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Stock Price Prognostication using Machine Learning Model (LSTM)

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Abstract-A stock/equity is a financial instrument that reflects ownership of a portion of a company. This empowers the stock owner to share a share of the corporation's assets and profits according to the amount of stock they own. Shares are the units of stock. A stock is a wide term that refers to any company's holding certificates. Market forces influence stock prices on a daily basis. This means that stock prices differ due to supply and demand. When there are more people who want to purchase a stock than there are those who want to trade it, the price rises. If more people wanted to sell a stock than acquire it, the supply would surpass the demand, and the price would fall. It's simple to understand supply and demand. What's harder to recognize is what makes individuals like one stock and dislike another. It all comes down to decide what news is good for a corporation and what news is bad. There are numerous solutions to this problem, and almost every investor you speak with will have their own thoughts and techniques. However, the main premise is that a stock's price fluctuation reflects what investors believe a firm is worth. Don't mistake a company's worth for its stock price. A company's market value is calculated by multiplying the stock price by the number of remaining shares.

Keywords- ML: Machine Learning, DNN: Deep Neural Network, LSTM: Long Short-Term Memory,AI: Artificial Intelligence, RNN: Recurrent Neural Network

I. INTRODUCTION

Machine learning is a branch of artificial intelligence that allows computers to learn and upgrade on their own without having to be explicitly programmed. Machine learning is bothered with the creation of computer programmes that can access data and learn on their own. The learning procedure starts with observations of data, such as examples, direct circumstance, or instruction, so that we can seek for patterns in data and make better decisions in the future based on the examples we provide. The basic goal is for computers to learn on their own, without the need for human involvement, and to change their behaviour accordingly. However, text is treated as a series of keywords when using traditional machine learning algorithms; instead, a semantic analysis technique mimics the human ability to comprehend the meaning of a document.

This modification initiates profit with a minimal error rate between the train and test data using the soft max function. The values obtained after this transformation form the output layer of our NN; however, these values may not be the best, in this case a back-propagation procedure will be used to target the optimal fault value. The back-propagation procedure connects the output layer to the unseen layer, sending a signal conforming to the best weight with the optimal error for the number of epochs established. This procedure will be repeated in the hopes of improving our predictions and reducing prognostication error. The model will be trained after this step is completed. ML is a division of AI that grants computers to grasp and improve on their own without having to be programmed.

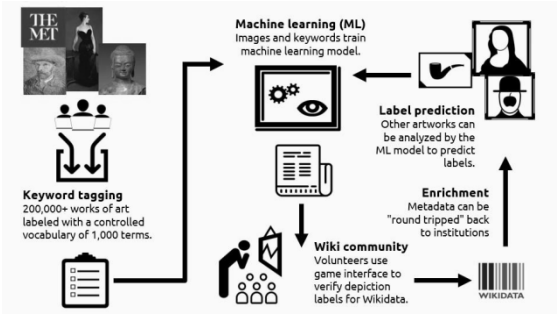

Fig. 1 Machine Learning.

Deep learning algorithms analyse data with a prearranged logical formation in order to reach similar conclusions as humans. Deep learning gets a multi-layered structure of algorithms known as neural networks. The neural network's structure is influenced by the structure of the human brain. Neural networks can be trained to perform the similar tasks on data that our brains do when recognizing patterns and classifying different sorts of information. Layers of neural networks sometimes can be used as a kind of filter that operates from coarse to fine, enhancing the chances of recognising and interpreting

information. generating an accurate result,the human brain operates in a similar manner. When we get new knowledge, our brain tries to compare it to earlier found objects. DNN makes use of the identical notion. We may use neural networks to complete a variety of tasks, like grouping, classification, and regression. We use neural networks for grouping or sorting unlabelled data based on similarities between the samples. In the instance of classification, we can train the network on a labelled dataset and use it to group the samples in the Artificial neural networks to give special features that allow deep learning models to accomplish tasks that machine learning models can't.

Problem Statement: Nowadays, people want to dive into the world of the stock market, but because of poor knowledge and skills they are not able to dive into this world and earn a good amount of money. And inflation is draining them down financially. The technical analysis and visualization part will be our center of attention. We'll be using a dataset from Company's stock Price and further perform testing and training on the same.

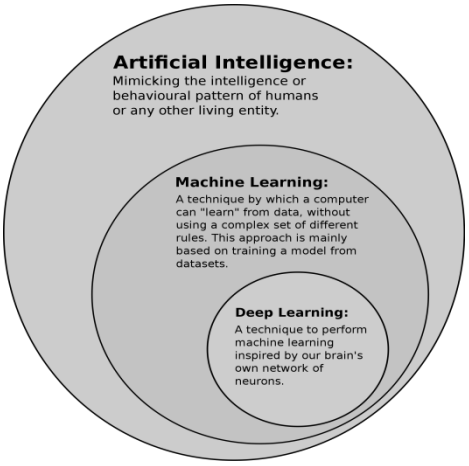

Fig. 2 Artificial Intelligence

II.METHODOLOGY

The process of choosing the right ML model to break a problem can be time consuming if not approached strategically. Here are some steps on how we will be implementing our methodology-
Step 1- Align the problem with implicit data inputs that should be considered for the result. This step requires help from experts who have a deep understanding of the problem.

Step 2- Collect the data, format it and after that label the data if necessary. This step is generally led by data scientists

Step 3- Choose which algorithm(s) to use and test to see how well they perform. This step is generally carried out by data scientists.

Step 4- Continue to fine tune results until they reach a respectable position of delicacy. This step is generally carried out by data scientists with feedback from experts who have a deep understanding of the problem.

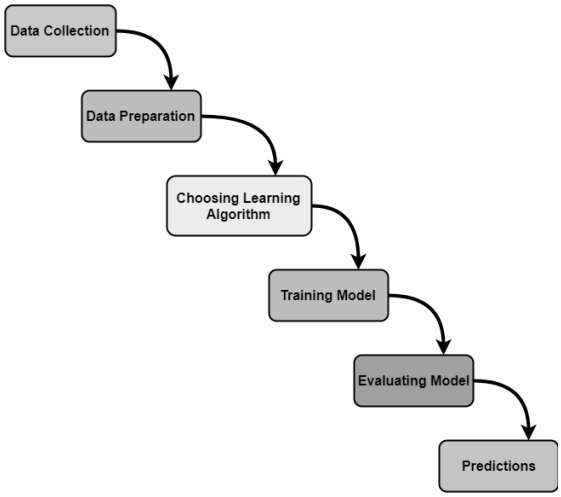

Fig. 3 Steps for Data Processing

III.THEORY AND CALCULATION

LSTM-
Long Short-Term Memory is one of many forms of Recurrent Neural Network RNN that can capture data from previous stages and use it to make predictions in the future. An artificial neural network consists of several layers: input, Hidden, output. The number of nodes in the input layer of a neural network with only one hidden layer is always determined by the dimension of the data, and the nodes of the input layer connect to another layer via links called synapses. The weight coefficient is the decision taker for signals in the relationship between every two nodes from input to the hidden layer. The learning procedure is naturally a continual adjustment of weights, and after the learning procedure is complete, the Artificial NN will have perfect weights for individual synapses. The activation function, which is applied by the hidden layer nodes to the sum of weights from the input layer, is a sigmoid or tangent hyperbolic (tanh) function. The capacity to memorise data sequences distinguishes the LSTM from other RNNs. Every LSTM node must have a set of cells for storing passed data streams.

The upper line in each cell connects the models as a transport line, passing data from the past to the present. Cell independence aids the model discard filter in adding values from one cell to another. Finally, allowing or discarding input to pass through the sigmoidal layer constituting the gates drives the cell to an ideal value. Each sigmoid layer contains a binary value (0 or 1), with 0 allowing "nothing" to flow through and 1 allowing "everything."

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The purpose is to regulate the state of each cell, and the gates are controlled in the following manner:
- The Forget Gate generates a value between 0 and 1, with 1 indicating "totally keep this" and 0 indicating "do not keep this."
"Ignore this fully."
- Memory Gate selects the new data to be stored in the cell. First a sigmoid layer called input door layer is created which determines which values will be altered. After that, a tanh layer creates a vector of fresh candidate values that could be used in the model. The state has been updated.
- The Output Gate determines what each cell's output will be. The output value will be determined by the cell status as well as the filtered and most recent data added.

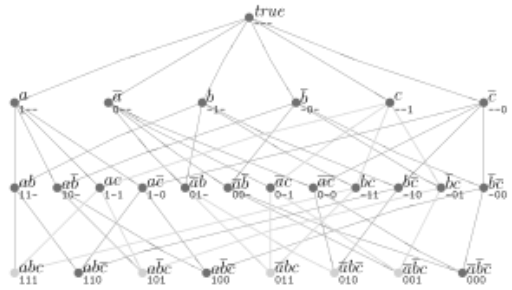

Fig. 4 LSTM

Epoch-
An epoch is termed as the number of passes of the entire data-set in the ML algorithm. Batches are usually used to group data sets. Some people use this iteration loosely, referring to the process of compiling one batch through the model as an iteration.The no. of epoch equates to the number of iterations if the batch size is the entire training data-set. This is often not the case for practical reasons. Many epochs are used in the creation of many models. When the dataset size is d, the number of epochs is e, the number of iterations is I and the batch size is b, the general relationship is d*e = i*b. Determining how many epochs a model should run to train is dependent on a number of criteria relating to both the data and the model's aim, and while attempts to turn this process into an algorithm have been made, a thorough understanding of the data is frequently required.

```
Epoch 1/100
38/38 [==============================] - 13s 123ms/step - loss: 0.0503
Epoch 2/100
38/38 [==============================] - 5s 124ms/step - loss: 0.0056
Epoch 3/100
38/38 [==============================] - 5s 122ms/step - loss: 0.0054
Epoch 4/100
38/38 [==============================] - 5s 123ms/step - loss: 0.0053
Epoch 5/100
38/38 [==============================] - 5s 123ms/step - loss: 0.0047
Epoch 6/100
38/38 [==============================] - 5s 123ms/step - loss: 0.0051
Epoch 7/100
38/38 [==============================] - 5s 123ms/step - loss: 0.0047
Epoch 8/100
38/38 [==============================] - 5s 126ms/step - loss: 0.0056
Epoch 9/100
38/38 [==============================] - 5s 124ms/step - loss: 0.0041
Epoch 10/100
38/38 [==============================] - 5s 122ms/step - loss: 0.0043
Epoch 11/100
38/38 [==============================] - 5s 119ms/step - loss: 0.0041
Epoch 12/100
38/38 [==============================] - 5s 121ms/step - loss: 0.0046
Epoch 13/100
38/38 [==============================] - 5s 121ms/step - loss: 0.0045
Epoch 14/100
38/38 [==============================] - 5s 123ms/step - loss: 0.0046
Epoch 15/100
38/38 [==============================] - 5s 125ms/step - loss: 0.0038
```

IV.RESULTS AND DISCUSSION

Fundamental analysis, in accounting and finance, is the analysis of a business's financial statements; health; and competitors and markets. It also considers the overall situation of the economy and factors which include interest rates, production, earnings, employment, GDP, housing, manufacturing and management.

Technical analysis is a tool, or valuation method. When valuing a company as a going concern there are three main valuation methods used: DCF analysis, comparable companies, and precedent transactions, used to predict the probable future price movement of a security – such as a stock. Throughout the project we got these outputs for different dataset and these graphs can be used for further analysis.

Fig.5 The above graph shows the price prediction of the Google stocks data.

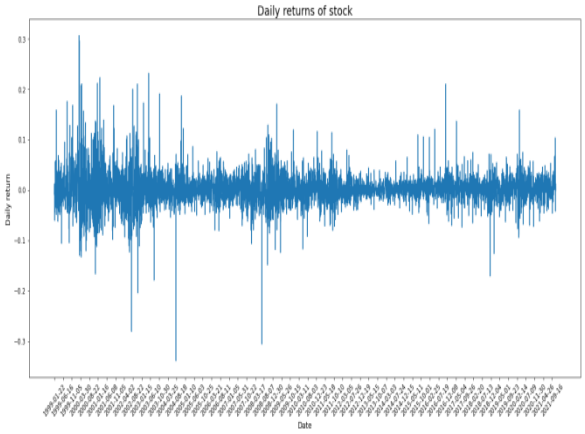

Fig. 5The above graph shows the prediction of the Nvidia stocks data.

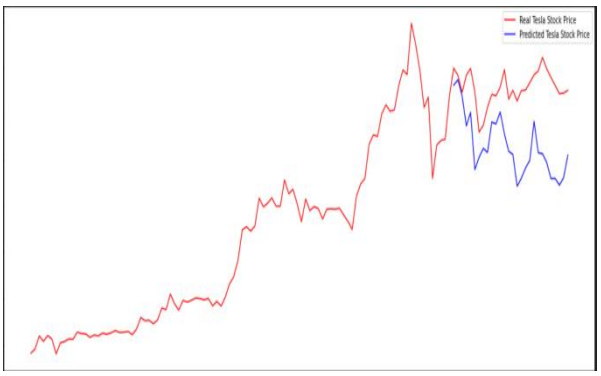

Fig.6 The above graph shows the price prediction of the Tesla stocks data**.**

V.CONCLUSION

By carrying out the whole project we can conclude that-

- Deep learning algorithms such as LSTM, DENSE, DROP OUT, and SEQUENTIAL can be used to predict, analyse, and visualise the prices of a company's stock (here, Google, Tesla, Nvidia).
- Similarly, we can directly utilise any company's Stock Dataset and use these algorithms to get the proper prediction. This solution works on any system, including cloud platforms.
- We have forecasted the future values for Google, Tesla, Nvidia and got a promising result.using LSTM.

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