Project Title - Stock Trend Prediction

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1. Preface

Stock trend prediction refers to predicting future price trend of stocks for seeking profit maximum of stock investment. Although it has aroused broad attention in stock markets, it is still a tough task not only because the stock markets are complex and easily volatile but also because real short-term stock data is so limited that existing stock prediction models could be far from perfect, especially for deep neural networks. As a kind of time-series data, the underlying patterns of stock data are easily influenced by any tiny noises. Thus, how to augment limited stock price data is an open problem in stock trend prediction, since most data augmentation schemes adopted in image processing cannot be brutally used here. To this end, we devise a simple yet effective LSTM method for stock trend prediction. The proposed method is to stock price data. Finally , here it concludes the stock price data fed to the prediction models.

1. Project Overview -

Project Title - Stock Trend Prediction

A stock trend prediction has been in the spotlight from the past to the present. Predicting the stock price of any stock is a challenging task because the Volatility of the stock market , the nature of stock price is dynamic, chaotic, noisy and sometimes totally unexpected. It is an important and classic problem in the world of stock trading.

So, in this project the purpose is to create a Stock Trend Prediction Web Application in Python. Deep learning for predicting stock market prices and trends using Long Short-Term Memory (LSTM) that will be trained from the available stocks data for correct prediction. Also, the recent trend in stock market prediction is using machine learning techniques as its model makes prediction easier and authentic.

Thus, it provides models which can visualize the price of the stock as graphs and give an overview of stock trends.

2. Introduction -

A stock market is a public market for trading of company stocks. Stock market prediction is the task to find the future price of a company stock. The price of a share depends on the number of people who want to buy or sell it. If there are more buyers, then prices will rise. If the seller has a number of buyers, the price will drop. The agent can often help people to buy/sell shares on the stock market. A broker can also help customers make the right choices in stock. Prediction of the stock market is an attractive topic to the stoke brokers. In stoke market the making decision when buying or selling the stock is an important in order to achieve profit. As the market fluctuating everyday it is difficult to predict the future stock price.

Prediction of stock prices has been an important area of research for a long time. While supporters of the efficient market hypothesis believe that it is impossible to predict stock prices accurately, there are formal propositions demonstrating that accurate modeling and designing of appropriate variables may lead to models using which stock prices and stock price movement patterns can be very accurately predicted. In this project , the purpose is to create a Stock Trend Prediction Web Application in Python.

Deep learning for predicting stock market prices and trends using Long Short-Term Memory (LSTM) that will be trained from the available stocks data for correct prediction.

Also, the recent trend in stock market prediction is using machine learning techniques as its model makes prediction easier and authentic. Stock ticker is nothing but the symbol that is assigned to that stock in the market. So for Tesla we have TSL and so on….You can just go on the Yahoo Finance website and here I've used this website for scrapping the stock data for our analysis. Thus, it provides models which can visualize the price of the stock as graphs and give an overview of stock trends. Also introduce several new factors including the prices of other related stocks to improve the prediction accuracy.

Therefore, I wanted to understand how accurately a trained model provides us with accurate price predictions, and what would be the best way to predict a rise/drop before it happens. Since for stock market prediction LSTM performs well when the information or the data is of the past and the prediction is to be made for the future then we can say that LSTMs are quite capable of doing the prediction for the stock market values.

3. Iiterature Review -

Stock market prediction has become an increasingly important issue in the present time. One of the methods employed is technical analysis, but such methods do not always yield accurate results. So it is important to develop methods for a more accurate prediction. This section briefly outlines the research on stock prediction techniques. It summarizes the techniques that only consider numerical financial data for stock prediction. Then it discusses the feature extraction from textual data. It also summarizes the prediction algorithms that exploit the combination of numerical and textual data for prediction.

This work uses deep learning models for daily directional movements prediction of a stock price using financial news titles and technical indicators as input. Prediction and modelling of the financial indices is a very challenging and demanding problem because of its dynamic, noisy and multivariate nature. Modern approaches have also to challenge the fact that they are dependencies between different global financial indices. All this complexity in combination with the large volume of historical financial data raised the need for advanced machine learning solutions to the problem.

Here, it proposes a Deep Learning approach utilizing Long Short-Term Memory (LSTM) Networks for the modelling and trading of financial indices. Predicting stock prices is a challenging problem in itself because of the number of variables which are involved.

Predicting stock prices is an important task of financial time series forecasting, which is of great interest to stock investors, stock traders and applied researchers. Many machine learning techniques have been used in recent times to predict the stock price. In this the main method is to predict the stock price with distributed representations of the reported information, and taking into account the interaction between multiple companies in the same industry.On their way to a regular network forecast changes, time-series fluctuations on the stock price.

The experimental results show that distributed text information is far better than digital, data-only methods and the bag of text-based methods, LSTM can capture other types of input data, and the company is an effective stock price forecast.

4. Research Methodology -

I. **Objective -** The main objective of an application is to predict the stock price. By Implementing the deep learning architecture which helps in prediction of future stock price whereas the current emerging competitive market, predicting the stock returns as well as the company's financial status in advance will provide more benefits for the investors in order to invest confidently. Stock prediction can be done by using the current and previous data available on the market.

II. **Scope** -

As the stock market fluctuates every day it is required intensive planning for making profit from the stock market. Since the stock market began, analysts have always faced a struggle to predict the future stock price because of its complexity and profitability. The most easy and reliable way to forecast the future is to try to understand the present but the amount of available data nowadays is huge.Data analysis is used to better understand the present scenario of the Stock exchange so as to understand and try to create a better future scope for investment of stock. Though the predictions can never be fully accurate, even a minute increase in accuracy of prediction can help a lot in terms of profitability.

The scope behind the use of these methods is LSTM to determine if there are any long term dependence on existing data or not. The LSTM is to identify long-term dependencies, and they are used to predict the future.

I Limitations -

The most important limitation concerning the implementation of this project is the lack of appropriate data analysis techniques. As the research study is completely based on the application of LSTM and it's techniques, we needed some powerful tools and software to implement different steps in this project. As there was no such data mining software at hand, had to use the Python programming language to write the codes for the algorithms related to different steps in the research process and implement those algorithms in the Python environment.

IV. Significance of Research -

The successful prediction of a stock's future price could yield significant profit. The efficient-market hypothesis suggests that stock prices reflect all currently available information and any price changes that are not based on newly revealed information thus are inherently unpredictable. Others disagree and those with this viewpoint possess myriad methods and technologies which purportedly allow them to gain future price inform. The successful prediction of a stock's future price could yield significant profit. The efficient-market hypothesis suggests that stock prices reflect all currently available information and any price changes that are not based on newly revealed information thus are inherently unpredictable. Others disagree and those with this viewpoint possess myriad methods and technologies which purportedly allow them to gain future price information.

V. Description of Algorithms / procedures / data collection methods / logic -

1. BASIC INTRODUCTION OF STOCK MARKET -

A stock market is a public market for trading of company stocks. Stock market prediction is the task to find the future price of a company stock. The price of a share depends on the number of people who want to buy or sell it. If there are more buyers, then prices will rise. If the seller has a number of buyers, the price will drop. The agent can often help people to buy/sell shares on the stock market. A broker can also help customers make the right choices in stock.

The existing methods for stock price forecasting can be classified as follows -

1. Fundamental analysis: This is a type of investment analysis of the shared values, the company estimates its sales, revenues, profits and other economic factors. This method is the most suitable for long-term forecasts.

2. Technical analysis: This method uses historical prices of stocks, looking for the price. This method usually uses a moving average technical analysis. This method is useful for short term forecasting.

3. Time series data: It includes two basic types of algorithms, which is linear and non-linear model.Prediction of the stock market is an attractive topic to the stoke brokers.

In the stock market the making decision when buying or selling the stock is important in order to achieve profit. As the market fluctuates everyday it is difficult to predict the future stock price.

The deep learning algorithm has a self-learning process that is capable of identifying hidden patterns and dynamics. The stock market is non-linear and the resulting data is enormous. The deep learning algorithms are able to identify and take advantage of the interactions and patterns that have data through a self-learning process. Unlike other algorithms, deep learning mode can be an effective model for these types of data, and can provide a good forecast analysis of the interaction and hidden patterns in the data.

2. DEEP LEARNING - The deep learning study is a subfield of machine learning algorithms inspired by the concerns and the structure and function of the brain, this is call artificial neural network. Most of the learning methods use neural network architecture, which is why you want to study the deep learning model commonly referred to as a deep neural network. Here, the term "deep" usually refers to the number of hidden layers of the neural network. The traditional neural network consists of only 2-3 hidden layers, while the deep neural networks with up to 150 hidden layers. These models are trained in the use of large data sets and neural network architecture and learn about the features directly from the data.A deep neural network has multiple non-linear processing layers, it uses simple elements run in parallel, which is inspired by the biological neuron system. It consists of an input layer, there are a few hidden layers and the output layer. Through the layer of interconnected nodes, or neurons, each hidden layer uses the output of the previous level as their input. Each node decides what to send on to the next tier based on its own inputs from the previous tier.

LONG SHORT – TERM MEMORY (LSTM) NEURAL NETWORK -

LSTM have a cell state which contains additional memory, which is used to store the relevant past information of prediction. Some of the information is in a cell, the status of the modified structure, known as the gate. There are steps to perform such a task. In the initial steps to forget the door to decide whether or not to get rid of any of the available information. After that, tanh layer and enter the door to decide which new information to be stored. The storage of new information, add and delete information in accordance with the previous gate. In the last step, the Activation function is applied to the output data . LSTM is a kind of RNN. In the LSTM architecture, hidden layers will be replaced with a LSTM's cell. The LSTM cell contains a wide range of gates; you can control the input stream. A LSTM cell contains the input gate, the status of the cell, forget gate and output gate. It also includes a ban on the sigmoid layers, tanh layers, and the pointwise multiplication operator.

6 Experimental Setup -

I. *Tools* :

1. **Jupyter Notebook** - The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

2. **Streamlit cloud -**

   It is used for deployment of the project.

3. **Browsers (Chrome) -**

   It is used for debugging frontend code.

4. **Pycharm -** PyCharm is a dedicated Python Integrated Development Environment (IDE) providing a wide range of essential tools for Python developers, tightly integrated to create a convenient environment for productive Python, web, and data science development.

II. Architecture/Framework -

Libraries used -

1. numpy - NumPy is a Python library used for working with arrays.It also has functions for working in the domain of linear algebra, fourier transform, and matrices.

2. Pandas - pandas is a software library written for the Python programming language for data manipulation and analysis.

3. matplotlib.pyplot - matplotlib.pyplot is a collection of functions that make matplotlib work like MATLAB.

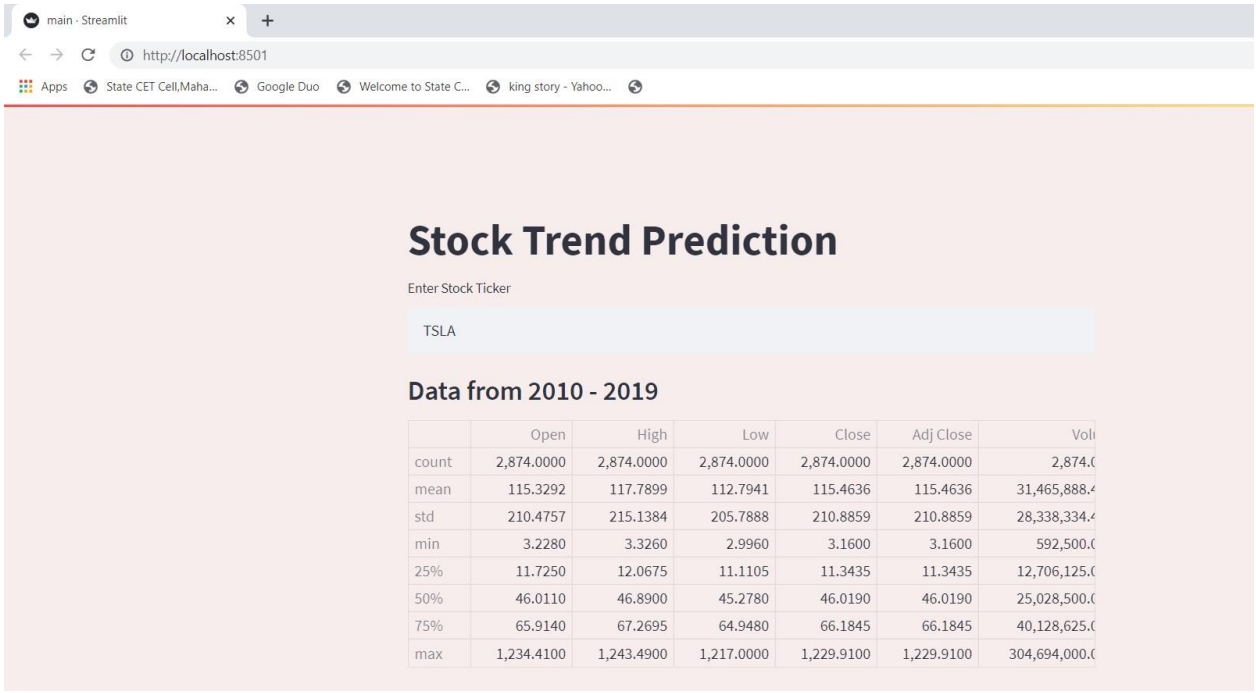
4. pandas_datareader - Pandas Datareader is a Python package that allows us to create a pandas DataFrame object by using various data sources from the internet.

5. yfinance - YFinance is a python package that enables us to fetch historical market data from Yahoo Finance API in a Pythonic way. It becomes so easy for all the Python developers to get data with the help of yfinance.

6. Keras - **Keras** is an open-source software library that provides a Python interface for artificial neural networks. Keras acts as an interface for the TensorFlow library.

III. Software Language - Python Programming Language

7. Results -



	Open	High	Low	Close	Adj Close	Vol
count	2,874.0000	2,874.0000	2,874.0000	2,874.0000	2,874.0000	2,874.(
mean	115.3292	117.7899	112.7941	115.4636	115.4636	31,465,888.4
std	210.4757	215.1384	205.7888	210.8859	210.8859	28,338,334.4
min	3.2280	3.3260	2.9960	3.1600	3.1600	592,500.(
25%	11.7250	12.0675	11.1105	11.3435	11.3435	12,706,125.(
50%	46.0110	46.8900	45.2780	46.0190	46.0190	25,028,500.(
75%	65.9140	67.2695	64.9480	66.1845	66.1845	40,128,625.(
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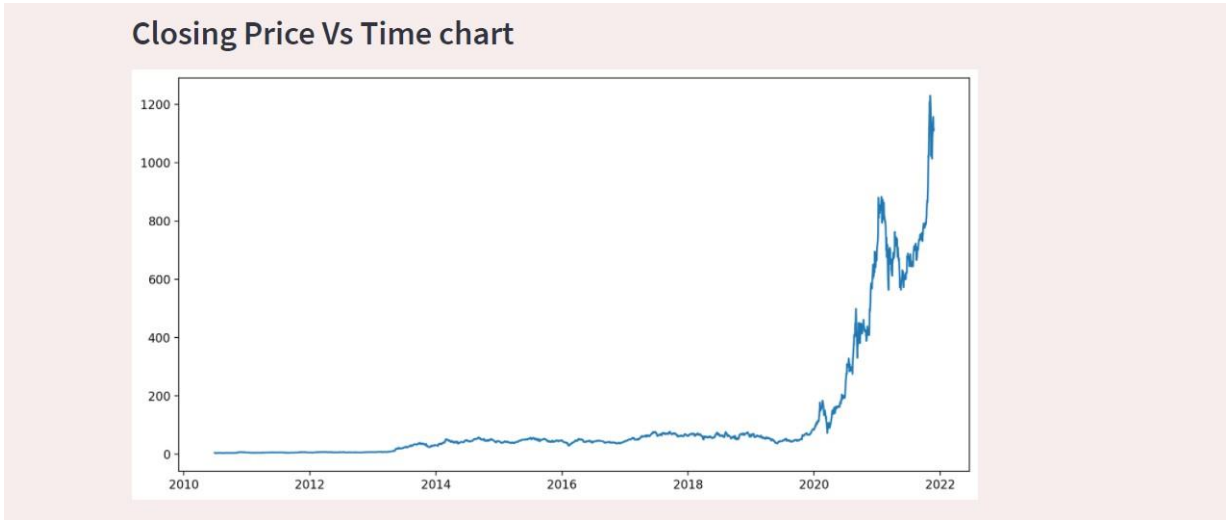
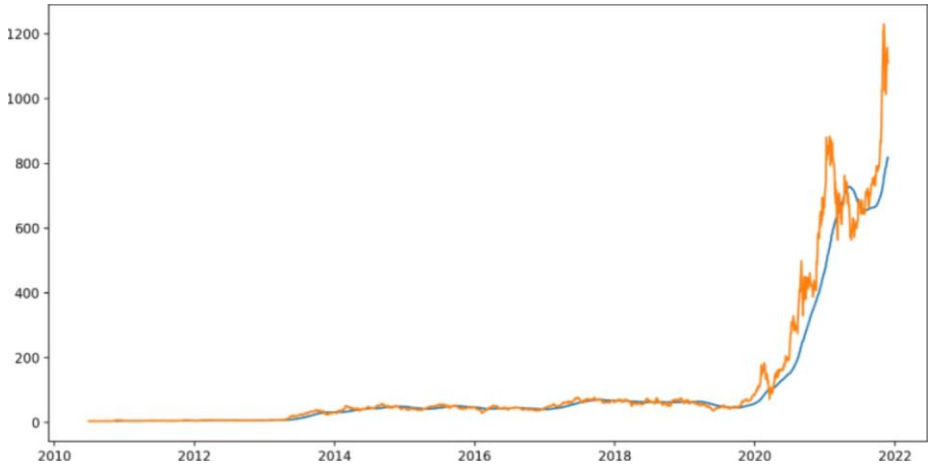
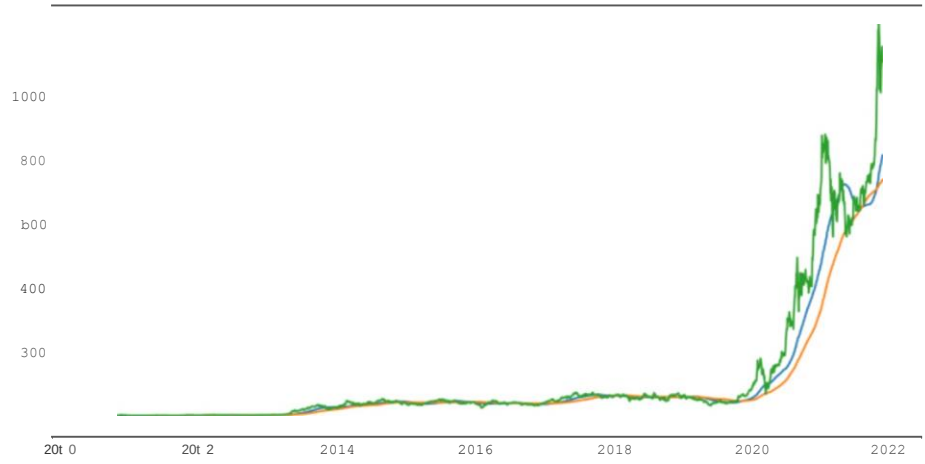


Closing Price Vs Time chart WITH 100MA



Closing Price Vs Time chart WITH 100MA & 200MA



8 Summary and Conclusion -

In this project, a method has been proposed to predict stock prices. Moreover, by combining latest sentiment analysis techniques with LSTM and deep learning models, there is also a high potential to develop a more comprehensive prediction system. Prediction could be more reliable if the model trains a greater number of data sets using higher computing capacities, an increased number of layers, and LSTM modules. Among all the machine learning and deep learning-based regression models, the performances of the LSTM based deep learning models were found to be far too superior to that of the machine-learning-based predictive models.

The popularity of stock market trading is growing rapidly. This encourages researchers to find new ways, new technology to make predictions. Prediction Technology can not only help researchers, it can also help investors and anyone dealing with stocks market. To help predict stock indexes, a predictive model with high accuracy is required. In this project , it has been used one of the most precise Prediction techniques using recurrent neural networks and the long-term short-term memory unit to help investors, Analyst or anyone interested in investing in stocks to market by providing them with a good understanding of the future situation in the stock market.

So here I've analyze the growth of the companies from different sector by scrapping the data from Yahoo finance website. So, this draws an important conclusion that companies from a certain sector have the same dependencies as well as the same growth rate. The prediction can be more accurate if the model will train with a greater number of data set. Moreover, in the case of prediction of various shares, there may be some scope of specific business analysis. We can study the different pattern of the share price of different sectors and can analyze a graph with more different time span to fine tune the accuracy.

This framework broadly helps in market analysis and prediction of growth of different companies in different time spans. Incorporating other parameters (e.g. investor sentiment, election outcome, geopolitical stability) that are not directly correlated with the closing price may improve the prediction accuracy.

The conclusion drawn from this is that machine learning techniques can be used to predict the stock market very accurately and effectively.In addition, you can even check alternative machine learning models to understand their accuracy.

9 Future Research -

Stock market forecasting is an attempt to determine the future value of company stocks or other financial instruments traded on exchanges. Successfully predicting the future price of stocks may generate considerable profits. A Stock Price Predictor is part of technology which will be developed as needs of future users and the stock market. Data and shareholders' behavior will always play the most important role in more accurate price prediction.

As part of the future of the stock market is infinite, and their data analysis will be more and more. Only by changing the training data, the proposed system can be used for any stock market in other countries. There are a few altercations, the system can be used for various purposes, such as forecasting the price of commodities such as gold. The prediction system can be further enhanced by using a data set that is much larger than the currently used data set.

10 **Bibliography** -

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3. https://www.kdnuggets.com/2018/10/introduction-deep-learning-keras.html