Expert Advisory System to Invest in Software Industry

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Abstract:
Stock market scares people because of the loss caused due to bad decisions taken while investing and while selling of stocks. Which further force them to take rational decisions causing harm to themselves and others. This project will help in taking better decisions by examining the data set of IT company in which we will try to find the best the best period for investing in the company so that we can we help in increase in public domain investment in IT further also decreasing the losses occurring and by using deep learning technique which are Long Short Term-Memory (LSTM) which will use keras as the platform to run itself and Multi-Layer Preceptron (MLP) Classifier. The outputs will be displayed in graph format in which their will be two lines which are comparison with actual output and predicted output for better understanding the accuracy and comparing. We will further try to find which is better algorithm and has a better time complexity. As per that recommendation will be done to use which one. We have not considered the external factors in the yielding the output.

Keywords: stocks, deep learning, Keras algorithm, MLP classifier algorithm, stock market prediction.

I. INTRODUCTION

Stock market normally scares people for obvious reasons like I am not a CA, I don’t know gambling and the most common what if I lose all my money. This is all true many people have lost all their money but there are many success stories there are many people who started with nothing but today are millionaires. But for this to happen you need to understand what is it, how does it work.? Nowadays the prices of everything has increased, everyone who’s working for you wants an increment only thing that isn’t increasing is your salary. So, to overcome this issue we can invest our money in stock. Now the question arises why stock we can make a FD. But here is a thing if you invest in FD you will get 5%-7% of interest whereas if you invest in a good company you will get 14%-20% of interest. Now a common question will arise that how does this happen: Before we get there, few concepts need to be clarified Shares: they are a unit that represent part of ownership you have in the company. E.g. When you buy shares of any company you become a part owner of that company. Now this is a good thing and a bad as well. Good thing when the company does well gets profit you get a profit too. But if the company does not do well faces a lose then you also take part in the loss.

To make profit we should
• Identify good companies.
• Reduce risk.
• Invest long term.

National Stock Exchange (NSE) and Bombay Stock Exchange (BSE): the people who want to buy and sell stock got to the stock market. BSE+NSE together form a stock market, to do trade in stock market you need a registered stock broker. Security and exchange board of India (SEBI): wherever there is money there will be thieves. Now the job of SEBI is that common people like us won’t be cheated. They are like the supervisors that will make sure there is no malfunction occurring if there is any then the SEBI will flat them down. DEMAT account and Trading account: you need these two types of account. The trading account is the one using which you will place, buy, sell orders in the stock market, once we buy the shares, they will be kept in the DEMAT account. Acting as a digital wallet where the shares will be stored. Stock broker: As mentioned if we want to do any trade, we do it with help of stock broker they are like a stock market best friend. They will help you set services, open DEMAT and trading account and suggest which stocks to buy and sell. For all this they take a specific amount of brokerage. Holding periods: the time for which you hold the share i.e. you neither sell it. You just keep it with you. Stock market index: Now when this question is asked that how is the share market doing, we cannot go and check all companies in the market we will pick few companies across key sectors and check their status. Majority of their them if they are going up then the market is doing profit. These majority companies through which we determine the market form the stock market index. In India we have two major indices SENSEX include 30 major companies from BSE NIFTY include major 50 companies from NSE. We need an index as it acts as barometer for every trader and investor. The intention is to outperform the index. And hence this index determines nation’s economy.

How does the stock market work?
Any company that wants to raise capital and decides to go public offers few of its shares to the stock exchange. Once the company gets registered in the stock exchange people start buying and selling shares regularly. With intentions of gaining profit.

The shares price goes up and down because of few reasons:
- a) Difference in opinion
- b) News
- c) Events

II. RELATED STUDY

As we have come from IT sector lets focus on it. Now major IT sectors in the Indian stock market are TCS, Infosys, Wipro, HCL tech, Tech Mahindra, Oracle Fin Serv, L&T Technologies, etc.
Table 1. The Present Market Value And Condition Is Represented In The Below Table

<table>
<thead>
<tr>
<th>Company</th>
<th>Last Price</th>
<th>%Chng</th>
<th>High</th>
<th>52 week</th>
<th>52 week Low</th>
<th>Market capital (Rs. Cr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCS</td>
<td>2,215.5</td>
<td>0</td>
<td>1.4</td>
<td>2,290.6</td>
<td>1,784.0</td>
<td>831,34</td>
</tr>
<tr>
<td>Infosys</td>
<td>774.95</td>
<td>-0.2</td>
<td>3</td>
<td>804.25</td>
<td>600.65</td>
<td>332,84</td>
</tr>
<tr>
<td>Wipro</td>
<td>258.65</td>
<td>-1.3</td>
<td>1.9</td>
<td>301.55</td>
<td>205.76</td>
<td>156,10</td>
</tr>
<tr>
<td>HCL Tech</td>
<td>1,122.4</td>
<td>-1.9</td>
<td>3.6</td>
<td>1,190.0</td>
<td>920.15</td>
<td>138,67</td>
</tr>
<tr>
<td>Tech Mahindra</td>
<td>668.80</td>
<td>0</td>
<td>9.0</td>
<td>840.10</td>
<td>607.90</td>
<td>65,890</td>
</tr>
<tr>
<td>Oracle Fin Serv</td>
<td>3,292.9</td>
<td>0.1</td>
<td>9.0</td>
<td>4,655.0</td>
<td>3,022.0</td>
<td>28,262</td>
</tr>
<tr>
<td>L&amp;T InfoTech</td>
<td>1,579.5</td>
<td>2.9</td>
<td>3</td>
<td>1,990.0</td>
<td>1,436.6</td>
<td>27,442</td>
</tr>
</tbody>
</table>

As we can observe and out of top 7 companies 3 are facing loss. The others all though have profit don’t get in a huge margin. There are certain factors affecting it. They are:

**Pricing pressure** India’s top IT companies have to keep costing low as people still People still expect to get to products at same price as they were receiving. Although there might be volume or overall growth but the rates have fallen down. Talking statistically the IT sector has grown by 25% in 15 years according to CAGR. But in last seven years it grew by 14%. From a long time, the IT market of India has been able to maintained their leverage of working at low cost. And considering other factors such as good demand and decrease in value of rupee in last few years the earning is going downhill on a constant rate.

**Slow growth** As we have put a down a table if we closing observe it the companies such as Wipro, HCL and other having profit but they really negligible such profits don’t encourage the investors to invest in the company. TCS had reported a profit in end of last year but the dollar rupee difference literally slashed it. And sometimes such minor growth doesn’t even matter.

**Cross currency impact** Rupee will always compete with dollar. And this difference will always affect the companies. Because IT is not yet grown in India so the main market of all these companies is foreign.

**Hiring new Talent** There is introduction of new technologies in the industry companies has to help their employees update and find new recruits and the train them. And most of the companies pay salaries even during the employees training period. Causing no input from the employee and output from companies. This causes to companies to give less salaries causing discontent. These are some of the factors affect. Let us try to understand the major investors in few major companies and try get to know the market more

Table 2. Performance Table of Tata consultancy Service Ltd

<table>
<thead>
<tr>
<th>Holder’s Name</th>
<th>% of share holders</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoters</td>
<td>72.05%</td>
<td>Most of the investment in company is advertisement</td>
</tr>
<tr>
<td>Foreign Institution</td>
<td>15.9%</td>
<td>Remaining handful are foreign companies</td>
</tr>
<tr>
<td>Financial Institution</td>
<td>5.33%</td>
<td>Loans and all for starting of project</td>
</tr>
<tr>
<td>General Public</td>
<td>3.48%</td>
<td>The commoners again have really less share</td>
</tr>
<tr>
<td>N banks mutual funds</td>
<td>2.7%</td>
<td>Loans from banks in form of mutual funds</td>
</tr>
<tr>
<td>Others</td>
<td>0.47%</td>
<td>Other entities with minor investments</td>
</tr>
<tr>
<td>Central government</td>
<td>0.06%</td>
<td>Government also invest in it</td>
</tr>
</tbody>
</table>

Graph 1. Present value representation

Graph 2. Tcs Performance Graph
Table.3. Performance table of Infosys Ltd.

<table>
<thead>
<tr>
<th>Holder’s Name</th>
<th>% of Shareholders</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoters</td>
<td>13.15%</td>
<td>Due to lack of advertisement</td>
</tr>
<tr>
<td>Foreign Institution</td>
<td>31.36%</td>
<td>The main investors are from foreign</td>
</tr>
<tr>
<td>Others</td>
<td>20.76%</td>
<td>They are minor group of investors</td>
</tr>
<tr>
<td>N banks mutual funds</td>
<td>13.36%</td>
<td>Bank loans and investments</td>
</tr>
<tr>
<td>Financial Institution</td>
<td>10.62%</td>
<td>Other companies that invest</td>
</tr>
<tr>
<td>General Public</td>
<td>9.9%</td>
<td>The general public</td>
</tr>
<tr>
<td>GDR</td>
<td>0.44%</td>
<td>Global depository receipt</td>
</tr>
</tbody>
</table>

Looking at above data we discover that general public do not invest much in the company there are several reasons:

• Lack of trust in company.
• Lack of knowledge
• Lack of communication of company with general public

• Main IT companies all the clients are mostly foreign base.
• More advertisement is needed.
• Company also needs to identify what the areas in which general public will be more interested.
• Recreate a strong network.

Graph.3. Infosys performance graph

III. SYSTEM ARCHITECTURE

The above diagram represents how the system will work. The data will be taken from the knowledge base and it is divided into the trained data and tested data. The trained data is further used and two algorithms are applied on its LSTM and MLP classifier. Then it will be compared from the tested data and more accurate form of output will be presented to the user.

IV. IMPLEMENTATION AND SCREENSHOT

Now our algorithm will help in making better decisions how? it will graphically represent which is the best time to invest in company. When people will earn more profits, the popularity will increase hence improving the condition of the Indian IT sector. In return the sectors being more developed and the development being more visible.

Algorithms used to do such prediction are:

A. LSTM
B. MLP Classifier

A. Long Short-Term Memory

Let’s understand what Keras is and how Keras will provide us with desired output. Keras is an effective interface that wraps multiple frameworks.

It acts as an interface for

• TensorFlow
• CNTK
• Theano

It is chosen high level API of TensorFlow. Keras is fastest model when you have to build the layers those are built from standard layers.

Graph.4. Wipro performance graph.

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Figure.2. Diagrammatical representation of Keras
The below code is when we create a network which runs for 200 epochs considering 50 units at a time for creating a consideration and in each cycle the amount of data loss in each step and the time required to execute each step. And display number of steps executed. The below diagram will show the graph of expected and predicted data.

MLP Classifier (Multi-layer perceptron)
In multi-layer perceptron there are more than two layers i.e. multiple layers. Which are input layer, hidden layer and output layer. Now we have to keep one thing in mind that input layer and output layer will be only one but the hidden layer can be how much ever we want. Each data has its own activation function or different function making it more complex and efficient. We define how much should be size of the hidden layer. And what activation function we will use. As we discussed in each layer, we will use different activation function just to get better output and accuracy.

Stock price prediction

The above graph shows the predicted output and expected output we can't see a much of a difference and hence we can say that it is more reliable.

V. CONCLUSION & FUTURE WORK

By the above observation it is clear that MLP classifier is much better algorithm giving a better decision having a faster working speed. We can depend on it for finding which company will fetch with profit or loss. In future I will try to create an application which will be much user friendly and company friendly. The current work just focuses on the base of the application which will help customer to invest in IT company.

VI. REFERENCES


[5]. Bowen Song, Heng Liu, Stock Price Trend Prediction Model Based on Deep Residual Network and Stock Price Graph, 2018 11th International Symposium on Computational Intelligence.


[12]. Economic Times and share market all the table values are taken from there.

[13]. All the above figures (1,2,3,4) are self-represented by understanding the theoretical concepts graphs are represented with help of tables.