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Tradexa: Your Million Dollar Shortcut

Group Number.:- 27

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Project Guide:- Prof. Ravindra Divekar

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Problem Definition

- Stock price movement is non-linear, complex and difficult to predict.
- To predict the stock prices there are numerous machine learning and forecasting methods available but are not accurate enough to predict future stock price across a period of time.
- A more efficient and accurate approach was required which is what LSTM yields.

Software Requirements Specification(SRS)

Functional Requirements

a. User login and logout. The user will be able to log-in to his/her account and access the services and log-out to protect his/her private data.
b. The program will run on a web browser and each user's will have options to select from various stocks and get live stock data and other information for the same.
c. All information will be stored on the server in database.
d. The model will be trained on a regular basis on the new data received daily to get the latest recommendations.

Software Requirements Specification(SRS)

Non-Functional Requirements

a. Functionality:-

   Website will also display normal data on the stock such as the current price and volume.

b. Usability:-

   The database will be updated daily to account for the daily changes to stock values. Site will be simple and clean so that the customer can view everything easily.

c. Reliability:-

   Prediction models will be updated daily. Data backed up in the case of a site failure.

Literature Review

- Nair et al. proposed a decision tree system based on rough sets. This method combines the advantages of rough sets and decision trees, but this method is prone to overfitting when dealing with data sets with a large amount of noise, which will affect the trend of stock prediction.
- Bowden et al. proposed to use the ARIMA method to build an autoregressive model to predict stock prices. The assumption of statistical distribution and stability of the research data limits their ability to model the nonlinear and non-stationary financial time series, and the outliers in the research data also have a great impact on the prediction results.
- Tsantekidou et al. proposed a CNN model but due to the timing of stock data, this model is not suitable for stock prediction.
- Selvin et al. proposed three stock prediction models based on CNN, recurrent neural network (RNN) and LSTM deep learning networks respectively, and compared the performance of the three models by predicting the stock prices of listed companies.

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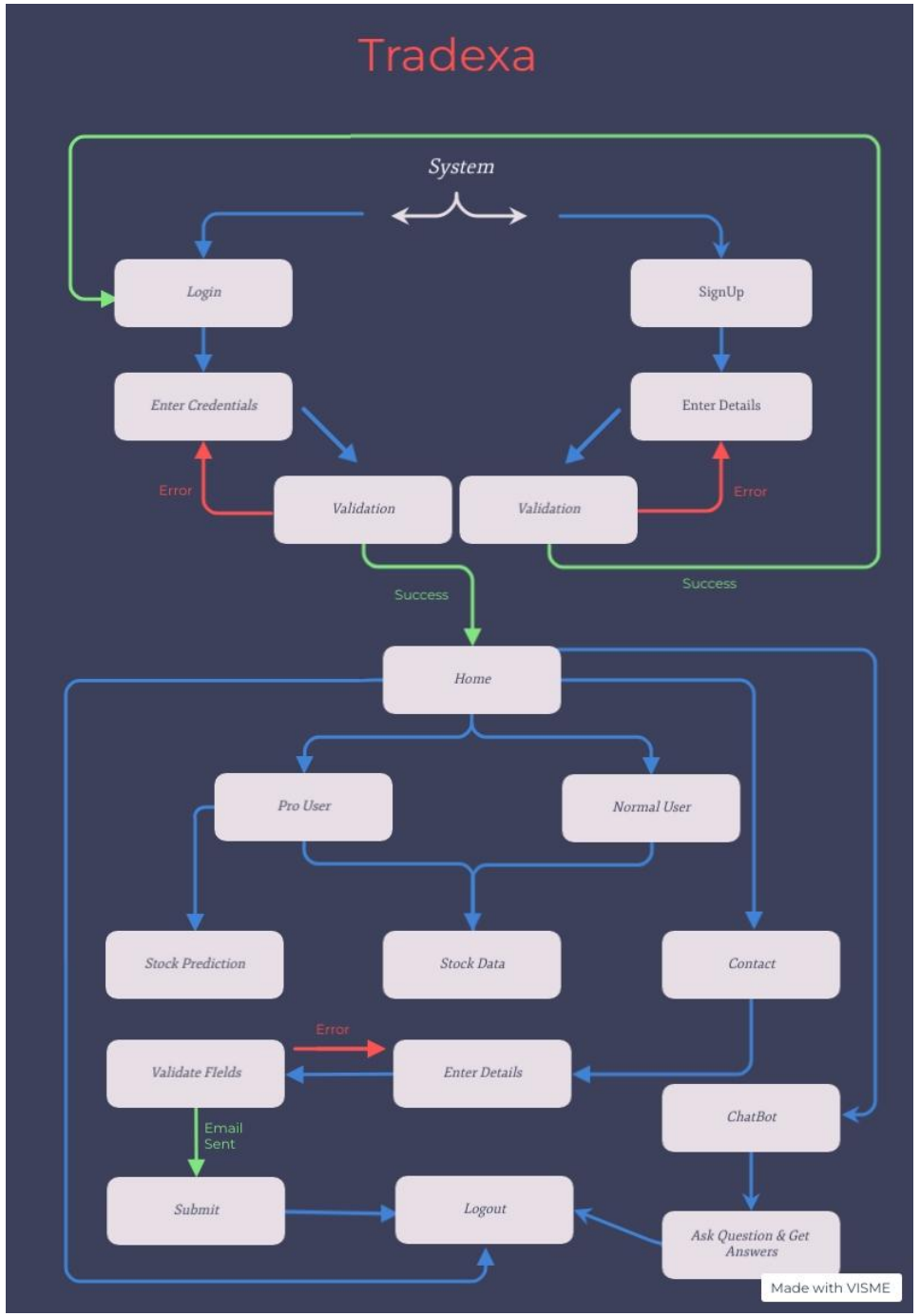
Technologies Used

Name	Version	Use
Python	3.9.2	Backend
Django	3.1.7	Framework
Html	HTML5	Frontend
JavaScript	ES6	Frontend
SQLite	3.0	Database
Selenium	V3.141.59	Testing
Windows	Windows 10	Operating System

Implementation Workflow



Implementation

```
Model: "sequential_3"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 lstm_9 (LSTM)               (None, 100, 32)           4352

 dropout_2 (Dropout)         (None, 100, 32)           0

 lstm_10 (LSTM)              (None, 100, 64)           24832

 dropout_3 (Dropout)         (None, 100, 64)           0

 lstm_11 (LSTM)              (None, 50)                23000

 dense_4 (Dense)             (None, 32)                1632

 dense_5 (Dense)             (None, 1)                 33

=================================================================
Total params: 53,849
Trainable params: 53,849
Non-trainable params: 0
```

```
16/16 [==============================] - 3s 211ms/step - loss: 7.6308e-04 - val_loss: 0.0025
Epoch 87/100
16/16 [==============================] - 3s 211ms/step - loss: 7.9837e-04 - val_loss: 0.0029
Epoch 88/100
16/16 [==============================] - 3s 208ms/step - loss: 7.2736e-04 - val_loss: 0.0015
Epoch 89/100
16/16 [==============================] - 3s 213ms/step - loss: 7.6243e-04 - val_loss: 0.0026
Epoch 90/100
16/16 [==============================] - 3s 210ms/step - loss: 7.5584e-04 - val_loss: 0.0021
Epoch 91/100
16/16 [==============================] - 3s 205ms/step - loss: 7.6575e-04 - val_loss: 0.0029
Epoch 92/100
16/16 [==============================] - 3s 207ms/step - loss: 7.7788e-04 - val_loss: 0.0033
Epoch 93/100
16/16 [==============================] - 3s 209ms/step - loss: 8.7872e-04 - val_loss: 0.0031
Epoch 94/100
16/16 [==============================] - 3s 212ms/step - loss: 0.0010 - val_loss: 0.0016
Epoch 95/100
16/16 [==============================] - 3s 210ms/step - loss: 8.5182e-04 - val_loss: 0.0014
Epoch 96/100
16/16 [==============================] - 3s 206ms/step - loss: 7.2185e-04 - val_loss: 0.0014
Epoch 97/100
16/16 [==============================] - 3s 211ms/step - loss: 7.2569e-04 - val_loss: 0.0024
Epoch 98/100
16/16 [==============================] - 3s 210ms/step - loss: 7.1078e-04 - val_loss: 0.0018
Epoch 99/100
16/16 [==============================] - 3s 211ms/step - loss: 6.9887e-04 - val_loss: 0.0018
Epoch 100/100
16/16 [==============================] - 3s 210ms/step - loss: 8.4122e-04 - val_loss: 0.0013
<keras.callbacks.History at 0x7fb0ce67bed0>
```

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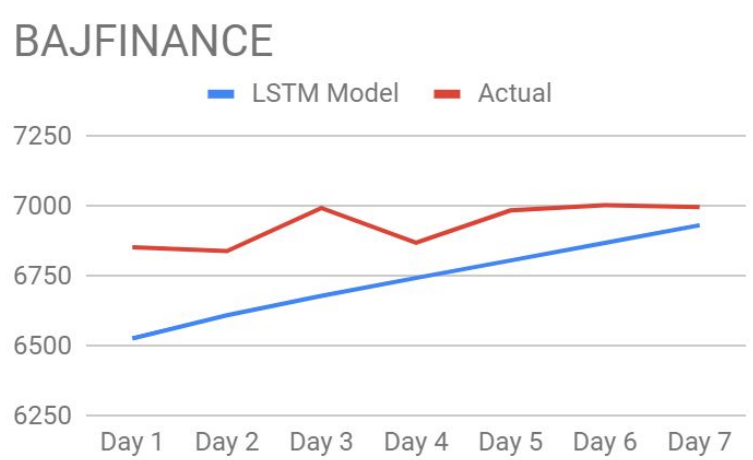
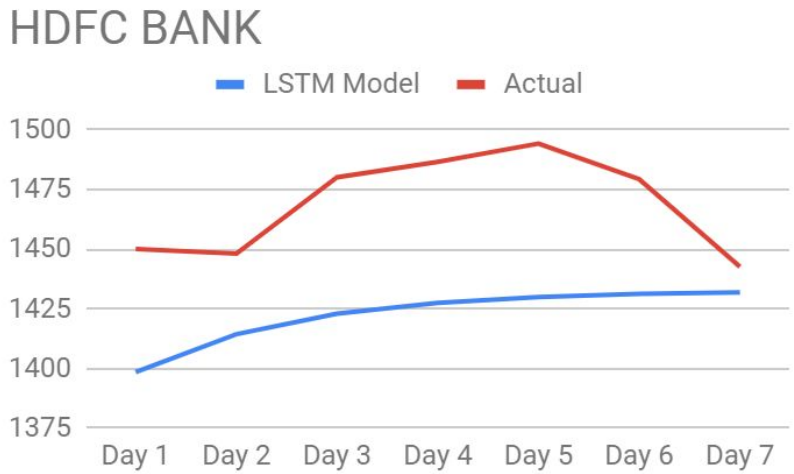
Results of Prediction



Observations-

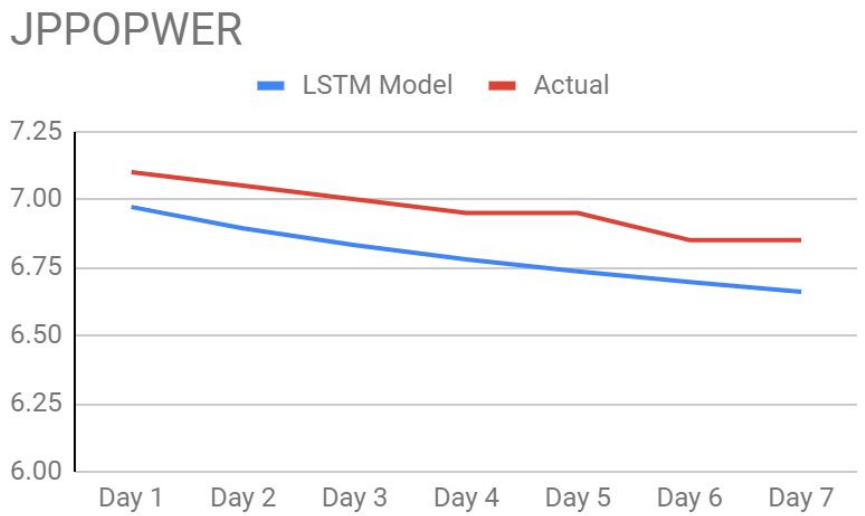
- The actual stock price of Bajaj Finance for the 7 days is increasing overall from the current price and the prediction drawn by model 2 is very accurate to it whereas the predictions of model 1 are a little off track.
- Also, it can be seen that the overfitting problem has arisen in model 1 and that a penalty method or a regularization technique is the next step forward.

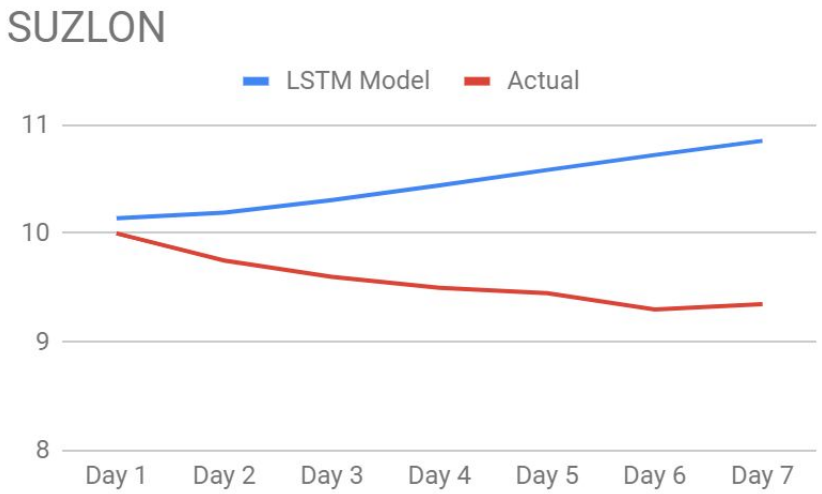


Observations-

- The stock prices of HDFC Bank predicted by model 1 and model 2 both are accurate overall while the actual price went through a rollercoaster, the graph carefully depicts the predicted prices of both the models and the actual price so anyone can understand the performance of the models.

Results of Prediction





Observations-

- The penny stocks under experimentation are JP Power and Suzlon. These stocks have more than 5 years' worth of data for the model to train.
- From the JP Powers graph, we can see that model 2 is predicting more precisely than model 1, but the predictions for Suzlon say otherwise.
- Model 2 is not accurate enough in predicting stock prices for Suzlon as the price went down and the prediction was that the price is going up.
- The stock prices are dependent on various factors and from this paper, we can see that historic data can only help in predictions to a certain level, but to get truly accurate predictions some extra aspects can be considered and added to the prediction model.

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Software Testing

https://docs.google.com/spreadsheets/d/1tpFC7Yqc9E8w0rgEDxggoVJW15GFgCRXSJVzjxhaMVw/edit?usp=sharing

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Conclusion based on Results

On the basis of the Results achieved and Observations We would like to conclude the following things-

1. Our Project has proposed an LSTM Neural Network built to forecast future values for various stocks like Bajaj Finance, HDFC Bank, and JP POWER etc.
2. From the results section and the observations made earlier, it is safe to say that LSTM has shown its worth in time-series forecasting, and with added other features like news analysis of a particular stock, and pre-defined weights of each stock can help a lot in the predictions.
3. The future work in this could be the addition of extra parameters like news analysis and how that affects the stock price, new architecture for the neural network with the inclusion of different layers like GRUs (Gated Recurrent Units) or LSTM or some other model which outperforms the current top of the table layers.

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Conclusion for Website

We would like to conclude that we have successfully completed our project which includes the following things-

1. Ui/Ux of the major part of our website and it's navigation.
2. User Login/Signup authentication which includes verification and validation as well.
3. Premium User option that will provide premium users to have extra and unique features, which the normal users won't be able to access.
4. Payment portal for users to buy the Premium User Account.
5. With the help of Django Beat Scheduler and Django Celery Worker we implemented live Data Fetching using Yahoo Financial Library which will fetch data every 10 seconds and will update the table of data and graph in real time without the need to refresh our website again and again.
6. We have also implemented the News page for our website which will show all the latest and up-to-date news which in a way affect the stock market or basically the news every stock trader should know.

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