analysis the supervised learning algorithm called Naïve Bays Classifier has been used. For predicting the financial health of a company the stock prices over a period of six months have been collected and its
moving average is calculated for the technical analysis. For the sentiment analysis the news articles for the same six months duration have been collected and analyzed for overall sentiment. Then these two analyses have been combined to give an overall view.

The last objective is to predict the movements of the stocks over a time period based on the sequence of events. Contrary to the previous work, in our study we have considered the effect of sequence of the events on the price of the stock. The stock values of the companies listed BSE have been extracted and analyzed for the negative events. The companies that have the negative events have been singled out and studied for price movements around the time frame, after the occurrence of multiple events.

According to one of the sayings [Lao Tzu], “Those who have knowledge don’t predict and those who predict don’t have knowledge”. In spite of such sayings and beliefs by ancient philosophers, we found that, the modern technologies provide us with all the necessary equipment to predict the future (limited to certain cases, though). The technology that has been developed made the researchers to stand tall and answer the questions with confidence and authority.

Stock market research is an area where every one wishes they could gauge the sentiments before investing in it. Though predicting stock movements is not easy the state of art technology allowed us predict the movements to a large extent, if not full. The standard classical theory which is based on Efficient Market Hypothesis (EMH) had been in the use for many years. Behavioral finance overtook the classical theory by considering the fact that human sentiment plays an important role in predicting the stock prices. Given that various media on the Internet publish news articles most of the researchers found that automation of that analysis of huge amount of data could produce informed decisions in a short span of time. This thesis presented the study, which investigated the role of sentiment analysis of news articles in predicting the future stock prices. The news items for sentiment analysis are extracted using dynamic data sources such as online news articles from streaming data.

Many researchers established that there is a relation between the sentiments in the news articles and stock values and this thesis proved the impact of the news articles on the movements of the stock prices. Our thesis provided a novel predictive model that shows the correlation between actual and predicted stock values. During our investigation, an insight is gained that established the relation between the news articles and stock prices. The
researchers in the related field used neural network for either numerical data of stock prices or for sentiment analysis. Our system used a unique work in which the neural network takes both the historical stock prices and sentiment score for predicting the future stock price.

However, the method used for analyzing the sentiment was not that efficient as it used “sentiwordnet” that uses the words, which are not pertaining to financial domain, but generalized. This problem overcame in the system established to achieve the third objective. A dictionary pertaining to the strong financial domain has been used and further strengthened by adding more sentiment terms along with the probabilities. This is a new method and empirical results have shown that this method outperformed the other standard machine learning methods.

In the experiment conducted to achieve the third objective only the companies with the negative news have been selected, and the results proved that there is fall in the stock price of that company immediately after the negative news. It shows the increase in tendency again after an event takes place. Empirical evidence from the work done in this thesis would provide informed decision to the investor so that he could safely invest in a company and get high yielding. The novel sentiment analysis methods adopted in our work have been successfully adopted in achieving our three objectives, which can be applicable to real life scenario.

9.2 FUTURE WORK

Even though the work in the thesis attempted to address many key issues in establishing the fact that news articles create an impact on the stock values, there is still some scope for improvement in several areas. The possible future directions are listed below.

The thesis focused on the news articles published on a particular website whose authenticity is not questionable. But there are some other key role players apart from news articles. Many investors seek guidance from some financial experts. These websites provide the expert advice also. These advices can be included in the sentiment analysis. Some discussion blogs are playing an important role in creating an impact on the stock price. These can be also being considered for the work, but the question here would be authenticity. The system should provide room for checking the true value and authenticity also.
A future work in the experiment with neural network could be to extend the results obtained here using Deep Multilayer Neural networks containing more than two hidden layers to determine the sentiment of the text. Abled researchers can go a step further and use certain complex algorithms.

In the implementation of measuring the health of a company, we have extracted the historical stock prices of a certain company from a list of companies and analysed those values to find the patterns in the stock values. We have also explored the predictive power of news articles on stock market domain to help the user make an informed decision. The historical prices are analysed by technical analysis and the news articles are analysed using sentiment analysis. This work could be extended by adding more companies and the exploration of various other techniques for both sentiment analysis and technical analysis.

Moreover, different events show different impact on the stock price. For example if the news is about the company acquiring another company would have different impact than there is an announcement that the company is cutting down the employees. Different weights can be attached to different events to study their impact on the stock prices.