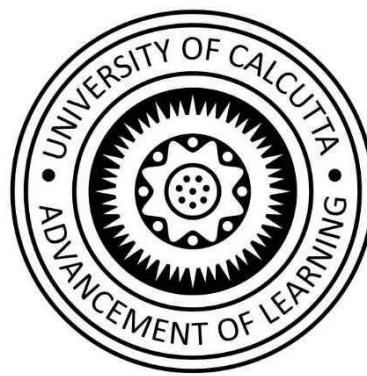


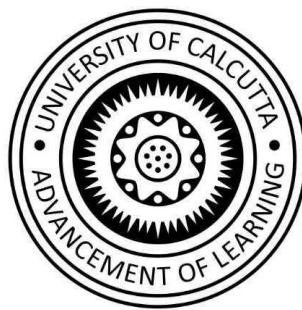
Stock Price Prediction Using LSTM on Indian Share Market



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This is to certify that the project entitled "**Stock Price Prediction Using LSTM in Indian Share Market**" submitted by **Achyut Ghosh** is based upon his own work carried out in **A.K. Choudhury School of IT, University college of Science & Technology** under **The University of Calcutta** in fulfillment of the requirements of **MCA**.

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Abstract

Predicting how the stock market will perform is one of the most difficult things to do. There are so many factors involved in the prediction – physical factors vs. physiological, rational and irrational behavior, etc. All these aspects combine to make share prices volatile and very difficult to predict with a high degree of accuracy. Can we use data analysis as a game changer in this domain? Using features like the latest announcements about an organization, their quarterly revenue results, etc., machine learning techniques have the potential to unearth patterns and insights we didn't see before, and these can be used to make unerringly accurate predictions. We propose a framework where in which we use LSTM (Long Short-Term Memory) model & companies' net growth calculation algorithm to analyze as well as prediction of future growth of a company.

Keywords: Stock Market Analysis, LSTM, Data Analysis

Introduction

Data analysis have been uses in all business for data driven decision making. In share market there are many factors that drive the share price, which changes daily & over the night it changes drastically. This is why it is tough to take decision for a far future. But artificial neural network has capability to learn from the past data & make decision for near the future. We train our model from the past stock data and calculate future price of that stock. This future price use to calculate the future growth of that company. Moreover, we found a future growth curve from different companies. So, we can then analyze and can investigate the similarity of one company's future curve over another. Stock market is a secondary market place where shares or stocks of different listed companies are traded. In Indian context any person having an authorized trading account from any depository participants can take part in buying or selling of stocks. Share prices of stocks vary throughout the day as well as throughout time depending on a lot of factors. Basic working of stock market depends on the individual perception on the future price of some company's share. Few people foresee an uptrend in stock valuation so they buy at current price level to sell it in future with a profit earning. Again, in the same time a few people assume that share price will fall in future so they sell at current price level and in future they may buy again at a lower price. There are internal as well as external factors that affect stock prices. Some of the internal factors may be operating ratio, work order received, high demand of produced goods, technically advanced assembly line, profit margin of the company etc. External factors can be those factors which are out of the company's control such as change in govt. policy, subsidy, political instability, big events like Olympics, world cup etc. But most common attribute is the balance between supply and demand of some stock that determines its price on day to day basis. In a normal day there are sellers as well as buyers for stocks due to different perception of the future stock price. In future any one category of people will benefit and other has to incur loss. So, there has been many efforts spent on predicting future stock price movement analysis and a lot of different data mining and statistical analysis has been tried with mixed success. Some of the simple tools that are widely used to analyze future price from historical price movement data are: 30 days moving average; 200 days moving average, weighted average etc.

Chapter 1: AN OVERVIEW OF INDIAN SHARE MARKET

Most of the trading in the Indian stock market takes place on its two stock exchanges: the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The BSE has been in existence since 1875. The NSE, on the other hand, was founded in 1992 and started trading in 1994. However, both exchanges follow the same trading mechanism, trading hours, settlement process, etc. At the last count, the BSE had more than 5,000 listed firms, whereas the rival NSE had about 1,600. Out of all the listed firms on the BSE, only about 500 firms constitute more than 90% of its market capitalization; the rest of the crowd consists of highly illiquid shares.

Almost all the significant firms of India are listed on both the exchanges. NSE enjoys a dominant share in spot trading, with about 70% of the market share, as of 2009, and almost a complete monopoly in derivatives trading, with about a 98% share in this market, also as of 2009. Both exchanges compete for the order flow that leads to reduced costs, market efficiency and innovation. The presence of arbitrageurs keeps the prices on the two stock exchanges within a very tight range.

Chapter 2: Related Works

There are lots of research paper in stock market prediction as well as in LSTM. Some of them are describe below

- Predicting Stock Prices Using LSTM by Murtaza Roondiwala, Harshal Patel & Shraddha Varma. Description: The art of forecasting the stock prices has been a difficult task for many of the researchers and analysts. In fact, investors are highly interested in the research area of stock price prediction. For a good and successful investment, many investors are keen in knowing the future situation of the stock market. Good and effective prediction systems for stock market help traders, investors, and analyst by providing supportive information like the future direction of the stock market. In this work, we present a recurrent neural network (RNN) and Long Short-Term Memory (LSTM) approach to predict stock market indices.
- Forecasting stock prices with a feature fusion LSTM-CNN model using different representations of the same data by Taewook Kim, Ha Young Kim. Description: Forecasting stock prices plays an important role in setting a trading strategy or determining the appropriate timing for buying or selling a stock. We propose a model, called the feature fusion long short-term memory-convolutional neural network (LSTM-CNN) model, that combines features learned from different representations of the same data, namely, stock time series and stock chart images, to predict stock prices. The proposed model is composed of LSTM and a CNN, which are utilized for extracting temporal features and image features. We measure the performance of the proposed model relative to those of single models (CNN and LSTM) using SPDR S&P 500 ETF data. Our feature fusion LSTM-CNN model outperforms the single models in predicting stock prices. In addition, we discover that a candlestick chart is the most appropriate stock chart image to use to forecast stock prices. Thus, this study shows that prediction error can be efficiently reduced by using a combination of temporal and image features from the same data rather than using these features separately.
- NSE Stock Market Prediction Using Deep-Learning Models by HiranshaM Gopalakrishnan E.A. Vijay Krishna Menon Soman K.P. Description: The neural network, one of the intelligent data mining technique that has been used by researchers in various areas for the past 10 years. Prediction and analysis of stock market data have got an important role in today's economy. The various algorithms used for forecasting can be categorized into linear (AR, MA, ARIMA, ARMA) and non-linear models (ARCH, GARCH, Neural Network). In this paper, we are using four types of deep learning architectures i.e Multilayer Perceptron (MLP), Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTM) and Convolutional Neural Network (CNN) for predicting the stock price of a company based on the historical prices available. Here we are using day-wise closing price of two different stock markets, National Stock Exchange (NSE) of India and New York Stock Exchange (NYSE). The network was trained with the

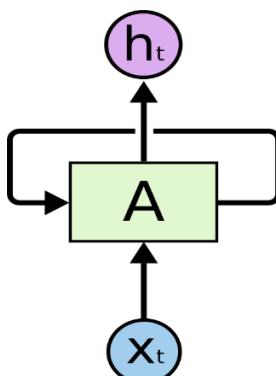
stock price of a single company from NSE and predicted for five different companies from both NSE and NYSE. It has been observed that CNN is outperforming the other models. The network was able to predict for NYSE even though it was trained with NSE data. This was possible because both the stock markets share some common inner dynamics. The results obtained were compared with ARIMA model and it has been observed that the neural networks are outperforming the existing linear model (ARIMA).

- S. Selvin, R. Vinayakumar, E. A. Gopalakrishnan, V. K. Menon and K. P. Soman. (2017) "Stock price prediction using LSTM, RNN and CNN-sliding window model." *International Conference on Advances in Computing, Communications and Informatics*: 1643-1647.
- Jabin S. Stock market prediction using feed-forward artificial neural network" growth, 99 (9) (2014)
- Hamzaebi C., Akay D., Kutay F.
Comparison of direct and iterative artificial neural network forecast approaches in multi-periodic time series forecasting
Expert Systems with Applications, 36 (2) (2009), pp. 3839-3844

Chapter 3: LSTM Architecture

3.1 An overview of Recurrent Neural Network (RNN)

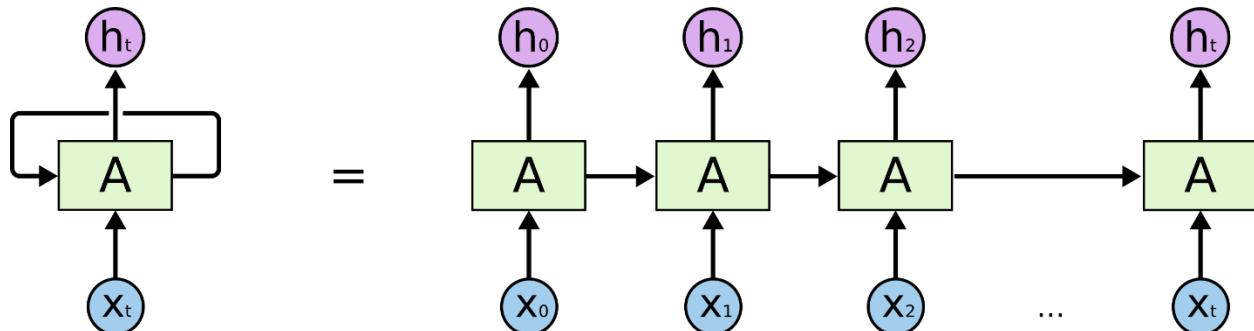
Humans don't start their thinking from scratch every second. As you read this essay, you understand each word based on your understanding of previous words. You don't throw everything away and start thinking from scratch again. Your thoughts have persistence. Traditional neural networks can't do this, and it seems like a major shortcoming. For example, imagine you want to classify what kind of event is happening at every point in a movie. It's unclear how a traditional neural network could use its reasoning about previous events in the film to inform later ones. Recurrent neural networks address this issue. They are networks with loops in them, allowing information to persist.



Recurrent Neural Networks have loops

In the above diagram, a chunk of neural network, A , looks at some input x_t and outputs a value h_t . A loop allows information to be passed from one step of the network to the next.

These loops make recurrent neural networks seem kind of mysterious. However, if you think a bit more, it turns out that they aren't all that different than a normal neural network. A recurrent neural network can be thought of as multiple copies of the same network, each passing a message to a successor. Consider what happens if we unroll the loop:

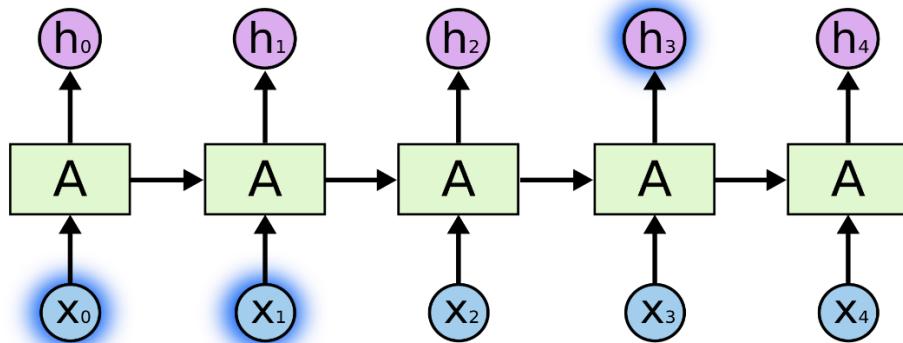


An unrolled recurrent neural network.

3.2 The Problem of Long-Term Dependencies

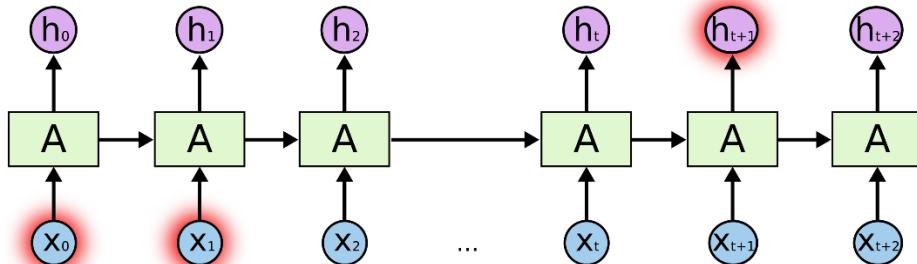
One of the appeals of RNNs is the idea that they might be able to connect previous information to the present task, such as using previous video frames might inform the understanding of the present frame. If RNNs could do this, they'd be extremely useful. But can they? It depends.

Sometimes, we only need to look at recent information to perform the present task. For example, consider a language model trying to predict the next word based on the previous ones. If we are trying to predict the last word in "the clouds are in the sky," we don't need any further context – it's pretty obvious the next word is going to be sky. In such cases, where the gap between the relevant information and the place that it's needed is small, RNNs can learn to use the past information.



But there are also cases where we need more context. Consider trying to predict the last word in the text "I grew up in France... I speak fluent *French*." Recent information suggests that the next word is probably the name of a language, but if we want to narrow down which language, we need the context of France, from further back. It's entirely possible for the gap between the relevant information and the point where it is needed to become very large.

Unfortunately, as that gap grows, RNNs become unable to learn to connect the information.



In theory, RNNs are absolutely capable of handling such "long-term dependencies." A human could carefully pick parameters for them to solve toy problems of this form. Sadly, in practice, RNNs don't seem to be able to learn them. The problem was

explored in depth by Hochreiter (1991) [German] and Bengio, et al. (1994), who found some pretty fundamental reasons why it might be difficult.

Thankfully, LSTMs don't have this problem!

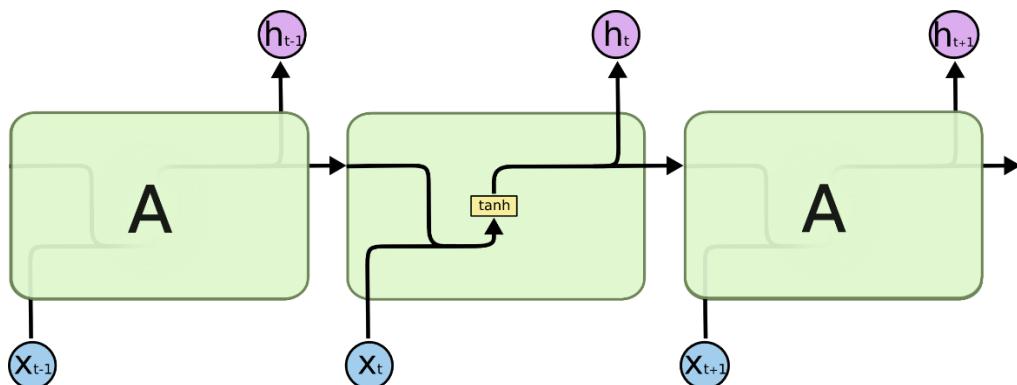
3.3 LSTM Networks

Long Short-Term Memory networks – usually just called “LSTMs” – are a special kind of RNN, capable of learning long-term dependencies. They were introduced by Hochreiter & Schmidhuber (1997), and were refined and popularized by many people in following work. They work tremendously well on a large variety of problems, and are now widely used.

LSTMs are explicitly designed to avoid the long-term dependency problem.

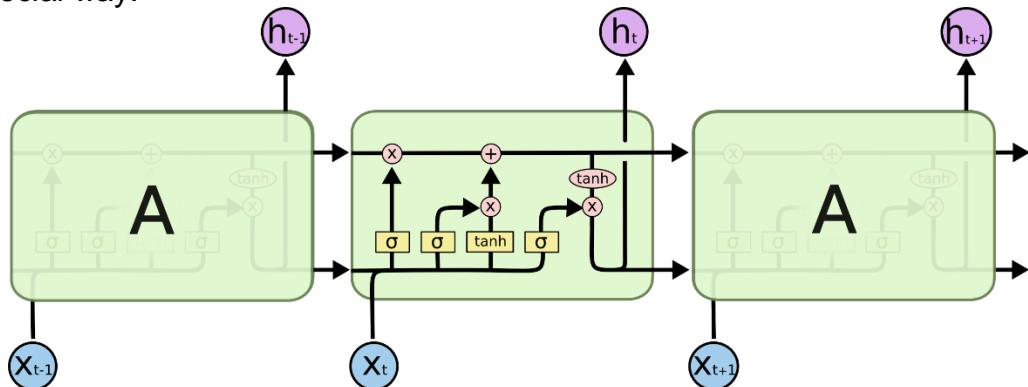
Remembering information for long periods of time is practically their default behaviour, not something they struggle to learn!

All recurrent neural networks have the form of a chain of repeating modules of neural network. In standard RNNs, this repeating module will have a very simple structure, such as a single tanh layer.



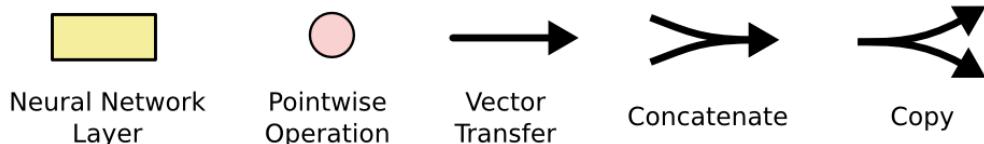
The repeating module in a standard RNN contains a single layer.

LSTMs also have this chain like structure, but the repeating module has a different structure. Instead of having a single neural network layer, there are four, interacting in a very special way.



The repeating module in an LSTM contains four interacting layers.

Don't worry about the details of what's going on. We'll walk through the LSTM diagram step by step later. For now, let's just try to get comfortable with the notation we'll be using.

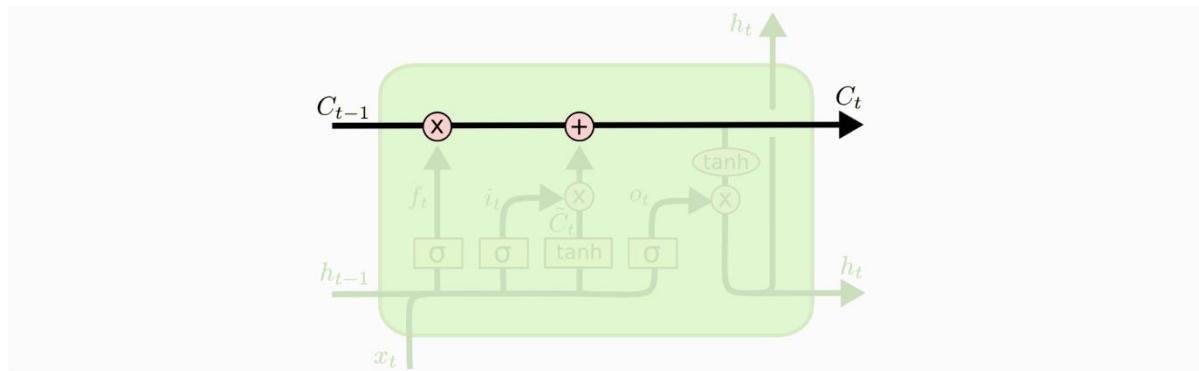


In the above diagram, each line carries an entire vector, from the output of one node to the inputs of others. The pink circles represent pointwise operations, like vector addition, while the yellow boxes are learned neural network layers. Lines merging denote concatenation, while a line forking denotes its content being copied and the copies going to different locations.

The Core Idea Behind LSTMs

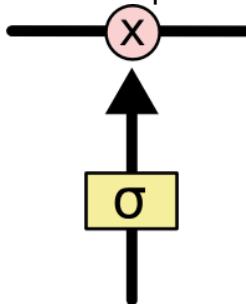
The key to LSTMs is the cell state, the horizontal line running through the top of the diagram.

The cell state is kind of like a conveyor belt. It runs straight down the entire chain, with only some minor linear interactions. It's very easy for information to just flow along it unchanged.



The LSTM does have the ability to remove or add information to the cell state, carefully regulated by structures called gates.

Gates are a way to optionally let information through. They are composed out of a sigmoid neural net layer and a pointwise multiplication operation.



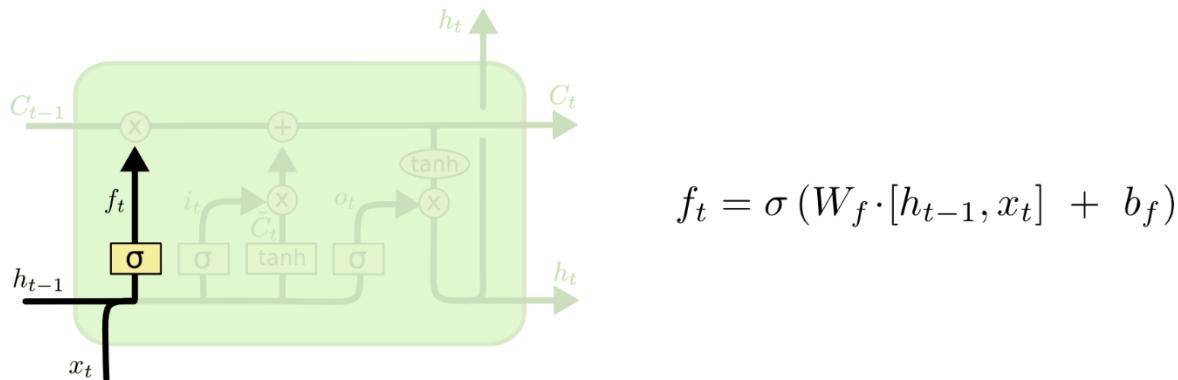
The sigmoid layer outputs numbers between zero and one, describing how much of each component should be let through. A value of zero means “let nothing through,” while a value of one means “let everything through!”

An LSTM has three of these gates, to protect and control the cell state.

3.3 Step-by-Step LSTM Walk Through

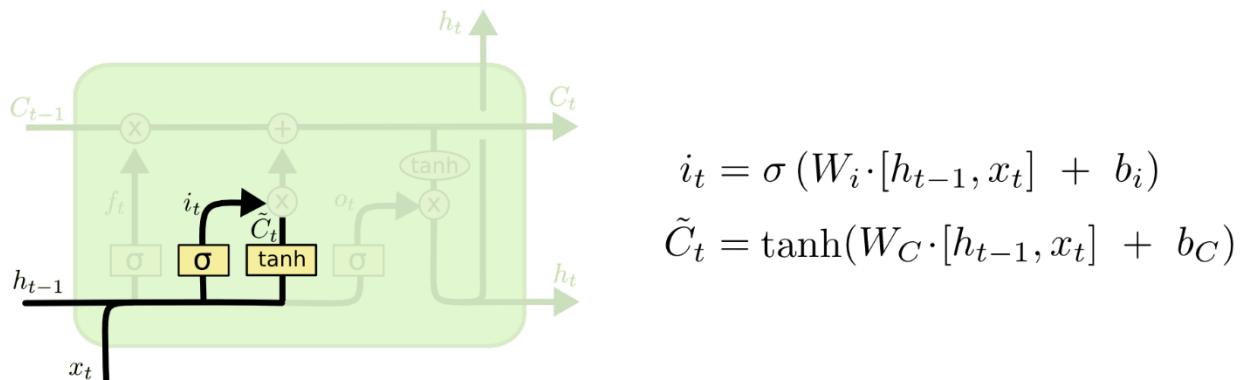
The first step in our LSTM is to decide what information we’re going to throw away from the cell state. This decision is made by a sigmoid layer called the “forget gate layer.” It looks at h_{t-1} and x_t , and outputs a number between 0.0 and 1.0 for each number in the cell state C_{t-1} . A 1.0 represents “completely keep this” while a 0.0 represents “completely get rid of this.”

Let’s go back to our example of a language model trying to predict the next word based on all the previous ones. In such a problem, the cell state might include the gender of the present subject, so that the correct pronouns can be used. When we see a new subject, we want to forget the gender of the old subject.



The next step is to decide what new information we’re going to store in the cell state. This has two parts. First, a sigmoid layer called the “input gate layer” decides which values we’ll update. Next, a tanh layer creates a vector of new candidate values, \tilde{C}_t , that could be added to the state. In the next step, we’ll combine these two to create an update to the state.

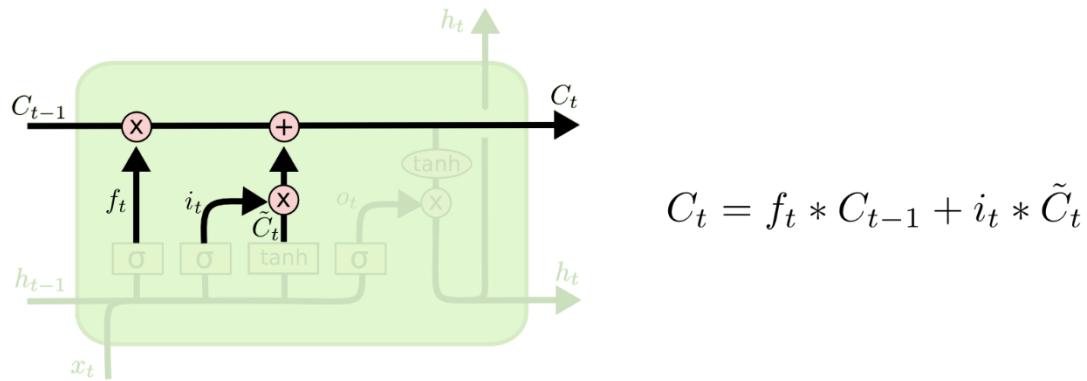
In the example of our language model, we’d want to add the gender of the new subject to the cell state, to replace the old one we’re forgetting.



It's now time to update the old cell state, C_{t-1} , into the new cell state C_t . The previous steps already decided what to do, we just need to actually do it.

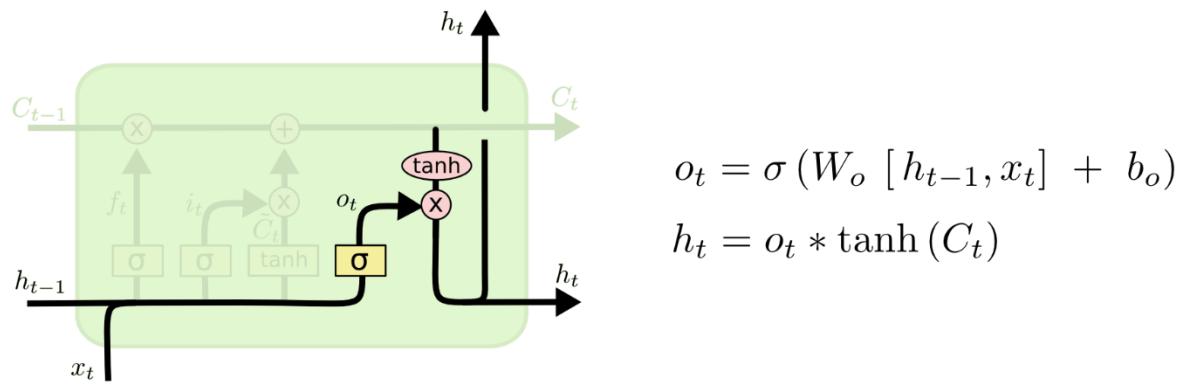
We multiply the old state by f_t , forgetting the things we decided to forget earlier. Then we add $i_t * \tilde{C}_t$. This is the new candidate values, scaled by how much we decided to update each state value.

In the case of the language model, this is where we'd actually drop the information about the old subject's gender and add the new information, as we decided in the previous steps.



Finally, we need to decide what we're going to output. This output will be based on our cell state, but will be a filtered version. First, we run a sigmoid layer which decides what parts of the cell state we're going to output. Then, we put the cell state through tanhtanh (to push the values to be between -1 and 1) and multiply it by the output of the sigmoid gate, so that we only output the parts we decided to.

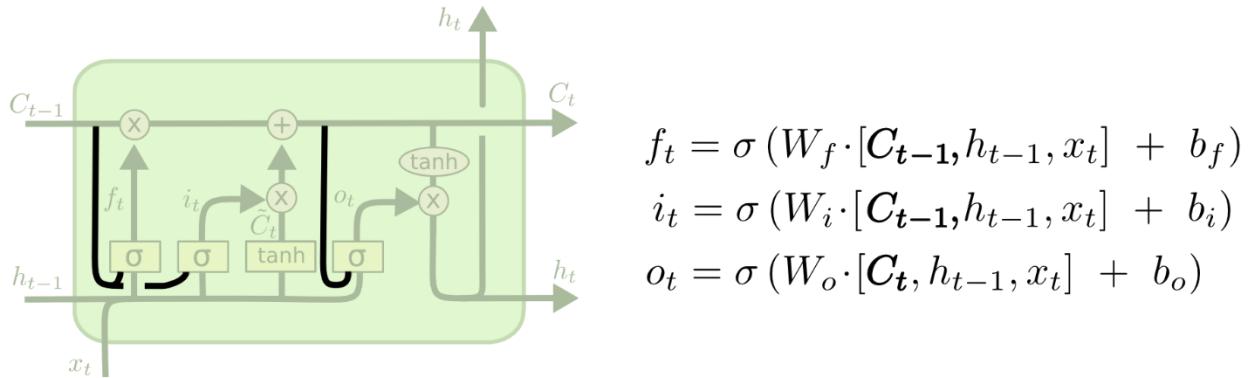
For the language model example, since it just saw a subject, it might want to output information relevant to a verb, in case that's what is coming next. For example, it might output whether the subject is singular or plural, so that we know what form a verb should be conjugated into if that's what follows next.



Variants on Long Short-Term Memory

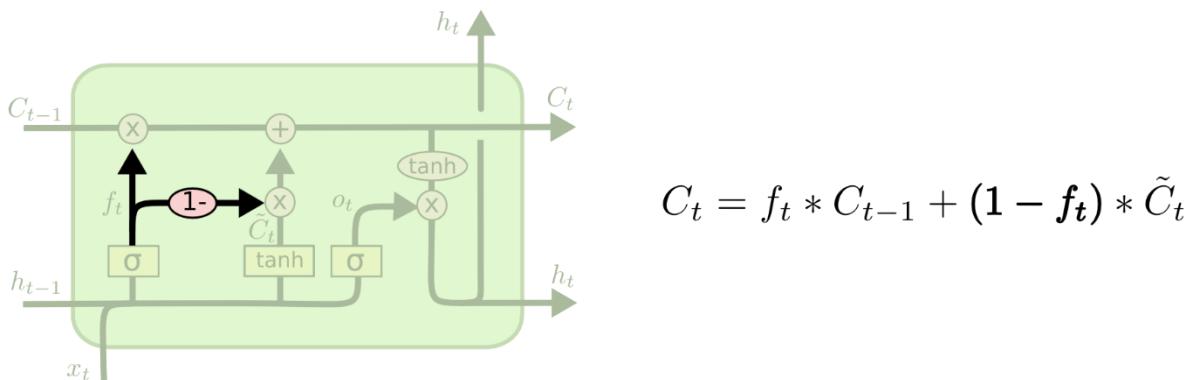
What I've described so far is a pretty normal LSTM. But not all LSTMs are the same as the above. In fact, it seems like almost every paper involving LSTMs uses a slightly different version. The differences are minor, but it's worth mentioning some of them.

One popular LSTM variant, introduced by Gers & Schmidhuber (2000), is adding “peephole connections.” This means that we let the gate layers look at the cell state.

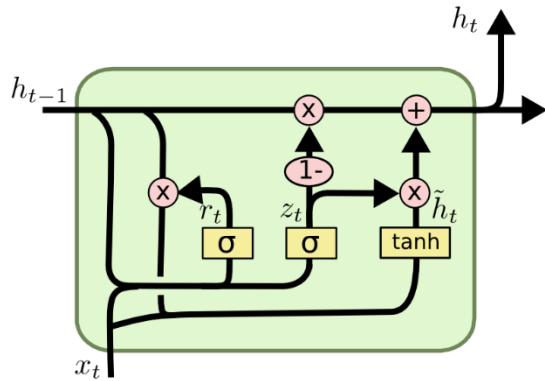


The above diagram adds peepholes to all the gates, but many papers will give some peepholes and not others.

Another variation is to use coupled forget and input gates. Instead of separately deciding what to forget and what we should add new information to, we make those decisions together. We only forget when we’re going to input something in its place. We only input new values to the state when we forget something older.



A slightly more dramatic variation on the LSTM is the Gated Recurrent Unit, or GRU, introduced by Cho, et al. (2014). It combines the forget and input gates into a single “update gate.” It also merges the cell state and hidden state, and makes some other changes. The resulting model is simpler than standard LSTM models, and has been growing increasingly popular.



$$z_t = \sigma (W_z \cdot [h_{t-1}, x_t])$$

$$r_t = \sigma (W_r \cdot [h_{t-1}, x_t])$$

$$\tilde{h}_t = \tanh (W \cdot [r_t * h_{t-1}, x_t])$$

$$h_t = (1 - z_t) * h_{t-1} + z_t * \tilde{h}_t$$

These are only a few of the most notable LSTM variants. There are lots of others, like Depth Gated RNNs by Yao, et al. (2015). There's also some completely different approach to tackling long-term dependencies, like Clockwork RNNs by Koutnik, et al. (2014).

Chapter 4: Proposed Framework to Forecast Share Price & Company Growth in Different Time Span

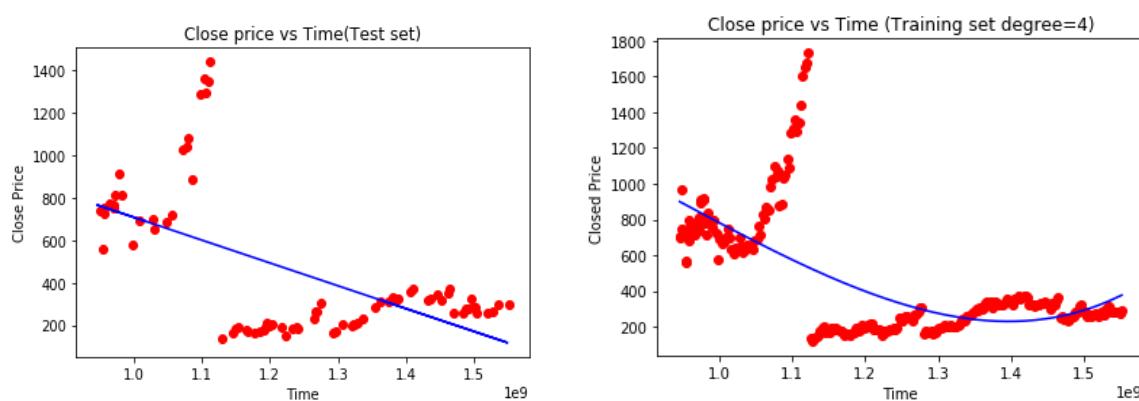
4.1 Analyzing Different Methods

In share market share price changes over time, so there are several mathematical curves can be used in mathematical analysis.



Change of stock price over the time of different companies

So, overall we can think that this can be solved by regression model. But this is not true at all means. Below are given two figures on TCS share price using linear regression & polynomial regression of degree four.



Regression is found not to be very much useful here compute the error values. Also, we found a problem of curve fitting. The above graphs are showing a poor result in terms of curve fitting. This has a clear justification. For time series data, such as text, signals, stock prices etc. a long short-term memory (LSTM) is superior for learning temporal patterns in deep neural networks (DNNs). A LSTM overcomes a vanishing gradient problem in a recurrent neural network (RNN) to learn long-term dependencies in time series data using memory cells and gates. So, LSTM become the best option for future prediction of company's share price as well as growth.

4.2 Methodology

The purpose of our framework is to analyze which is the best time span to predict the future share price of a company from a particular sector. Our objective is to predict the future price and calculate the future growth of the company in different time span. Then we analyze the prediction error for each company of different sector & draw a conclusion which time span is best for future prediction form that particular sector.

We first predict the future closing price of 5 different companies from some pre-decided sectors with the help of LSTM. This prediction will be done on the bases of 1-month or 2-months of historical data & the future prediction will be done for 3-month, 6-month, 1 year & 3 years. In these four different time spans (3 & 6 months, 1 & 3 years), we calculate the growth of that companies. Then by analyzing the deviations of closing price for each time span, we took the resultant time span which has maximum growth, i.e. less error for the particular sector, e.g. companies A, B, C, D & E from a sector S1 has more growth in 3-months' time span of prediction then we draw an conclusion that for sector S1, our framework gives best prediction for next 3-months for that particular sector.

In our analysis, let's consider we are using the data for M months. Then the weight of a company is defined as

$$\text{weight} = 1 / (P * (P+1)/2)$$

In our case, month-wise weight (Y_i) will be calculated using the following algorithm:

```
N := M
weight := 1/(M*(M+1)/2)
FOR i = 1 to M
Begin
  Yi := weight * N ; /* Yi is the weight of previous ith month*/
  Q = Q - 1;
  i := i + 1
End
End FOR
```

Suppose the growth rate between different time periods is Gri where $i=1$ to M , considering current year as 0th year. Therefore, Gri is the growth rate of $(i-1)^{th}$ time

period w.r.t its immediate earlier year i.e. i^{th} year. To maximize the impact of current growth over the growth of older year, we would develop a mathematical formula stated below. Suppose the growth rates of a company are $Gr1; Gr2; \dots; Grm$ respectively from present to M years earlier.

Then the Company Net Growth Rate (CNGR) by the following formula.

$$CNGRj = Y1 * Gr1 + Y2 * Gr2 + \dots + Yi * Gri + \dots + Yp * Grm$$

Where CNGRj is the Company Net Growth Rate of the j^{th} company (where j=1 to m)

4.3 Implementation with python code

- **Step 1:** Raw Data: In this stage, the historical stock data is collected from the BSE (Bombay Stock Exchange) official website. This historical data is used for the prediction of future stock prices.

```

1 #import packages
2 import pandas as pd
3 import numpy as np
4
5 #to plot within notebook
6 import matplotlib.pyplot as plt
7 from matplotlib import dates
8
9 #setting figure size
10 from matplotlib.pyplot import rcParams
11 rcParams['figure.figsize']= 20,10
12
13 #for normalizing data
14 from sklearn.preprocessing import MinMaxScaler
15 scaler=MinMaxScaler(feature_range=(0, 1))
16
17 #read the file
18 df=pd.read_csv('tcs.csv')
19
20 #print the head
21 df.head()
22
23 #setting index as date
24 df['Date']=pd.to_datetime(df.Date,format='%d-%m-%Y')
25 df.index=df['Date']

```

- **Step 2:** Data Preprocessing: The pre-processing stage involves

- a) Data discretization: Part of data reduction but with particular importance, especially for numerical data
- b) Data transformation: Normalization.
- c) Data cleaning: Fill in missing values.
- d) Data integration: Integration of data files. After the dataset is transformed into a clean dataset, the dataset is divided into training and testing sets so as to evaluate. Creating a data structure with 60 timesteps and 1 output.

```

27  #plot
28  plt.figure(figsize=(8,8))
29  fig,ax = plt.subplots()
30  #Set Axis
31  ax.xaxis.set_minor_locator(dates.DayLocator(interval=7))
32  ax.xaxis.set_minor_formatter(dates.DateFormatter('%d'))
33  ax.xaxis.set_major_locator(dates.MonthLocator())
34  ax.xaxis.set_major_formatter(dates.DateFormatter('\n%b'))
35  plt.plot(df['Date'],df['Close Price'],label='Close Price history')
36  plt.legend()

```

- **Step 3:** Feature Extraction: In this layer, only the features which are to be fed to the neural network are chosen. We will choose the feature from Date, open, high, low, close price etc. For this project we choose Date & Close Price as feature.

```

38  #importing required libraries
39  from sklearn.preprocessing import MinMaxScaler
40  from keras.models import Sequential
41  from keras.layers import Dense, Dropout, LSTM
42
43  #creating dataframe
44  data = df.sort_index(ascending=True, axis=0)
45  new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close Price'])
46  for i in range(0,len(data)):
47      new_data['Date'][i] = data['Date'][i]
48      new_data['Close Price'][i] = data['Close Price'][i]
49
50  #setting index
51  new_data.index = new_data.Date
52  new_data.drop('Date', axis=1, inplace=True)
53
54  #creating train and test sets
55  dataset = new_data.values
56
57  train = dataset[0:60,:]
58  valid = dataset[60:,:]
59
60  #converting dataset into x_train and y_train
61  scaler = MinMaxScaler(feature_range=(0, 1))
62  scaled_data = scaler.fit_transform(dataset)
63
64  x_train, y_train = [], []
65  for i in range(20,len(train)):
66      x_train.append(scaled_data[i-20:i,0])
67      y_train.append(scaled_data[i,0])
68  x_train, y_train = np.array(x_train), np.array(y_train)
69
70  x_train = np.reshape(x_train, (x_train.shape[0],x_train.shape[1],1))

```

- **Step 4:** Training Neural Network: In this stage, the data is fed to the neural network and trained for prediction assigning random biases and weights. Our LSTM model is composed of a sequential input layer followed by 3 LSTM layers and dense layer with activation and then finally a dense output layer with linear activation function.

Optimizer: The type of optimizer used can greatly affect how fast the algorithm converges to the minimum value. Also, it is important that there is some notion of randomness to avoid getting stuck in a local minimum and not reach the global minimum. There are a few great algorithms, but I have chosen to use Adam optimizer. The Adam optimizer combines the perks of two other optimizers: ADAGrad and RMSprop.

The **ADAGrad optimizer** essentially uses a different learning rate for every parameter and every time step. The reasoning behind ADAGrad is that the parameters that are infrequent must have larger learning rates while parameters that are frequent must have smaller learning rates. In other words, the stochastic gradient descent update for ADAGrad becomes

$$\theta_{t+1,i} = \theta_{t,i} - \eta g_{t,i}$$

Where,

$$g_{t,i} = \nabla_{\theta_t} J(\theta_{t,i})$$

The learning rate is calculated based on the past gradients that have been computed for each parameter. Hence,

$$\theta_{t+1} = \theta_t - \frac{\eta}{\sqrt{G_t + \epsilon}} \cdot g_t$$

Where G is the matrix of sums of squares of the past gradients. The issue with this optimization is that the learning rates start vanishing very quickly as the iterations increase.

RMSprop considers fixing the diminishing learning rate by only using a certain number of previous gradients. The updates become

$$\theta_{t+1} = \theta_t - \frac{\eta}{\sqrt{E[g^2]_t + \epsilon}} \cdot g_t$$

Where

$$E[g^2]_t = 0.9E[g^2]_{t-1} + 0.1g_t^2$$

Now that we understand how those two optimizers work, we can look into how Adam works.

Adaptive Moment Estimation, or Adam, is another method that computes the adaptive learning rates for each parameter by considering the exponentially decaying average of past squared gradients and the exponentially decaying average of past gradients. This can be represented as

$$\begin{aligned} v_t &= \beta v_{t-1} + (1 - \beta) g_t^2 \\ m_t &= \beta m_{t-1} + (1 - \beta) g_t \end{aligned}$$

The v and m can be considered as the estimates of the first and second moment of the gradients respectively, hence getting the name Adaptive Moment Estimation. When this was first used, researchers observed that there was an inherent bias towards 0 and they countered this by using the following estimates:

$$\begin{aligned} \hat{v}_t &= \frac{v_t}{1 - \beta_2^t} \\ \hat{m}_t &= \frac{m_t}{1 - \beta_1^t} \end{aligned}$$

This leads us to the final gradient update rule

$$\theta_{t+1} = \theta_t - \frac{\eta}{\sqrt{\hat{v}_t} + \epsilon} \cdot \hat{m}_t$$

This is the optimizer that I used, and the benefits are summarized into the following:

1. The learning rate is different for every parameter and every iteration.
2. The learning does not diminish as with the ADAGrad.
3. The gradient update uses the moments of the distribution of weights, allowing for a more statistically sound descent.

Regularization: Another important aspect of training the model is making sure the weights do not get too large and start focusing on one data point, hence overfitting. So, we should always include a penalty for large weights (the definition of large would be depending on the type of regularizer used). I have chosen to use Tikhonov regularization, which can be thought of as the following minimization problem:

$$\operatorname{argmin}_{f \in \mathcal{H}} \frac{1}{n} \sum_{i=1}^n V(f(x_i), y_i) + \gamma \|f\|_K^2$$

The fact that the function space is in a Reproducing Kernel Hilbert Space (RKHS) ensures that the notion of a norm exists. This allows us to encode the notion of the norm into our regularizer.

Dropouts: A newer method of preventing overfitting considers what happens when some of the neurons are suddenly not working. This forces the model to not be overdependent on any groups of neurons, and consider all of them. Dropouts have found their use in making the neurons more robust and hence allowing them to predict the trend without focusing on any one neuron. Here are the results of using dropouts.

```
73 # Initialising the RNN and fit the LSTM network
74 regressor = Sequential()
75
76 # Adding the first LSTM layer and some Dropout regularisation
77 regressor.add(LSTM(units=50, return_sequences=True, input_shape=(x_train.shape[1],1)))
78 #model.add(Dropout(0.2))
79
80 # Adding the second LSTM layer and some Dropout regularisation
81 regressor.add(LSTM(units=50, return_sequences=True))
82 #model.add(Dropout(0.2))
83
84 # Adding the third LSTM layer and some Dropout regularisation
85 regressor.add(LSTM(units=50))
86 regressor.add(Dropout(0.2))
87
88 regressor.add(Dense(1))
89
90 regressor.compile(loss='mean_squared_error', optimizer='adam')
91
92 # Fitting the RNN to the Training set
93 # [OLD epochs=1, batch_size=32]
94 regressor.fit(x_train, y_train, epochs=100, batch_size=10, verbose=2)
95
```

- **Step 5:** Output Generation: In this layer, the output value generated by the output layer of the RNN is compared with the target value. The error or the difference between the target and the obtained output value is minimized by using back propagation algorithm which adjusts the weights and the biases of the network.

```
97  #predicting 246 values, using past 60 from the train data
98  inputs = new_data[len(new_data) - len(valid) - 20: ].values
99  inputs = inputs.reshape(-1,1)
100 inputs = scaler.transform(inputs)
101
102 X_test = []
103 for i in range(20,inputs.shape[0]):
104     X_test.append(inputs[i-20:i,0])
105 X_test = np.array(X_test)
106
107 X_test = np.reshape(X_test, (X_test.shape[0],X_test.shape[1],1))
108 closing_price = regressor.predict(X_test)
109 closing_price = scaler.inverse_transform(closing_price)
110
111
112 #for plotting
113 train = new_data[:60]
114 valid = new_data[60:]
115 #Visualizing of growth with respect to monthly
116 fig,ax = plt.subplots()
117 #Set Axis
118 ax.xaxis.set_minor_locator(dates.DayLocator(interval=7))
119 ax.xaxis.set_minor_formatter(dates.DateFormatter('%d'))
120 ax.xaxis.set_major_locator(dates.MonthLocator())
121 ax.xaxis.set_major_formatter(dates.DateFormatter('\n%b'))
122 valid['Predictions'] = closing_price
123 plt.plot(train['Close Price'], color='blue', label='Train Closed Price')
124 plt.plot(valid['Close Price'], color='red', label='Valid Closed Price')
125 plt.plot(valid['Predictions'], color='green', label='Predicted Closed Price')
126 plt.legend()
127
```

- **Step 6:** Test Dataset Update: Step 2 is repeated for the test data set.
- **Step 7:** Error and companies' net growth calculation: By calculating deviation we check the percentage of error of our prediction with respect to actual price.

```

131     #Deviation
132     Deviation=[]
133     for i in range(0,len(valid)):
134         Dev= valid['Close_Price'][i]-valid['Predictions'][i]
135         Deviation.append(Dev)
136
137     Difference=[]
138     for i in range(0,len(valid)):
139         D=Deviation[i]*100/valid["Close_Price"][i]
140         Difference.append(D)
141
142     A=0
143     s=len(Difference)
144     for i in range(0,len(valid)):
145         A=A+Difference[i]
146
147     ADiff=A/s
148
149     P=len(valid)
150     #compute Yi
151     #formula 1
152     m=[]
153     Q=P
154
155     #Weight Calculation
156     Wt=1/(P*(P+1)/2)
157     i=0
158     #compute Yi
159     #formula 2
160     for i in range(0,P):
161         Yi= Wt*Q
162         m.append(Yi)
163         Q=Q-1

```

- **Step 8:** Visualization: Using Keras and their function APIs the prediction is visualized.

```

167     Gr=[]
168     G=0.0
169     #for first growth is 0
170     Gr.append(G)
171     #Compute Growth(Gr)
172     for i in range(1,P):
173         G=(valid['Close_Price'][i]-valid['Close_Price'][i-1])/valid['Close_Price'][i-1]*100
174         Gr.append(G)
175
176     #Company net growth Rate
177     #CNGR
178
179     CNGR=[]
180
181     for i in range(0,P):
182         CN=Gr[i]*m[i]
183         CNGR.append(CN)
184
185     #Calculate time for respective growth
186     pt=len(data)
187     time=[]
188
189     for i in range(60,pt):
190         t=data['Date'][i]
191         time.append(t)
192

```

- **Step 9:** Investigate different time interval: We repeated this process to predict the price in different time intervals. For our case we took 2-month dataset as training to predict 3-month, 6-month, 1 year & 3 years of close price of the share. In this different time span we calculate the percentage of error in the future prediction. This would be different for different sectors. So, this will help to find a frame for the particular sector to predict the future companies' net growth.

```
194 #Visualizing of grwoth with respect to monthly
195 fig,ax = plt.subplots()
196 #Set Axis
197 ax.xaxis.set_minor_locator(dates.DayLocator(interval=7))
198 ax.xaxis.set_minor_formatter(dates.DateFormatter('%d'))
199 ax.xaxis.set_major_locator(dates.MonthLocator())
200 ax.xaxis.set_major_formatter(dates.DateFormatter('\n%b'))
201 ax.spines['bottom'].set_position('center')
202 ax.spines['right'].set_color('none')
203 ax.spines['top'].set_color('none')
204 ax.xaxis.set_ticks_position('bottom')
205 ax.yaxis.set_ticks_position('left')
206 plt.plot(time,CNGR, color='red',label='Growth')
207 plt.title('Time vs Growth (LSTM)')
208 plt.xlabel('Time')
209 plt.ylabel('Growth')
210 plt.legend()
211 plt.show()
212
```

Chapter 5: Numerical Result Analysis

5.1 Tabular Analysis (Sector Wise)

I. IT Sector: TCS

1 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
1824.2	1604.259888	219.9401123	12.05679817
1792.25	1610.473145	181.7768555	10.14238279
1841.45	1621.745239	219.7047607	11.93107392
1830.7	1636.042969	194.6570313	10.632929
1825.85	1651.114258	174.7357422	9.570103907
1826.3	1665.126709	161.173291	8.825126815
1819.85	1677.253662	142.5963379	7.835609412
1811.8	1687.174438	124.6255615	6.878549593
1820.45	1694.56543	125.8845703	6.915024874
1852.7	1699.814209	152.885791	8.252053274
1859.8	1704.10437	155.6956299	8.371632965
1847.3	1707.808716	139.4912842	7.551089925
1847.2	1708.571899	138.6281006	7.504769412
1855.6	1709.185791	146.414209	7.890397121
1875.9	1709.753784	166.1462158	8.856880208
1869.65	1710.574951	159.0750488	8.508279562
1881.7	1711.486206	170.2137939	9.045745546
1913.3	1712.538696	200.7613037	10.49293387
1887.65	1714.196533	173.4534668	9.188857405
1877	1715.731201	161.2687988	8.591837977
1979.6	1716.694214	262.9057861	13.28075299
1971	1719.006104	251.9938965	12.78507846
1981.25	1722.254272	258.9957275	13.07233956
1988.8	1726.070801	262.7291992	13.21043842
1997.85	1729.885742	267.9642578	13.41263147
1997.3	1733.417969	263.8820313	13.21193768
1981.45	1736.353027	245.0969727	12.36957645
1995.95	1738.204102	257.7458984	12.91344465
2005.05	1739.283569	265.7664307	13.25485303
1996.85	1739.979004	256.8709961	12.86381031
1979.4	1740.271851	239.1281494	12.08084012
1963.3	1739.847046	223.4529541	11.3814982
1943.1	1738.530273	204.5697266	10.52800816
1944.95	1736.272461	208.6775391	10.72919813
1941.25	1733.568481	207.6815186	10.69833966
1975.1	1730.829468	244.2705322	12.36750201

1950.65	1729.001343	221.6486572	11.3628102
1977.35	1727.725952	249.6240479	12.62417113
1976.35	1727.379761	248.9702393	12.59747713
1968.1	1727.693481	240.4065186	12.21515769
1974.6	1728.248047	246.3519531	12.47604341
1974.55	1729.085449	245.4645508	12.43141732
1993.85	1729.896118	263.9538818	13.23840218
2000.5	1730.995972	269.5040283	13.47183346
2001.25	1732.4021	268.8479004	13.43399877
2008.75	1733.924438	274.8255615	13.68142186
2011.85	1735.485962	276.3640381	13.7368113
2010.4	1736.965088	273.4349121	13.6010203
2013.65	1738.240723	275.4092773	13.67711754
2035.45	1739.278687	296.1713135	14.55065531
2042.2	1740.457153	301.7428467	14.77538178
2051.65	1741.835815	309.8141846	15.1007328
2065.55	1743.420898	322.1291016	15.59531851
2065.8	1745.26062	320.5393799	15.5164769
2079.45	1747.140381	332.3096191	15.98064965
2078.2	1749.070435	329.1295654	15.83724211

TOTAL	653.1064644
AVG Error %	11.66261544

2 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
1979.4	1929.547974	49.85202637	2.518542304
1963.3	1927.682861	35.61713867	1.814146522
1943.1	1924.768799	18.33120117	0.943399782
1944.95	1920.741577	24.20842285	1.244680987
1941.25	1916.608887	24.64111328	1.269342603
1975.1	1913.033447	62.06655273	3.142451154
1950.65	1911.719238	38.93076172	1.995784058
1977.35	1911.435181	65.91481934	3.333492772
1976.35	1912.602539	63.74746094	3.225514759
1968.1	1914.641235	53.45876465	2.716262621
1974.6	1916.551392	58.0486084	2.939765441
1974.55	1918.125	56.425	2.857613127
1993.85	1919.317749	74.53225098	3.738107229
2000.5	1920.806885	79.69311523	3.983659847
2001.25	1922.652222	78.59777832	3.92743427
2008.75	1924.473511	84.27648926	4.195469285

2011.85	1926.201538	85.64846191	4.25719919
2010.4	1927.70105	82.6989502	4.113557013
2013.65	1928.699219	84.95078125	4.21874612
2035.45	1929.263916	106.186084	5.216835785
2042.2	1930.268677	111.9313232	5.480918776
2051.65	1931.778809	119.8711914	5.842672552
2065.55	1933.696777	131.8532227	6.383443763
2065.8	1936.046387	129.7536133	6.281034625
2079.45	1938.266235	141.1837646	6.789476287
2078.2	1940.43396	137.76604	6.629104034

TOTAL	99.05865491
AVG Error %	3.809948266

1 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Difference %
1979.6	1877.145996	102.4540039	5.175490195
1971	1878.553101	92.44689941	4.69035512
1981.25	1880.359985	100.8900146	5.092240487
1988.8	1882.369263	106.4307373	5.351505295
1997.85	1884.662964	113.1870361	5.665442157
1997.3	1887.153076	110.1469238	5.514791159
1981.45	1889.72522	91.72478027	4.629174608
1995.95	1892.235229	103.7147705	5.196260954
2005.05	1894.637573	110.4124268	5.506716878
1996.85	1896.889526	99.96047363	5.005907987
1979.4	1898.899048	80.50095215	4.066937059
1963.3	1900.636719	62.66328125	3.191732351
1943.1	1902.051514	41.04848633	2.112525672
1944.95	1903.026001	41.92399902	2.15553094
1941.25	1903.562012	37.68798828	1.941428888
1975.1	1903.689453	71.41054687	3.615540827
1950.65	1903.669556	46.98044434	2.408450739
1977.35	1903.48584	73.86416016	3.735512689
1976.35	1903.237427	73.11257324	3.699373757
1968.1	1903.109497	64.99050293	3.302195159
1974.6	1903.046997	71.55300293	3.623670765
1974.55	1902.835327	71.71467285	3.631950209
1993.85	1902.738403	91.11159668	4.569631451
2000.5	1902.768188	97.73181152	4.885369234
2001.25	1902.96106	98.28894043	4.911377411
2008.75	1903.301636	105.4483643	5.249451861
2011.85	1903.802612	108.0473877	5.370548883

2010.4	1904.468018	105.9319824	5.269199285
2013.65	1905.184082	108.465918	5.386532812
2035.45	1905.936279	129.5137207	6.362903569
2042.2	1906.807983	135.3920166	6.629713867
2051.65	1907.829102	143.8208984	7.010011378
2065.55	1908.998901	156.5510986	7.579148345
2065.8	1910.338013	155.4619873	7.525510083
2079.45	1911.764526	167.6854736	8.063933907
2078.2	1913.291382	164.9086182	7.935165921
2054.95	1914.800415	140.149585	6.820097081
2093.2	1916.283447	176.9165527	8.45196602
2078.15	1917.695435	160.4545654	7.721029061
2075.7	1919.057129	156.6428711	7.546508219
2079.7	1920.337402	159.3625977	7.662768556
2081.2	1921.493042	159.706958	7.673791947
2045.95	1922.538452	123.4115479	6.031992368
2043.75	1923.304688	120.4453125	5.893348624
2063.3	1923.781616	139.5183838	6.761904899
2071.6	1924.069092	147.5309082	7.121592402
2070	1924.246582	145.753418	7.041227921
2076.9	1924.372681	152.5273193	7.343989568
2103.8	1924.508057	179.2919434	8.522290301
2198.7	1924.760742	273.9392578	12.45914667
2183.1	1925.475464	257.6245361	11.80085824
2141.45	1926.71521	214.73479	10.02754162
2187.8	1928.232178	259.5678223	11.86433048
2184.5	1930.011963	254.4880371	11.64971559
2255.8	1931.997681	323.8023193	14.35421222
2162.45	1934.320923	228.1290771	10.54956541
2064.25	1936.65271	127.59729	6.181290543
2103.1	1938.4729	164.6270996	7.827830327
2080.1	1939.597778	140.5022217	6.754589764
2090.5	1940.115601	150.3843994	7.193704827
2043.05	1940.106201	102.9437988	5.038731251
1979.75	1939.511841	40.23815918	2.032486889
1918.4	1938.182129	-19.78212891	-1.031178529
1949.15	1936.022095	13.12790527	0.673519497
1961.7	1933.161011	28.53898926	1.454809056
1927.7	1929.849365	-2.149365234	-0.111498949
1917.05	1926.237671	-9.187670898	-0.47926089
1902.15	1922.46106	-20.31105957	-1.067794841
1844.15	1918.582153	-74.43215332	-4.036122513
1851.5	1914.459473	-62.95947266	-3.40045761
1852.65	1910.045532	-57.39553223	-3.098023492
1799.6	1905.716309	-106.1163086	-5.896660847

1869.75	1901.429443	-31.67944336	-1.694314393
1895.4	1897.292969	-1.89296875	-0.099871729
1937.6	1893.686035	43.91396484	2.266410242
1934.6	1890.713013	43.8869873	2.268530306
1909.8	1888.759521	21.04047852	1.101711096
1889.95	1887.62146	2.328540039	0.123206436
1931.95	1886.765869	45.18413086	2.338783657
1942.8	1886.353882	56.44611816	2.905400358
1909.8	1886.306274	23.49372559	1.230166802
1915.9	1886.5625	29.3375	1.53126468
1935.8	1887.039795	48.76020508	2.518865848
1880.55	1887.721558	-7.171557617	-0.381354264
1865.5	1888.18042	-22.68041992	-1.21578236
1882.25	1888.331421	-6.081420898	-0.323093154
1902.05	1888.312866	13.73713379	0.722227796
1877.75	1888.19165	-10.44165039	-0.556072448
1811.75	1887.961426	-76.21142578	-4.206508943
1815.25	1887.474609	-72.22460938	-3.978769281
1846.1	1886.552124	-40.45212402	-2.191220629
1888.35	1885.395874	2.954125977	0.156439536
1976.55	1884.408203	92.14179688	4.661748849
1959.45	1883.789917	75.66008301	3.861291842
1970.6	1883.740845	86.85915527	4.407751714
1982.2	1884.219971	97.9800293	4.942994112
2009.4	1885.267212	124.1327881	6.177604662
2006.1	1886.891846	119.2081543	5.942283749
1991.75	1888.942017	102.8079834	5.161691146
1995.95	1891.085205	104.8647949	5.253878851
1974.9	1893.265991	81.63400879	4.133576829
1998.35	1895.391602	102.9583984	5.152170463
2018.7	1897.359009	121.3409912	6.010848131
1983.65	1899.206299	84.44370117	4.256985918
1989.25	1900.970703	88.27929688	4.437818116
1993.25	1902.515259	90.73474121	4.552100399
1987.7	1903.786743	83.91325684	4.221625841
1967.2	1904.789063	62.4109375	3.17257714
1956.35	1905.55957	50.79042969	2.596183182
1897.25	1906.132935	-8.88293457	-0.468200531
1915.55	1906.148926	9.401074219	0.49077676
1889.5	1905.621704	-16.1217041	-0.853225938
1909.45	1904.555542	4.894458008	0.256328158
1895.8	1903.041626	-7.241625977	-0.381982592

TOTAL	451.8979199
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AVG Error %	3.964016842
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2 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Error %
2042.2	2011.608032	30.59197	1.497990783
2051.65	2015.005859	36.64414	1.786081477
2065.55	2018.853516	46.69648	2.260728831
2065.8	2023.232788	42.56721	2.060567911
2079.45	2027.86731	51.58269	2.480592966
2078.2	2032.778076	45.42192	2.185637755
2054.95	2037.618652	17.33135	0.843395102
2093.2	2041.953369	51.24663	2.448243401
2078.15	2046.072021	32.07798	1.543583404
2075.7	2049.889404	25.8106	1.243464648
2079.7	2053.271729	26.42827	1.27077326
2081.2	2056.189209	25.01079	1.201748559
2045.95	2058.719238	-12.7692	-0.624122695
2043.75	2060.184326	-16.4343	-0.804126051
2063.3	2060.55542	2.74458	0.133018954
2071.6	2060.406006	11.19399	0.540354998
2070	2060.182861	9.817139	0.474257907
2076.9	2060.058838	16.84116	0.810879778
2103.8	2060.212891	43.58711	2.071827616
2198.7	2061.11792	137.5821	6.257428484
2183.1	2064.438721	118.6613	5.435448642
2141.45	2069.919189	71.53081	3.340297955
2187.8	2076.044434	111.7556	5.10812535
2184.5	2082.786377	101.7136	4.656151204
2255.8	2089.782715	166.0173	7.359574659
2162.45	2097.873047	64.57695	2.986286533
2064.25	2105.24707	-40.9971	-1.986051608
2103.1	2109.484131	-6.38413	-0.303558122
2080.1	2110.797363	-30.6974	-1.475763823
2090.5	2109.67627	-19.1763	-0.917305407
2043.05	2106.94873	-63.8987	-3.127614619
1979.75	2102.47583	-122.726	-6.199056956
1918.4	2095.576904	-177.177	-9.235660149
1949.15	2085.703857	-136.554	-7.005815736
1961.7	2074.004639	-112.305	-5.724863061
1927.7	2061.814941	-134.115	-6.95725172
1917.05	2049.475342	-132.425	-6.907766714
1902.15	2037.286987	-135.137	-7.104433788
1844.15	2025.335205	-181.185	-9.824862678

1851.5	2012.779785	-161.28	-8.710763443
1852.65	1999.717407	-147.067	-7.938218618
1799.6	1987.035645	-187.436	-10.4154059
1869.75	1974.239258	-104.489	-5.588407959
1895.4	1962.530762	-67.1308	-3.541772804
1937.6	1953.171753	-15.5718	-0.803661898
1934.6	1946.852173	-12.2522	-0.633318146
1909.8	1943.928223	-34.1282	-1.787005061
1889.95	1943.236206	-53.2862	-2.81945057
1931.95	1943.069336	-11.1193	-0.575549882
1942.8	1943.911255	-1.11125	-0.057198625
1909.8	1945.695068	-35.8951	-1.879519759
1915.9	1947.785889	-31.8859	-1.664277294
1935.8	1949.934204	-14.1342	-0.730147954
1880.55	1952.35083	-71.8008	-3.818076099
1865.5	1953.630981	-88.131	-4.724255237
1882.25	1953.396606	-71.1466	-3.779870179
1902.05	1952.291504	-50.2415	-2.641439705
1877.75	1950.986206	-73.2362	-3.900210681
1811.75	1949.403076	-137.653	-7.597796394
1815.25	1946.522827	-131.273	-7.231666555
1846.1	1942.091309	-95.9913	-5.199680873
1888.35	1937.17749	-48.8275	-2.585722469
1976.55	1933.39917	43.15083	2.183138806
1959.45	1932.361328	27.08867	1.382463032
1970.6	1934.121704	36.4783	1.851126352
1982.2	1938.122559	44.07744	2.223662668
2009.4	1943.9729	65.4271	3.256051538
2006.1	1951.495728	54.60427	2.721911792
1991.75	1959.955444	31.79456	1.596312573
1995.95	1968.1698	27.7802	1.391828462
1974.9	1975.819702	-0.9197	-0.046569555
1998.35	1982.411987	15.93801	0.797558621
2018.7	1988.049072	30.65093	1.518349816
1983.65	1993.213013	-9.56301	-0.482091735
1989.25	1997.674072	-8.42407	-0.423479817
1993.25	2001.233643	-7.98364	-0.400533931
1987.7	2003.95166	-16.2517	-0.817611317
1967.2	2005.889648	-38.6896	-1.966736907
1956.35	2006.954956	-50.605	-2.586702587
1897.25	2007.153931	-109.904	-5.792801722
1915.55	2005.279663	-89.7297	-4.68427674
1889.5	2001.752441	-112.252	-5.940854269
1909.45	1996.674316	-87.2243	-4.568033539
1895.8	1990.768066	-94.9681	-5.009392679

Total	-110.6218902
Avg Error %	-1.316927264

1 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Difference %
1979.6	1877.852539	101.7474609	5.139798997
1971	1879.07312	91.92687988	4.663971582
1981.25	1880.634399	100.6156006	5.078389935
1988.8	1882.385132	106.4148682	5.350707369
1997.85	1884.383789	113.4662109	5.679415919
1997.3	1886.552002	110.747998	5.544885498
1981.45	1888.788452	92.66154785	4.67645148
1995.95	1890.963501	104.986499	5.259976403
2005.05	1893.032227	112.0177734	5.586782047
1996.85	1894.958984	101.8910156	5.102587356
1979.4	1896.670898	82.72910156	4.179503969
1963.3	1898.138794	65.16120605	3.318963279
1943.1	1899.315796	43.7842041	2.253317076
1944.95	1900.10437	44.84562988	2.305747185
1941.25	1900.507568	40.74243164	2.09877304
1975.1	1900.556396	74.54360352	3.774168575
1950.65	1900.473755	50.17624512	2.572283347
1977.35	1900.258545	77.09145508	3.898725824
1976.35	1900.002808	76.34719238	3.863040068
1968.1	1899.857666	68.24233398	3.467422081
1974.6	1899.781372	74.81862793	3.789052361
1974.55	1899.609375	74.940625	3.795326783
1993.85	1899.539795	94.31020508	4.730055174
2000.5	1899.584106	100.9158936	5.044533544
2001.25	1899.771973	101.4780273	5.07073216
2008.75	1900.089966	108.6600342	5.409335865
2011.85	1900.545288	111.3047119	5.532455795
2010.4	1901.137695	109.2623047	5.434853994
2013.65	1901.774658	111.8753418	5.555848424
2035.45	1902.439453	133.0105469	6.53469979
2042.2	1903.198608	139.0013916	6.806453413
2051.65	1904.078857	147.5711426	7.192802992
2065.55	1905.080933	160.4690674	7.768829967
2065.8	1906.223877	159.576123	7.724664684
2079.45	1907.443604	172.0063965	8.271725528
2078.2	1908.748291	169.451709	8.153772928
2054.95	1910.043823	144.9061768	7.051567034

2093.2	1911.309937	181.8900635	8.689569247
2078.15	1912.513306	165.6366943	7.970391663
2075.7	1913.667603	162.0323975	7.806156837
2079.7	1914.745117	164.9548828	7.931667203
2081.2	1915.711914	165.4880859	7.951570533
2045.95	1916.579712	129.3702881	6.323238011
2043.75	1917.210205	126.5397949	6.191549599
2063.3	1917.588867	145.7111328	7.06204298
2071.6	1917.799072	153.8009277	7.424257952
2070	1917.914185	152.0858154	7.347140842
2076.9	1917.988037	158.9119629	7.651401747
2103.8	1918.074707	185.725293	8.828086936
2198.7	1918.269653	280.4303467	12.75437061
2183.1	1918.871216	264.2287842	12.10337521
2141.45	1919.940552	221.5094482	10.34390008
2187.8	1921.26709	266.5329102	12.18269084
2184.5	1922.82666	261.6733398	11.97863767
2255.8	1924.560791	331.239209	14.68389081
2162.45	1926.57605	235.8739502	10.90771811
2064.25	1928.59375	135.65625	6.571696742
2103.1	1930.15686	172.9431396	8.223248521
2080.1	1931.105469	148.9945313	7.16285425
2090.5	1931.501831	158.9981689	7.605748335
2043.05	1931.422363	111.6276367	5.463774098
1979.75	1930.831787	48.91821289	2.470928799
1918.4	1929.608398	-11.20839844	-0.584257633
1949.15	1927.665527	21.48447266	1.102248296
1961.7	1925.119995	36.58000488	1.86470943
1927.7	1922.19812	5.501879883	0.285411624
1917.05	1919.037598	-1.987597656	-0.103680011
1902.15	1915.756836	-13.60683594	-0.715339796
1844.15	1912.41333	-68.26333008	-3.70161484
1851.5	1908.888794	-57.38879395	-3.099583794
1852.65	1905.146606	-52.49660645	-2.833595468
1799.6	1901.477417	-101.877417	-5.661114525
1869.75	1897.839722	-28.08972168	-1.502325
1895.4	1894.341187	1.058813477	0.055862271
1937.6	1891.299805	46.30019531	2.389564168
1934.6	1888.827515	45.77248535	2.365992213
1909.8	1887.22937	22.57062988	1.181832123
1889.95	1886.334595	3.615405273	0.191296345
1931.95	1885.7052	46.2447998	2.393685127
1942.8	1885.451416	57.34858398	2.951852171
1909.8	1885.506226	24.29377441	1.272058562
1915.9	1885.804932	30.09506836	1.570805802

1935.8	1886.270508	49.52949219	2.558605857
1880.55	1886.887329	-6.337329102	-0.336993385
1865.5	1887.308838	-21.80883789	-1.169061265
1882.25	1887.453125	-5.203125	-0.276431133
1902.05	1887.427246	14.62275391	0.768789144
1877.75	1887.297485	-9.547485352	-0.508453487
1811.75	1887.065796	-75.3157959	-4.157074425
1815.25	1886.60376	-71.35375977	-3.930795194
1846.1	1885.766357	-39.66635742	-2.14865703
1888.35	1884.723145	3.626855469	0.19206479
1976.55	1883.816162	92.73383789	4.691702102
1959.45	1883.251709	76.19829102	3.888759142
1970.6	1883.208618	87.39138184	4.434760065
1982.2	1883.657349	98.54265137	4.971377831
2009.4	1884.617798	124.7822021	6.209923467
2006.1	1886.084839	120.0151611	5.982511397
1991.75	1887.921753	103.8282471	5.21291563
1995.95	1889.84436	106.1056396	5.316046978
1974.9	1891.788086	83.11191406	4.208411264
1998.35	1893.658569	104.6914307	5.23889362
2018.7	1895.369629	123.3303711	6.109395705
1983.65	1896.957397	86.69260254	4.370357802
1989.25	1898.44751	90.80249023	4.564659557
1993.25	1899.734253	93.51574707	4.691621576
1987.7	1900.780518	86.91948242	4.372867255
1967.2	1901.593628	65.60637207	3.335012814
1956.35	1902.20105	54.1489502	2.767855966
1897.25	1902.626099	-5.376098633	-0.28336269
1915.55	1902.57666	12.97333984	0.677264485
1889.5	1902.064331	-12.56433105	-0.664955335
1909.45	1901.095459	8.354541016	0.437536517
1895.8	1899.756592	-3.956591797	-0.208703017
1893.55	1898.313232	-4.763232422	-0.251550391
1902.35	1896.7854	5.564599609	0.292511873
1923.15	1895.270874	27.87912598	1.449659464
1896.45	1893.880493	2.569506836	0.135490355
1873.95	1892.642822	-18.69282227	-0.997509126
1896.65	1891.484131	5.165869141	0.272368077
1893.05	1890.411011	2.638989258	0.139404097
1887.8	1889.475586	-1.675585938	-0.088758658
1888.15	1888.592041	-0.442041016	-0.023411329
1841.95	1887.770386	-45.82038574	-2.487602038
1814.4	1886.950562	-72.55056152	-3.998597968
1864.2	1885.918701	-21.71870117	-1.165041367
1870.1	1884.819092	-14.7190918	-0.787075119

1895.1	1883.783203	11.31679687	0.597160935
1900.4	1882.97583	17.42416992	0.91686855
1905.8	1882.444946	23.35505371	1.225472437
1900.35	1882.281738	18.06826172	0.950785998
1879.75	1882.30188	-2.551879883	-0.135756344
1901.75	1882.461792	19.28820801	1.014234679
1919.05	1882.677734	36.37226563	1.895326626
1951.95	1883.046753	68.90324707	3.52996988
1983.15	1883.644409	99.50559082	5.01755242
1977.85	1884.557861	93.29213867	4.716846003
2014.6	1885.740967	128.8590332	6.39625897
2030.75	1887.309448	143.4405518	7.063427392
2047.15	1889.239502	157.910498	7.713675014
2044.35	1891.422974	152.9270264	7.480471855
2077.85	1893.806396	184.0436035	8.85740566
2079.9	1896.378906	183.5210938	8.823553717
2062.75	1899.063477	163.6865234	7.935354427
2065.55	1901.784668	163.765332	7.92841287
2050.65	1904.398315	146.2516846	7.13196716
2068.6	1906.666626	161.933374	7.82816272
2044.65	1908.680664	135.9693359	6.650005426
2030.9	1910.345337	120.5546631	5.93602162
1971.75	1911.641479	60.10852051	3.048485889
1904.85	1912.389038	-7.539038086	-0.395781195
1914.45	1912.37561	2.074389648	0.108354339
1912.25	1911.65686	0.593139648	0.031017892
1925.9	1910.296509	15.60349121	0.810192181
1985	1908.530518	76.46948242	3.852366873
2032.35	1906.717407	125.6325928	6.181641586
2053.75	1905.227417	148.522583	7.231775192
1984.25	1904.328369	79.92163086	4.027800472
1991.65	1903.756714	87.89328613	4.413088953
1987.85	1903.430176	84.41982422	4.246790463
1999.4	1903.245117	96.15488281	4.809186897
2011.5	1903.197998	108.302002	5.384141285
2022.3	1903.236572	119.0634277	5.887525478
2014.1	1903.433105	110.6668945	5.494607742
2012.55	1903.770874	108.779126	5.405039675
2001.15	1904.164307	96.98569336	4.846497932
1988.6	1904.566895	84.03310547	4.225742003
2040.2	1904.845581	135.3544189	6.634370108
2021.3	1905.204224	116.0957764	5.743619273
2024.7	1905.61499	119.0850098	5.881612573
2015.5	1906.138062	109.3619385	5.426045075
2004.65	1906.723755	97.92624512	4.884954736

1986.9	1907.18103	79.71896973	4.012228584
1981.8	1907.460449	74.33955078	3.751112664
1968.2	1907.51062	60.68937988	3.08349659
2000.45	1907.242432	93.20756836	4.659330069
2000.4	1906.820557	93.57944336	4.678036561
2031.3	1906.376831	124.9231689	6.149912319
2079.5	1906.190918	173.309082	8.334170812
2080.25	1906.32312	173.9268799	8.360864314
2014.3	1906.840698	107.4593018	5.334821117
2051.45	1907.467407	143.9825928	7.018576752
2069.75	1908.17041	161.5795898	7.806720128
2088.1	1908.97229	179.12771	8.578502464
2043.8	1909.940308	133.8596924	6.549549485
2019.05	1910.901245	108.1487549	5.356417864
2013.75	1911.699707	102.050293	5.067674387
2110.05	1912.250122	197.7998779	9.374179661
2132.45	1912.749268	219.7007324	10.30273781
2145.5	1913.521851	231.9781494	10.81231179
2164.35	1914.613403	249.7365967	11.53864193
2157.7	1916.075684	241.6243164	11.19823499
2185.45	1917.823364	267.6266357	12.24583659
2191.7	1919.838867	271.8611328	12.40412159
2238.3	1922.037231	316.2627686	14.12959695
2254.95	1924.483643	330.4663574	14.65515233
2214.4	1927.110229	287.2897705	12.97370712
2132.5	1929.773926	202.7260742	9.506498205
2154.7	1932.027222	222.6727783	10.33428219
2150.35	1933.749512	216.6004883	10.07280156
2152.65	1935.005615	217.6443848	10.11053282
2168.7	1935.938721	232.7612793	10.732756
2135.55	1936.500488	199.0495117	9.320761009
2131.1	1936.726807	194.3731934	9.120791768
2094.35	1936.647339	157.7026611	7.529909573
2094.5	1936.296753	158.2032471	7.55327033
2109.45	1935.658569	173.7914307	8.238708226
2096.35	1934.817383	161.5326172	7.705422147
2139.3	1933.689087	205.6109131	9.611130421
2109.2	1932.612793	176.587207	8.372236252
2082.75	1931.611938	151.1380615	7.256658818
2053.75	1930.600464	123.1495361	5.996325557
2049.65	1929.502441	120.1475586	5.861857322
2053.8	1928.228516	125.5714844	6.1141048
2075	1926.855591	148.1444092	7.139489599
2105.25	1925.446533	179.8034668	8.540718052
2145.4	1924.229248	221.170752	10.30906833

TOTAL	1049.997581
AVG Error %	4.838698531

2 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Error %
2042.2	1996.536377	45.66362305	2.23600152
2051.65	1999.074097	52.57590332	2.562615618
2065.55	2002.083984	63.46601563	3.072596433
2065.8	2005.622803	60.17719727	2.913021457
2079.45	2009.395996	70.05400391	3.368871764
2078.2	2013.464478	64.73552246	3.11498039
2054.95	2017.379028	37.57097168	1.828315613
2093.2	2021.49585	71.70415039	3.425575692
2078.15	2025.357666	52.79233398	2.540352428
2075.7	2029.182251	46.51774902	2.241063209
2079.7	2032.930786	46.76921387	2.24884425
2081.2	2036.396729	44.80327148	2.152761459
2045.95	2039.629761	6.320239258	0.308914649
2043.75	2042.176514	1.573486328	0.076990157
2063.3	2044.06311	19.23688965	0.932336047
2071.6	2045.473022	26.12697754	1.261197989
2070	2046.501831	23.49816895	1.135177244
2076.9	2047.303955	29.59604492	1.425010589
2103.8	2048.039307	55.76069336	2.650475015
2198.7	2048.906738	149.7932617	6.812810375
2183.1	2050.493652	132.6063477	6.074222329
2141.45	2053.156982	88.29301758	4.123048289
2187.8	2056.512695	131.2873047	6.000882379
2184.5	2060.522461	123.9775391	5.67532795
2255.8	2065.181885	190.6181152	8.450133666
2162.45	2070.644043	91.80595703	4.245460336
2064.25	2076.422119	-12.17211914	-0.58966303
2103.1	2081.592773	21.50722656	1.022644028
2080.1	2085.229248	-5.129248047	-0.24658661
2090.5	2087.709961	2.790039063	0.133462763
2043.05	2088.976563	-45.9265625	-2.24794119
1979.75	2088.81958	-109.0695801	-5.50926026
1918.4	2086.913086	-168.5130859	-8.78404326
1949.15	2083.213135	-134.0631348	-6.87803067
1961.7	2077.626221	-115.9262207	-5.90947753
1927.7	2070.465576	-142.7655762	-7.40600592

1917.05	2062.148438	-145.0984375	-7.56883949
1902.15	2053.055664	-150.9056641	-7.93342607
1844.15	2043.321045	-199.1710449	-10.8001543
1851.5	2032.63269	-181.1326904	-9.78302406
1852.65	2020.536377	-167.886377	-9.06195865
1799.6	2008.534424	-208.9344238	-11.610048
1869.75	1996.741333	-126.991333	-6.79188838
1895.4	1984.806152	-89.40615234	-4.71700709
1937.6	1973.878174	-36.27817383	-1.87232524
1934.6	1963.821533	-29.2215332	-1.510469
1909.8	1956.587891	-46.78789063	-2.44988431
1889.95	1951.849243	-61.89924316	-3.27517888
1931.95	1947.732788	-15.78278809	-0.81693564
1942.8	1944.951904	-2.151904297	-0.11076304
1909.8	1943.140869	-33.34086914	-1.74577805
1915.9	1942.553833	-26.65383301	-1.39119124
1935.8	1943.050903	-7.25090332	-0.37456883
1880.55	1944.488403	-63.93840332	-3.39998422
1865.5	1945.431763	-79.9317627	-4.28473668
1882.25	1945.7948	-63.5447998	-3.37600211
1902.05	1946.048462	-43.99846191	-2.31321269
1877.75	1946.098145	-68.34814453	-3.63989586
1811.75	1945.942139	-134.1921387	-7.40676907
1815.25	1945.539307	-130.2893066	-7.17748556
1846.1	1944.050049	-97.95004883	-5.3057824
1888.35	1941.851563	-53.5015625	-2.83324397
1976.55	1940.037842	36.5121582	1.847267117
1959.45	1938.278931	21.17106934	1.080459789
1970.6	1937.451172	33.14882812	1.682169295
1982.2	1937.536377	44.66362305	2.253234943
2009.4	1939.013062	70.38693848	3.502883372
2006.1	1942.079956	64.02004395	3.191268827
1991.75	1946.432617	45.31738281	2.275254566
1995.95	1951.054688	44.8953125	2.249320499
1974.9	1956.023193	18.87680664	0.955836075
1998.35	1961.369629	36.98037109	1.850545255
2018.7	1966.543457	52.15654297	2.583669835
1983.65	1971.474365	12.17563477	0.61379955
1989.25	1976.664917	12.58508301	0.632654669
1993.25	1981.507813	11.7421875	0.589097579
1987.7	1985.650635	2.049365234	0.103102341
1967.2	1989.064819	-21.86481934	-1.11146906
1956.35	1992.075806	-35.72580566	-1.82614592
1897.25	1994.9375	-97.6875	-5.14889972
1915.55	1996.462036	-80.91203613	-4.22395845

1889.5	1996.446411	-106.9464111	-5.66003764
1909.45	1994.822388	-85.3723877	-4.47104599
1895.8	1991.49585	-95.69584961	-5.04778192
1893.55	1987.813477	-94.26347656	-4.97813507
1902.35	1983.63147	-81.28146973	-4.27268745
1923.15	1979.199341	-56.04934082	-2.91445497
1896.45	1974.712769	-78.26276855	-4.12680369
1873.95	1970.520264	-96.57026367	-5.15329991
1896.65	1966.572144	-69.92214355	-3.6866129
1893.05	1962.770386	-69.72038574	-3.68296589
1887.8	1959.422241	-71.62224121	-3.79395281
1888.15	1956.056396	-67.90639648	-3.59645137
1841.95	1952.756714	-110.8067139	-6.01572865
1814.4	1949.780396	-135.3803955	-7.46144155
1864.2	1946.338867	-82.13886719	-4.40611883
1870.1	1942.721191	-72.62119141	-3.88327851
1895.1	1939.268311	-44.16831055	-2.33065857
1900.4	1936.444824	-36.04482422	-1.89669671
1905.8	1934.314941	-28.51494141	-1.49621898
1900.35	1933.426758	-33.07675781	-1.74056136
1879.75	1932.874268	-53.12426758	-2.82613473
1901.75	1932.899902	-31.14990234	-1.6379599
1919.05	1933.008911	-13.95891113	-0.72738653
1951.95	1933.655029	18.2949707	0.937266359
1983.15	1934.930664	48.21933594	2.431451778
1977.85	1936.984741	40.86525879	2.066145501
2014.6	1939.694946	74.90505371	3.718110479
2030.75	1943.673096	87.0769043	4.287918468
2047.15	1948.847778	98.30222168	4.801906147
2044.35	1954.701782	89.64821777	4.385169749
2077.85	1961.326294	116.5237061	5.607897878
2079.9	1968.699219	111.2007813	5.346448447
2062.75	1976.60083	86.14916992	4.176423218
2065.55	1985.137695	80.41230469	3.893021456
2050.65	1993.777954	56.8720459	2.773366781
2068.6	2001.417847	67.18215332	3.247711173
2044.65	2008.511475	36.13852539	1.767467556
2030.9	2014.665894	16.23410645	0.799355283
1971.75	2019.915771	-48.16577148	-2.44279303
1904.85	2023.791504	-118.9415039	-6.24414016
1914.45	2025.795288	-111.3452881	-5.81604576
1912.25	2026.006592	-113.7565918	-5.94883471
1925.9	2024.168091	-98.26809082	-5.10245033
1985	2020.793823	-35.79382324	-1.80321528
2032.35	2016.592773	15.75722656	0.775320519

2053.75	2012.505615	41.24438477	2.008247584
1984.25	2009.532349	-25.28234863	-1.27415137
1991.65	2006.978027	-15.32802734	-0.76961451
1987.85	2004.93042	-17.08041992	-0.85924088
1999.4	2003.230591	-3.83059082	-0.19158702
2011.5	2002.033203	9.466796875	0.4706337
2022.3	2000.990845	21.30915527	1.053708909
2014.1	2000.506226	13.59377441	0.674930461
2012.55	2000.667847	11.88215332	0.590402888
2001.15	2001.131958	0.018041992	0.000901581
1988.6	2001.893066	-13.29306641	-0.66846356
2040.2	2002.397461	37.80253906	1.852883985
2021.3	2003.341309	17.95869141	0.88847234
2024.7	2004.559937	20.14006348	0.994718402
2015.5	2006.455688	9.044311523	0.448737858
2004.65	2008.904663	-4.254663086	-0.2122397
1986.9	2010.921509	-24.02150879	-1.20899435
1981.8	2012.471191	-30.67119141	-1.54764312
1968.2	2013.310669	-45.11066895	-2.29197586
2000.45	2012.938965	-12.48896484	-0.62430777
2000.4	2011.82312	-11.42312012	-0.5710418
2031.3	2010.465576	20.83442383	1.025669464
2079.5	2010.099976	69.40002441	3.337341881
2080.25	2010.333374	69.91662598	3.360972286
2014.3	2011.473999	2.826000977	0.140296926
2051.45	2012.88562	38.56437988	1.879859606
2069.75	2014.518433	55.23156738	2.668513945
2088.1	2016.44519	71.65480957	3.431579406
2043.8	2018.952026	24.84797363	1.215773248
2019.05	2021.611938	-2.561938477	-0.12688831
2013.75	2024.115356	-10.36535645	-0.51472906
2110.05	2026.209229	83.84077148	3.973402122
2132.45	2027.837158	104.6128418	4.90575825
2145.5	2030.227905	115.2720947	5.372738044
2164.35	2033.365601	130.9843994	6.051904702
2157.7	2037.508423	120.1915771	5.570356266
2185.45	2042.526245	142.9237549	6.53978608
2191.7	2048.447998	143.252002	6.536113608
2238.3	2055.010254	183.2897461	8.188792659
2254.95	2062.416748	192.533252	8.538249272
2214.4	2070.229736	144.1702637	6.510579104
2132.5	2078.386475	54.11352539	2.537562738
2154.7	2085.658936	69.04106445	3.204207753
2150.35	2091.578857	58.77114258	2.733096593
2152.65	2096.511475	56.13852539	2.607879841

2168.7	2101.085693	67.61430664	3.117734433
2135.55	2104.373535	31.17646484	1.459879883
2131.1	2106.569092	24.5309082	1.151091371
2094.35	2107.716553	-13.36655273	-0.63821963
2094.5	2108.286621	-13.78662109	-0.6582297
2109.45	2108.036621	1.413378906	0.067002247
2096.35	2106.984375	-10.634375	-0.50728051
2139.3	2104.296631	35.00336914	1.636206663
2109.2	2101.326172	7.873828125	0.373308749
2082.75	2098.27002	-15.52001953	-0.74516958
2053.75	2094.96167	-41.21166992	-2.00665465
2049.65	2091.443848	-41.79384766	-2.03907241
2053.8	2087.280762	-33.48076172	-1.63018608
2075	2082.796143	-7.796142578	-0.37571771
2105.25	2077.867188	27.3828125	1.300691723
2145.4	2073.259277	72.14072266	3.362576799
TOTAL		-33.8161337	
AVG ERROR %		-0.18083494	

IT Sector

This Below table 1. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 1 Month train data.

Sector	Company	1 Months (Trained) & 3 Months (Predicted)		1 Months (Trained) & 6Months (Predicted)		1 Months (Trained) & 12 Months (Predicted)	
IT	TCS	Total Error	Avg Error %	Total Error	Avg Error %	Total Error	Avg Error %
		653.1064644	11.66261544	451.8979199	3.964016842	1049.997581	4.838698531

Table 1.

This Below table 2. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 2 Month train data

Sector	Company	2 Months (Trained) & 3 Months (Predicted)		2 Months (Trained) & 6Months (Predicted)		2 Months (Trained) & 12 Months (Predicted)	
IT	TCS	Total Error	Avg Error %	Total Error	Avg Error %	Total Error	Avg Error %
		99.05865491	3.809948266	110.6218902	1.316927264	33.8161337	0.18083494

Table 2.

If we compare both table 1 and table 2, we can easily identify that error value of predicted result in table 2 is much less than table 1.

In table 2 when we compared between different time intervals, we can say that the 2 Months (Trained) & 12 Months (Predicted) gives us less error (0.18083494%) than other two data set. So, for IT sector if we trained 2 months data and we can best predict the future closed Price.

Banking Sector: Axis

1 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
539.75	537.091248	2.658752	0.492589614
531.75	537.060181	-5.31018	-0.998623538
528	537.076538	-9.07654	-1.719041304
522.05	537.090454	-15.0405	-2.881037085
516.75	537.051453	-20.3015	-3.928679756
519.15	536.932739	-17.7827	-3.42535669
513.25	536.713562	-23.4636	-4.571565906
524.65	536.307556	-11.6576	-2.221968198
515.15	535.817444	-20.6674	-4.01192737
514.05	535.242004	-21.192	-4.122557026
507.6	534.640869	-27.0409	-5.327200382
504.95	534.033813	-29.0838	-5.759741257
510.4	533.365295	-22.9653	-4.499470104
512.6	532.703064	-20.1031	-3.92178384
512	532.044739	-20.0447	-3.914988041
514.3	531.437622	-17.1376	-3.332222841
510.9	530.869446	-19.9694	-3.908679938
514.25	530.29541	-16.0454	-3.120157541
523.65	529.82428	-6.17428	-1.179085226
532.55	529.436096	3.113904	0.584715765
536.6	529.209839	7.390161	1.377219741
537.25	529.143188	8.106812	1.50894584
523.9	529.300171	-5.40017	-1.030763676
523.1	529.603333	-6.50333	-1.24322931
538.05	530.006409	8.043591	1.494952385
524.2	530.49469	-6.29469	-1.200818379
527.3	530.981812	-3.68181	-0.698238483
534.45	531.483093	2.966907	0.555132704
540.8	531.909607	8.890393	1.643933629
546	532.392639	13.60736	2.49219063
531.85	532.906616	-1.05662	-0.198668085
541.65	533.451416	8.198584	1.513631309
553.65	534.003662	19.64634	3.548512217
568.45	534.55365	33.89635	5.962943108
550.1	535.180786	14.91921	2.712091232
544.9	535.882324	9.017676	1.654923065
546.1	536.599915	9.500085	1.739623778
574.35	537.323853	37.02615	6.446617474
596.5	538.061523	58.43848	9.796894646
592.05	538.875854	53.17415	8.981360613
596.4	539.817566	56.58243	9.487329658

619.45	540.930298	78.5197	12.67571267
615.65	542.270325	73.37968	11.91905714
605.3	543.889343	61.41066	10.14549095
618.3	545.647095	72.65291	11.75042945
623.85	547.427307	76.42269	12.25017117
627.1	549.339722	77.76028	12.3999806
624.2	551.255432	72.94457	11.68608905
636.2	553.115479	83.08452	13.05949725
631.8	554.91626	76.88374	12.16899972
639.6	556.640381	82.95962	12.97054708
650.05	558.365906	91.68409	14.10416033
660.6	559.983948	100.6161	15.23101003
656.55	561.522949	95.02705	14.47369595
649.55	562.984558	86.56544	13.32698667
649.2	564.492676	84.70732	13.04795506

TOTAL	185.9875866
AVG ERROR %	3.321206903

2 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
531.85	537.349365	-5.49937	-1.034006813
541.65	538.270813	3.379187	0.623869106
553.65	539.137512	14.51249	2.621238651
568.45	541.115234	27.33477	4.808649068
550.1	545.227966	4.872034	0.885663278
544.9	548.715332	-3.81533	-0.700189398
546.1	550.337402	-4.2374	-0.775938902
574.35	550.349243	24.00076	4.178768492
596.5	552.079651	44.42035	7.44683137
592.05	557.554138	34.49586	5.826511581
596.4	564.815308	31.58469	5.295890742
619.45	572.511353	46.93865	7.577471541
615.65	581.698242	33.95176	5.514782395
605.3	590.634827	14.66517	2.422794208
618.3	597.20929	21.09071	3.411080454
623.85	602.597107	21.25289	3.406731276
627.1	607.308044	19.79196	3.156108367
624.2	611.599304	12.6007	2.018695258
636.2	614.919189	21.28081	3.344987511

631.8	618.472168	13.32783	2.109501746
639.6	621.491394	18.10861	2.831239205
650.05	624.57019	25.47981	3.91966919
660.6	628.6474	31.9526	4.836905858
656.55	634.220581	22.32942	3.401023371
649.55	639.845764	9.704236	1.493993663
649.2	643.973511	5.226489	0.805066121

TOTAL	79.42733734
AVG ERROR %	3.05489759

1 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Difference %
539.75	536.0884	3.661621	0.678392051
531.75	536.0823	-4.33228	-0.814720337
528	536.0889	-8.08893	-1.531993982
522.05	536.0549	-14.0049	-2.682680134
516.75	535.9277	-19.1777	-3.711220972
519.15	535.679	-16.529	-3.183849577
513.25	535.3195	-22.0695	-4.299955001
524.65	534.7975	-10.1475	-1.934143782
515.15	534.2388	-19.0888	-3.705489773
514.05	533.6338	-19.5838	-3.809705099
507.6	533.0186	-25.4186	-5.00760751
504.95	532.3866	-27.4366	-5.433527415
510.4	531.6944	-21.2944	-4.17209972
512.6	531.0151	-18.4151	-3.592496434
512	530.3717	-18.3717	-3.588223457
514.3	529.8013	-15.5013	-3.014063886
510.9	529.3036	-18.4036	-3.602190031
514.25	528.8341	-14.5841	-2.83599542
523.65	528.4669	-4.81686	-0.919862104
532.55	528.2188	4.33125	0.813303915
536.6	528.1721	8.427942	1.570619063
537.25	528.3285	8.921509	1.660587955
523.9	528.7068	-4.80679	-0.91750088
523.1	529.1741	-6.07413	-1.161180138
538.05	529.6597	8.390332	1.559396344
524.2	530.1964	-5.99635	-1.143905017
527.3	530.6878	-3.38781	-0.642481543
534.45	531.1441	3.305896	0.618560388
540.8	531.539	9.260999	1.712462747

546	531.9917	14.0083	2.565622854
531.85	532.5076	-0.65763	-0.123649411
541.65	533.0287	8.621252	1.59166481
553.65	533.5513	20.09867	3.630212126
568.45	534.1127	34.33733	6.040518797
550.1	534.8185	15.28146	2.777941741
544.9	535.5918	9.308203	1.708240618
546.1	536.3337	9.76626	1.788364725
574.35	537.0202	37.3298	6.499485917
596.5	537.7557	58.74426	9.848158038
592.05	538.6791	53.37092	9.014597222
596.4	539.8	56.60001	9.49027703
619.45	541.1106	78.3394	12.64660655
615.65	542.675	72.97501	11.85332774
605.3	544.4741	60.82594	10.04889145
618.3	546.3255	71.9745	11.64070832
623.85	548.1498	75.70022	12.13436238
627.1	550.0164	77.08364	12.29208142
624.2	551.8408	72.35918	11.5923069
636.2	553.5643	82.63567	12.98894513
631.8	555.2112	76.58882	12.12232009
639.6	556.7563	82.84365	12.95241594
650.05	558.262	91.78804	14.12015031
660.6	559.6929	100.9071	15.2750725
656.55	561.0976	95.4524	14.53848218
649.55	562.4548	87.09523	13.40854854
649.2	563.7927	85.40734	13.15578195
631.75	565.0245	66.72546	10.56200457
640.5	566.0363	74.46368	11.62586793
637.4	566.7784	70.62162	11.07963895
639.05	567.2917	71.75831	11.22890431
645.15	567.6763	77.47367	12.00862891
651.55	567.9603	83.58967	12.82935659
650.5	568.1634	82.33661	12.65743411
635.55	568.3802	67.16981	10.5687691
636.25	568.5629	67.68713	10.63844932
626.05	568.6372	57.41279	9.170640199
608.45	568.5854	39.86461	6.551830359
609.2	568.3359	40.86412	6.707833804
599.4	567.9018	31.49821	5.254955884
597.55	567.237	30.313	5.072881012
615.25	566.408	48.84198	7.938558306
615.9	565.5138	50.38621	8.180906974
598.7	564.6334	34.06664	5.690101584
612.35	563.7372	48.61282	7.93873069

593.95	562.923	31.02703	5.22384483
570.7	562.1384	8.561633	1.500198581
586.1	561.2393	24.86068	4.241713215
568.45	560.3114	8.138599	1.431717589
556.5	559.2436	-2.74359	-0.493008321
552.75	558.0244	-5.27435	-0.954202266
589.35	556.6405	32.7095	5.550097068
580.8	555.3051	25.49495	4.389625738
584.65	554.0917	30.55826	5.226762022
575.85	553.0731	22.77688	3.955349463
588.8	552.2518	36.54823	6.207240146
574.6	551.6204	22.97964	3.99924098
562.2	551.1389	11.06115	1.967475101
561.1	550.7175	10.38247	1.850377955
563.05	550.2506	12.79939	2.27322434
563.4	549.7681	13.63187	2.419572694
560	549.2589	10.74115	1.918062483
537.35	548.6725	-11.3225	-2.10709693
565.9	547.9631	17.93687	3.169617465
562.6	547.3042	15.2958	2.718770135
581.9	546.6525	35.24747	6.057307638
602.35	546.2301	56.1199	9.316825344
609.95	546.1814	63.7686	10.45472637
624.3	546.4474	77.85261	12.4703848
607.6	547.1729	60.42709	9.945208592
607.1	548.1962	58.90377	9.702482618
612.6	549.3699	63.23007	10.32159091
606.2	550.5174	55.6826	9.185517153
618.6	551.6951	66.90487	10.81553033
612.75	552.8599	59.89014	9.773992121
625.65	553.9998	71.65018	11.45211909
618.3	555.0794	63.22059	10.22490591
615.15	556.1429	59.00712	9.592313533
612.85	557.1353	55.71469	9.091080209
626.35	557.9909	68.35909	10.91388109
614.3	558.759	55.54097	9.041342471
630.8	559.4146	71.38539	11.31664366
625.2	560.0357	65.16429	10.42295176
627.65	560.6685	66.98154	10.67179845
630.35	561.1819	69.16805	10.97296013
625.75	561.6882	64.06177	10.2375977

TOTAL	624.6851009
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AVG ERROR %	5.432044356
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2 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Error %
531.85	534.8329	-2.98289	-0.560850943
541.65	535.676	5.973975	1.102921556
553.65	536.4667	17.18333	3.103644034
568.45	538.3596	30.09038	5.293408542
550.1	542.3989	7.701135	1.399951873
544.9	545.8165	-0.91647	-0.168189995
546.1	547.3741	-1.27408	-0.233306074
574.35	547.3354	27.01461	4.703510371
596.5	549.1182	47.38177	7.943298391
592.05	554.8623	37.1877	6.281174785
596.4	562.6045	33.79551	5.66658414
619.45	571.0284	48.42162	7.816872815
615.65	581.4185	34.23154	5.560227884
605.3	591.9807	13.31935	2.200454014
618.3	600.4202	17.87977	2.891763375
623.85	608.0584	15.79159	2.531311911
627.1	615.4872	11.61276	1.851818904
624.2	622.8922	1.307849	0.20952405
636.2	629.5432	6.656848	1.046345197
631.8	636.7889	-4.98894	-0.789639194
639.6	643.6107	-4.01072	-0.627066569
650.05	650.8033	-0.75334	-0.115890274
660.6	659.1882	1.411829	0.213719136
656.55	669.243	-12.693	-1.933284739
649.55	679.1916	-29.6416	-4.563403796
649.2	687.6859	-38.4859	-5.928196557
631.75	694.5692	-62.8192	-9.943682448
640.5	697.8494	-57.3494	-8.953843128
637.4	699.4398	-62.0398	-9.733253577
639.05	699.6491	-60.5991	-9.482686627
645.15	699.6158	-54.4658	-8.442344213
651.55	700.2379	-48.6879	-7.472629121
650.5	701.8559	-51.3559	-7.894834127
635.55	704.224	-68.674	-10.80544395
636.25	705.1368	-68.8868	-10.82699879
626.05	704.7156	-78.6656	-12.56539209
608.45	702.2628	-93.8128	-15.41831808
609.2	696.4353	-87.2353	-14.31964917

599.4	688.8787	-89.4787	-14.92804857
597.55	679.2061	-81.6561	-13.66514178
615.25	668.7191	-53.4691	-8.69062254
615.9	660.5316	-44.6316	-7.246558723
598.7	654.6578	-55.9578	-9.346557026
612.35	648.3484	-35.9984	-5.878727635
593.95	643.8434	-49.8934	-8.400266654
570.7	638.468	-67.768	-11.87454312
586.1	629.3338	-43.2338	-7.376522994
568.45	620.2115	-51.7615	-9.105723778
556.5	609.3187	-52.8187	-9.491224537
552.75	596.4839	-43.7339	-7.91205549
589.35	582.6748	6.675195	1.132636856
580.8	574.1871	6.612866	1.138578893
584.65	569.8339	14.81614	2.534189292
575.85	569.0098	6.840173	1.187839427
588.8	569.3249	19.47511	3.307593387
574.6	571.4105	3.189478	0.555077887
562.2	572.7858	-10.5858	-1.882929142
561.1	571.6556	-10.5556	-1.881240358
563.05	568.4822	-5.43224	-0.964787989
563.4	564.5642	-1.16421	-0.206639862
560	560.7781	-0.77808	-0.138942174
537.35	557.2037	-19.8537	-3.694737939
565.9	551.4982	14.40183	2.544942756
562.6	547.7973	14.8027	2.631122957
581.9	546.1624	35.73759	6.141533846
602.35	548.2551	54.09493	8.980648142
609.95	555.2341	54.71593	8.970559911
624.3	565.9332	58.36677	9.349154647
607.6	579.4611	28.13894	4.631162019
607.1	591.5526	15.54745	2.560937034
612.6	601.0311	11.56893	1.888497079
606.2	608.5319	-2.33186	-0.384668484
618.6	613.541	5.058984	0.817811894
612.75	618.1661	-5.41614	-0.883906601
625.65	621.8657	3.784338	0.604865081
618.3	626.3779	-8.07787	-1.306464281
615.15	630.5111	-15.3611	-2.497132146
612.85	633.7007	-20.8507	-3.402249097
626.35	635.7291	-9.37906	-1.497415972
614.3	638.6648	-24.3648	-3.966269725
630.8	640.7109	-9.91094	-1.571169547
625.2	644.1556	-18.9556	-3.031932125
627.65	647.9818	-20.3318	-3.239354979

630.35	651.6641	-21.3141	-3.381315703
625.75	655.5989	-29.8489	-4.770096197

TOTAL	-174.6024665
AVG ERROR %	-2.054146665

1 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Error %
539.75	536.546	3.204041	0.59361566
531.75	536.5421	-4.79205	-0.901185373
528	536.5454	-8.54541	-1.618448893
522.05	536.5319	-14.4819	-2.774048728
516.75	536.4764	-19.7264	-3.817393206
519.15	536.3622	-17.2122	-3.315454612
513.25	536.1887	-22.9387	-4.4692956
524.65	535.9365	-11.2865	-2.15123652
515.15	535.6555	-20.5055	-3.980494531
514.05	535.3503	-21.3003	-4.143632292
507.6	535.0392	-27.4392	-5.405670719
504.95	534.7217	-29.7717	-5.895977963
510.4	534.3805	-23.9805	-4.698372485
512.6	534.0419	-21.4419	-4.182975254
512	533.7169	-21.7169	-4.241573811
514.3	533.4239	-19.1239	-3.718430714
510.9	533.1667	-22.2667	-4.358337844
514.25	532.9324	-18.6824	-3.632935935
523.65	532.7491	-9.09915	-1.737638787
532.55	532.6235	-0.07347	-0.013796662
536.6	532.5901	4.009912	0.747281422
537.25	532.6556	4.59436	0.855162467
523.9	532.8314	-8.93136	-1.70478333
523.1	533.0663	-9.96635	-1.905246648
538.05	533.3231	4.72688	0.878520562
524.2	533.6021	-9.40211	-1.793611564
527.3	533.8643	-6.56426	-1.244881057
534.45	534.1068	0.343188	0.064213393
540.8	534.3162	6.483777	1.198923235
546	534.5394	11.46063	2.099016909
531.85	534.7838	-2.93375	-0.551612756
541.65	535.0334	6.616553	1.221555014
553.65	535.2844	18.36558	3.317181644
568.45	535.551	32.89904	5.787498574

550.1	535.8798	14.22024	2.585028042
544.9	536.2512	8.648779	1.587223215
546.1	536.6246	9.475427	1.73510845
574.35	536.9802	37.36978	6.506446486
596.5	537.3501	59.1499	9.916161332
592.05	537.7966	54.25343	9.163656815
596.4	538.3425	58.05747	9.734653035
619.45	538.9949	80.45507	12.98814528
615.65	539.7824	75.86759	12.32316906
605.3	540.7032	64.59675	10.67185741
618.3	541.6816	76.61836	12.39177735
623.85	542.6718	81.17819	13.01245268
627.1	543.6909	83.40914	13.3007723
624.2	544.6976	79.50237	12.73668186
636.2	545.6628	90.53716	14.2309271
631.8	546.59	85.20997	13.48685868
639.6	547.4678	92.13223	14.40466331
650.05	548.3189	101.7311	15.6497333
660.6	549.1293	111.4707	16.87415478
656.55	549.9261	106.6239	16.24002019
649.55	550.7085	98.8415	15.21692001
649.2	551.4897	97.71025	15.0508709
631.75	552.2235	79.52649	12.58828481
640.5	552.8493	87.6507	13.68473002
637.4	553.328	84.072	13.18983324
639.05	553.6714	85.37861	13.36023993
645.15	553.9229	91.22709	14.14044601
651.55	554.0971	97.45289	14.95708588
650.5	554.2111	96.28888	14.80228738
635.55	554.322	81.22804	12.78074731
636.25	554.4167	81.83331	12.86181737
626.05	554.457	71.59297	11.43566309
608.45	554.4323	54.01769	8.877917329
609.2	554.3035	54.89647	9.011239686
599.4	554.0643	45.33567	7.563508333
597.55	553.6876	43.86238	7.340369497
615.25	553.2026	62.04742	10.08491253
615.9	552.6544	63.24564	10.26881671
598.7	552.0957	46.6043	7.784248685
612.35	551.5333	60.81674	9.931695246
593.95	551.0165	42.93346	7.228463587
570.7	550.5309	20.16906	3.534090621
586.1	550.011	36.08895	6.157473577
568.45	549.4788	18.97124	3.337363046
556.5	548.8808	7.619202	1.36912878

552.75	548.2094	4.540649	0.821465294
589.35	547.4525	41.89755	7.10911112
580.8	546.6957	34.10426	5.871945636
584.65	545.9915	38.65848	6.612243887
575.85	545.3882	30.46176	5.289876768
588.8	544.9004	43.89961	7.455776049
574.6	544.5244	30.07565	5.234188474
562.2	544.2469	17.95311	3.193367626
561.1	544.0237	17.07632	3.043364527
563.05	543.7948	19.2552	3.419802894
563.4	543.5601	19.83994	3.521466348
560	543.3078	16.6922	2.980749948
537.35	543.0165	-5.66648	-1.054523028
565.9	542.67	23.23002	4.104968562
562.6	542.3292	20.27078	3.603053034
581.9	541.9829	39.91709	6.85978516
602.35	541.7311	60.61886	10.06372705
609.95	541.6471	68.30291	11.19811546
624.3	541.7284	82.57161	13.22627045
607.6	542.0515	65.54849	10.78809847
607.1	542.5609	64.53909	10.63071766
612.6	543.187	69.41305	11.3308928
606.2	543.8403	62.35967	10.28697921
618.6	544.528	74.07205	11.97414256
612.75	545.2134	67.53656	11.02187843
625.65	545.8834	79.76664	12.74940273
618.3	546.5154	71.78462	11.60999824
615.15	547.1293	68.02073	11.05758393
612.85	547.6992	65.15084	10.63079747
626.35	548.193	78.15701	12.47816825
614.3	548.628	65.67201	10.69054359
630.8	548.9985	81.80153	12.96790201
625.2	549.3376	75.86235	12.13409365
627.65	549.6729	77.97715	12.4236674
630.35	549.951	80.39895	12.75465221
625.75	550.2252	75.52478	12.06948147
624.8	550.4633	74.33668	11.8976764
622.65	550.6617	71.98832	11.56160248
614.55	550.8289	63.72114	10.36874828
600.35	550.9365	49.41348	8.23077814
603.25	550.9819	52.26807	8.664412168
590	550.9313	39.06873	6.621817896
604.25	550.7588	53.49121	8.852496638
619.35	550.5099	68.84005	11.11488678
618.15	550.2272	67.92283	10.98808172

618.7	549.9781	68.72191	11.10746915
617.25	549.7675	67.48254	10.93277342
619.75	549.6286	70.1214	11.31446534
639.45	549.5565	89.89354	14.05794706
633	549.5826	83.41742	13.17810734
621.1	549.6878	71.41219	11.4976968
614.8	549.8652	64.93477	10.56193325
616.85	550.0336	66.81637	10.83186668
617.5	550.1935	67.30646	10.89983118
625.25	550.3196	74.93036	11.9840638
619.8	550.4225	69.37751	11.19353253
627.5	550.5093	76.99072	12.26943787
618.9	550.5901	68.30991	11.03731008
607.95	550.6594	57.29064	9.423577137
619.85	550.6965	69.15347	11.15648412
637.45	550.716	86.734	13.60639997
650.9	550.7423	100.1577	15.38756959
670.05	550.8502	119.1998	17.7896935
663	551.0706	111.9294	16.88225978
666.5	551.416	115.084	17.26691438
659.4	551.8954	107.5046	16.30338993
660.1	552.4617	107.6383	16.30636723
663.65	553.0724	110.5776	16.66203757
676.3	553.6909	122.6091	18.12939258
664.3	554.2982	110.0018	16.55905197
660.25	554.8976	105.3524	15.95644332
661.8	555.4597	106.3403	16.0683506
661.4	555.9572	105.4428	15.94236251
663.95	556.3721	107.5779	16.20270633
667.75	556.7122	111.0378	16.62864557
655.95	556.9863	98.96367	15.08707552
660.8	557.2012	103.5988	15.67778876
690.9	557.348	133.552	19.33015466
722.95	557.5128	165.4372	22.88363561
716.4	557.7973	158.6027	22.1388467
719.2	558.2123	160.9877	22.38427694
727.8	558.7582	169.0418	23.22640289
723.9	559.4346	164.4654	22.71934917
729.35	560.1992	169.1508	23.1919903
718.25	561.046	157.204	21.88708381
710.35	561.8997	148.4503	20.89819692
705.85	562.7078	143.1422	20.27941295
697.25	563.41	133.84	19.19540564
694.75	563.9628	130.7872	18.82506951
686.55	564.3397	122.2103	17.80063773

692.6	564.558	128.042	18.48715227
693.2	564.6274	128.5726	18.54768589
700.9	564.5745	136.3255	19.4500695
696.9	564.4508	132.4492	19.0054806
703.05	564.2859	138.7641	19.73744561
704	564.1148	139.8852	19.87005581
710.1	563.9787	146.1213	20.57756672
717.85	563.8815	153.9685	21.44855739
709.35	563.8253	145.5247	20.51522431
703.1	563.8076	139.2924	19.81117662
732.1	563.8468	168.2532	22.98226994
719.5	563.9583	155.5417	21.6180246
732.2	564.1254	168.0746	22.95473542
732.35	564.3677	167.9823	22.93743759
734.15	564.668	169.482	23.08546894
742.25	565.0327	177.2173	23.87569501
738.45	565.4523	172.9977	23.42714192
740.45	565.904	174.546	23.57296351
735.7	566.3749	169.3251	23.01551204
751.95	566.8323	185.1177	24.61835556
761	567.2916	193.7084	25.45445927
755.55	567.7573	187.7927	24.85510381
757.35	568.2343	189.1157	24.97071989
743.85	568.7088	175.1412	23.54523072
757.2	569.1594	188.0406	24.83368162
760.15	569.5726	190.5774	25.0710293
780.2	569.9597	210.2403	26.94697298
776.1	570.353	205.747	26.51037672
765.1	570.7645	194.3355	25.4000176
767.45	571.1905	196.2595	25.57293756
761.4	571.6085	189.7915	24.92664559
762.15	571.9592	190.1908	24.95450653
761.95	572.2758	189.6742	24.89325837
754.3	572.5233	181.7767	24.09873334
763.55	572.7036	190.8464	24.99461551
761.75	572.8275	188.9225	24.80111393
752.05	572.9007	179.1493	23.8214619
764.15	572.9302	191.2198	25.02385175
763.2	572.9297	190.2703	24.9305965
770.65	572.9215	197.7285	25.65736602
771.2	572.9084	198.2916	25.71207893
755.4	572.9163	182.4837	24.15723328
753.1	572.9377	180.1623	23.9227534
752.6	572.9415	179.6585	23.87171575
740.85	572.9287	167.9213	22.66603078

760.2	572.8465	187.3535	24.64529116
766.9	572.7335	194.1665	25.31835696
752.65	572.6098	180.0402	23.9208394
757.4	572.5014	184.8986	24.41227835
747.55	572.4172	175.1328	23.42757337
742.55	572.3266	170.2234	22.92416684
735.5	572.2203	163.2797	22.19981823
730	572.0701	157.9299	21.63423721
733.65	571.8613	161.7887	22.05257724
732.35	571.6069	160.7431	21.94894892
731.5	571.3009	160.1991	21.90008157
721.25	570.9713	150.2787	20.83587488
732.25	570.6221	161.6279	22.07277975
748.15	570.2541	177.8959	23.77810742
782.75	569.9326	212.8174	27.18842323
773.1	569.741	203.359	26.30436337
779.3	569.7174	209.5826	26.89369855
777.05	569.8827	207.1673	26.66074378
793.65	570.1954	223.4546	28.15531109
812.45	570.6449	241.8051	29.76245954
808.75	571.2495	237.5005	29.3663664
804.8	571.954	232.846	28.93215202
808.1	572.7325	235.3675	29.12603094
808.5	573.5651	234.9349	29.05811694

TOTAL	3185.370349
AVG ERROR %	13.38390903

2 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Error %
531.85	532.9195	-1.06949	-0.201089523
541.65	533.9041	7.745947	1.430065036
553.65	534.7517	18.89829	3.413400346
568.45	536.6945	31.75554	5.586338639
550.1	540.7872	9.312769	1.692922842
544.9	544.0744	0.825598	0.151513699
546.1	545.2443	0.855676	0.156688568
574.35	544.7062	29.64382	5.161282013
596.5	545.988	50.51196	8.468057484
592.05	551.1422	40.90785	6.909526074
596.4	557.9907	38.40934	6.440197582
619.45	564.9653	54.48473	8.79566212

615.65	573.0668	42.58317	6.916781695
605.3	580.5983	24.70173	4.08090755
618.3	585.3486	32.95143	5.329359247
623.85	588.4731	35.37686	5.67073102
627.1	590.8028	36.2972	5.788104703
624.2	592.6663	31.53368	5.051855046
636.2	593.5916	42.60839	6.69732572
631.8	594.7566	37.04341	5.863154195
639.6	595.5374	44.06265	6.889094197
650.05	596.5029	53.54713	8.237386562
660.6	598.5168	62.08322	9.398004137
656.55	602.0618	54.48817	8.299165545
649.55	605.7194	43.83058	6.74783752
649.2	607.9148	41.28521	6.359396962
631.75	608.5162	23.23376	3.6777683363
640.5	606.1212	34.37878	5.367491675
637.4	602.6517	34.74833	5.451573209
639.05	598.8167	40.23329	6.295796663
645.15	595.402	49.74802	7.711078425
651.55	593.3932	58.15675	8.925907526
650.5	593.3387	57.16125	8.787279767
635.55	594.4624	41.0876	6.46488831
636.25	594.5115	41.73853	6.560082576
626.05	593.5494	32.50056	5.191368345
608.45	590.9781	17.47191	2.871544354
609.2	585.7441	23.45586	3.850272386
599.4	579.2875	20.11246	3.355432662
597.55	572.0864	25.46357	4.261329465
615.25	565.1622	50.08777	8.141043243
615.9	561.3692	54.5308	8.85383964
598.7	560.7322	37.96782	6.341710751
612.35	560.4914	51.85861	8.468785165
593.95	561.5054	32.44457	5.46250827
570.7	561.559	9.140979	1.60171351
586.1	558.2695	27.83047	4.748416439
568.45	554.4473	14.00273	2.463318564
556.5	549.5967	6.903259	1.240477858
552.75	543.4171	9.332947	1.688457128
589.35	536.7971	52.55288	8.917091857
580.8	534.7936	46.00642	7.921215719
584.65	536.2592	48.39078	8.276880816
575.85	540.055	35.79501	6.216029752
588.8	543.8652	44.93483	7.631594202
574.6	548.2274	26.37258	4.58972903
562.2	551.157	11.04302	1.964250725

561.1	551.244	9.856042	1.756557206
563.05	549.1751	13.87489	2.464237659
563.4	546.3478	17.05216	3.026652582
560	543.7328	16.26715	2.904848371
537.35	541.4373	-4.08732	-0.760643323
565.9	537.3484	28.55155	5.045334917
562.6	535.1372	27.46279	4.8814065
581.9	534.8791	47.02091	8.080582685
602.35	537.938	64.41195	10.69344246
609.95	545.1843	64.76573	10.61820393
624.3	555.1966	69.10341	11.06894214
607.6	566.9171	40.68289	6.695669148
607.1	576.3934	30.70663	5.057919357
612.6	582.45	30.14999	4.921643453
606.2	585.8404	20.35961	3.358562675
618.6	586.4973	32.10269	5.189570893
612.75	586.4542	26.29584	4.291446332
625.65	585.6047	40.04532	6.400595334
618.3	585.4933	32.80671	5.305954046
615.15	585.2496	29.90043	4.860672559
612.85	584.3469	28.50314	4.650915755
626.35	582.6829	43.66708	6.971673607
614.3	582.0026	32.29738	5.257590019
630.8	581.0452	49.75483	7.887576725
625.2	581.4263	43.77373	7.001556377
627.65	582.2841	45.36594	7.227904466
630.35	583.4462	46.90383	7.440919014
625.75	584.8238	40.92621	6.540344945
624.8	585.6844	39.11561	6.260501407
622.65	585.8334	36.81656	5.91288283
614.55	585.2039	29.34608	4.775214636
600.35	583.2782	17.0718	2.843641502
603.25	579.1219	24.12811	3.99968716
590	574.1497	15.85034	2.68649861
604.25	568.1191	36.13092	5.979465521
619.35	563.5554	55.79458	9.008570288
618.15	562.5888	55.56119	8.988302814
618.7	564.3462	54.35381	8.785163826
617.25	567.5948	49.65515	8.044576973
619.75	571.0389	48.71112	7.859801631
639.45	574.2723	65.17772	10.19277851
633	578.9846	54.01544	8.533245165
621.1	583.7609	37.33907	6.011765369
614.8	586.5016	28.29835	4.60285492
616.85	586.587	30.26296	4.906049099

617.5	584.9958	32.50421	5.263839907
625.25	582.7489	42.5011	6.797456799
619.8	581.2994	38.50056	6.211771785
627.5	580.197	47.30298	7.538323269
618.9	580.1315	38.76847	6.264092622
607.95	579.9448	28.00524	4.606503301
619.85	578.3312	41.51876	6.698195081
637.45	576.968	60.48198	9.488113957
650.9	578.09	72.81003	11.18605534
670.05	582.4667	87.58326	13.07115352
663	590.5352	72.46484	10.92984069
666.5	599.2982	67.20178	10.08278803
659.4	607.2313	52.16874	7.911546526
660.1	612.6724	47.42758	7.184907693
663.65	615.618	48.03196	7.237543586
676.3	616.9276	59.37239	8.779001581
664.3	618.4158	45.88423	6.907154676
660.25	618.8265	41.42346	6.273905629
661.8	617.7817	44.01826	6.651293702
661.4	615.9198	45.4802	6.87635322
663.95	613.7417	50.2083	7.562060514
667.75	611.8856	55.86438	8.366062131
655.95	610.9031	45.04692	6.867432553
660.8	609.408	51.39204	7.777245916
690.9	607.9962	82.90378	11.99938981
722.95	609.9415	113.0085	15.63158347
716.4	617.6367	98.76334	13.78606118
719.2	627.8286	91.37145	12.70459507
727.8	638.1029	89.69709	12.32441532
723.9	647.627	76.27299	10.5363981
729.35	655.0383	74.31167	10.18875299
718.25	660.5125	57.73749	8.038633873
710.35	663.0624	47.28756	6.656938275
705.85	662.4521	43.39785	6.148310769
697.25	659.3345	37.91553	5.437866955
694.75	654.1151	40.63495	5.848859119
686.55	647.8632	38.68684	5.634963341
692.6	640.8526	51.7474	7.47146981
693.2	634.7495	58.45055	8.431989226
700.9	630.2141	70.68589	10.08501764
696.9	628.0699	68.83011	9.876612821
703.05	627.4333	75.61665	10.75551531
704	628.3229	75.67712	10.74959148
710.1	630.1658	79.93423	11.25675659
717.85	633.004	84.84603	11.81946545

709.35	637.0115	72.33853	10.19786077
703.1	640.5015	62.59847	8.903210656
732.1	642.3113	89.78866	12.26453485
719.5	645.6011	73.89893	10.27087224
732.2	648.7305	83.46947	11.39981838
732.35	652.3923	79.95767	10.91795808
734.15	656.0997	78.05027	10.63137895
742.25	659.4708	82.77917	11.15246545
738.45	662.9698	75.48015	10.22143021
740.45	665.8384	74.61156	10.07651564
735.7	668.0275	67.67253	9.198387139
751.95	669.046	82.90404	11.02520653
761	670.6619	90.33807	11.87096895
755.55	673.6261	81.9239	10.84294903
757.35	676.6738	80.67617	10.65242911
743.85	679.4026	64.44735	8.664025149
757.2	680.2004	76.99962	10.16899387
760.15	680.7088	79.4412	10.45072666
780.2	681.4611	98.73894	12.65559349
776.1	684.2908	91.80923	11.82956172
765.1	687.9938	77.10623	10.0779278
767.45	690.5788	76.8712	10.01644454
761.4	692.0662	69.33378	9.106090998
762.15	692.1661	69.98392	9.182434342
761.95	691.2781	70.67192	9.275139291
754.3	689.9526	64.34736	8.530738868
763.55	687.7906	75.75935	9.921989468
761.75	686.1391	75.6109	9.925946948
752.05	685.0156	67.03444	8.913561071
764.15	683.3891	80.7609	10.56872353
763.2	682.6194	80.58062	10.55825671
770.65	682.5587	88.09135	11.43078508
771.2	683.7108	87.48918	11.34455194
755.4	685.6108	69.78922	9.238710775
753.1	686.183	66.91696	8.885533869
752.6	685.3295	67.27053	8.938417782
740.85	683.5342	57.31576	7.736486371
760.2	680.3434	79.85662	10.50468511
766.9	678.3734	88.52665	11.543444086
752.65	678.4946	74.15543	9.852578506
757.4	678.6636	78.73643	10.39561999
747.55	678.9825	68.56752	9.172298454
742.55	678.4391	64.11091	8.633885002
735.5	676.7429	58.75708	7.988726047
730	673.7742	56.22577	7.702160143

Stock Price Prediction Using LSTM on Indian Share Market

733.65	669.7477	63.90232	8.710191418
732.35	665.8542	66.49581	9.07978603
731.5	662.5823	68.91766	9.421416757
721.25	660.0447	61.20526	8.485998091
732.25	657.2531	74.99695	10.24198679
748.15	655.6062	92.5438	12.36968507
782.75	656.65	126.1	16.10987373
773.1	662.9925	110.1075	14.242337
779.3	671.4312	107.8688	13.84176154
777.05	680.3412	96.70881	12.44563586
793.65	688.1174	105.5326	13.2971246
812.45	695.6428	116.8072	14.37715278
808.75	704.0231	104.7269	12.94923384
804.8	711.9261	92.87391	11.5399992
808.1	718.1027	89.99734	11.13690618
808.5	722.5914	85.90863	10.62568094

TOTAL	1614.494159
AVG ERROR %	7.76199115

Banking Sector

This Below table 1. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 1 Month training data.

Sector	Company	1 Months (Trained) & 3 Months (Predicted)		1 Months (Trained) & 6 Months (Predicted)		1 Months (Trained) & 12 Months (Predicted)	
Bank	AXIS	Total Error	Avg Error %	Total Error	Avg Error %	Total Error	Avg Error %
		185.9875866	3.321206903	624.6851009	5.432044356		

Table 1.

This Below table 2. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 2 Month training data.

Sector	Company	2 Months (Trained) & 3 Months (Predicted)		2 Months (Trained) & 6 Months (Predicted)		2 Months (Trained) & 12 Months (Predicted)	
Bank	Axis	Total Error	Avg Error %	Total Error	Avg Error %	Total Error	Avg Error %
		79.42733734	3.05489759	174.6024665	2.054146665		

Table 2.

If we compare both table 1 and table 2, we can easily identify that error value of predicted result in table 2 is much less than table 1.

In table 2 when we compared between different time intervals, we can say that the 2 Months (Trained) & 12 Months (Predicted) gives us less error (0.18083494%) than other two data set. So, for Banking sector if we trained 2 months data and we can best predict the future closed Price.

Pharmacy Sector: Emami

1 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
1105.95	1056.332275	49.6177246	4.486434704
1097.4	1057.222168	40.177832	3.661183892
1104.65	1058.620728	46.0292725	4.166864841
1089.75	1060.558594	29.1914063	2.678725052
1057.95	1062.924561	-4.9745605	-0.470207528
1069.15	1065.205322	3.94467773	0.368954565
530.3	1066.970093	-536.67009	-101.2012244
527.45	1065.997559	-538.54756	-102.104002
506.25	1060.552856	-554.30286	-109.4919223
505.65	1050.070068	-544.42007	-107.6673724
507.25	1034.721191	-527.47119	-103.986435
507.3	1014.816101	-507.5161	-100.0425983
527.9	991.4128418	-463.51284	-87.80315245
524.35	965.604248	-441.25425	-84.15261715
521.1	938.3364868	-417.23649	-80.06841044
516.45	910.4731445	-394.02314	-76.29453859
521.95	882.6442871	-360.69429	-69.1051417
531.75	855.2210083	-323.47101	-60.8314073
545.2	828.3908081	-283.19081	-51.94255468
540	803.190918	-263.19092	-48.73905888
533.5	779.6107788	-246.11078	-46.13135498
529.8	757.7358398	-227.93584	-43.02299733
529.3	738.1306152	-208.83062	-39.45411208
525.1	720.4287109	-195.32871	-37.19838334
530.55	704.9685669	-174.41857	-32.87504795
551	691.9727783	-140.97278	-25.58489625
548.3	680.5896606	-132.28966	-24.12724068
558.85	681.4160156	-122.56602	-21.93182708
567	682.5370483	-115.53705	-20.37690447
554	684.3793945	-130.37939	-23.53418674
550.7	686.3980103	-135.69801	-24.64100422
552.25	688.4440308	-136.19403	-24.66166243
564.75	690.4802246	-125.73022	-22.26298798
565.55	692.135437	-126.58544	-22.38271364
591.25	693.9475098	-102.69751	-17.36955768
567.4	696.0618286	-128.66183	-22.67568358
566.45	698.3935547	-131.94355	-23.29306288
566.05	700.6306763	-134.58068	-23.77540434
571.95	702.6233521	-130.67335	-22.84698873
570.75	704.30896	-133.55896	-23.40060621
574.5	706.0601196	-131.56012	-22.89993379

577	707.8881836	-130.88818	-22.68426059
575.6	709.7330933	-134.13309	-23.30317812
575.85	711.5142212	-135.66422	-23.55895132
573.75	713.2935181	-139.54352	-24.32131034
554.05	714.8468628	-160.79686	-29.02208515
573.85	715.7438354	-141.89384	-24.72664206
564	716.5496826	-152.54968	-27.04781607
565.3	716.973999	-151.674	-26.83070919
559.65	717.0977783	-157.44778	-28.13325799
558.55	717.3302002	-158.7802	-28.42721336
548.05	717.4368896	-169.38689	-30.90719636
551.75	717.2553101	-165.50531	-29.99643137
560.95	716.590332	-155.64033	-27.74584759
568.6	715.8027954	-147.2028	-25.88863795
565.95	714.5343018	-148.5843	-26.25396267

TOTAL	-2131.832536
AVG ERROR %	-38.06843815

2 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
550.7	555.4210815	-4.72108	-0.857287369
552.25	558.5388794	-6.28888	-1.138773996
564.75	559.6175537	5.132446	0.908799697
565.55	560.5825195	4.96748	0.878345057
591.25	562.0263062	29.22369	4.942696634
567.4	566.5532837	0.846716	0.149227407
566.45	570.7116699	-4.26167	-0.75234706
566.05	573.0913696	-7.04137	-1.243948349
571.95	573.6166382	-1.66664	-0.291395783
570.75	573.5215454	-2.77155	-0.485597093
574.5	573.2702637	1.229736	0.214053321
577	573.486084	3.513916	0.608997576
575.6	574.4278564	1.172144	0.203638561
575.85	575.6484985	0.201501	0.034992006
573.75	576.8433838	-3.09338	-0.539151859
554.05	577.5466919	-23.4967	-4.240897373
573.85	575.4744873	-1.62449	-0.283085703
564	573.5925903	-9.59259	-1.700813889
565.3	571.6521606	-6.35216	-1.123679576

559.65	570.0131226	-10.3631	-1.851714922
558.55	568.2796021	-9.7296	-1.741939316
548.05	566.4321899	-18.3822	-3.354108191
551.75	563.5895386	-11.8395	-2.145815781
560.95	560.5964355	0.353564	0.063029584
568.6	559.0741577	9.525842	1.67531521
565.95	559.8442993	6.105701	1.078841008

TOTAL	-10.9926202
AVG ERROR %	-0.422793085

1 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Difference %
1105.95	1024.46	81.4904053	7.368362519
1097.4	1025.56	71.8396973	6.546354772
1104.65	1027.181	77.4687256	7.012965698
1089.75	1029.309	60.440918	5.546310435
1057.95	1031.764	26.1857178	2.475137556
1069.15	1034.047	35.103125	3.283274096
530.3	1035.861	-505.56145	-95.33498967
527.45	1033.983	-506.5334	-96.03439159
506.25	1026.987	-520.73706	-102.8616416
505.65	1014.59	-508.94039	-100.6507254
507.25	997.3022	-490.05225	-96.60960988
507.3	975.8548	-468.5548	-92.36246745
527.9	951.4745	-423.57455	-80.23764886
524.35	925.4335	-401.08353	-76.49156722
521.1	898.7676	-377.66758	-72.47506777
516.45	872.3444	-355.89442	-68.91168969
521.95	846.7753	-324.82527	-62.23302396
531.75	822.4554	-290.70544	-54.6695711
545.2	799.6196	-254.41963	-46.66537581
540	778.9665	-238.96649	-44.25305402
533.5	760.4291	-226.92914	-42.53592093
529.8	743.9321	-214.13207	-40.41752885
529.3	729.6653	-200.36528	-37.85476728
525.1	717.2448	-192.14481	-36.5920419
530.55	706.725	-176.17504	-33.20611377
551	698.1349	-147.13495	-26.70325748
548.3	690.8973	-142.59734	-26.0071747
558.85	691.7321	-132.88206	-23.77776786
567	692.8314	-125.83136	-22.19247969

554	694.4872	-140.48724	-25.35870824
550.7	696.2953	-145.59529	-26.43822192
552.25	698.116	-145.86597	-26.41303156
564.75	699.9021	-135.1521	-23.93131467
565.55	701.4472	-135.8972	-24.02921131
591.25	703.1003	-111.85028	-18.91759505
567.4	705.029	-137.62899	-24.2560789
566.45	707.1099	-140.65986	-24.83182334
566.05	709.1037	-143.0537	-25.27227254
571.95	710.892	-138.94197	-24.29267729
570.75	712.4442	-141.69421	-24.82596826
574.5	713.991	-139.49097	-24.28041198
577	715.5438	-138.54376	-24.01105064
575.6	717.0724	-141.47245	-24.57825725
575.85	718.5235	-142.6735	-24.77615673
573.75	719.9348	-146.18481	-25.47883476
554.05	721.1586	-167.10857	-30.16127955
573.85	721.862	-148.012	-25.79280291
564	722.4538	-158.4538	-28.09464475
565.3	722.7425	-157.44249	-27.85113969
559.65	722.7921	-163.14205	-29.15072871
558.55	722.8494	-164.29943	-29.415348
548.05	722.7653	-174.71532	-31.87944892
551.75	722.4132	-170.66321	-30.93125655
560.95	721.6918	-160.74177	-28.65527631
568.6	720.882	-152.28196	-26.78191312
565.95	719.8189	-153.86891	-27.1877213
579.8	719.2062	-139.40618	-24.0438387
573.55	718.8414	-145.29137	-25.33194484
565.55	718.7152	-153.16521	-27.0825232
566.65	718.6654	-152.01541	-26.82703702
557.6	718.7366	-161.13663	-28.89824844
556.8	718.754	-161.95397	-29.08656022
553.45	718.6739	-165.22389	-29.8534446
547.85	718.4936	-170.64359	-31.14786736
552.85	718.1312	-165.28116	-29.89620413
547.85	717.6461	-169.79612	-30.99317663
544.05	717.2449	-173.19493	-31.83437811
530.5	716.4025	-185.90253	-35.04288913
508.15	715.4417	-207.29165	-40.7933977
518.65	714.0252	-195.37521	-37.66995228
509	712.2881	-203.28809	-39.93872022
520.7	710.1713	-189.47126	-36.38779809
493.8	707.9467	-214.14666	-43.36708288
493.35	705.3441	-211.99412	-42.97032861

495.2	702.3249	-207.12489	-41.82651255
495.95	699.0112	-203.06117	-40.94387931
474.7	695.646	-220.946	-46.54434297
447.3	691.9511	-244.65111	-54.69508402
453.9	688.0005	-234.10055	-51.57535786
417.6	683.8195	-266.21946	-63.74987021
428.95	679.0782	-250.12825	-58.31174894
439.2	673.9915	-234.79152	-53.45890622
444.35	668.6627	-224.31266	-50.48107543
446.9	663.3618	-216.46182	-48.43629814
447.9	658.313	-210.41299	-46.97767097
430.1	653.5219	-223.42185	-51.94648932
431.9	649.0755	-217.1755	-50.28374635
420.15	644.9503	-224.80026	-53.50476172
420.4	641.1784	-220.77841	-52.51627159
414	637.8181	-223.81805	-54.06233193
408.25	634.369	-226.11902	-55.38738973
397.2	631.069	-233.86903	-58.87941359
400.85	627.5491	-226.69907	-56.55458956
403.95	624.3472	-220.39723	-54.5605221
395.1	621.1456	-226.04557	-57.21224218
397.6	617.9193	-220.31925	-55.41228634
419.5	614.74	-195.23999	-46.54111805
424.45	612.1143	-187.66426	-44.21351344
417.5	610.2328	-192.73279	-46.16354206
421.05	608.621	-187.57097	-44.5483842
421.9	607.8551	-185.9551	-44.07563464
433.25	607.2392	-173.9892	-40.159076
436	606.8727	-170.87268	-39.1909818
436.3	606.8557	-170.55571	-39.09138503
458.75	607.1949	-148.44495	-32.3585714
460.05	608.0262	-147.97618	-32.16523945
455.65	609.5969	-153.94692	-33.78622272
444.3	611.5212	-167.22118	-37.63699734
439.1	613.7759	-174.67588	-39.78043245
434.4	615.9943	-181.59432	-41.80348152
437.65	618.1054	-180.45541	-41.23281337
440.95	620.0284	-179.07844	-40.61196108
433.2	621.8232	-188.62324	-43.54183799
438.55	623.2361	-184.68615	-42.11290503
438.05	624.3256	-186.27562	-42.52382663

TOTAL	-4574.462753
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AVG ERROR %	-39.77793698
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2 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Error %
550.7	540.4958	10.2041504	1.852941781
552.25	543.5639	8.68609619	1.572855807
564.75	544.4636	20.286438	3.592109427
565.55	545.0957	20.4542969	3.616708845
591.25	546.1896	45.0604248	7.621213498
567.4	550.36	17.0400146	3.003174947
566.45	554.3132	12.1367676	2.142601744
566.05	556.6201	9.42994385	1.665920651
571.95	557.1088	14.8411743	2.594837716
570.75	556.9347	13.8153076	2.42055324
574.5	556.6059	17.894104	3.114726546
577	556.7656	20.234375	3.50682409
575.6	557.6873	17.9126831	3.112001929
575.85	558.9425	16.9074951	2.936093621
573.75	560.2166	13.5334473	2.358770765
554.05	561.014	-6.9640381	-1.256933144
573.85	559.0895	14.7605225	2.572191768
564	557.2807	6.71929932	1.191365127
565.3	555.3813	9.91865234	1.754582053
559.65	553.796	5.85397949	1.046007235
558.55	552.1815	6.36848145	1.140181084
548.05	550.4914	-2.441394	-0.445469217
551.75	547.8446	3.90539551	0.707819757
560.95	545.0251	15.9249146	2.838918718
568.6	543.6386	24.9613892	4.389973472
565.95	544.4991	21.4509155	3.790249232
579.8	546.8962	32.9038208	5.675029459
573.55	551.1674	22.3825806	3.902463703
565.55	555.644	9.90601807	1.751572463
566.65	558.3685	8.28153076	1.46148959
557.6	559.1837	-1.5837158	-0.284023641
556.8	557.5632	-0.7631714	-0.137063827
553.45	554.3124	-0.862439	-0.155829608
547.85	550.2475	-2.3974976	-0.437619341
552.85	545.7657	7.08431396	1.281417015
547.85	542.1916	5.65841064	1.032839398
544.05	539.5388	4.51118164	0.829185119
530.5	537.2991	-6.7990723	-1.281634734

508.15	534.2465	-26.09646	-5.135582005
518.65	528.4289	-9.778894	-1.885451469
509	522.0289	-13.028931	-2.559711329
520.7	515.6155	5.08452148	0.976478103
493.8	511.1812	-17.381213	-3.519889303
493.35	506.5629	-13.212927	-2.678205583
495.2	501.6954	-6.4954346	-1.311679033
495.95	497.3052	-1.3551758	-0.273248469
474.7	493.9606	-19.260602	-4.057426123
447.3	489.9275	-42.62746	-9.529948517
453.9	483.1638	-29.263818	-6.447195056
417.6	475.2159	-57.615851	-13.79689915
428.95	464.8714	-35.921399	-8.374262484
439.2	454.5052	-15.305249	-3.48480169
444.35	446.4221	-2.0721191	-0.466325901
446.9	441.6113	5.28867187	1.183412816
447.9	439.892	8.00803223	1.78790628
430.1	440.402	-10.302008	-2.39525879
431.9	440.9082	-9.0081726	-2.085707943
420.15	440.7564	-20.606439	-4.904543427
420.4	439.1641	-18.764124	-4.463397606
414	436.4927	-22.492737	-5.433028217
408.25	432.9025	-24.652496	-6.038578405
397.2	428.7205	-31.52052	-7.935679763
400.85	423.7967	-22.946722	-5.724516007
403.95	419.0459	-15.095868	-3.737063478
395.1	415.1823	-20.082281	-5.082835104
397.6	411.9302	-14.330237	-3.60418431
419.5	409.411	10.0889587	2.404996124
424.45	408.9925	15.4575073	3.64177343
417.5	410.8279	6.67214966	1.598119679
421.05	413.6607	7.38929443	1.754968397
421.9	416.8661	5.03394165	1.193159908
433.25	419.8235	13.4265137	3.099022198
436	422.9352	13.0647888	2.996511197
436.3	426.2342	10.0658386	2.307091135
458.75	429.429	29.3210449	6.39150843
460.05	433.7063	26.3437012	5.726269139
455.65	438.9283	16.7217163	3.669859829
444.3	443.9872	0.31278687	0.070399925
439.1	447.3774	-8.2773804	-1.885078654
434.4	448.4506	-14.050623	-3.234489539
437.65	447.3423	-9.6923462	-2.214634112
440.95	445.1267	-4.1767395	-0.947213857
433.2	442.9355	-9.7355164	-2.247349113

438.55	440.7437	-2.1937134	-0.500219674
438.05	439.1186	-1.0685913	-0.243942771

TOTAL	14.50995859
AVG ERROR %	0.259106403

1 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Error %
1105.95	1044.692	61.25762	5.538913801
1097.4	1045.868	51.53171	4.695800425
1104.65	1047.645	57.0051	5.160467346
1089.75	1050.006	39.74377	3.647054317
1057.95	1052.767	5.182544	0.489866624
1069.15	1055.394	13.75608	1.286636964
530.3	1057.532	-527.232	-99.4214102
527.45	1055.966	-528.516	-100.2021398
506.25	1048.796	-542.546	-107.1696325
505.65	1035.537	-529.887	-104.7931856
507.25	1016.653	-509.403	-100.4244606
507.3	992.9401	-485.64	-95.73036162
527.9	965.7734	-437.873	-82.94627325
524.35	936.584	-412.234	-78.61810726
521.1	906.5757	-385.476	-73.97346855
516.45	876.765	-360.315	-69.76764733
521.95	847.8864	-325.936	-62.44589569
531.75	820.4319	-288.682	-54.28902393
545.2	794.7198	-249.52	-45.76665216
540	771.5427	-231.543	-42.87827103
533.5	750.8828	-217.383	-40.74654405
529.8	732.6995	-202.899	-38.29736936
529.3	717.1921	-187.892	-35.49823138
525.1	703.9498	-178.85	-34.06014647
530.55	692.9866	-162.437	-30.61663788
551	684.2614	-133.261	-24.18537451
548.3	677.1399	-128.84	-23.4980654
558.85	678.0421	-119.192	-21.3281049
567	679.215	-112.215	-19.79101003
554	680.9481	-126.948	-22.91482313
550.7	682.8453	-132.145	-23.99588468
552.25	684.7648	-132.515	-23.99544256
564.75	686.653	-121.903	-21.5852951
565.55	688.3046	-122.755	-21.70535346

591.25	690.0671	-98.8171	-16.7132478
567.4	692.1059	-124.706	-21.97848008
566.45	694.3076	-127.858	-22.57173929
566.05	696.4299	-130.38	-23.03328887
571.95	698.3504	-126.4	-22.09990433
570.75	700.0352	-129.285	-22.65181205
574.5	701.7095	-127.209	-22.14264102
577	703.3793	-126.379	-21.90283076
575.6	705.0128	-129.413	-22.48310569
575.85	706.557	-130.707	-22.69809965
573.75	708.0486	-134.299	-23.40716061
554.05	709.3412	-155.291	-28.02838147
573.85	710.1075	-136.258	-23.74445307
564	710.7445	-146.745	-26.01852958
565.3	711.0661	-145.766	-25.78561845
559.65	711.1369	-151.487	-27.06815007
558.55	711.2006	-152.651	-27.32979349
548.05	711.1047	-163.055	-29.75179935
551.75	710.7238	-158.974	-28.81264248
560.95	709.9562	-149.006	-26.56318331
568.6	709.0844	-140.484	-24.70706131
565.95	707.9568	-142.007	-25.09175494
579.8	707.2801	-127.48	-21.98690761
573.55	706.856	-133.306	-23.24225561
565.55	706.6851	-141.135	-24.95537435
566.65	706.6106	-139.961	-24.69965511
557.6	706.6736	-149.074	-26.73486083
556.8	706.6967	-149.897	-26.9210947
553.45	706.6298	-153.18	-27.67725373
547.85	706.4637	-158.614	-28.95202776
552.85	706.1111	-153.261	-27.7220123
547.85	705.6251	-157.775	-28.79895246
544.05	705.2062	-161.156	-29.62157463
530.5	704.3346	-173.835	-32.76806687
508.15	703.3301	-195.18	-38.40994572
518.65	701.852	-183.202	-35.32285544
509	700.0214	-191.021	-37.52876686
520.7	697.7797	-177.08	-34.00801308
493.8	695.3956	-201.596	-40.82536045
493.35	692.6116	-199.262	-40.3895071
495.2	689.3912	-194.191	-39.21469594
495.95	685.861	-189.911	-38.29237281
474.7	682.2687	-207.569	-43.72628539
447.3	678.3492	-231.049	-51.65420147
453.9	674.175	-220.275	-48.52940908

417.6	669.7585	-252.159	-60.38279332
428.95	664.7726	-235.823	-54.97672084
439.2	659.4184	-220.218	-50.14080055
444.35	653.8002	-209.45	-47.13631865
446.9	648.1976	-201.298	-45.04310401
447.9	642.8468	-194.947	-43.52462643
430.1	637.7703	-207.67	-48.28418128
431.9	633.0659	-201.166	-46.57695229
420.15	628.7111	-208.561	-49.63966668
420.4	624.7355	-204.335	-48.60501276
414	621.1866	-207.187	-50.04506871
408.25	617.5735	-209.323	-51.27335856
397.2	614.1263	-216.926	-54.61386751
400.85	610.4825	-209.632	-52.29698962
403.95	607.158	-203.208	-50.30524075
395.1	603.8394	-208.739	-52.8320467
397.6	600.5059	-202.906	-51.03267616
419.5	597.2289	-177.729	-42.3668517
424.45	594.5005	-170.051	-40.06374115
417.5	592.5103	-175.01	-41.91862369
421.05	590.8069	-169.757	-40.31752661
421.9	589.9496	-168.05	-39.8316153
433.25	589.2644	-156.014	-36.01024912
436	588.8546	-152.855	-35.05839777
436.3	588.8234	-152.523	-34.95836907
458.75	589.1792	-130.429	-28.43143307
460.05	590.0542	-130.004	-28.25871084
455.65	591.6888	-136.039	-29.85599534
444.3	593.707	-149.407	-33.62749723
439.1	596.0767	-156.977	-35.74963793
434.4	598.4274	-164.027	-37.75952306
437.65	600.6736	-163.024	-37.24977608
440.95	602.7224	-161.772	-36.6872462
433.2	604.6216	-171.422	-39.5710164
438.55	606.1213	-167.571	-38.21031533
438.05	607.2762	-169.226	-38.63171901
434.6	608.2766	-173.677	-39.96240482
437.55	608.9774	-171.427	-39.17893201
434.85	609.2026	-174.353	-40.09489174
418.8	609.2334	-190.433	-45.47120307
404.85	609.1215	-204.272	-50.45610004
405.8	608.5787	-202.779	-49.9701021
413.7	607.6154	-193.915	-46.87342433
432.65	606.2012	-173.551	-40.11354049
435.9	604.7126	-168.813	-38.72736532

436.65	603.3671	-166.717	-38.1809519
439.25	602.0034	-162.753	-37.05257097
436.95	600.9937	-164.044	-37.54288874
433.05	600.3936	-167.344	-38.64302407
425.15	600.2062	-175.056	-41.17515624
414.1	600.2034	-186.103	-44.94166389
401.25	600.1994	-198.949	-49.58240545
405.75	599.8986	-194.149	-47.84932116
405.65	599.2659	-193.616	-47.72978408
407.55	598.4537	-190.904	-46.84179496
418.2	597.3433	-179.143	-42.8367436
418.9	596.1696	-177.27	-42.31786958
422.1	595.0765	-172.976	-40.97997561
420.15	594.072	-173.922	-41.39522111
417.6	593.2661	-175.666	-42.06562554
417.6	592.8029	-175.203	-41.95472162
421.6	592.6038	-171.004	-40.56067856
421.75	592.4749	-170.725	-40.48010753
422.2	592.3422	-170.142	-40.2989491
432.5	592.0894	-159.589	-36.89927294
427.75	592.0176	-164.268	-38.40272102
438.35	592.1404	-153.79	-35.083924
435.75	592.4824	-156.732	-35.96842728
436.35	593.0867	-156.737	-35.91995668
433.95	593.9291	-159.979	-36.86578572
428.5	594.9821	-166.482	-38.85228837
424.7	596.165	-171.465	-40.37321381
417.8	597.3796	-179.58	-42.98218708
419.1	598.2838	-179.184	-42.7544148
419.6	598.916	-179.316	-42.73498942
405.55	599.2618	-193.712	-47.76520276
403.15	599.14	-195.99	-48.61464805
413.65	598.6652	-185.015	-44.72748028
411	597.9102	-186.91	-45.47693851
413	597.0138	-184.014	-44.55539805
407.6	596.0578	-188.458	-46.23596671
403.4	595.027	-191.627	-47.50298428
404.2	593.8695	-189.67	-46.9246677
396.3	592.6627	-196.363	-49.54900826
385.75	591.369	-205.619	-53.30369891
366.25	589.788	-223.538	-61.03425635
360.15	587.9571	-227.807	-63.25339228
358.2	585.5812	-227.381	-63.47884919
356.8	582.8391	-226.039	-63.35176887
360.85	579.736	-218.886	-60.65843478

355.05	576.4355	-221.386	-62.35334372
407.6	573.0499	-165.45	-40.591233
394.7	570.047	-175.347	-44.42538563
395.85	567.6382	-171.788	-43.39730823
397.2	565.7908	-168.591	-42.44482188
397.7	564.5331	-166.833	-41.94949512
396.55	564.0052	-167.455	-42.22801361
396.75	563.9504	-167.2	-42.14251782
392	564.1202	-172.12	-43.90820873
396.2	564.5748	-168.375	-42.49741748
399.25	565.1819	-165.932	-41.56089787
399.35	565.998	-166.648	-41.7298074
391.05	566.9542	-175.904	-44.98252464
383.1	567.8765	-184.776	-48.2319146
397.7	568.7463	-171.046	-43.00887022
400.1	569.6266	-169.527	-42.37106922
400.35	570.6564	-170.306	-42.53938631
399	571.6655	-172.666	-43.27456826
392.2	572.6056	-180.406	-45.99836584
396.15	573.4238	-177.274	-44.74915236
396.85	574.0638	-177.214	-44.65510438
397.5	574.6744	-177.174	-44.57217043
397.45	574.5554	-177.105	-44.56042771
391.6	574.6408	-183.041	-46.74177939
393.3	574.6777	-181.378	-46.11689153
396.9	574.6558	-177.756	-44.78604756
397.45	574.6147	-177.165	-44.57533905
400	574.5964	-174.596	-43.64910889
403.8	574.6131	-170.813	-42.30141113
410.15	574.7688	-164.619	-40.13624255
410.25	575.0089	-164.759	-40.1606121
410.35	575.3801	-165.03	-40.21690409
412.3	575.9166	-163.617	-39.68387727
408.85	576.708	-167.858	-41.05613497
403.65	577.6743	-174.024	-43.11266081
404.8	578.4366	-173.637	-42.89442824
403.15	579.1324	-175.982	-43.65185323
401.35	579.7491	-178.399	-44.44976841
397.9	580.2695	-182.369	-45.83299076
396.5	580.7152	-184.215	-46.46033038
394.55	580.919	-186.369	-47.23583991
391.6	580.9217	-189.322	-48.3456823
391.6	580.7166	-189.117	-48.29331302
391.85	580.3309	-188.481	-48.10026071
394.85	579.868	-185.018	-46.85778928

386.3	579.2852	-192.985	-49.95734333
386.45	578.5492	-192.099	-49.70868012
384.85	577.7146	-192.865	-50.11422622
379.75	576.7673	-197.017	-51.88079894
378.95	575.6799	-196.73	-51.91448255
376.3	574.432	-198.132	-52.65267256
370.55	573.1131	-202.563	-54.66552372
365.65	571.6959	-206.046	-56.35057071
363.4	570.1269	-206.727	-56.88687179
366.15	568.4685	-202.319	-55.25563454
365.15	566.7791	-201.629	-55.21816069
378.8	565.0146	-186.215	-49.1590941
373.3	563.3668	-190.067	-50.91530171
367.2	561.8851	-194.685	-53.01882675
367.45	560.5662	-193.116	-52.55576598
362	559.3677	-197.368	-54.52147426
358.05	558.2468	-200.197	-55.91309207
356.6	557.1589	-200.559	-56.24198978
359.5	556.0314	-196.531	-54.66797554
356.85	554.882	-198.032	-55.4944708
342.85	553.6823	-210.832	-61.4940388
343.65	552.4855	-208.836	-60.76983404
342.35	551.1399	-208.79	-60.98726233
347.5	549.6716	-202.172	-58.17886901

TOTAL	-10045.6
AVG ERROR %	-42.2082

2 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Error %
550.7	534.7675	15.93248	2.893132905
552.25	536.6129	15.63708	2.831522854
564.75	536.3441	28.40594	5.029826441
565.55	536.5663	28.98365	5.124861601
591.25	537.7148	53.53522	9.054582205
567.4	542.6829	24.71708	4.356199795
566.45	546.663	19.78704	3.493165528
566.05	548.3362	17.71382	3.12937344
571.95	548.0263	23.92369	4.182829591
570.75	547.4312	23.31885	4.085650049
574.5	546.9669	27.53308	4.792529339
577	547.2482	29.75177	5.156285965

575.6	548.3989	27.20114	4.725701052
575.85	549.7425	26.10751	4.533734015
573.75	550.9174	22.83264	3.979545377
554.05	551.4481	2.60188	0.469611025
573.85	548.7478	25.1022	4.374348221
564	546.7851	17.2149	3.052288082
565.3	544.977	20.32301	3.595084071
559.65	543.6531	15.99686	2.858369122
558.55	542.1723	16.3777	2.932181139
548.05	540.5588	7.491223	1.366886807
551.75	537.7538	13.99615	2.536684148
560.95	534.9689	25.98113	4.631629901
568.6	534.083	34.51699	6.07052272
565.95	535.8054	30.14458	5.326368068
579.8	538.7182	41.0818	7.085512128
573.55	543.395	30.15504	5.257613374
565.55	547.7073	17.84266	3.15492239
566.65	549.6156	17.0344	3.006158901
557.6	549.5017	8.098291	1.452347743
556.8	547.0151	9.784863	1.757338951
553.45	543.3204	10.12963	1.830269485
547.85	539.2615	8.588464	1.567667127
552.85	535.0542	17.7958	3.218920282
547.85	532.1248	15.72518	2.870344639
544.05	530.0798	13.97017	2.567809212
530.5	528.2888	2.211182	0.416810865
508.15	525.1604	-17.0104	-3.347515574
518.65	518.6143	0.035681	0.006879621
509	511.969	-2.96899	-0.583299438
520.7	505.7268	14.97319	2.875589276
493.8	502.1675	-8.36754	-1.694520353
493.35	498.0052	-4.65525	-0.94359968
495.2	493.3991	1.800861	0.363663287
495.95	489.4104	6.539569	1.318594433
474.7	486.6568	-11.9568	-2.518818166
447.3	482.7736	-35.4736	-7.930603641
453.9	475.3251	-21.4251	-4.720218824
417.6	466.9413	-49.3413	-11.81544892
428.95	455.91	-26.96	-6.285108555
439.2	445.559	-6.35896	-1.447850629
444.35	438.5722	5.777795	1.300280277
446.9	435.5719	11.32813	2.534824592
447.9	435.7867	12.11332	2.704469272
430.1	437.8958	-7.79578	-1.812551144
431.9	438.9792	-7.07919	-1.639080114

420.15	438.7704	-18.6204	-4.431856903
420.4	436.6161	-16.2161	-3.85730718
414	433.3646	-19.3646	-4.677438045
408.25	429.3584	-21.1084	-5.17046637
397.2	424.9367	-27.7367	-6.983050359
400.85	419.8272	-18.9772	-4.73423449
403.95	415.1747	-11.2247	-2.778730689
395.1	411.8132	-16.7132	-4.230127163
397.6	409.0949	-11.4949	-2.89107386
419.5	407.1449	12.3551	2.945197268
424.45	407.7815	16.66854	3.927090677
417.5	410.8723	6.627686	1.587469592
421.05	414.5609	6.489117	1.541175022
421.9	418.1364	3.763556	0.892049279
433.25	421.079	12.17102	2.809237278
436	424.1661	11.83386	2.714188602
436.3	427.438	8.861951	2.031159909
458.75	430.4971	28.2529	6.158670119
460.05	434.9977	25.05235	5.445571102
455.65	440.4683	15.18168	3.331872544
444.3	445.3923	-1.0923	-0.245848181
439.1	447.9806	-8.88059	-2.022452931
434.4	447.8472	-13.4472	-3.095579762
437.65	445.496	-7.84603	-1.792764244
440.95	442.4583	-1.50834	-0.342066789
433.2	440.0218	-6.82179	-1.574743664
438.55	437.8182	0.731793	0.16686654
438.05	436.45	1.599988	0.365252321
434.6	435.8801	-1.2801	-0.294545889
437.55	435.55	1.999951	0.457079459
434.85	435.5454	-0.69538	-0.15991253
418.8	435.5457	-16.7457	-3.998499363
404.85	434.0131	-29.1631	-7.203431404
405.8	430.0692	-24.2692	-5.980584985
413.7	424.9732	-11.2732	-2.724978507
432.65	420.7139	11.93613	2.75884267
435.9	419.5948	16.30515	3.740571546
436.65	421.4259	15.22407	3.48656044
439.25	424.9438	14.30624	3.256970722
436.95	429.1106	7.839435	1.794126288
433.05	432.7647	0.285291	0.065879351
425.15	435.0471	-9.89706	-2.327897943
414.1	435.2577	-21.1577	-5.109319109
401.25	432.9647	-31.7147	-7.90396527
405.75	428.1028	-22.3528	-5.509011391

405.65	422.5819	-16.9319	-4.174019273
407.55	417.7198	-10.1698	-2.495347221
418.2	414.2771	3.92287	0.938036794
418.9	413.223	5.677039	1.35522525
422.1	414.1034	7.996606	1.894481508
420.15	416.2939	3.856146	0.917802271
417.6	418.7775	-1.17747	-0.281960206
417.6	420.7216	-3.12162	-0.747514045
421.6	421.8978	-0.29777	-0.070627636
421.75	422.7278	-0.97784	-0.231853998
422.2	423.3501	-1.15007	-0.272398659
432.5	423.8257	8.674316	2.00562229
427.75	425.0886	2.661377	0.622180468
438.35	426.5118	11.83816	2.70061804
435.75	428.667	7.082977	1.625468111
436.35	430.9591	5.390924	1.235458708
433.95	432.9936	0.956439	0.22040309
428.5	434.325	-5.82504	-1.359403203
424.7	434.4602	-9.76021	-2.298141059
417.8	433.3643	-15.5643	-3.725303697
419.1	430.971	-11.871	-2.832507473
419.6	428.1522	-8.55216	-2.038169839
405.55	425.634	-20.084	-4.95228768
403.15	422.5177	-19.3677	-4.804100388
413.65	418.9833	-5.33328	-1.289321012
411	416.5336	-5.53363	-1.346382085
413	415.1779	-2.17789	-0.527333405
407.6	414.8462	-7.24622	-1.777777705
403.4	414.7223	-11.3223	-2.806707864
404.2	414.1878	-9.98781	-2.471005734
396.3	413.3743	-17.0743	-4.308427478
385.75	411.8303	-26.0803	-6.760923196
366.25	408.9863	-42.7363	-11.66862201
360.15	403.9021	-43.7521	-12.14829074
358.2	397.2321	-39.0321	-10.89672129
356.8	390.3051	-33.5051	-9.390438405
360.85	384.1518	-23.3018	-6.45748232
355.05	379.692	-24.642	-6.940427006
407.6	376.5597	31.04031	7.615384597
394.7	378.4729	16.22707	4.111241219
395.85	383.4942	12.35583	3.121341129
397.2	389.6431	7.556903	1.902543574
397.7	395.5153	2.18468	0.549328684
396.55	400.3018	-3.75176	-0.946099562
396.75	403.5699	-6.81995	-1.718953066

392	405.4021	-13.4021	-3.418910747
396.2	405.7552	-9.55516	-2.411700523
399.25	405.4312	-6.18121	-1.548206231
399.35	405.1576	-5.80762	-1.45426901
391.05	405.1293	-14.0793	-3.600384344
383.1	404.629	-21.529	-5.619673006
397.7	403.0676	-5.36757	-1.349651978
400.1	402.0405	-1.94047	-0.484995328
400.35	402.0671	-1.71708	-0.428894127
399	402.9136	-3.91357	-0.980845669
392.2	404.0358	-11.8358	-3.017796308
396.15	404.5276	-8.37759	-2.114751455
396.85	404.6573	-7.80729	-1.967314501
397.5	404.674	-7.17395	-1.804767345
397.45	404.6731	-7.22307	-1.817351915
391.6	404.7549	-13.1549	-3.359257481
393.3	404.3908	-11.0908	-2.819935954
396.9	403.7926	-6.89263	-1.736617046
397.45	403.4545	-6.00447	-1.510747962
400	403.4878	-3.48779	-0.871948242
403.8	403.9919	-0.19191	-0.047526707
410.15	405.0881	5.061896	1.234157199
410.25	406.9967	3.253265	0.792995827
410.35	409.2971	1.052911	0.256588614
412.3	411.5123	0.787701	0.19105055
408.85	413.488	-4.63801	-1.134402982
403.65	414.764	-11.114	-2.753377324
404.8	414.8768	-10.0768	-2.489328196
403.15	414.2337	-11.0837	-2.74926779
401.35	413.1339	-11.7839	-2.936076156
397.9	411.7851	-13.8851	-3.489586503
396.5	410.1909	-13.6909	-3.452935044
394.55	408.4888	-13.9388	-3.532842622
391.6	406.7832	-15.1832	-3.87721466
391.6	405.0433	-13.4433	-3.432917376
391.85	403.4655	-11.6155	-2.96426033
394.85	402.2355	-7.38547	-1.870450458
386.3	401.6428	-15.3428	-3.971721779
386.45	400.8977	-14.4477	-3.738578237
384.85	399.9558	-15.1058	-3.925124351
379.75	398.8432	-19.0932	-5.027834281
378.95	397.3336	-18.3836	-4.851206935
376.3	395.6055	-19.3055	-5.130356042
370.55	393.7563	-23.2063	-6.262668233
365.65	391.5903	-25.9403	-7.094289894

363.4	389.0133	-25.6133	-7.048248812
366.15	386.2475	-20.0975	-5.48886168
365.15	383.9096	-18.7596	-5.137498676
378.8	382.1566	-3.35659	-0.886110268
373.3	382.0387	-8.73873	-2.340939407
367.2	382.8431	-15.6431	-4.260114283
367.45	383.5198	-16.0698	-4.373331313
362	383.794	-21.794	-6.020452173
358.05	383.2975	-25.2475	-7.05138538
356.6	381.9591	-25.3591	-7.11135907
359.5	380.0793	-20.5793	-5.724410056
356.85	378.328	-21.478	-6.018784769
342.85	376.8034	-33.9534	-9.903274098
343.65	374.576	-30.926	-8.999260367
342.35	371.9269	-29.5769	-8.639377947
347.5	369.2499	-21.7499	-6.258957678

TOTAL	-226.1907124
AVG ERROR %	-1.087455348

Pharmacy Sector:

This Below table 1. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 1 Month training data.

Sector	Company	1 Months (Trained) & 3 Months (Predicted)		1 Months (Trained) & 6Months (Predicted)		1 Months (Trained) & 12 Months (Predicted)	
PHARMA	EMAMI	Total Error	Avg Error %	Total Error	Avg Error %	Total Error	Avg Error%
		2131.832536	38.06843815	4574.462753	39.77793698	10045.6	42.2082

Table 1.

This Below table 2. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 2 Month training data.

Sector	Company	2 Months (Trained) & 3 Months (Predicted)		2 Months (Trained) & 6 Months (Predicted)		2 Months (Trained) & 12 Months (Predicted)	
PHARMA	EMAMI	Total Error	Avg Error %	Total Error	Avg Error %	Total Error	Avg Error %
		10.9926202	0.422793085	14.50995859	0.259106403	226.1907124	1.087455348

Table 2.

If we compare both table 1 and table 2, we can easily identify that error value of predicted result in table 2 is much less than table 1.

In table 2 when we compared between different time intervals, we can say that the 2 Months (Trained) & 12 Months (Predicted) gives us less error (0.18083494%) than other two data set. So, for Pharmacy sector if we trained 2 months data and we can best predict the future closed Price.

IV. Medicine Sector: Lupin

1 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
869.6	858.4354	11.16464	1.283882
898.7	901.0704	-2.37037	-0.26376
910.4	962.8199	-52.4199	-5.7579
902.3	1048.127	-145.827	-16.1617
898.3	1160.235	-261.935	-29.159
899.85	1296.361	-396.511	-44.0641
898.85	1444.127	-545.277	-60.6638
904.9	1586.837	-681.937	-75.3604
914.05	1710.032	-795.982	-87.083
902.2	1808.365	-906.165	-100.44
892.3	1881.455	-989.155	-110.855
895.05	1931.489	-1036.44	-115.797

903.7	1966.054	-1062.35	-117.556
888.05	1990.06	-1102.01	-124.093
902.9	2005.978	-1103.08	-122.171
933.45	2017.211	-1083.76	-116.103
922.25	2025.588	-1103.34	-119.635
915.8	2031.896	-1116.1	-121.871
911.95	2036.254	-1124.3	-123.286
903.2	2039.553	-1136.35	-125.814
901.1	2041.371	-1140.27	-126.542
885.25	2042.478	-1157.23	-130.723
865.2	2042.744	-1177.54	-136.101
818.45	2042.451	-1224	-149.551
828.25	2041.412	-1213.16	-146.473
809.8	2039.677	-1229.88	-151.874
795.25	2036.918	-1241.67	-156.136
800.3	2032.939	-1232.64	-154.022
799.8	2027.587	-1227.79	-153.512
821.1	2020.304	-1199.2	-146.048
800	2011.331	-1211.33	-151.416
814.55	2000.134	-1185.58	-145.551
815.4	1985.738	-1170.34	-143.529
820.35	1967.011	-1146.66	-139.777
821.35	1944.618	-1123.27	-136.759
842.4	1914.831	-1072.43	-127.307
865	1874.53	-1009.53	-116.709
886.25	1833.744	-947.494	-106.911
871.85	1797.196	-925.346	-106.136
865.05	1767.905	-902.855	-104.37
825.85	1749.957	-924.107	-111.898
820.75	1744.799	-924.049	-112.586
808.05	1755.435	-947.385	-117.243
811.25	1776.936	-965.686	-119.037
832.5	1801.806	-969.306	-116.433
849.35	1823.21	-973.86	-114.659
879.35	1841.738	-962.388	-109.443
869.8	1857.436	-987.636	-113.548
889.2	1870.182	-980.982	-110.322
903.65	1881.544	-977.894	-108.216
907.15	1892.317	-985.167	-108.6
907.65	1903.795	-996.145	-109.75
901.75	1914.719	-1012.97	-112.334
887.4	1926.044	-1038.64	-117.044
893.65	1937.27	-1043.62	-116.782
932.55	1948.561	-1016.01	-108.95

TOTAL	-6151.14
AVG ERROR %	-109.842

2 Months (Trained) & 3 Months (Predicted)			
Close Price	Predictions	Error	Error %
13.229	1.653625	13.229	1.653625
35.01136	4.298246	35.01136	4.298246
39.7609	4.876245	39.7609	4.876245
45.07925	5.495124	45.07925	5.495124
44.24825	5.387259	44.24825	5.387259
60.25089	7.15229	60.25089	7.15229
73.159	8.457687	73.159	8.457687
81.66003	9.214108	81.66003	9.214108
51.10867	5.862094	51.10867	5.862094
27.37654	3.164735	27.37654	3.164735
-26.8958	-3.25674	-26.8958	-3.25674
-41.972	-5.11386	-41.972	-5.11386
-58.7287	-7.26796	-58.7287	-7.26796
-53.9609	-6.65158	-53.9609	-6.65158
-26.0801	-3.13274	-26.0801	-3.13274
-3.10734	-0.36585	-3.10734	-0.36585
31.93893	3.632106	31.93893	3.632106
24.08271	2.768765	24.08271	2.768765
42.08556	4.732969	42.08556	4.732969
52.28959	5.786487	52.28959	5.786487
48.00175	5.291489	48.00175	5.291489
40.53409	4.465829	40.53409	4.465829
26.0954	2.893862	26.0954	2.893862
4.761511	0.536569	4.761511	0.536569
6.798621	0.76077	6.798621	0.76077
43.83766	4.700837	43.83766	4.700837

TOTAL	65.34236
AVG ERROR %	2.513168

1 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Difference %

869.6	877.2271	-7.62711	-0.87708
898.7	919.8113	-21.1113	-2.34909
910.4	980.868	-70.468	-7.74034
902.3	1064.224	-161.924	-17.9457
898.3	1170.737	-272.437	-30.328
899.85	1295.787	-395.937	-44.0003
898.85	1428.628	-529.778	-58.9395
904.9	1555.494	-650.594	-71.8968
914.05	1665.374	-751.324	-82.1972
902.2	1750.917	-848.717	-94.0719
892.3	1818.254	-925.954	-103.772
895.05	1869.699	-974.649	-108.893
903.7	1908.441	-1004.74	-111.181
888.05	1937.051	-1049	-118.124
902.9	1957.302	-1054.4	-116.78
933.45	1972.197	-1038.75	-111.28
922.25	1982.952	-1060.7	-115.012
915.8	1990.743	-1074.94	-117.377
911.95	1995.669	-1083.72	-118.835
903.2	1999.267	-1096.07	-121.354
901.1	2001.167	-1100.07	-122.08
885.25	2002.308	-1117.06	-126.186
865.2	2002.532	-1137.33	-131.453
818.45	2001.996	-1183.55	-144.608
828.25	2000.253	-1172	-141.504
809.8	1997.555	-1187.76	-146.673
795.25	1993.491	-1198.24	-150.675
800.3	1987.833	-1187.53	-148.386
799.8	1980.559	-1180.76	-147.632
821.1	1971.482	-1150.38	-140.103
800	1961.064	-1161.06	-145.133
814.55	1948.374	-1133.82	-139.196
815.4	1933.098	-1117.7	-137.074
820.35	1914.615	-1094.26	-133.39
821.35	1893.274	-1071.92	-130.508
842.4	1867.347	-1024.95	-121.67
865	1835.882	-970.882	-112.241
886.25	1803.064	-916.814	-103.449
871.85	1771.725	-899.875	-103.214
865.05	1745.205	-880.155	-101.746
825.85	1727.962	-902.112	-109.234
820.75	1721.316	-900.566	-109.725
808.05	1728.062	-920.012	-113.856
811.25	1744.039	-932.789	-114.982
832.5	1765.531	-933.031	-112.076

849.35	1783.977	-934.627	-110.04
879.35	1801.42	-922.07	-104.858
869.8	1817.42	-947.62	-108.947
889.2	1830.614	-941.414	-105.872
903.65	1842.577	-938.927	-103.904
907.15	1853.226	-946.076	-104.291
907.65	1865.596	-957.946	-105.541
901.75	1877.311	-975.561	-108.185
887.4	1889.317	-1001.92	-112.905
893.65	1900.873	-1007.22	-112.709
932.55	1912.228	-979.678	-105.054
935.2	1923.228	-988.028	-105.649
917.3	1934.299	-1017	-110.869
903.15	1945.409	-1042.26	-115.403
919.35	1957.259	-1037.91	-112.896
956.65	1968.755	-1012.1	-105.797
944.2	1980.464	-1036.26	-109.75
939.6	1990.433	-1050.83	-111.838
956.35	1998.779	-1042.43	-109.001
966.4	2005.633	-1039.23	-107.537
948.75	2011.224	-1062.47	-111.987
929.7	2015.692	-1085.99	-116.811
909	2018.984	-1109.98	-122.11
889.75	2021.479	-1131.73	-127.196
859.05	2022.806	-1163.76	-135.47
880.65	2022.881	-1142.23	-129.703
889.5	2022.397	-1132.9	-127.363
896.85	2021.509	-1124.66	-125.401
900.7	2020.331	-1119.63	-124.307
898.1	2018.89	-1120.79	-124.796
898.1	2017.017	-1118.92	-124.587
852.55	2014.715	-1162.17	-136.316
839	2011.557	-1172.56	-139.756
847.3	2007.562	-1160.26	-136.936
865.5	2002.842	-1137.34	-131.409
859.35	1997.494	-1138.14	-132.442
837.75	1991.293	-1153.54	-137.695
845.35	1984.377	-1139.03	-134.74
880.45	1976.889	-1096.44	-124.532
895.4	1969.364	-1073.96	-119.942
895.4	1962.431	-1067.03	-119.168
877.6	1956.918	-1079.32	-122.985
882.1	1952.645	-1070.55	-121.363
851.3	1949.766	-1098.47	-129.034
859.35	1947.419	-1088.07	-126.615

852.4	1945.888	-1093.49	-128.283
854.15	1943.313	-1089.16	-127.514
885.9	1940.498	-1054.6	-119.043
876.5	1938.484	-1061.98	-121.162
888.95	1937.409	-1048.46	-117.944
852.2	1937.878	-1085.68	-127.397
849.4	1938.85	-1089.45	-128.261
853.45	1941.144	-1087.69	-127.447
850.75	1942.884	-1092.13	-128.373
852.4	1943.225	-1090.82	-127.971
854.2	1942.187	-1087.99	-127.369
860.5	1940.729	-1080.23	-125.535
853.15	1939.283	-1086.13	-127.309
841.3	1936.677	-1095.38	-130.2
852.6	1932.186	-1079.59	-126.623
863.45	1927.32	-1063.87	-123.212
855.95	1923.126	-1067.18	-124.677
848.75	1920.013	-1071.26	-126.217
849.95	1916.813	-1066.86	-125.521
850.8	1914.765	-1063.97	-125.055
844.8	1912.001	-1067.2	-126.326
849.05	1909.137	-1060.09	-124.856
864.6	1905.909	-1041.31	-120.438
865.15	1901.802	-1036.65	-119.823
884.5	1899.336	-1014.84	-114.736

TOTAL	-13214.7
AVG ERROR %	-114.911

2 Months (Trained) & 6 Months (Predicted)			
Close Price	Predictions	Error	Error %
800	787.1863	12.81366	1.601707
814.55	781.7152	32.83479	4.031034
815.4	779.4076	35.99241	4.41408
820.35	780.285	40.06503	4.883894
821.35	783.1052	38.24478	4.656331
842.4	788.5479	53.85215	6.392705
865	797.6736	67.32642	7.783401
886.25	809.3096	76.94037	8.681565

871.85	823.8456	48.00436	5.506034
865.05	839.0009	26.04915	3.011288
825.85	852.4954	-26.6454	-3.22642
820.75	861.3306	-40.5806	-4.94433
808.05	864.7413	-56.6913	-7.01581
811.25	862.9362	-51.6862	-6.37118
832.5	856.5374	-24.0374	-2.88737
849.35	850.4078	-1.05778	-0.12454
879.35	845.3597	33.99032	3.865391
869.8	843.6007	26.19929	3.012105
889.2	844.8976	44.30242	4.982278
903.65	849.036	54.61399	6.04371
907.15	856.5146	50.63535	5.581806
907.65	864.3892	43.26084	4.766247
901.75	872.766	28.98401	3.214196
887.4	879.6333	7.766699	0.87522
893.65	883.7344	9.915625	1.109565
932.55	885.4158	47.13417	5.054331
935.2	888.1111	47.08892	5.035171
917.3	891.8878	25.41224	2.770331
903.15	895.0713	8.078711	0.894504
919.35	895.4266	23.92343	2.602211
956.65	894.5726	62.07737	6.489037
944.2	894.0718	50.12822	5.309068
939.6	893.986	45.61398	4.854617
956.35	893.269	63.08096	6.596012
966.4	893.1705	73.22947	7.577553
948.75	894.4014	54.34863	5.728446
929.7	895.0746	34.62535	3.724358
909	894.1938	14.80615	1.62884
889.75	889.8215	-0.07147	-0.00803
859.05	882.7665	-23.7165	-2.76079
880.65	872.5007	8.149268	0.92537
889.5	861.8262	27.67383	3.111167
896.85	852.5737	44.27633	4.936871
900.7	845.6795	55.0205	6.108637
898.1	841.1668	56.93319	6.339293
898.1	839.1402	58.9598	6.564948
852.55	840.0393	12.51069	1.467444
839	839.3701	-0.37006	-0.04411
847.3	835.7147	11.58534	1.367324
865.5	830.5107	34.98932	4.042671
859.35	826.7776	32.57241	3.790355
837.75	825.3737	12.37634	1.477331
845.35	823.5152	21.8348	2.58293

880.45	821.9972	58.45281	6.63897
895.4	823.8467	71.55326	7.991206
895.4	829.6282	65.77183	7.345524
877.6	837.4729	40.1271	4.572368
882.1	844.9629	37.13711	4.210079
851.3	851.3149	-0.01494	-0.00176
859.35	854.3122	5.037805	0.586234
852.4	854.2438	-1.84377	-0.2163
854.15	853.1574	0.99259	0.116208
885.9	851.3229	34.57706	3.903044
876.5	851.1835	25.31647	2.888359
888.95	852.2374	36.71257	4.129881
852.2	854.6906	-2.49055	-0.29225
849.4	855.9717	-6.57174	-0.77369
853.45	854.0825	-0.63252	-0.07411
850.75	850.8787	-0.12866	-0.01512
852.4	847.5073	4.892737	0.573995
854.2	844.8089	9.391101	1.099403
860.5	842.292	18.20801	2.11598
853.15	839.967	13.18302	1.545217
841.3	838.4853	2.814709	0.334567
852.6	837.9525	14.64755	1.717986
863.45	838.2382	25.21184	2.919896
855.95	839.5426	16.4074	1.916864
848.75	840.6905	8.059509	0.949574
849.95	841.8627	8.087268	0.951499
850.8	841.6896	9.110425	1.070807
844.8	841.757	3.042981	0.360201
849.05	841.1956	7.854382	0.925079
864.6	840.6757	23.92428	2.767092
865.15	842.3	22.85001	2.641162
884.5	844.4734	40.02661	4.525338

TOTAL	225.4321
AVG ERROR %	2.652142

1 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Error %
869.6	799.7094	69.89065	8.037103
898.7	806.2001	92.49993	10.29264
910.4	815.1464	95.25358	10.46283
902.3	826.5225	75.77754	8.398264

898.3	839.9264	58.37361	6.498231
899.85	854.7092	45.14077	5.016477
898.85	869.9967	28.8533	3.210023
904.9	885.1594	19.74064	2.181527
914.05	899.6456	14.40443	1.575891
902.2	913.5029	-11.3029	-1.25281
892.3	925.9129	-33.6129	-3.767
895.05	936.3758	-41.3258	-4.61715
903.7	944.6533	-40.9533	-4.53173
888.05	950.9489	-62.8989	-7.08281
902.9	955.3063	-52.4063	-5.80422
933.45	957.9078	-24.4578	-2.62015
922.25	959.8543	-37.6043	-4.07745
915.8	961.3522	-45.5522	-4.97404
911.95	962.9745	-51.0245	-5.5951
903.2	964.331	-61.131	-6.76827
901.1	965.761	-64.661	-7.17578
885.25	966.9164	-81.6664	-9.22523
865.2	967.6123	-102.412	-11.8368
818.45	967.2227	-148.773	-18.1774
828.25	964.556	-136.306	-16.4571
809.8	959.5468	-149.747	-18.4918
795.25	952.1265	-156.877	-19.7267
800.3	942.321	-142.021	-17.746
799.8	930.7106	-130.911	-16.3679
821.1	917.9781	-96.8781	-11.7986
800	904.9738	-104.974	-13.1217
814.55	892.1451	-77.5951	-9.52613
815.4	880.3087	-64.9087	-7.96035
820.35	870.0283	-49.6783	-6.05574
821.35	861.4244	-40.0744	-4.87909
842.4	854.9587	-12.5587	-1.49082
865	851.1819	13.81812	1.59747
886.25	850.0402	36.20978	4.08573
871.85	851.8538	19.99624	2.293541
865.05	856.231	8.819043	1.019484
825.85	862.4278	-36.5778	-4.42911
820.75	869.124	-48.374	-5.89387
808.05	875.1309	-67.0809	-8.30157
811.25	879.5274	-68.2774	-8.41632
832.5	881.6669	-49.1669	-5.90593
849.35	882.4584	-33.1084	-3.89808
879.35	882.2657	-2.91575	-0.33158
869.8	882.0941	-12.2941	-1.41343
889.2	882.5258	6.674243	0.75059

903.65	884.0436	19.60642	2.169692
907.15	887.3001	19.84989	2.18816
907.65	891.9582	15.69181	1.728839
901.75	898.1866	3.563354	0.39516
887.4	905.4127	-18.0127	-2.02983
893.65	912.9464	-19.2964	-2.15927
932.55	920.3145	12.23549	1.312046
935.2	928.1138	7.086169	0.757717
917.3	936.4724	-19.1724	-2.09009
903.15	944.9561	-41.8061	-4.62892
919.35	952.584	-33.234	-3.61494
956.65	959.339	-2.68899	-0.28108
944.2	965.4918	-21.2918	-2.25501
939.6	971.3384	-31.7384	-3.37786
956.35	976.7156	-20.3656	-2.12952
966.4	981.9937	-15.5937	-1.61359
948.75	987.5877	-38.8377	-4.09357
929.7	993.1868	-63.4868	-6.82874
909	998.3929	-89.3929	-9.8342
889.75	1002.19	-112.44	-12.6372
859.05	1004.206	-145.156	-16.8973
880.65	1003.708	-123.058	-13.9736
889.5	1000.894	-111.394	-12.5232
896.85	996.2516	-99.4016	-11.0834
900.7	990.3812	-89.6812	-9.95683
898.1	983.8328	-85.7328	-9.54602
898.1	977.2478	-79.1478	-8.81281
852.55	971.3505	-118.8	-13.9347
839	965.3256	-126.326	-15.0567
847.3	958.5529	-111.253	-13.1303
865.5	951.0743	-85.5743	-9.88727
859.35	943.6756	-84.3256	-9.81272
837.75	936.9177	-99.1677	-11.8374
845.35	930.2276	-84.8776	-10.0405
880.45	923.787	-43.337	-4.92215
895.4	918.5768	-23.1768	-2.58843
895.4	915.201	-19.801	-2.21142
877.6	913.6003	-36.0003	-4.10213
882.1	913.3596	-31.2596	-3.54377
851.3	914.1671	-62.8671	-7.38484
859.35	915.1498	-55.7998	-6.49325
852.4	915.7847	-63.3847	-7.43602
854.15	916.2659	-62.1159	-7.27224
885.9	916.3817	-30.4817	-3.44076
876.5	916.6691	-40.1691	-4.58289

888.95	917.1926	-28.2426	-3.17708
852.2	918.1544	-65.9544	-7.73931
849.4	918.9893	-69.5893	-8.19276
853.45	918.8546	-65.4046	-7.66355
850.75	917.9434	-67.1934	-7.89814
852.4	916.4747	-64.0747	-7.51697
854.2	914.7026	-60.5026	-7.08295
860.5	912.5666	-52.0666	-6.05074
853.15	910.1486	-56.9986	-6.68096
841.3	907.8002	-66.5002	-7.90445
852.6	905.7361	-53.1361	-6.23224
863.45	903.9626	-40.5126	-4.69195
855.95	902.6	-46.65	-5.45008
848.75	901.4301	-52.6801	-6.20678
849.95	900.5242	-50.5742	-5.95025
850.8	899.4354	-48.6354	-5.71643
844.8	898.5237	-53.7237	-6.35934
849.05	897.535	-48.485	-5.7105
864.6	896.5897	-31.9897	-3.69994
865.15	896.342	-31.192	-3.60539
884.5	896.5139	-12.0139	-1.35827
898.25	897.6944	0.555603	0.061854
888.05	899.6905	-11.6405	-1.31079
859.05	902.6752	-43.6252	-5.0783
844.85	905.9961	-61.1461	-7.23751
839.9	908.8506	-68.9506	-8.20939
815.05	910.7725	-95.7225	-11.7444
835.35	911.0953	-75.7453	-9.0675
821.85	910.033	-88.183	-10.7298
846.25	907.4356	-61.1856	-7.2302
842.8	903.8747	-61.0747	-7.24664
847.8	900.0179	-52.2179	-6.15923
844.4	896.3336	-51.9336	-6.15035
841.9	892.877	-50.977	-6.05499
855.1	889.7495	-34.6495	-4.05209
857.35	887.3341	-29.9841	-3.4973
838.05	885.8001	-47.7501	-5.69776
833.15	884.7631	-51.6131	-6.19494
837.3	884.0333	-46.7333	-5.58143
839.05	883.6353	-44.5853	-5.31378
845.6	883.3661	-37.7661	-4.4662
842.3	883.5089	-41.2089	-4.89242
832.6	883.9758	-51.3758	-6.17052
820.05	884.2771	-64.2271	-7.8321
828.8	883.8359	-55.0359	-6.64044

820.9	882.7915	-61.8915	-7.53947
841.45	881.1675	-39.7175	-4.72012
836.65	879.1541	-42.5041	-5.08027
838.2	877.406	-39.206	-4.6774
837.85	875.762	-37.912	-4.52492
834.95	874.7113	-39.7613	-4.76212
848.45	873.9665	-25.5165	-3.00742
862.55	873.8041	-11.2541	-1.30474
868.3	874.4326	-6.13262	-0.70628
859.6	876.0289	-16.4289	-1.91123
865.5	878.5923	-13.0923	-1.51269
863.2	881.9064	-18.7064	-2.1671
864.25	885.4847	-21.2347	-2.45701
867.4	889.2365	-21.8365	-2.51747
863	893.1169	-30.1169	-3.4898
865.9	896.8807	-30.9807	-3.57786
862.95	900.4689	-37.5189	-4.34775
863.1	903.6301	-40.5301	-4.69588
880.35	906.1999	-25.8499	-2.93632
880.2	908.4082	-28.2082	-3.20475
857.05	910.6113	-53.5613	-6.2495
837.25	912.2928	-75.0428	-8.96301
841.95	913.2375	-71.2875	-8.46695
821.75	913.0826	-91.3326	-11.1144
830.4	911.5459	-81.1459	-9.7719
819.2	908.7537	-89.5537	-10.9319
812.85	904.7189	-91.8689	-11.3021
792.5	899.7321	-107.232	-13.5309
810.85	893.7295	-82.8795	-10.2213
775.8	887.1169	-111.317	-14.3487
771.1	879.5669	-108.467	-14.0665
763.25	871.2764	-108.026	-14.1535
760.7	862.2787	-101.579	-13.3533
770.05	852.8441	-82.7941	-10.7518
776.85	843.4785	-66.6285	-8.57675
776.6	834.6243	-58.0243	-7.47158
773.4	826.7241	-53.3241	-6.89477
767.7	819.9033	-52.2033	-6.79996
764.75	814.1886	-49.4386	-6.46467
785.75	809.6824	-23.9324	-3.0458
784.75	806.4379	-21.6879	-2.76367
788.65	804.2259	-15.5759	-1.97501
791.1	803.027	-11.927	-1.50765
779.85	803.0029	-23.1529	-2.96889
793.5	803.5753	-10.0753	-1.26973

800.85	804.9506	-4.10062	-0.51203
763.9	806.924	-43.024	-5.63215
766.6	808.8408	-42.2408	-5.51015
785.3	810.1736	-24.8736	-3.1674
754.5	811.3821	-56.8821	-7.53905
755.3	811.5578	-56.2578	-7.4484
752.55	810.811	-58.261	-7.74182
743.55	809.1013	-65.5513	-8.81599
729.1	806.4595	-77.3595	-10.6103
734.65	802.9254	-68.2754	-9.29359
724.75	798.6898	-73.9398	-10.2021
724.7	793.8112	-69.1112	-9.53652
739.1	788.472	-49.372	-6.68001
766.1	783.0972	-16.9972	-2.21866
776.85	778.4271	-1.57712	-0.20302
770.95	775.2581	-4.30806	-0.5588
788.55	773.5652	14.98475	1.900292
789.15	773.5937	15.55631	1.971274
792.4	775.2874	17.11265	2.159597
809.25	778.3426	30.90741	3.819266
803.95	782.945	21.00499	2.612724
808.85	788.7481	20.10189	2.485244
829.8	795.0297	34.77028	4.1902
830.2	802.1053	28.09471	3.38409
832	809.9788	22.02124	2.646784
834.1	817.9628	16.13723	1.934688
831.55	826.0566	5.493359	0.660617
864.3	833.9188	30.38124	3.515126
864.5	841.7729	22.72711	2.628931
867.8	849.5929	18.2071	2.098076
868.3	857.5245	10.77552	1.240991
870.7	865.2972	5.40282	0.620515
874.8	872.8488	1.951184	0.223043
870	880.2372	-10.2372	-1.17669
867.5	887.4061	-19.9061	-2.29465
854.5	893.998	-39.498	-4.62235
851.1	899.4413	-48.3413	-5.67987
864.15	903.7231	-39.5731	-4.57943
836.85	906.8537	-70.0037	-8.36514
801.35	908.5172	-107.167	-13.3733
809.15	908.1984	-99.0484	-12.241
783.1	905.6887	-122.589	-15.6543
781.35	900.867	-119.517	-15.2962
752.75	894.1066	-141.357	-18.7787
758.55	885.1699	-126.62	-16.6924

747.55	874.5223	-126.972	-16.9851
756.35	862.5994	-106.249	-14.0476
749.15	850.0767	-100.927	-13.4722
762.95	837.8938	-74.9438	-9.8229
743.95	826.4736	-82.5236	-11.0926
744.45	816.0468	-71.5968	-9.61741
733.6	806.7618	-73.1618	-9.97299
743.7	798.5886	-54.8886	-7.38047
745.3	791.6615	-46.3615	-6.22052

TOTAL	-1306.22
AVG ERROR %	-5.48834

2 Months (Trained) & 12 Months (Predicted)			
Close Price	Predictions	Error	Error %
800	782.0105	17.9895	2.248688
814.55	778.878	35.67201	4.379352
815.4	779.001	36.39902	4.463947
820.35	781.9982	38.35183	4.675057
821.35	786.7867	34.56326	4.208103
842.4	793.4076	48.99241	5.815813
865	802.9767	62.02332	7.170325
886.25	815.2326	71.0174	8.013246
871.85	830.637	41.21298	4.727072
865.05	845.9408	19.1092	2.209029
825.85	858.4604	-32.6104	-3.94871
820.75	864.2322	-43.4822	-5.29787
808.05	863.5836	-55.5336	-6.87254
811.25	857.6149	-46.3649	-5.71524
832.5	848.373	-15.873	-1.90666
849.35	840.7761	8.573877	1.009463
879.35	836.2692	43.08077	4.899161
869.8	837.0838	32.7162	3.761347
889.2	841.4614	47.73864	5.368717
903.65	848.9409	54.70914	6.05424
907.15	859.4066	47.74338	5.263009
907.65	870.0391	37.61094	4.143771
901.75	879.9985	21.75146	2.412139
887.4	887.2062	0.193823	0.021842
893.65	890.1758	3.474158	0.38876
932.55	890.2108	42.33925	4.540158
935.2	892.3263	42.87371	4.584442

917.3	896.3182	20.98176	2.287339
903.15	899.2576	3.892371	0.430977
919.35	898.7198	20.63021	2.244
956.65	897.2156	59.43442	6.212766
944.2	898.1896	46.01042	4.872953
939.6	900.0425	39.55752	4.210038
956.35	901.0603	55.2897	5.781325
966.4	902.7751	63.62491	6.583704
948.75	905.8253	42.92474	4.524347
929.7	907.3029	22.39708	2.409066
909	905.4995	3.500488	0.385092
889.75	898.9487	-9.19867	-1.03385
859.05	888.6442	-29.5942	-3.44499
880.65	874.331	6.319006	0.717539
889.5	860.8676	28.63239	3.21893
896.85	850.676	46.17404	5.148468
900.7	844.595	56.10497	6.229041
898.1	842.1885	55.91152	6.225534
898.1	842.5543	55.54574	6.184806
852.55	845.2585	7.291516	0.85526
839	844.6078	-5.60785	-0.6684
847.3	839.6842	7.615796	0.898831
865.5	833.1411	32.35895	3.738758
859.35	828.7357	30.61434	3.5625
837.75	826.9122	10.83783	1.293683
845.35	824.682	20.66799	2.444904
880.45	822.9586	57.49144	6.529779
895.4	825.3951	70.00492	7.818285
895.4	832.5806	62.81937	7.015789
877.6	842.2185	35.38149	4.03162
882.1	850.7281	31.37185	3.556496
851.3	857.3656	-6.0656	-0.71251
859.35	859.2189	0.131067	0.015252
852.4	857.7083	-5.30831	-0.62275
854.15	854.6896	-0.53958	-0.06317
885.9	851.1165	34.78354	3.926351
876.5	850.5101	25.98993	2.965194
888.95	851.7529	37.19707	4.184383
852.2	855.0057	-2.80574	-0.32923
849.4	856.1465	-6.74648	-0.79426
853.45	853.9066	-0.45656	-0.0535
850.75	850.314	0.435974	0.051246
852.4	846.4907	5.909277	0.693252
854.2	843.3754	10.82463	1.267225
860.5	840.8882	19.61176	2.279112

853.15	839.3228	13.82725	1.620729
841.3	838.5495	2.7505	0.326935
852.6	837.9146	14.68545	1.722431
863.45	837.949	25.50103	2.953388
855.95	839.3563	16.59368	1.938627
848.75	840.8355	7.91449	0.932488
849.95	841.9471	8.002917	0.941575
850.8	841.8996	8.900403	1.046122
844.8	841.872	2.927991	0.34659
849.05	841.1299	7.920056	0.932814
864.6	840.4479	24.15212	2.793445
865.15	841.9672	23.18278	2.679625
884.5	844.4668	40.0332	4.526083
898.25	849.5272	48.72284	5.424196
888.05	856.205	31.84498	3.585945
859.05	862.9981	-3.94811	-0.45959
844.85	866.2991	-21.4491	-2.5388
839.9	864.9476	-25.0476	-2.98221
815.05	860.0975	-45.0475	-5.52697
835.35	851.4595	-16.1095	-1.92847
821.85	842.8317	-20.9817	-2.55299
846.25	834.1978	12.05219	1.424187
842.8	828.2184	14.58156	1.730132
847.8	825.2574	22.54261	2.658954
844.4	825.1352	19.26481	2.281479
841.9	826.3627	15.53733	1.845508
855.1	828.0287	27.07131	3.165865
857.35	830.9534	26.39657	3.078856
838.05	834.8345	3.215466	0.383684
833.15	837.2804	-4.1304	-0.49576
837.3	837.9647	-0.66472	-0.07939
839.05	837.9102	1.139844	0.135849
845.6	837.4306	8.169397	0.966107
842.3	837.8722	4.427808	0.525681
832.6	838.8687	-6.26871	-0.75291
820.05	838.9531	-18.9031	-2.30511
828.8	836.795	-7.99498	-0.96465
820.9	834.0239	-13.1239	-1.59872
841.45	830.7973	10.6527	1.265993
836.65	828.6696	7.980444	0.953857
838.2	828.426	9.773975	1.166067
837.85	828.9037	8.946313	1.06777
834.95	830.5959	4.354114	0.521482
848.45	832.1435	16.30651	1.921917
862.55	834.6442	27.90583	3.235272

868.3	838.7645	29.53547	3.401529
859.6	844.3255	15.2745	1.776931
865.5	849.9573	15.54266	1.795802
863.2	855.0947	8.105273	0.93898
864.25	858.6403	5.609741	0.649088
867.4	860.9492	6.450781	0.743692
863	862.5699	0.430115	0.049839
865.9	863.1344	2.765601	0.31939
862.95	863.1811	-0.23109	-0.02678
863.1	862.4208	0.679224	0.078696
880.35	860.9615	19.38845	2.202357
880.2	860.4899	19.71007	2.239272
857.05	861.2631	-4.21306	-0.49158
837.25	860.3223	-23.0723	-2.75572
841.95	856.7165	-14.7665	-1.75384
821.75	851.2994	-29.5494	-3.59592
830.4	843.7729	-13.3729	-1.61042
819.2	836.1059	-16.9059	-2.06371
812.85	828.3672	-15.5172	-1.90899
792.5	821.1434	-28.6434	-3.61431
810.85	813.4717	-2.62168	-0.32332
775.8	807.2625	-31.4625	-4.05548
771.1	800.1694	-29.0694	-3.76987
763.25	792.6769	-29.4269	-3.85548
760.7	784.8398	-24.1398	-3.17336
770.05	777.3895	-7.33953	-0.95312
776.85	771.7	5.149988	0.662932
776.6	768.452	8.147974	1.049185
773.4	767.8048	5.59519	0.723454
767.7	768.9481	-1.24812	-0.16258
764.75	771.0387	-6.2887	-0.82232
785.75	773.8995	11.85052	1.50818
784.75	778.153	6.597046	0.840656
788.65	782.9655	5.684546	0.720795
791.1	788.2497	2.850305	0.360296
779.85	794.353	-14.503	-1.85972
793.5	799.1714	-5.67139	-0.71473
800.85	804.1173	-3.26731	-0.40798
763.9	809.0244	-45.1244	-5.90711
766.6	811.1655	-44.5655	-5.81339
785.3	810.3098	-25.0098	-3.18475
754.5	809.5996	-55.0996	-7.3028
755.3	806.0578	-50.7578	-6.72022
752.55	801.0778	-48.5278	-6.44845
743.55	795.1432	-51.5932	-6.93877

729.1	788.5182	-59.4182	-8.14953
734.65	781.201	-46.551	-6.33649
724.75	774.0442	-49.2942	-6.80154
724.7	766.9167	-42.2167	-5.8254
739.1	760.1768	-21.0768	-2.85169
766.1	755.0158	11.08419	1.446834
776.85	753.4412	23.40884	3.013302
770.95	756.7924	14.15764	1.836389
788.55	763.0854	25.46455	3.229288
789.15	772.2264	16.92356	2.14453
792.4	782.9842	9.415808	1.188265
809.25	793.8103	15.4397	1.907902
803.95	805.5664	-1.61641	-0.20106
808.85	816.7217	-7.87168	-0.97319
829.8	825.5067	4.293286	0.517388
830.2	834.2632	-4.06324	-0.48943
832	842.9435	-10.9435	-1.31533
834.1	849.6739	-15.5739	-1.86715
831.55	855.0479	-23.4979	-2.8258
864.3	858.4892	5.810803	0.672313
864.5	862.4965	2.00354	0.231757
867.8	866.6241	1.175916	0.135505
868.3	870.8577	-2.55767	-0.29456
870.7	874.0823	-3.38228	-0.38845
874.8	876.2697	-1.46971	-0.16801
870	877.8595	-7.8595	-0.90339
867.5	878.5317	-11.0317	-1.27167
854.5	877.7329	-23.2329	-2.71889
851.1	874.3286	-23.2286	-2.72925
864.15	869.387	-5.23696	-0.60602
836.85	864.5997	-27.7497	-3.31597
801.35	858.2335	-56.8835	-7.09846
809.15	848.4087	-39.2587	-4.85184
783.1	836.9185	-53.8185	-6.87249
781.35	823.7143	-42.3643	-5.42194
752.75	810.6143	-57.8643	-7.68705
758.55	796.447	-37.897	-4.99598
747.55	782.8973	-35.3473	-4.72842
756.35	770.3976	-14.0476	-1.85729
749.15	760.119	-10.969	-1.4642
762.95	753.0381	9.911914	1.299156
743.95	749.1227	-5.17274	-0.69531
744.45	747.1945	-2.74452	-0.36866
733.6	746.6615	-13.0615	-1.78047
743.7	746.6594	-2.95942	-0.39793

745.3	747.6512	-2.35118	-0.31547
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TOTAL	216.4447
AVG ERROR %	1.882128

Medicine Sector:

This Below table 1. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 1 Month training data.

Sector	Company	1 Months (Trained) & 3 Months (Predicted)		1 Months (Trained) & 6Months (Predicted)		1 Months (Trained) & 12 Months (Predicted)	
MEDICINE	LUPIN	Total Error	Avg Error %	Total Error	Avg Error%	Total Error	Avg Error%
		6151.14	109.842	13214.7	114.911	1306.22	5.48834

Table 1.

This Below table 2. is the Predicted Calculation for 3 Months, 6 Months, 12 Months with respect to 2 Month training data.

Sector	Company	2 Months (Trained) & 3 Months (Predicted)		2 Months (Trained) & 6Months (Predicted)		2 Months (Trained) & 12 Months (Predicted)	
MEDICINE	LUPIN	Total Error	Avg Error %	Total Error	Avg Error %	Total Error	Avg Error %
		65.34236	2.513168	225.4321	2.652142	216.4447	1.882128

Table 2.

If we compare both table 1 and table 2, we can easily identify that error value of predicted result in table 2 is much less than table 1.

In table 2 when we compared between different time intervals, we can say that the

2 Months (Trained) & 12 Months (Predicted) gives us less error (0.18083494%) than other two data set. So, for Lupin sector if we trained 2 months data and we can best predict the future closed Price.

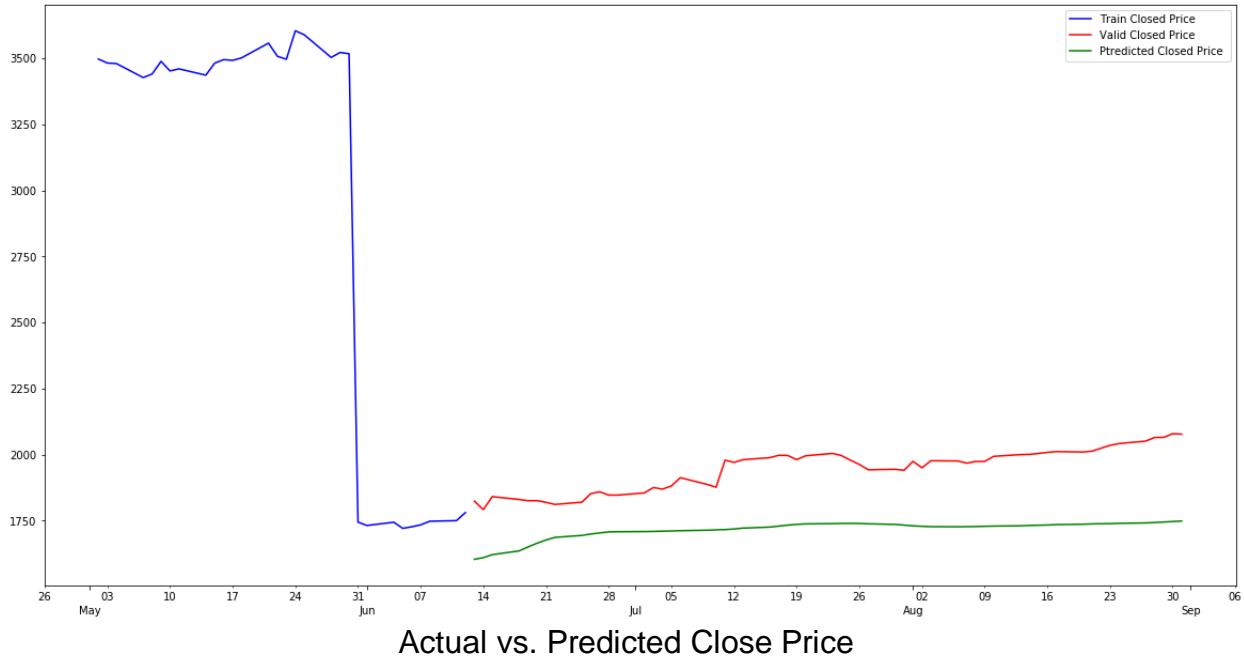
5.2 Result Analysis

From the above analysis, we found that for the IT sector, 3 months' time span the predicted CNGR is best in our framework. But the percentage of error is more. On the other hand, for 12 months' time span percentage of error is less. So, it is clear that best-predicted growth is obtained in this time span. Thus, we conclude that for the IT sector this framework gives better result in 12 months' time span. Similarly, we found that for Bank, FMCG, Medicine sectors 12 months' time span gives better result in terms of prediction of future growth. Then this analysis comes up with the solution that LSTM is giving a better result for this in 12 months' time span for these companies based on the data set provided by BSE (Bombay Stock Exchange).

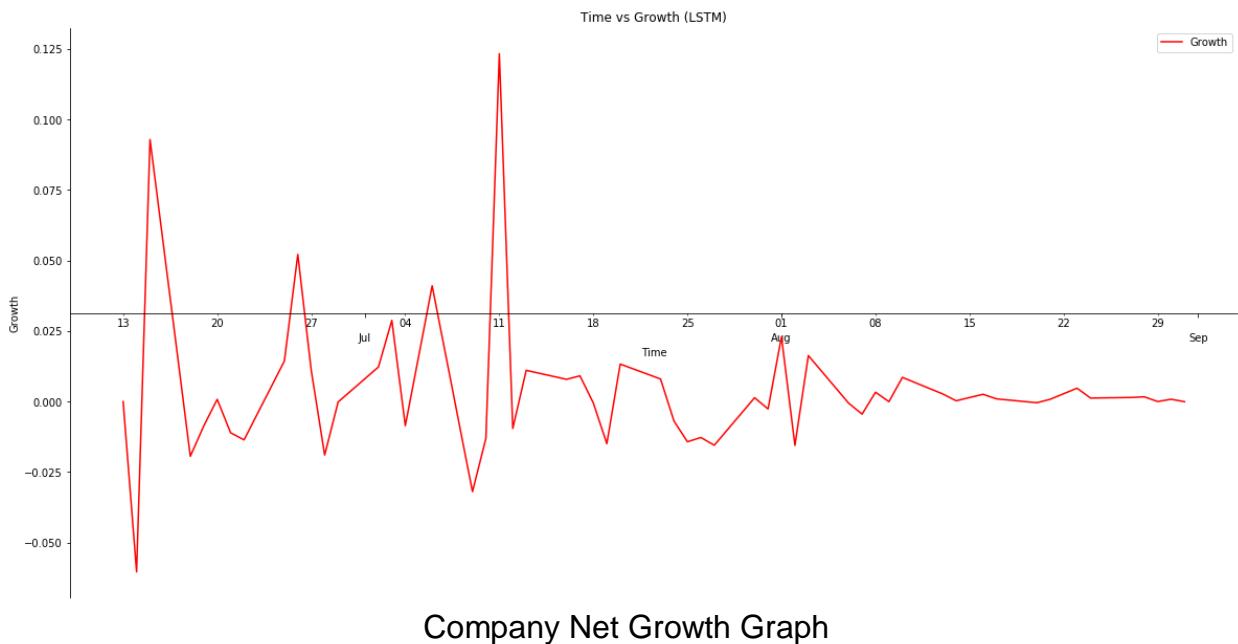
Chapter 6: Graphical Result Analysis

6.1 Graphical Analysis of IT Companies

3 Months' Time Span (TCS)

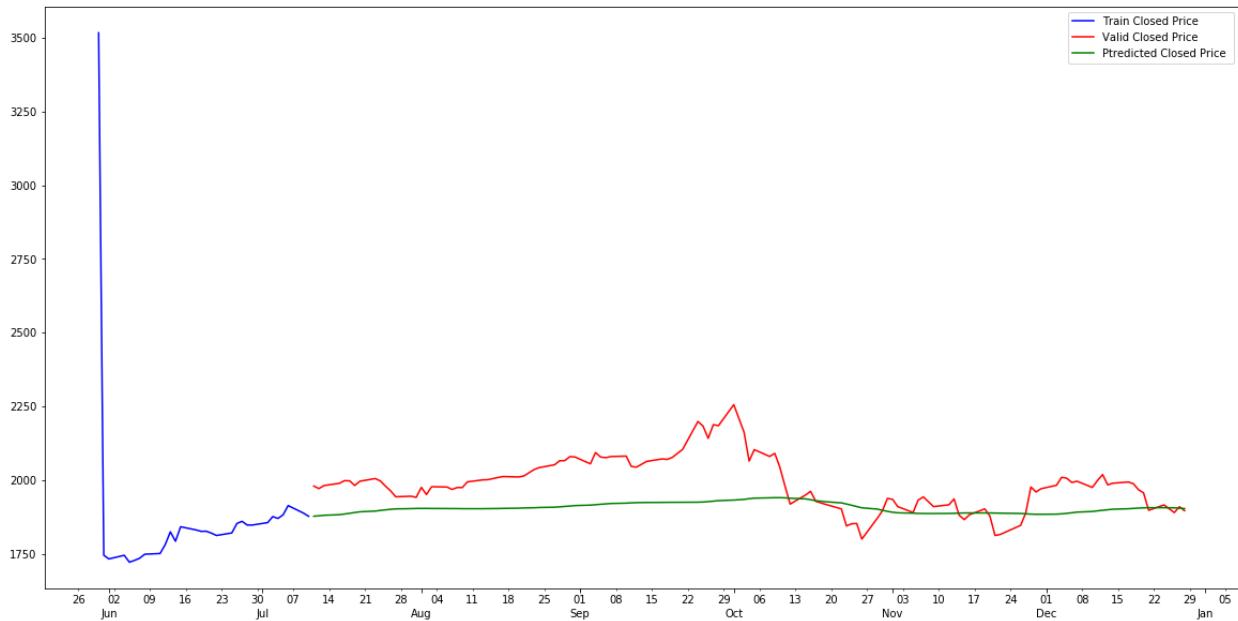


Actual vs. Predicted Close Price

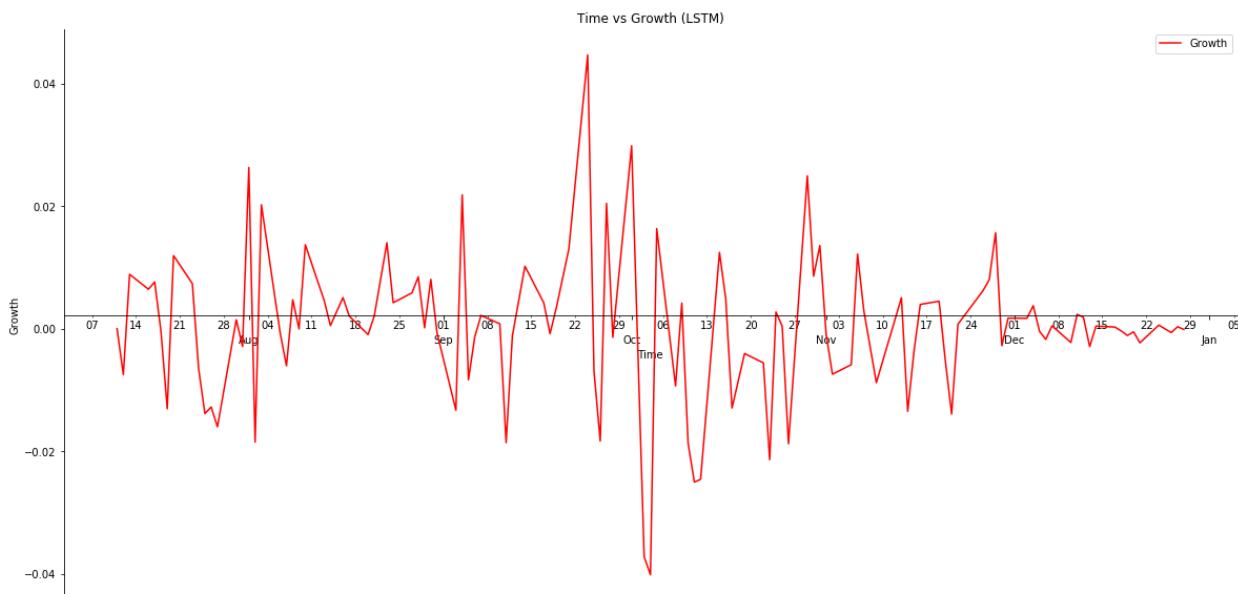


Company Net Growth Graph

6 Months' Time Span (TCS)

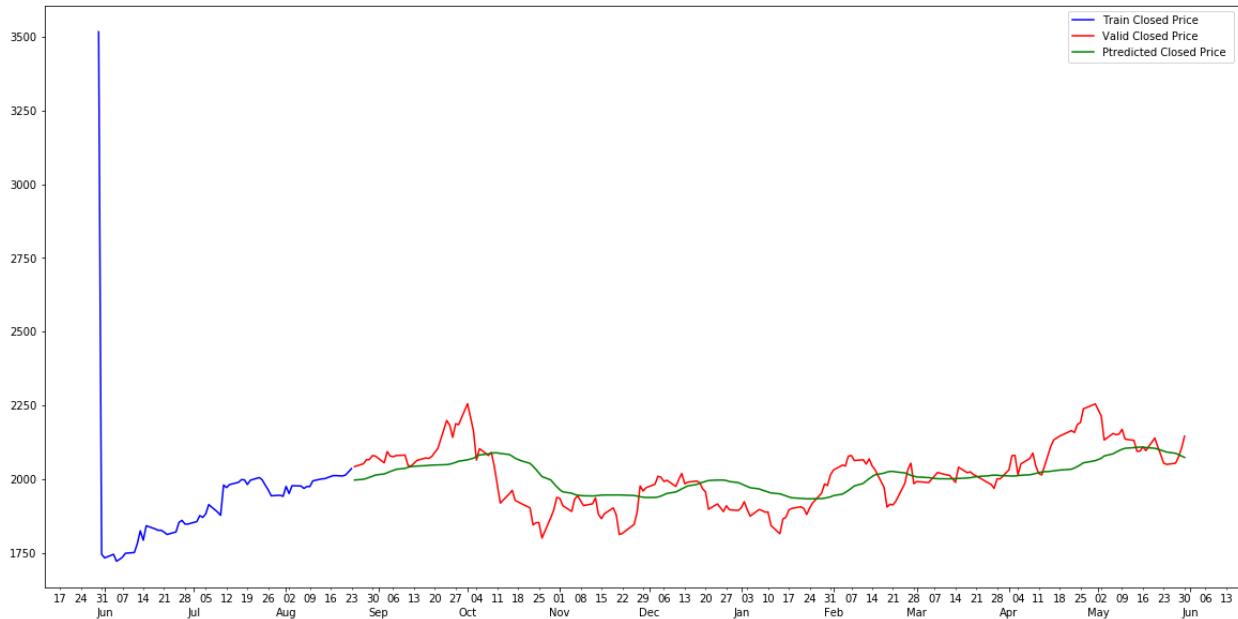


Actual vs. Predicted Close Price

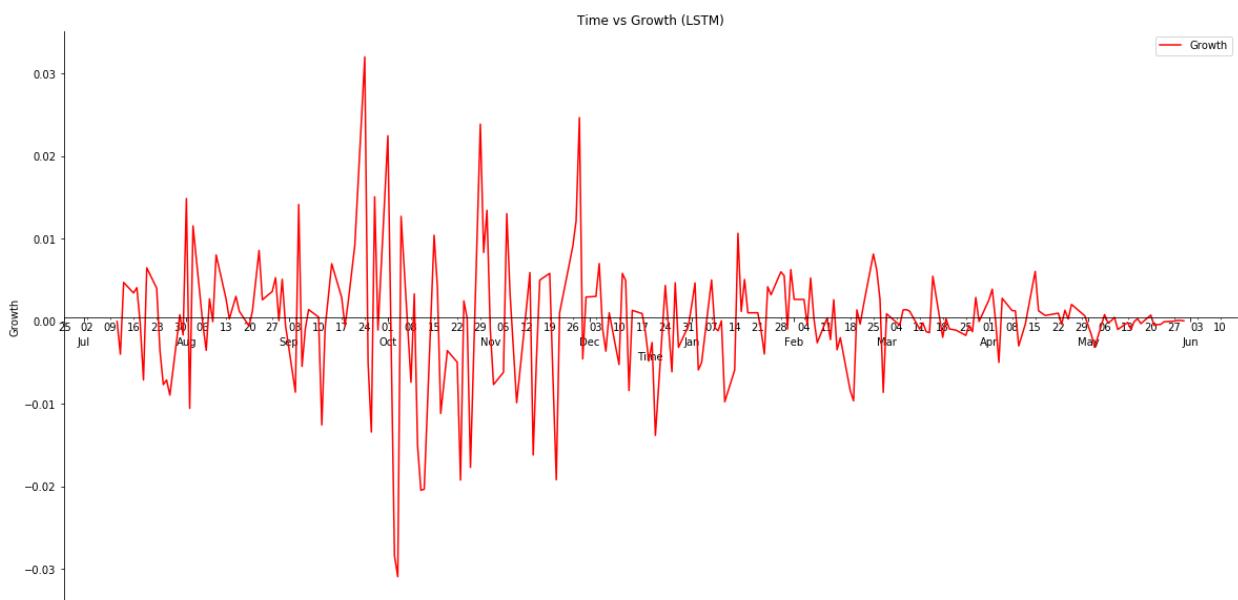


Company Net Growth Graph

12 Months' Time Span (TCS)

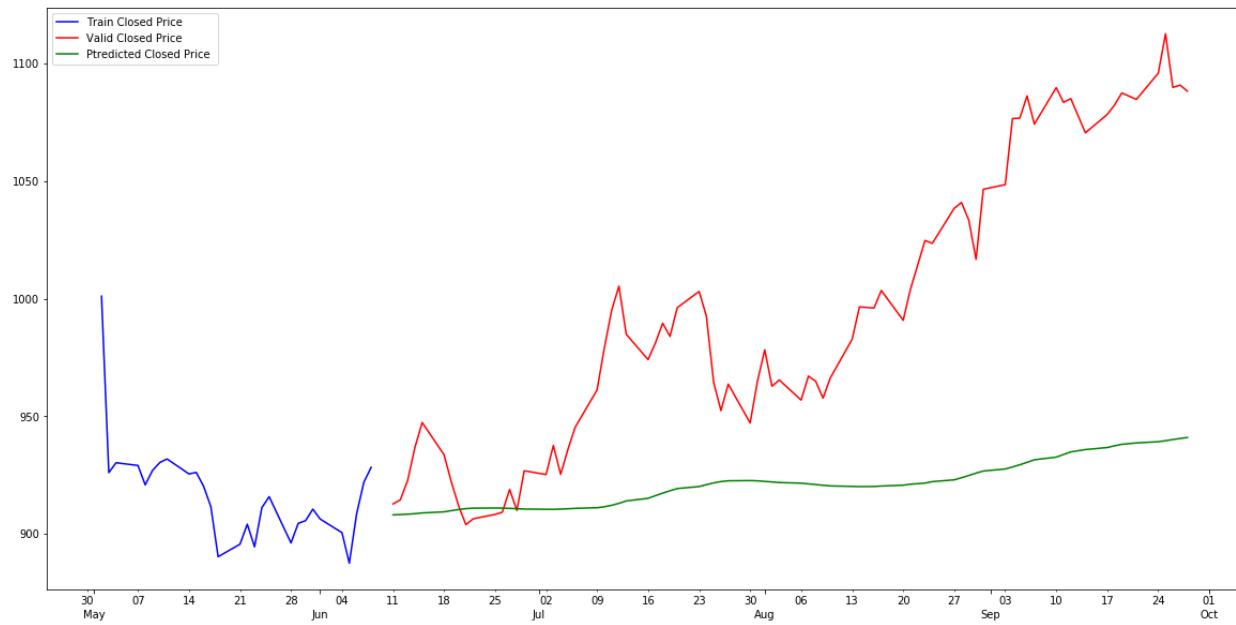


Actual vs. Predicted Close Price

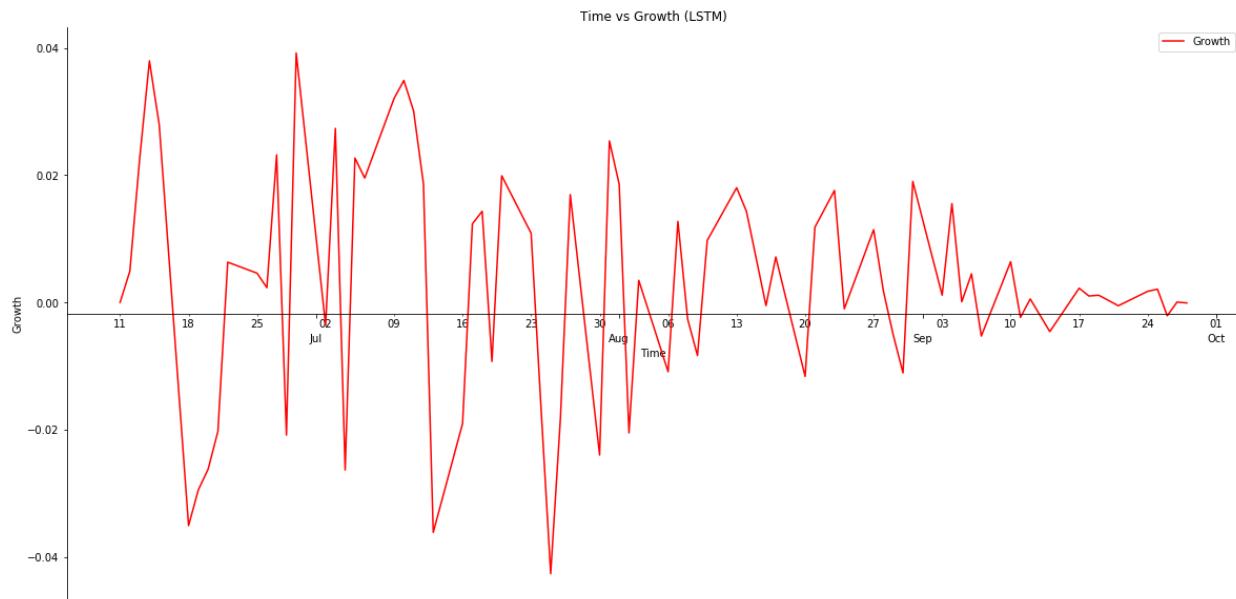


Company Net Growth Graph

3 Months' Time Span (HCL)

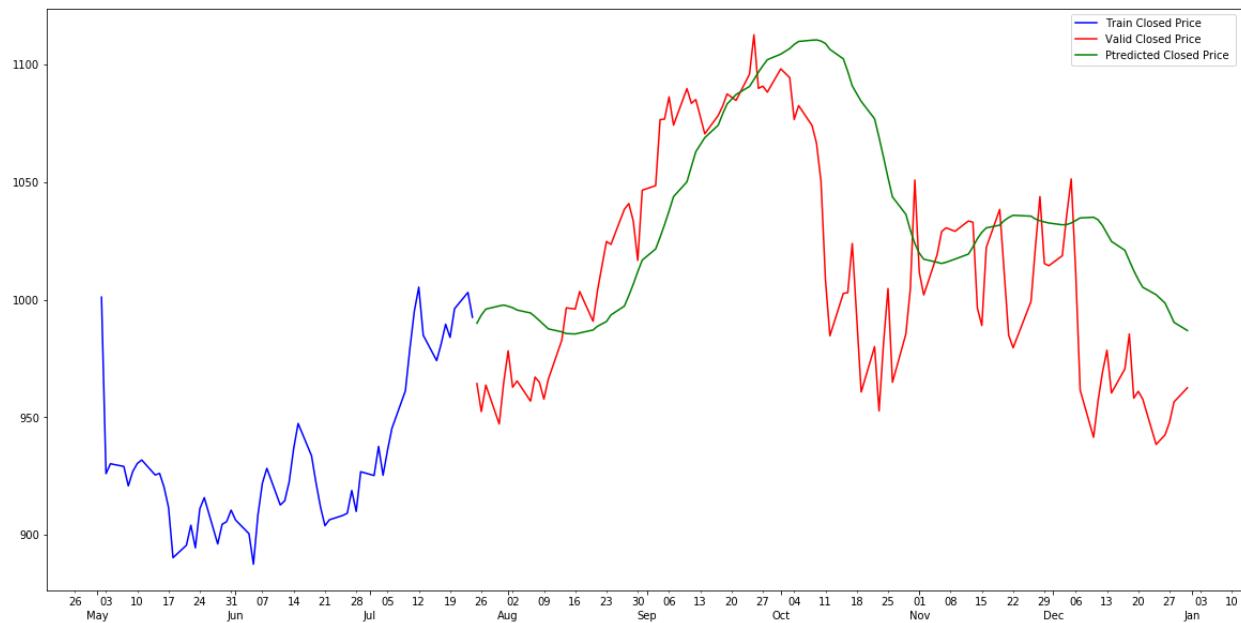


Actual vs. Predicted Close Price

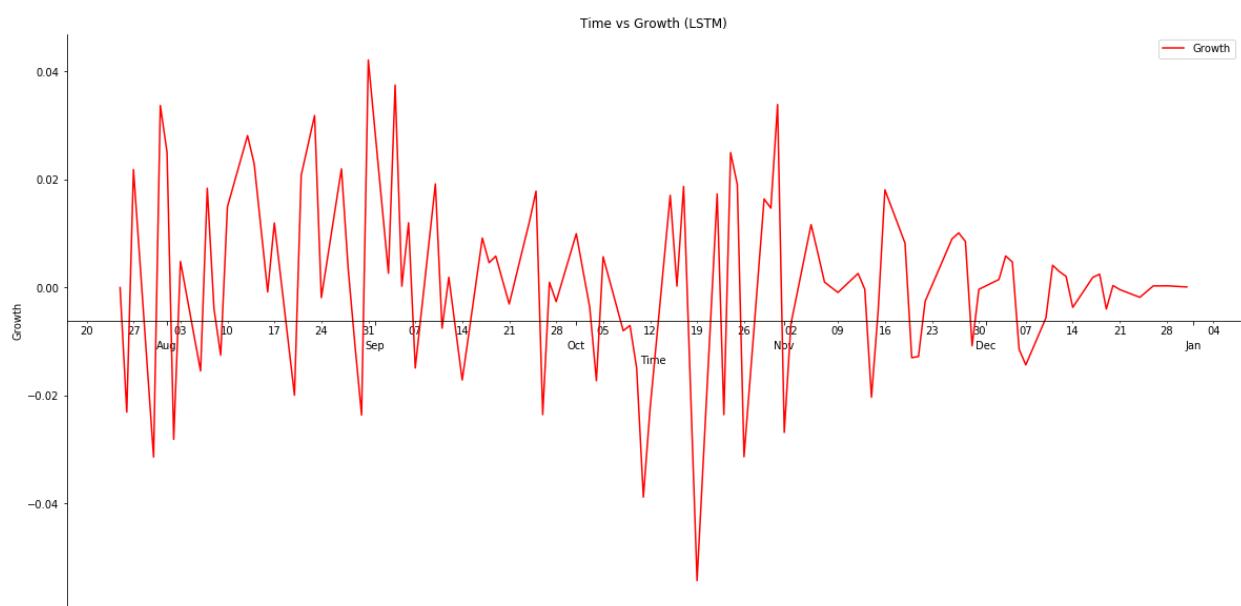


Company Net Growth Graph

6 Months' Time Span (HCL)

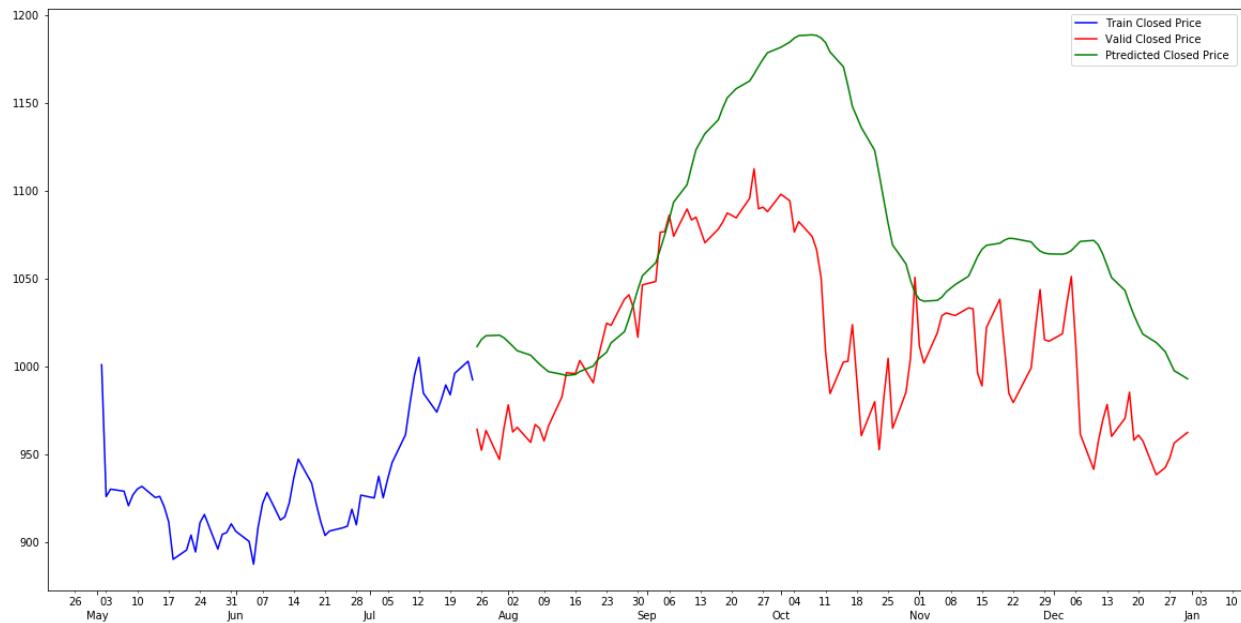


Actual vs. Predicted Close Price

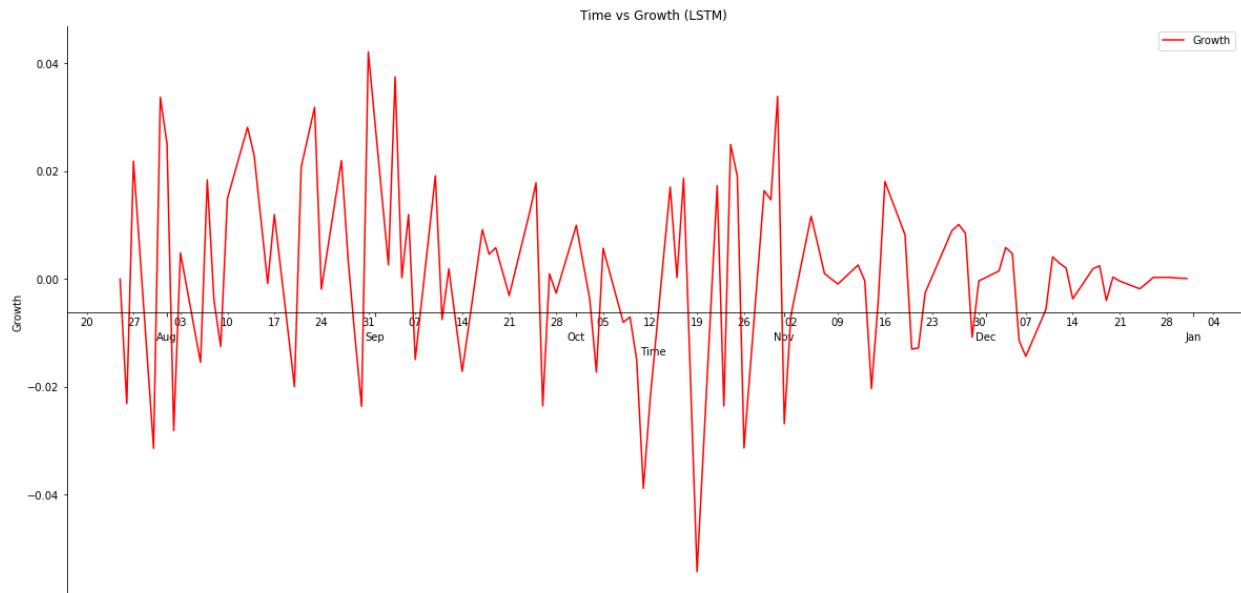


Company Net Growth Graph

12 Months' Time Span (HCL)

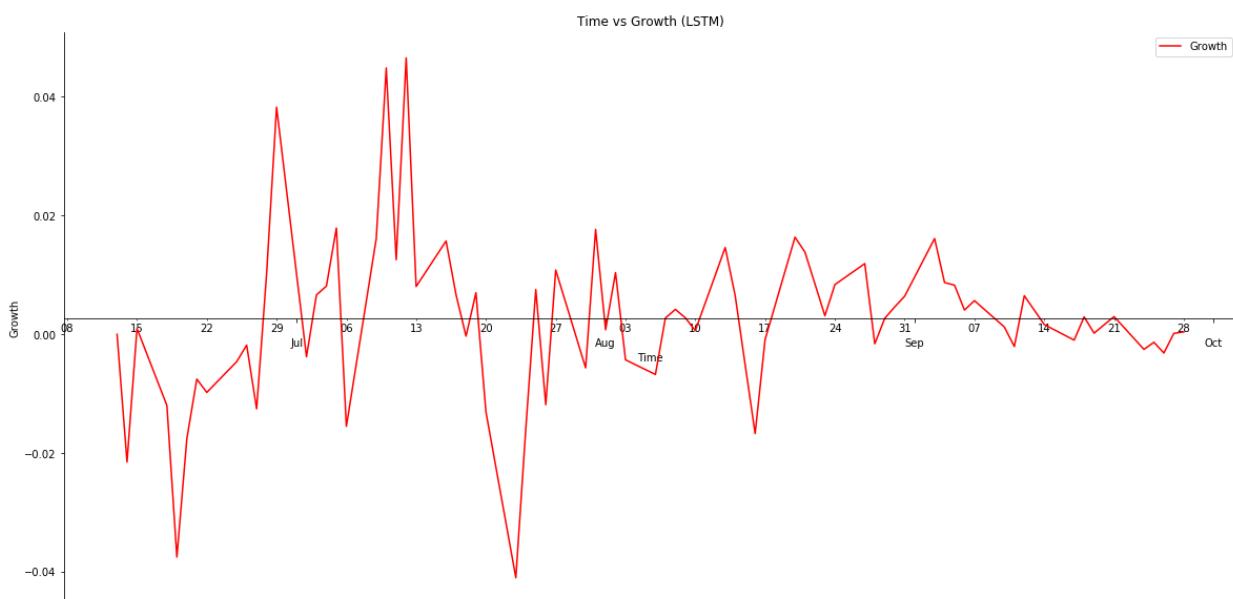
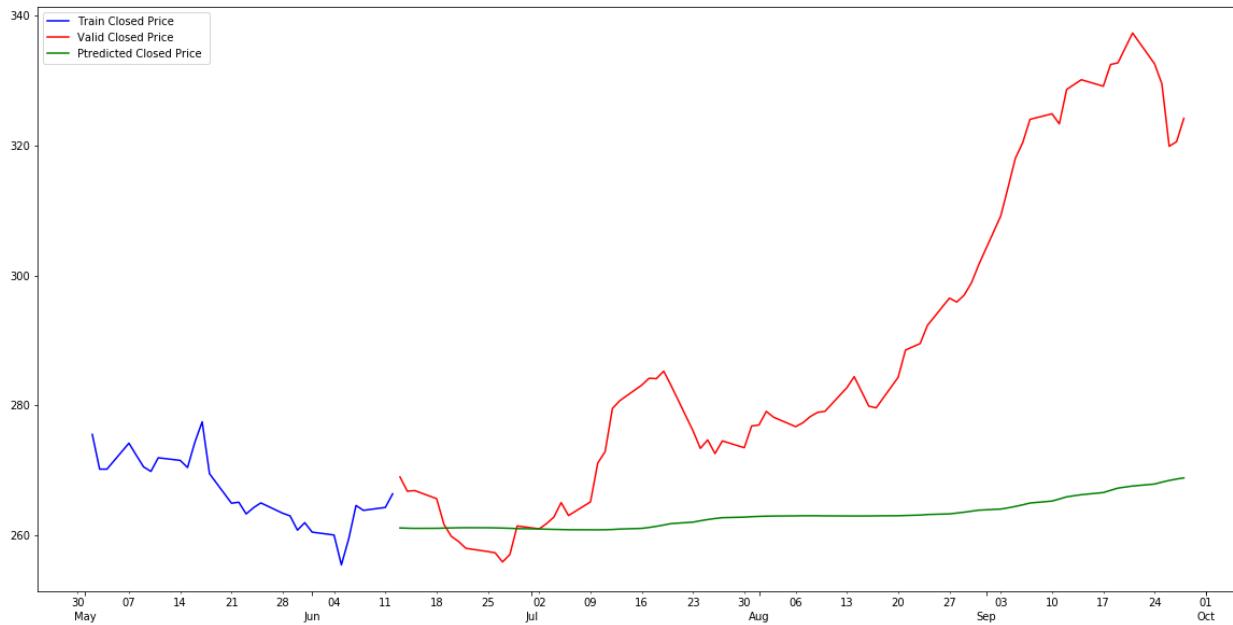


Actual vs. Predicted Close Price

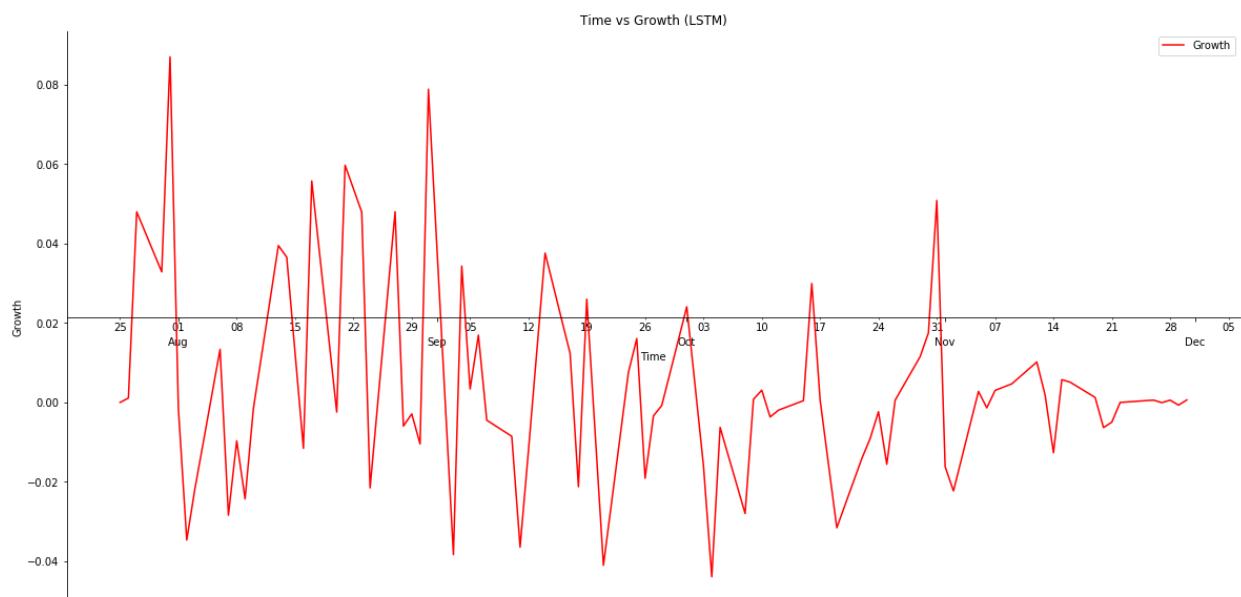
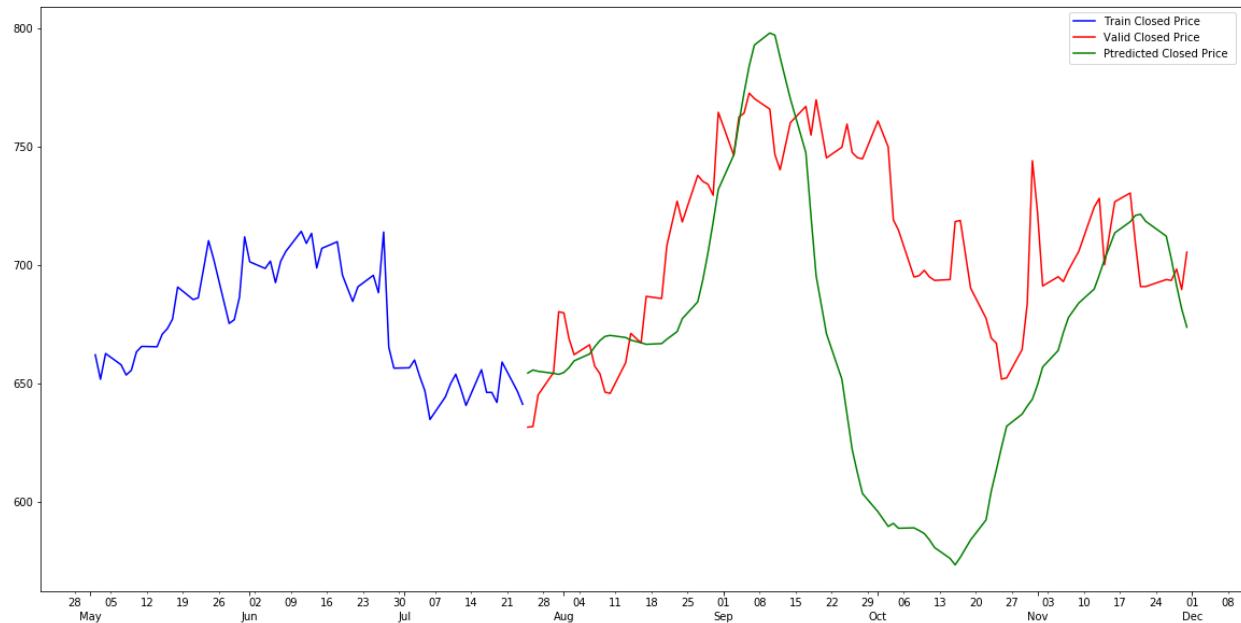


Company Net Growth Graph

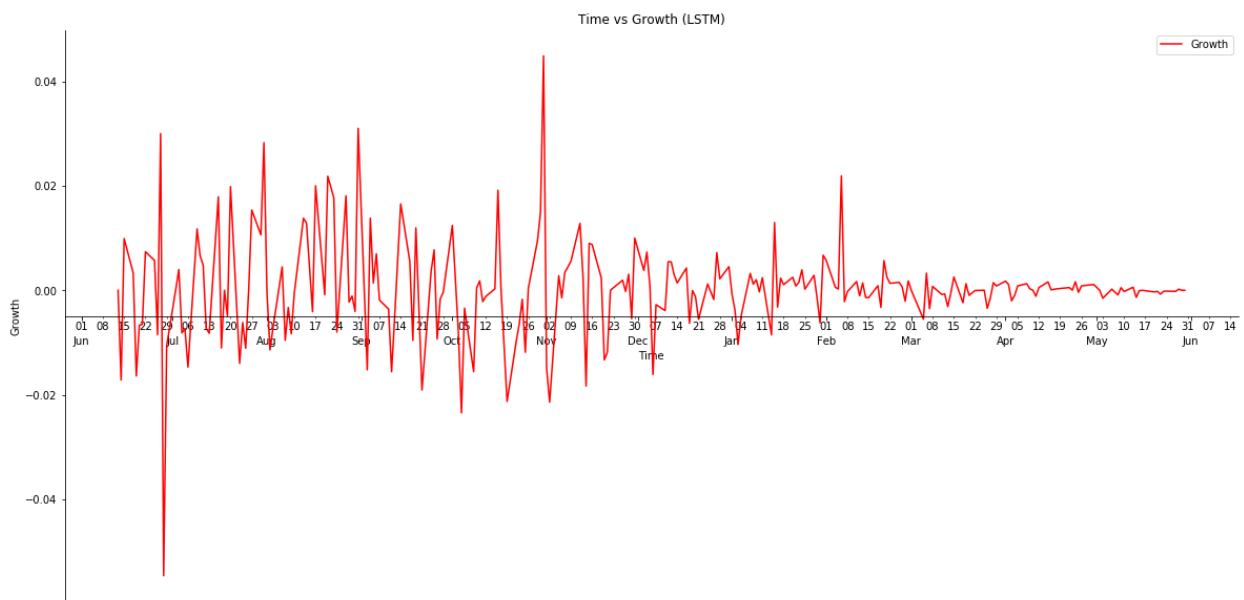
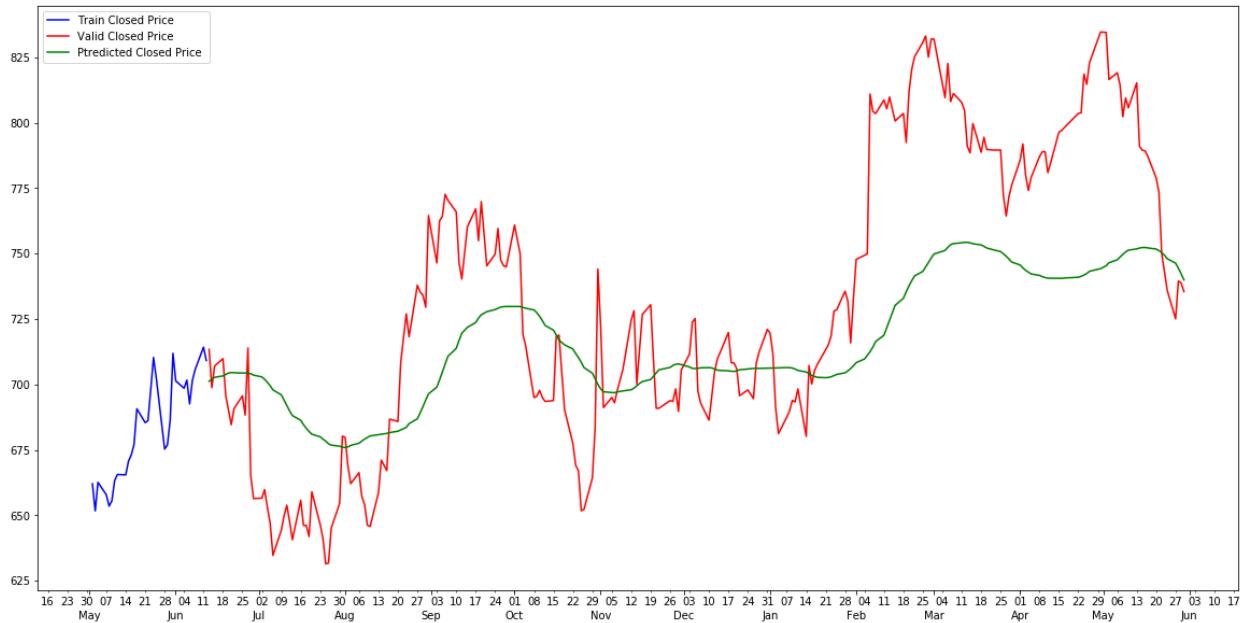
3 Months' Time Span (Tech Mahindra)



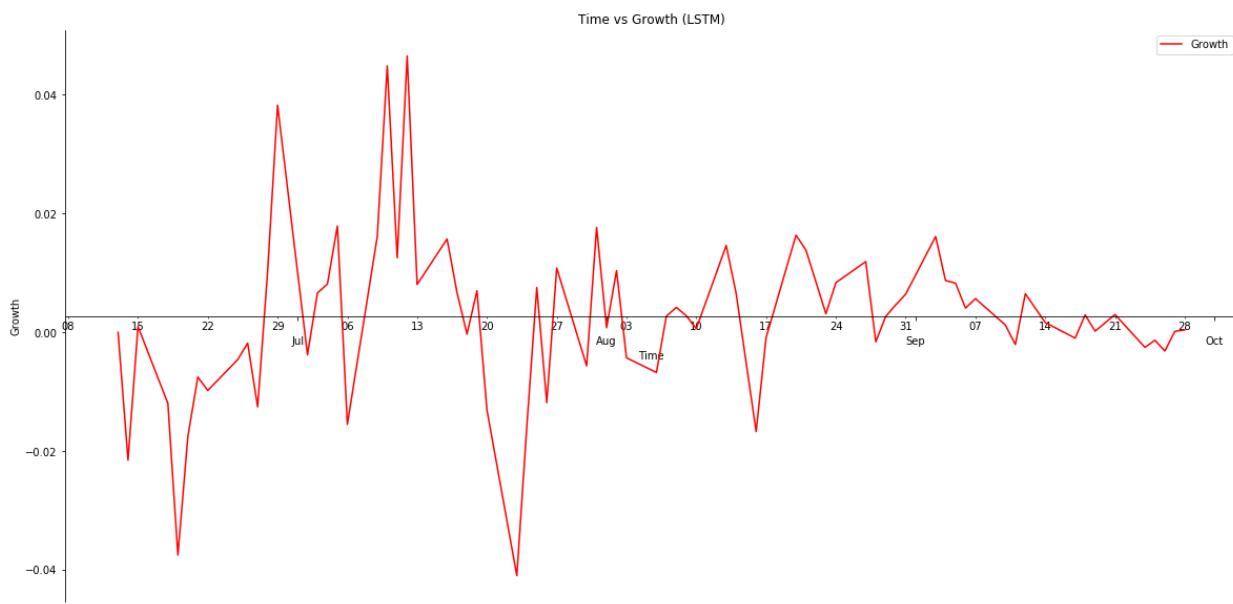
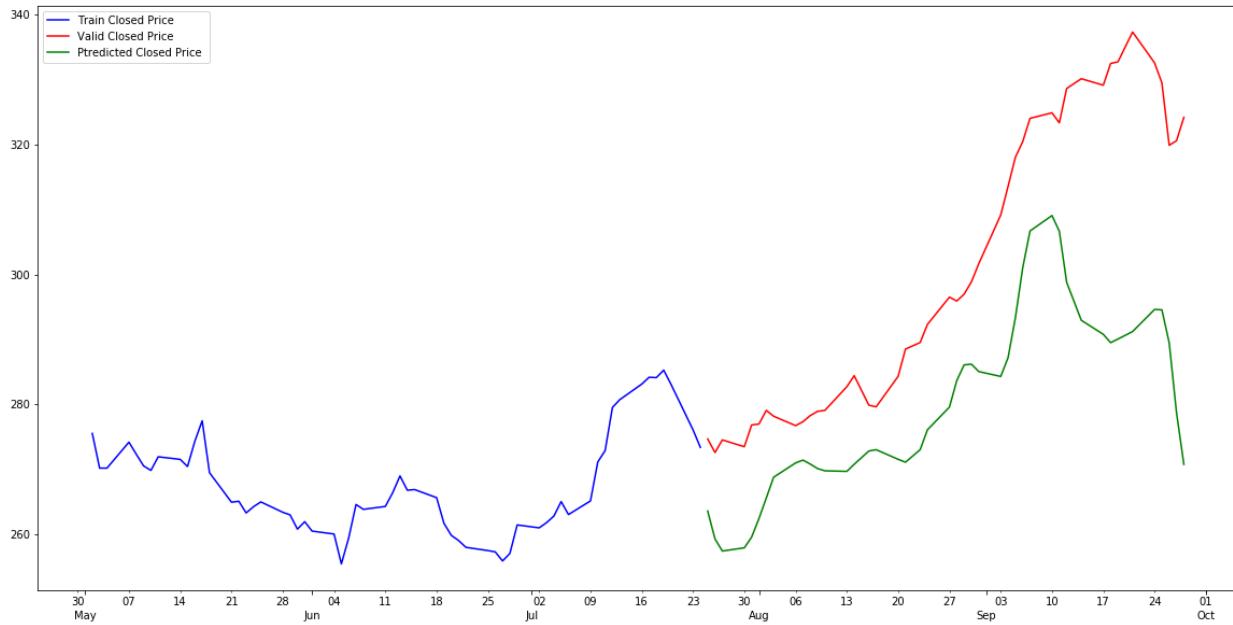
6 Months' Time Span (Tech Mahindra)



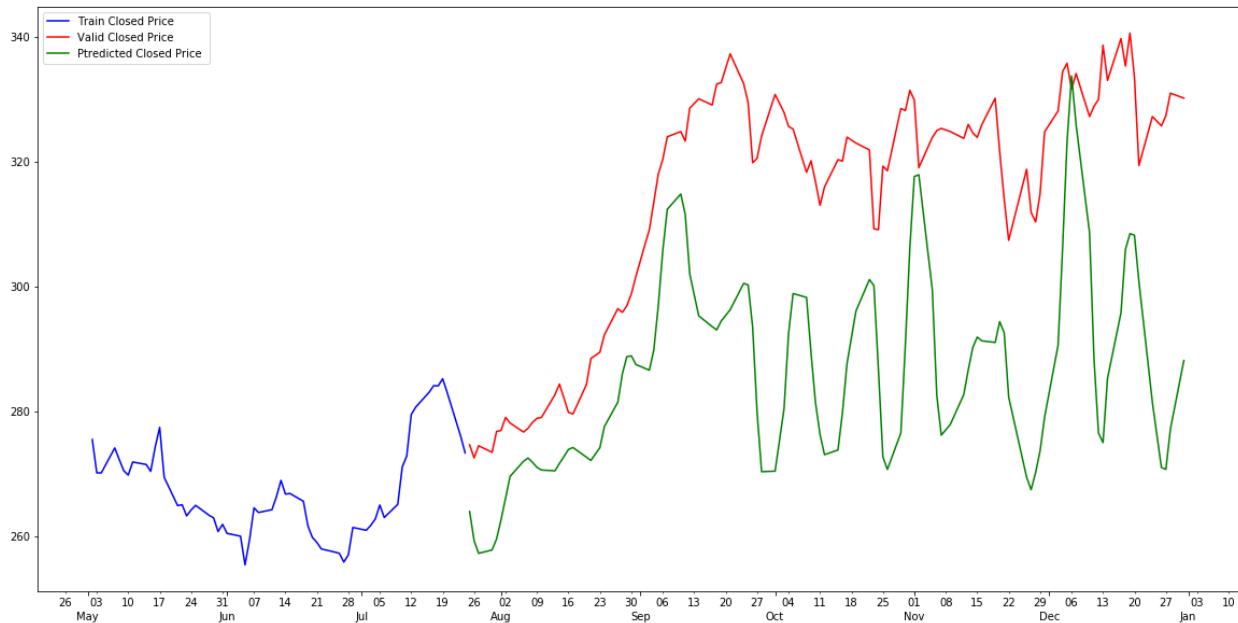
12 Months' Time Span (Tech Mahindra)



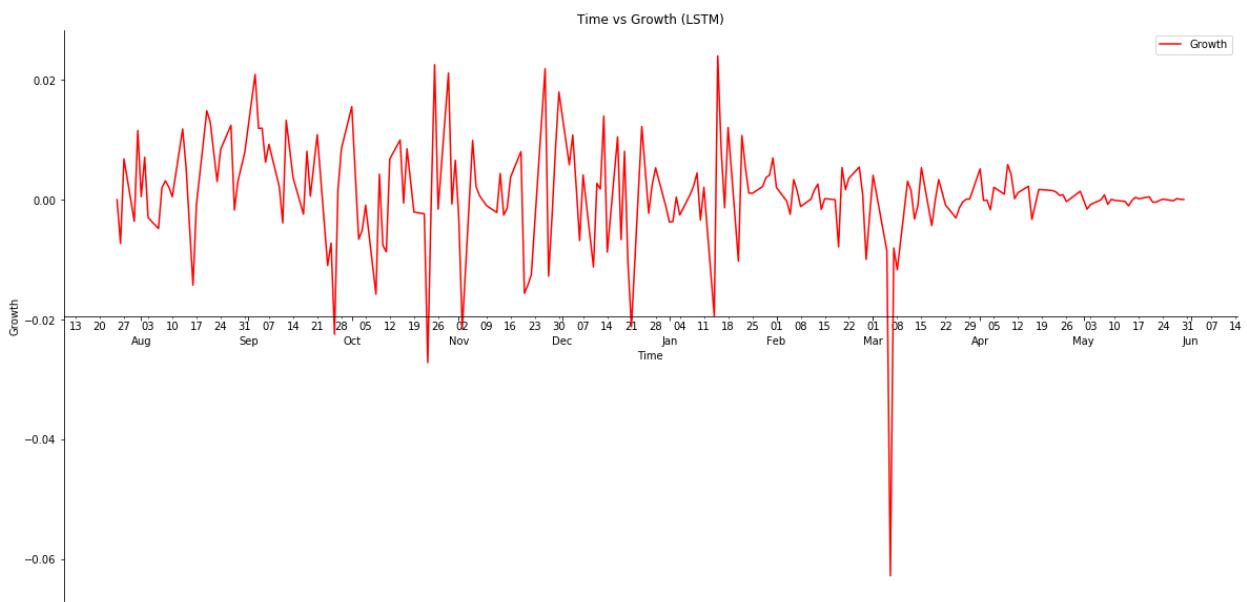
3 Months' Time Span (Wipro)



6 Months' Time Span (Wipro)

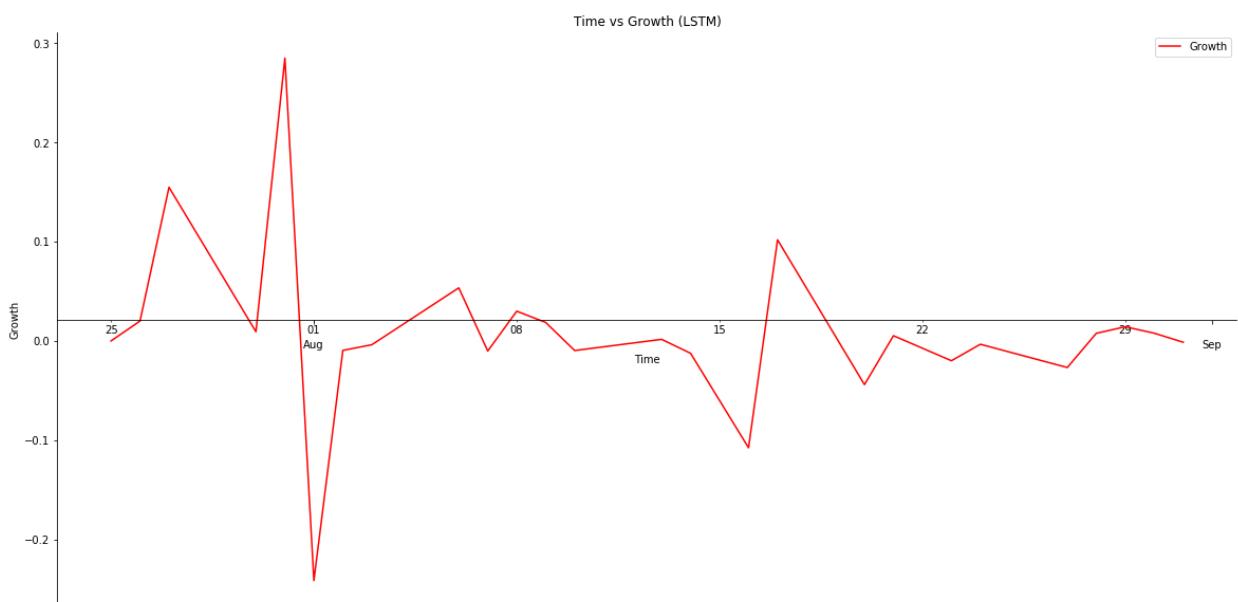
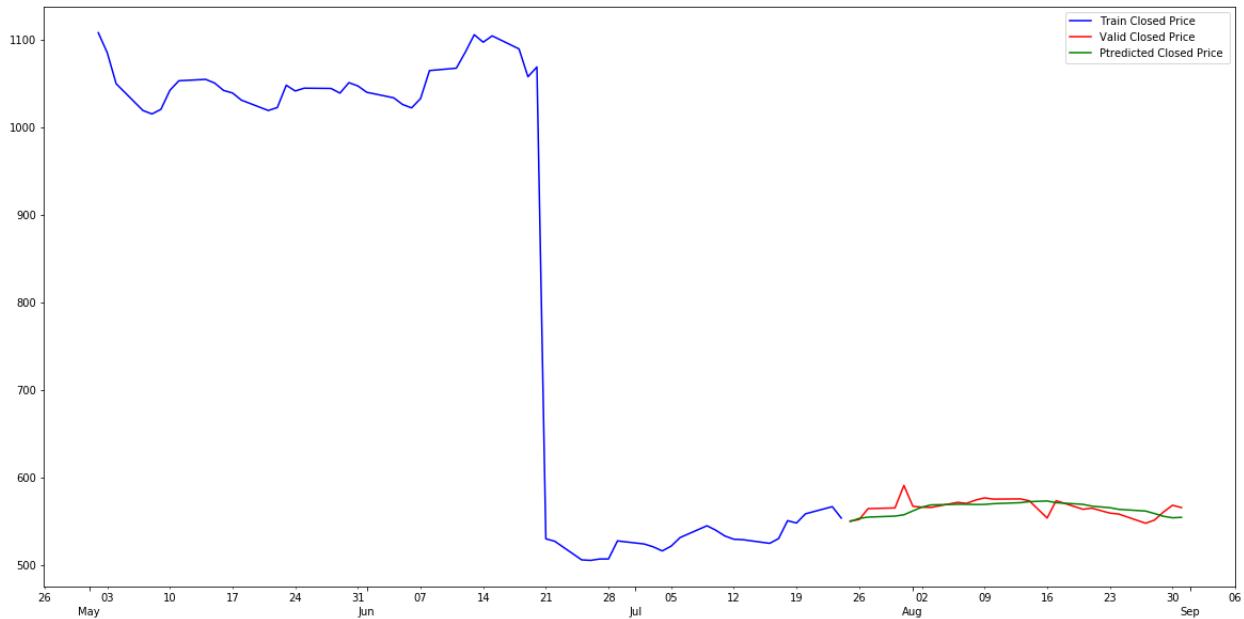


12 Months' Time Span (Wipro)

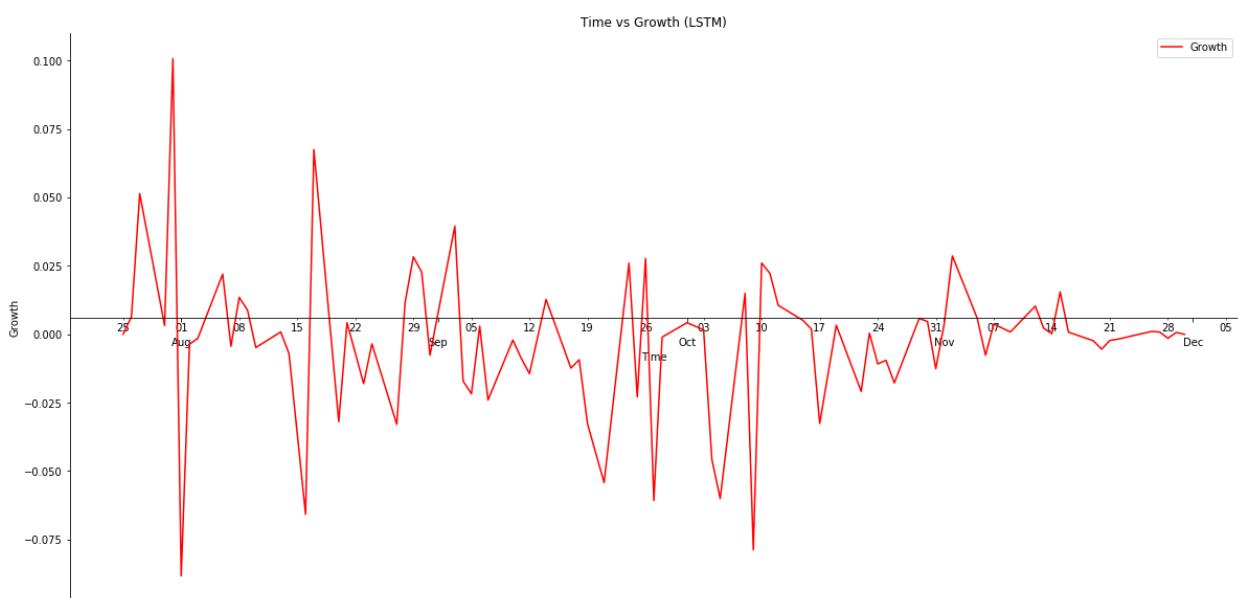
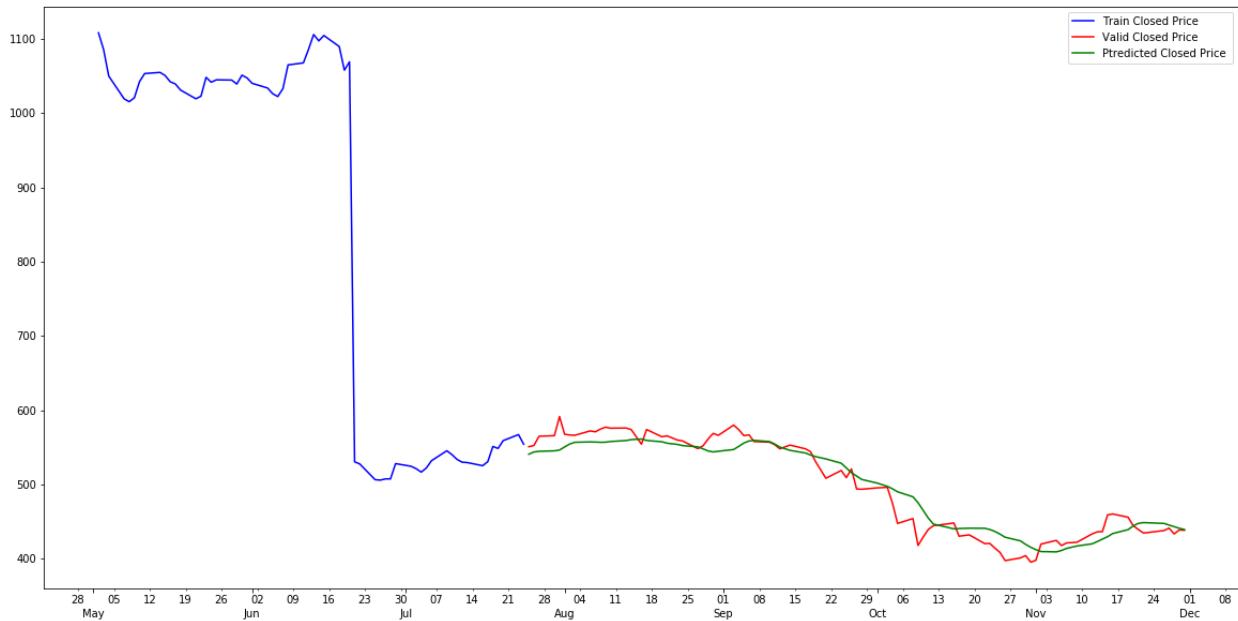


6.2 Graphical Analysis of FMCG Companies

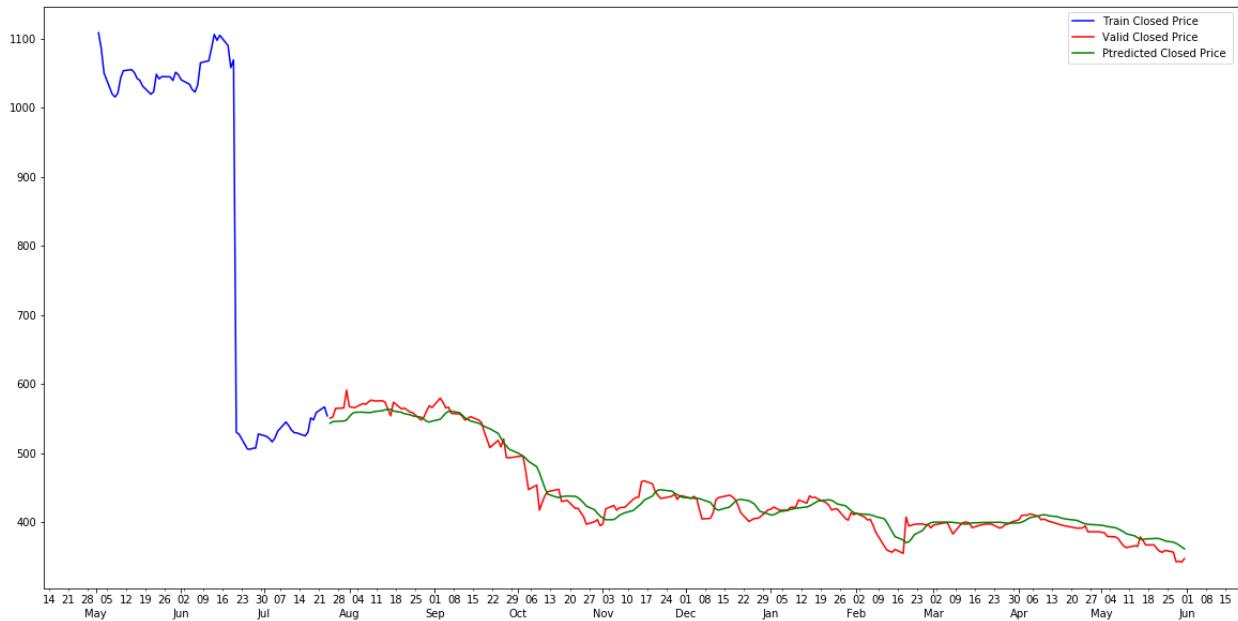
3 Months' Time Span (Emami)



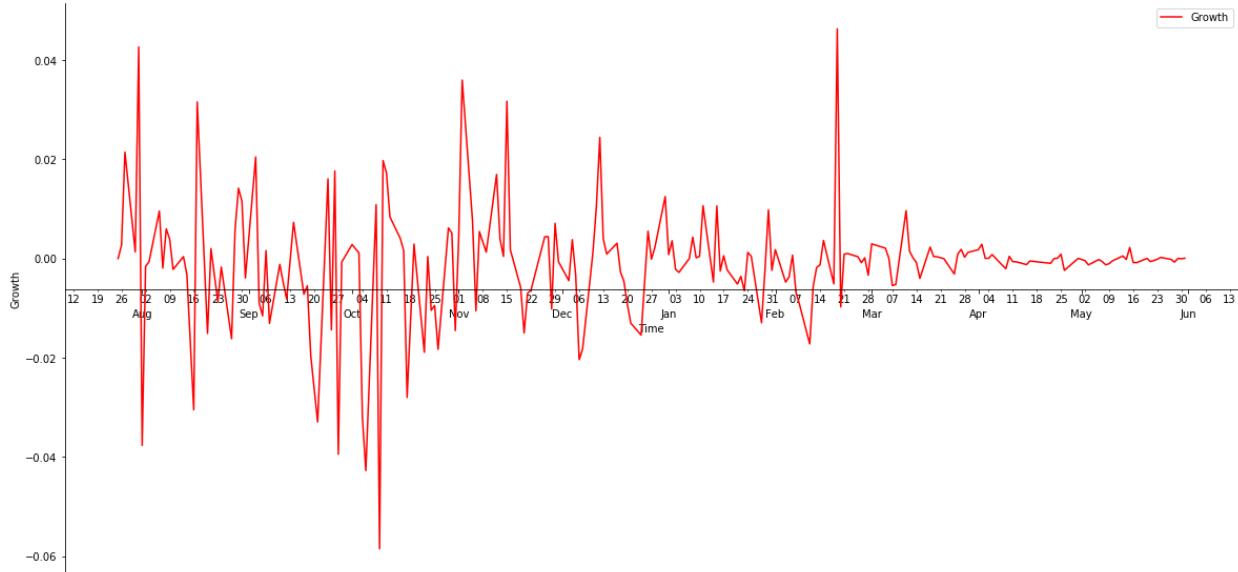
6 Months' Time Span (Emami)



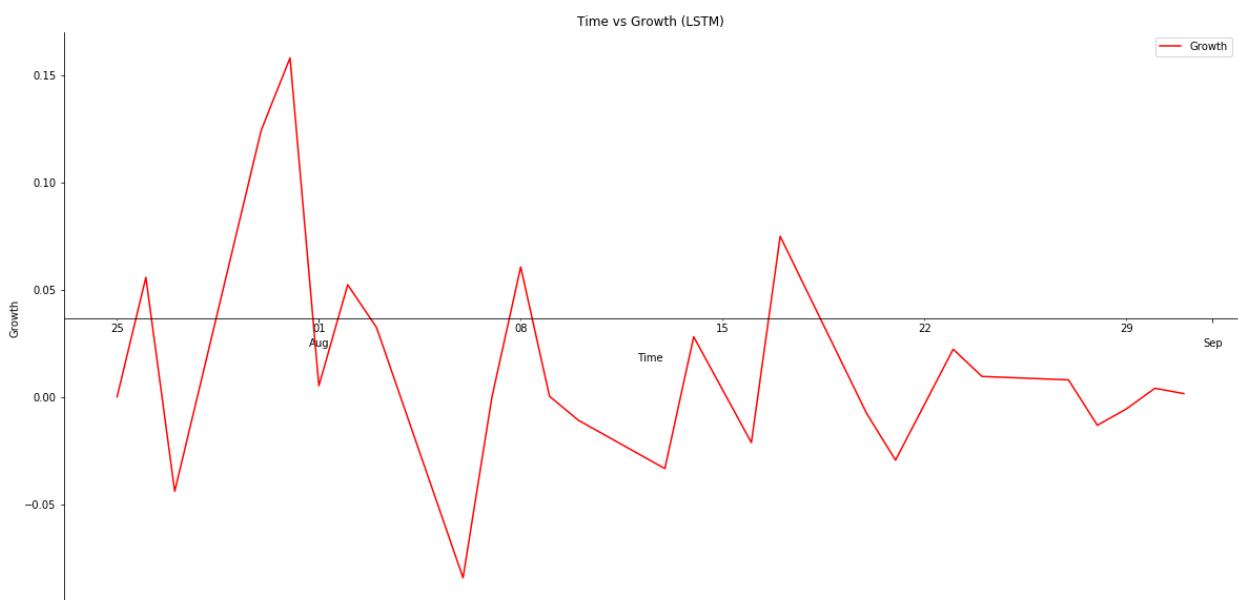
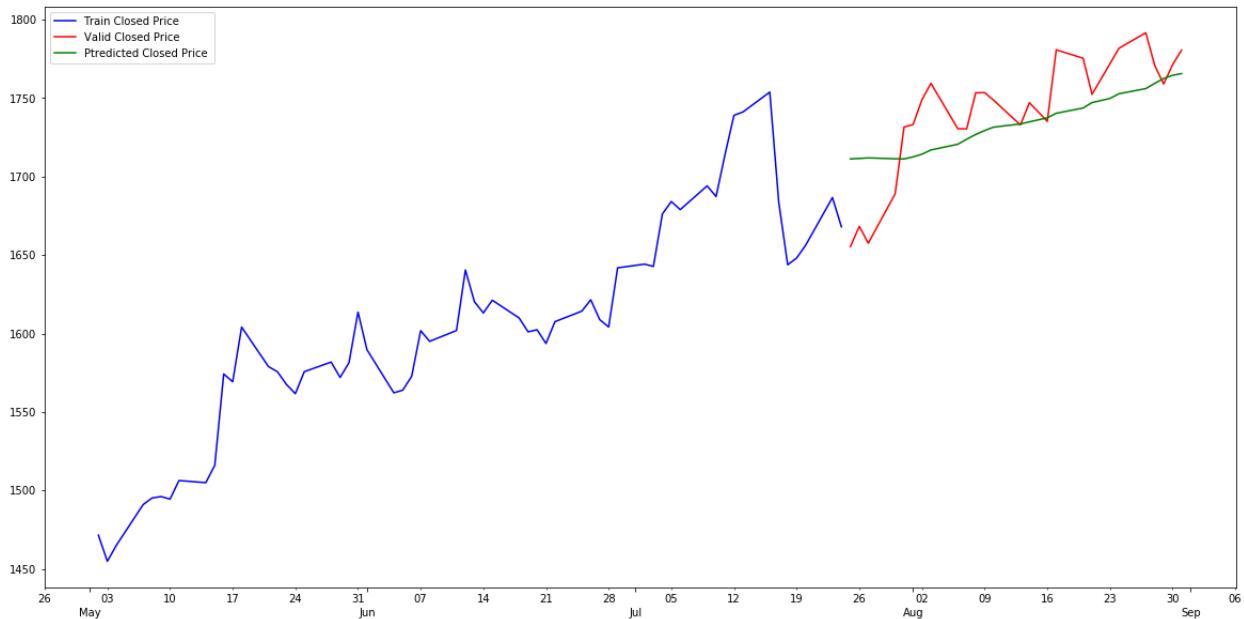
12 Months' Time Span (Emami)



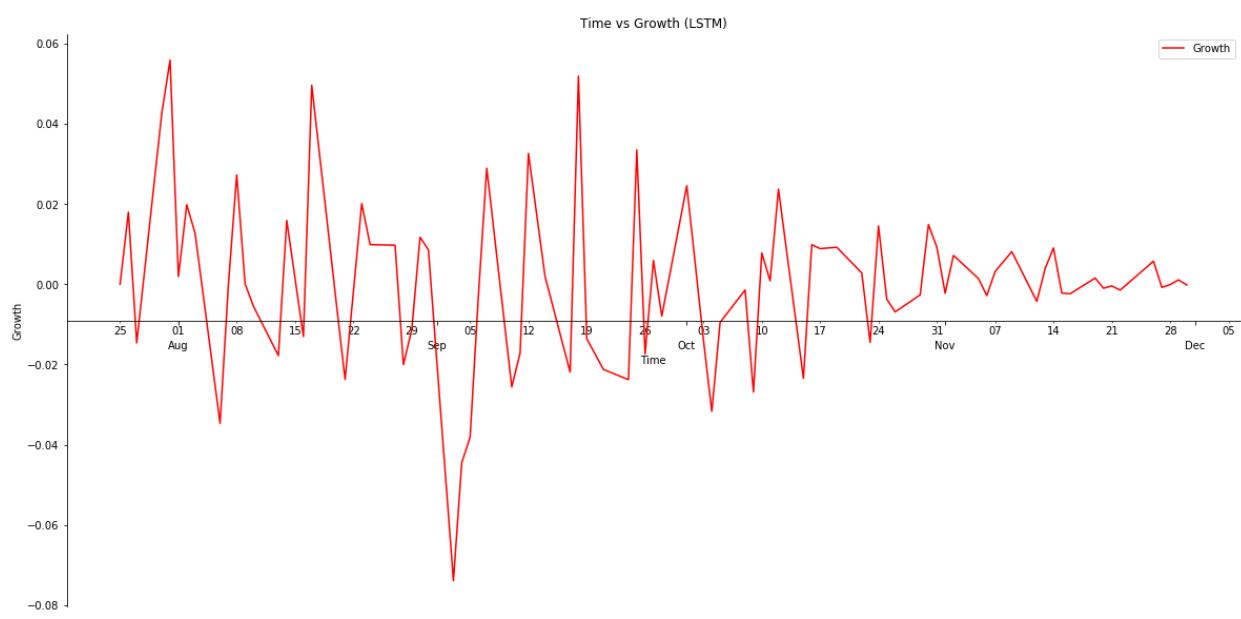
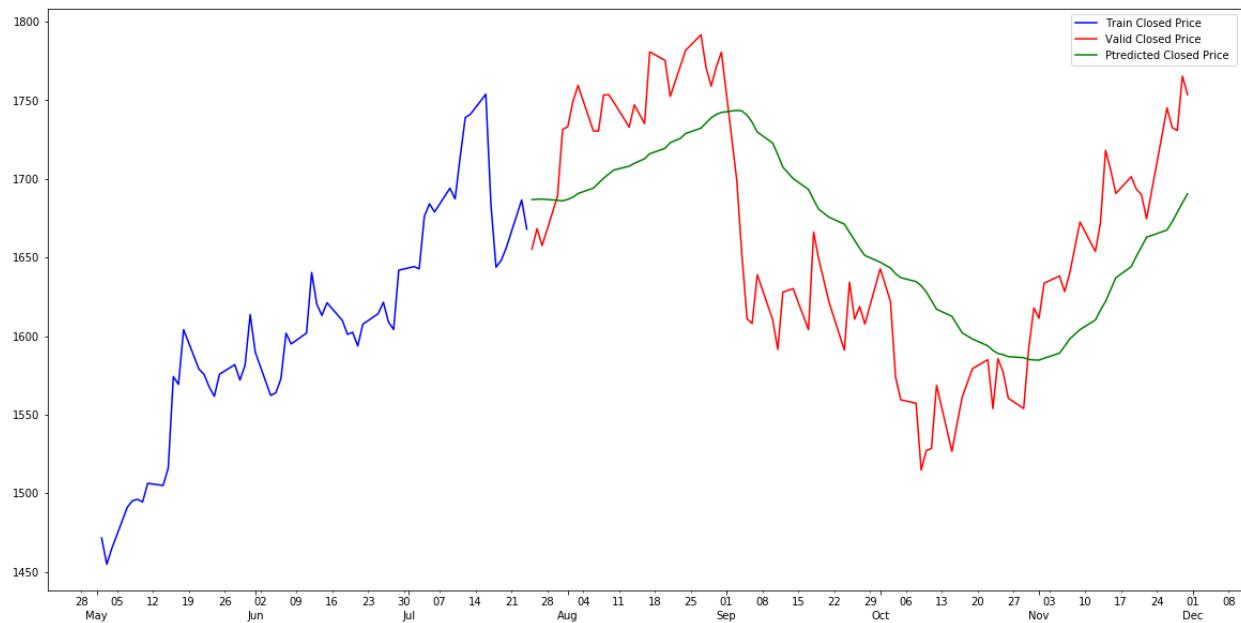
Time vs Growth (LSTM)



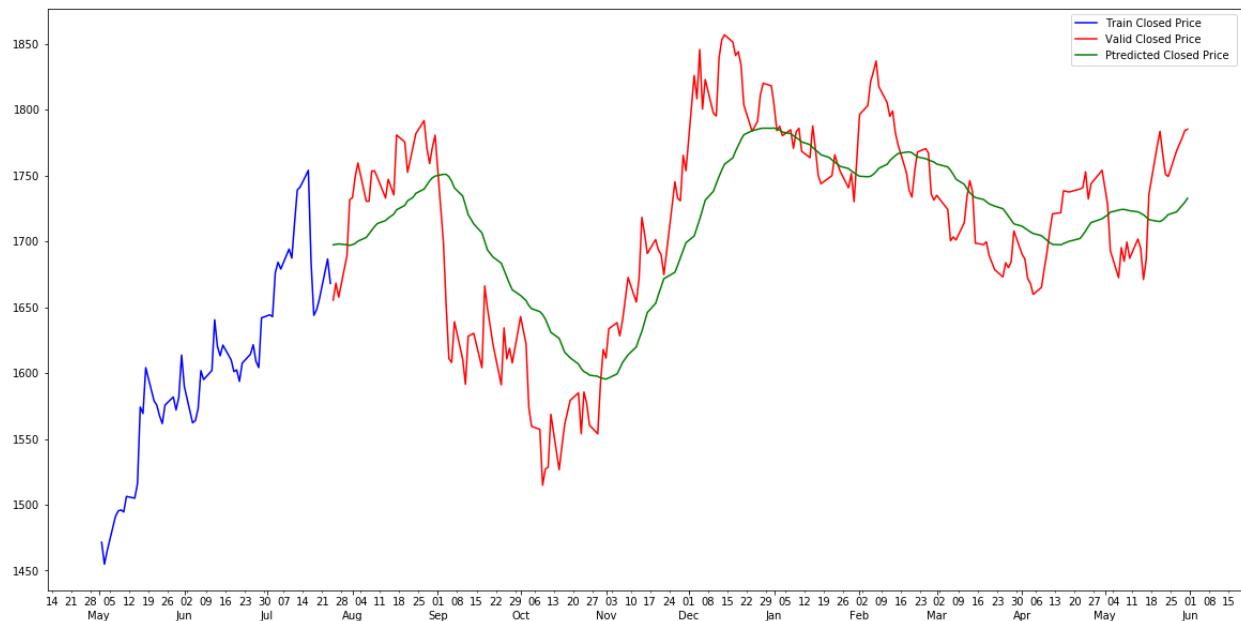
3 Months' Time Span (Hindustan Unilever)



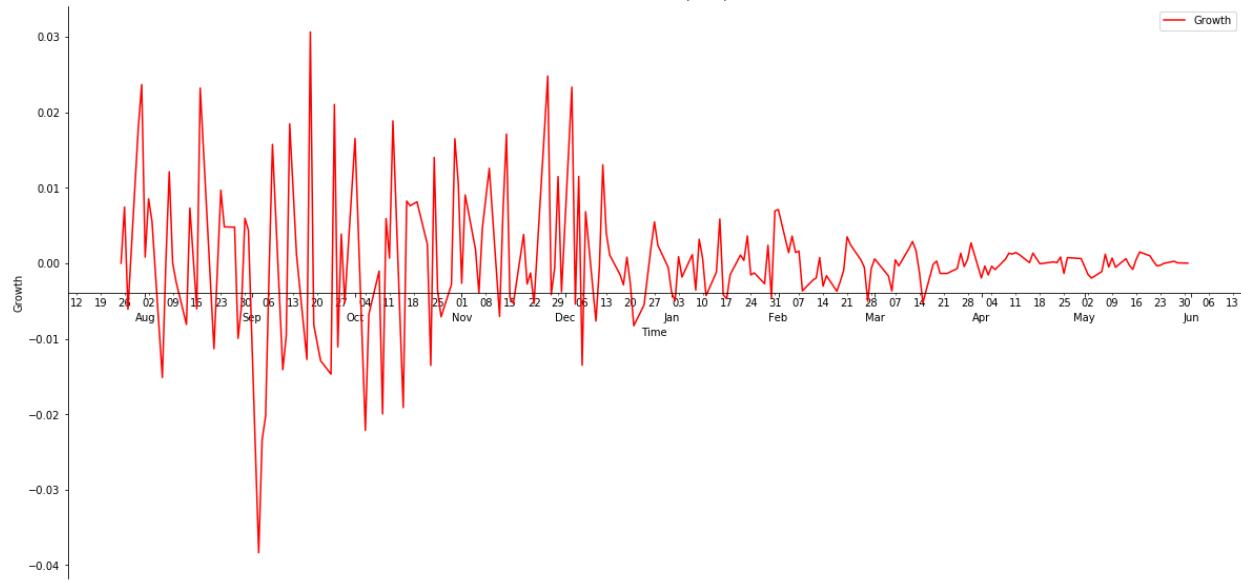
6 Months' Time Span (Hindustan Unilever)



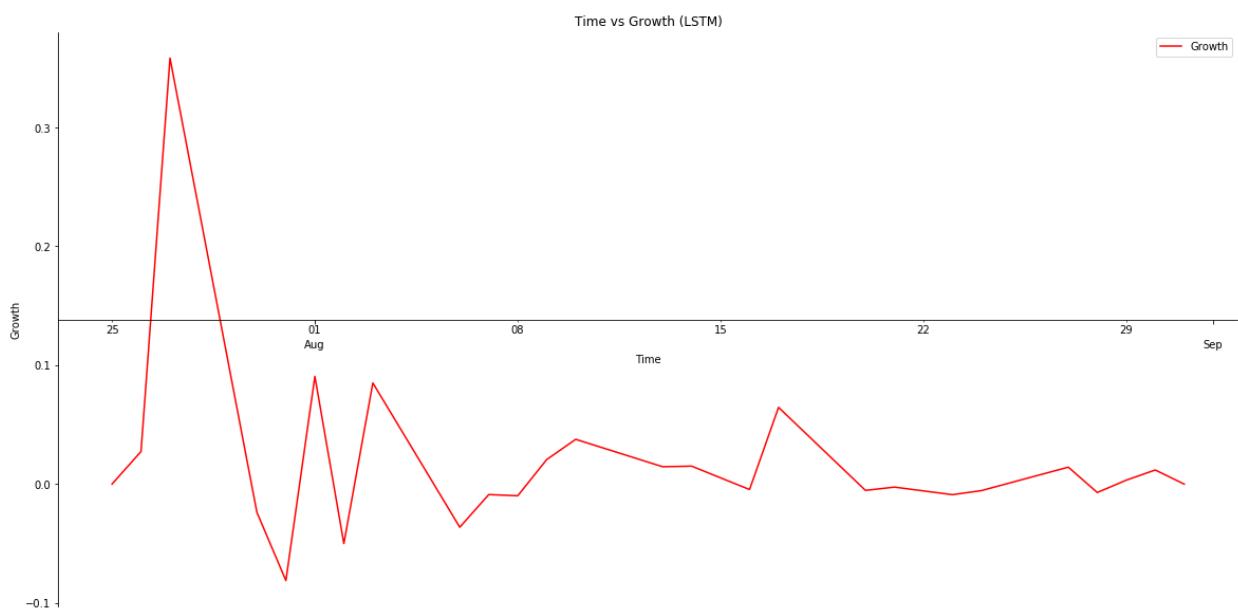
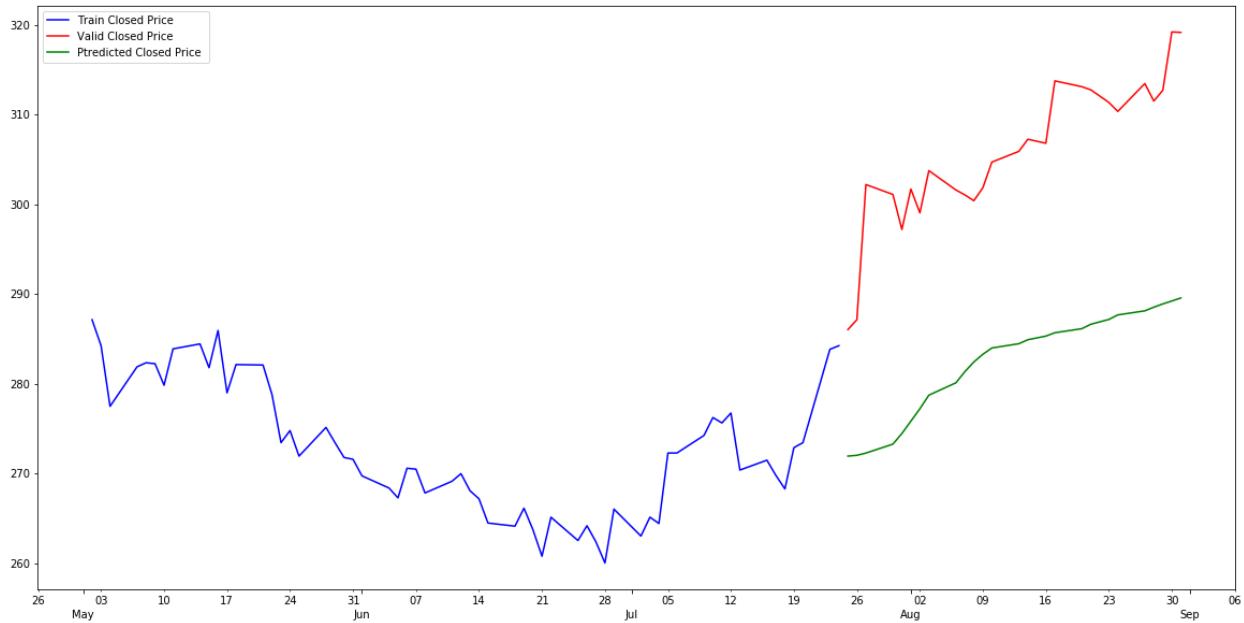
12 Months' Time Span (Hindustan Unilever)



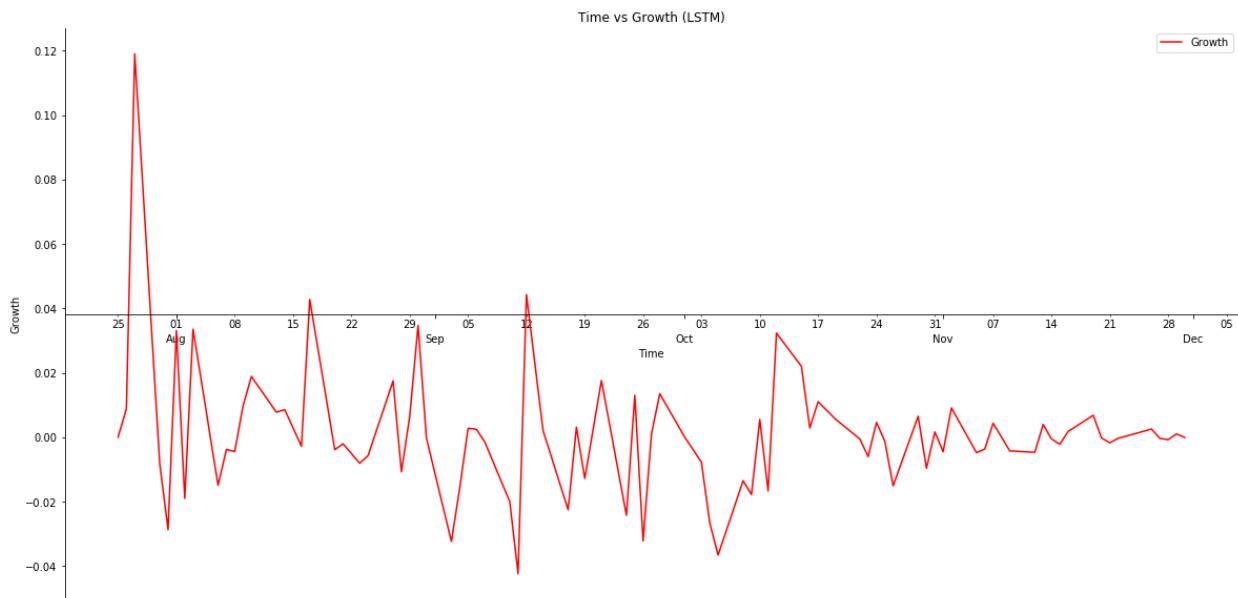
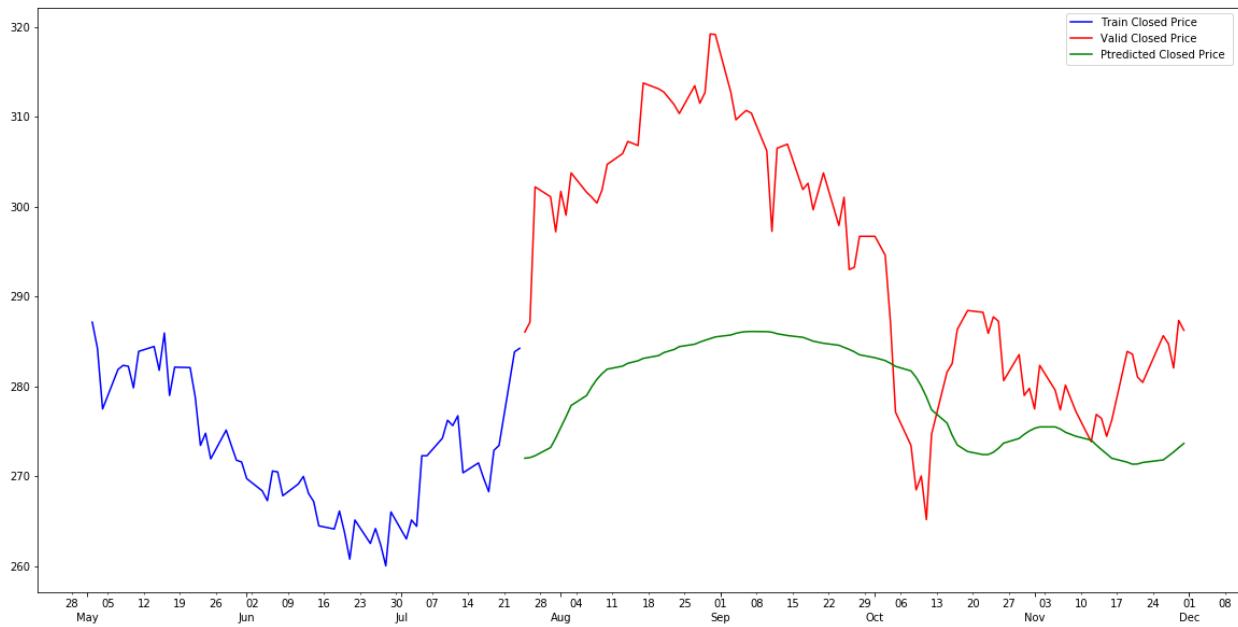
Time vs Growth (LSTM)



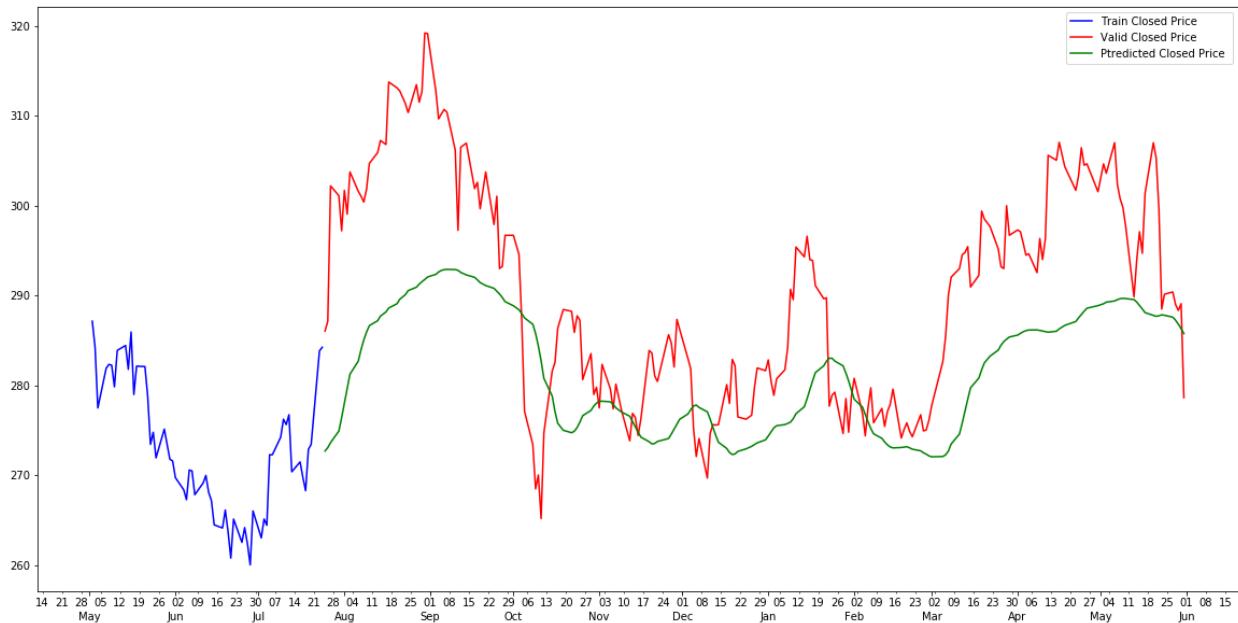
3 Months' Time Span (ITC)



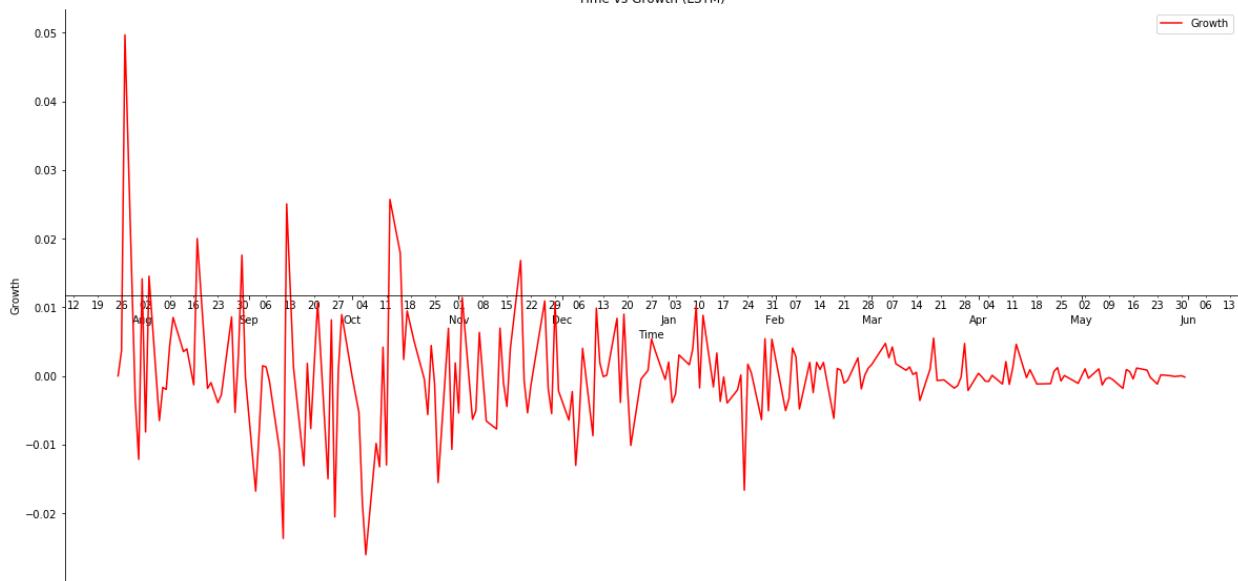
6 Months' Time Span (ITC)



12 Months' Time Span (ITC)

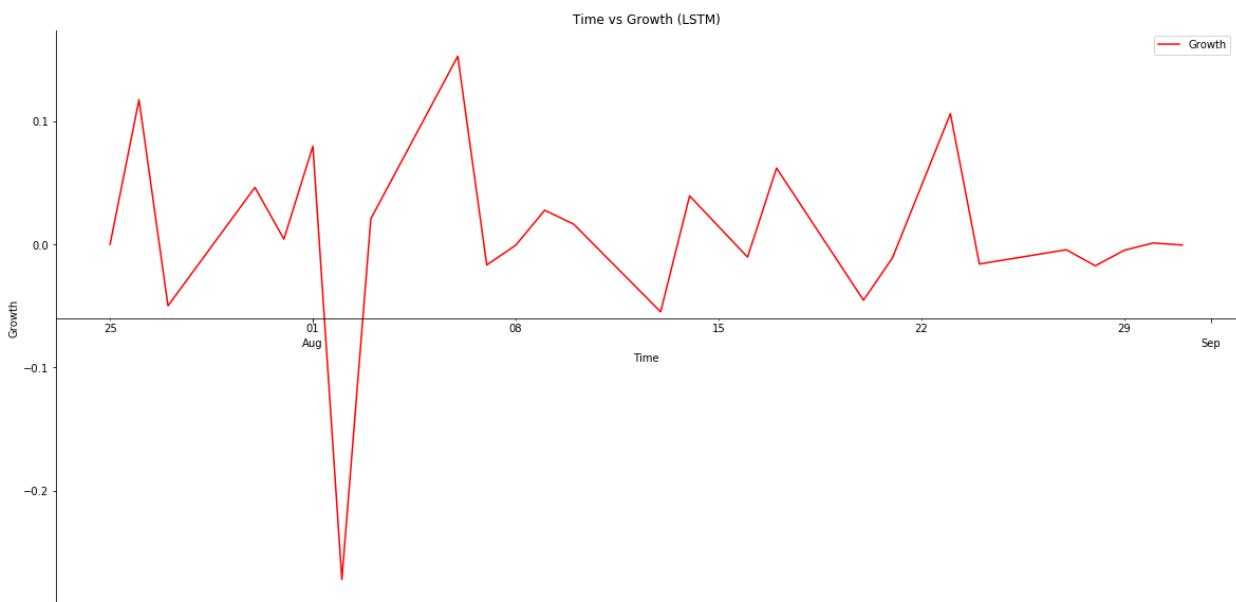
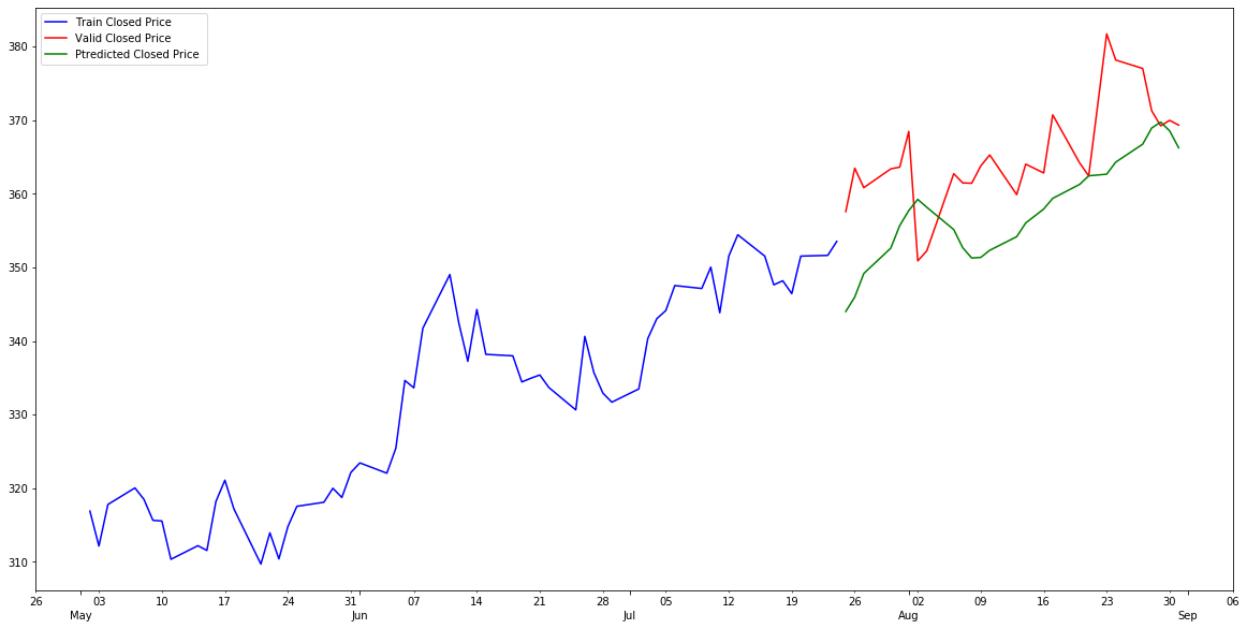


Time vs Growth (LSTM)

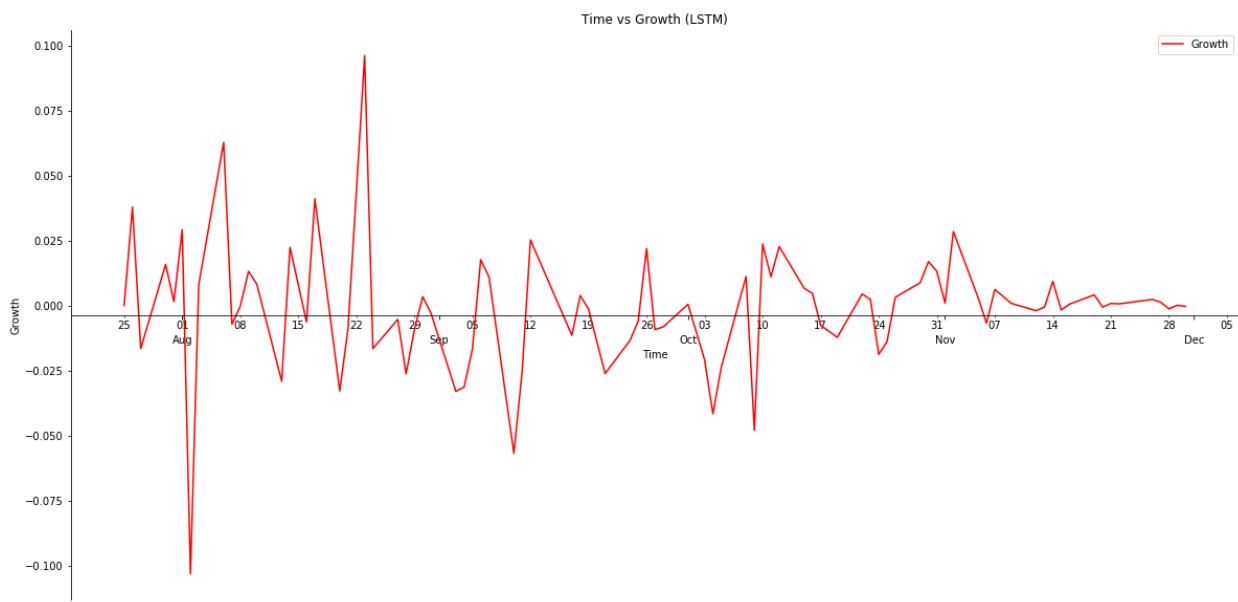
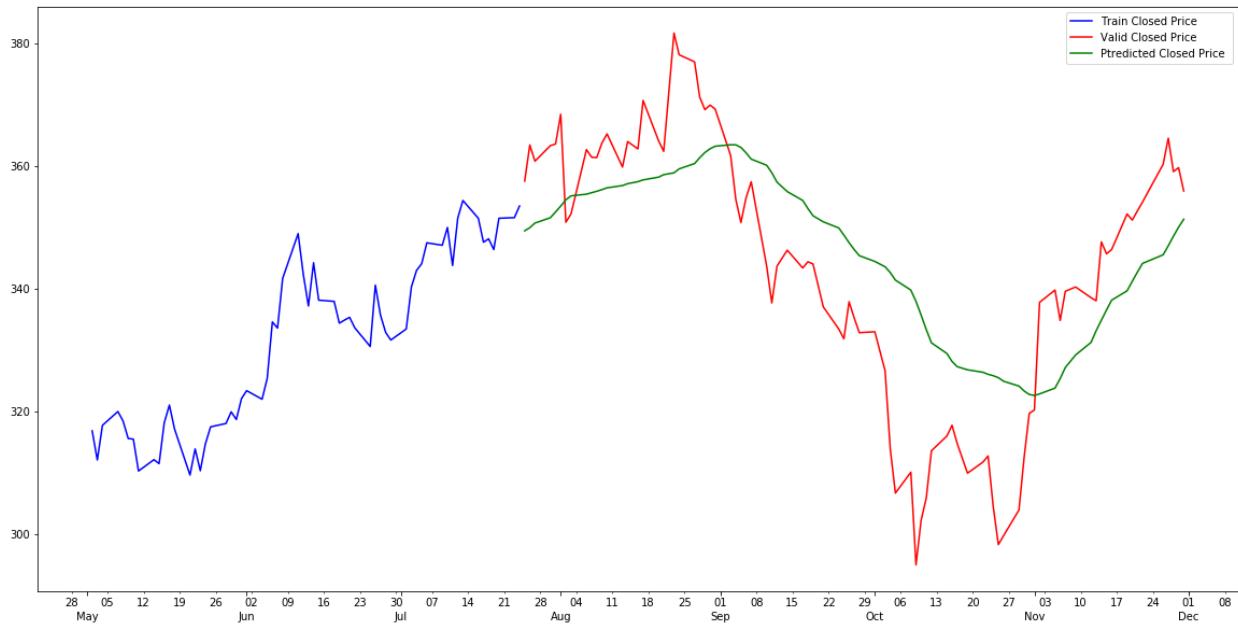


3 Months' Time Span (Marico)

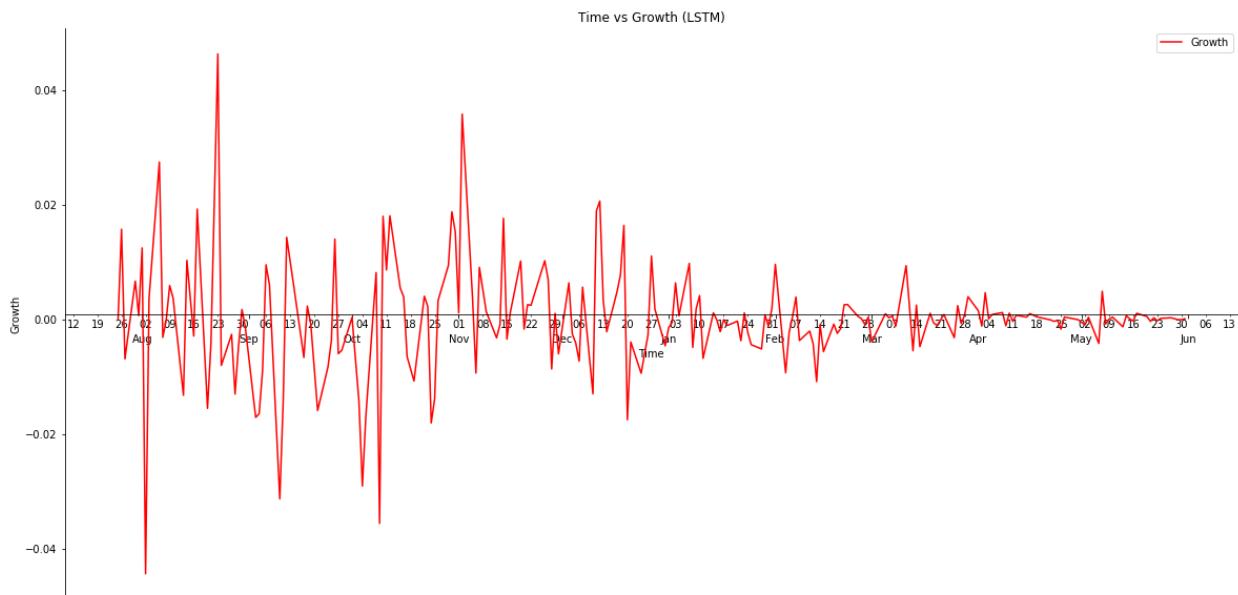
Stock Price Prediction Using LSTM on Indian Share Market



6 Months' Time Span (Marico)

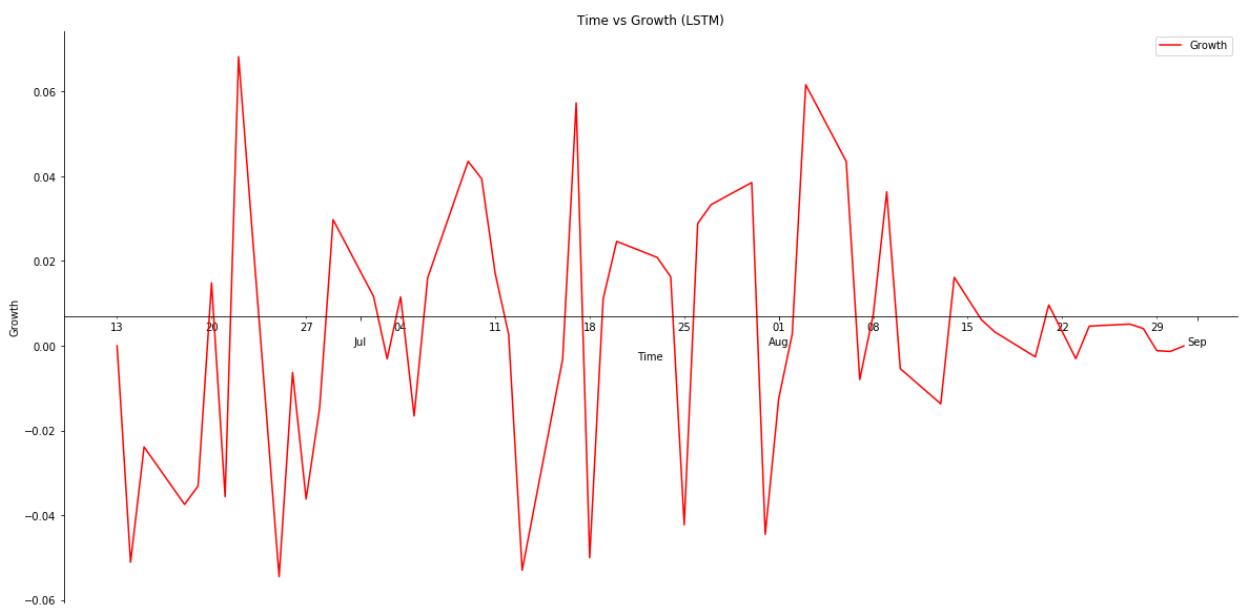
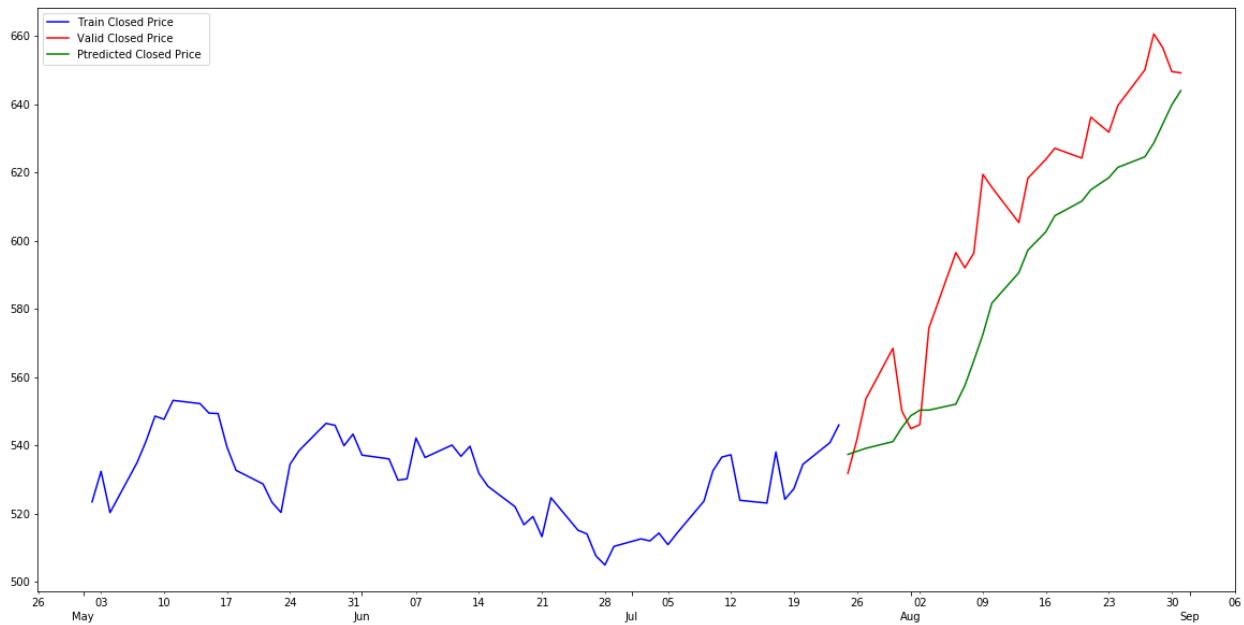


12 Months' Time Span (Marico)

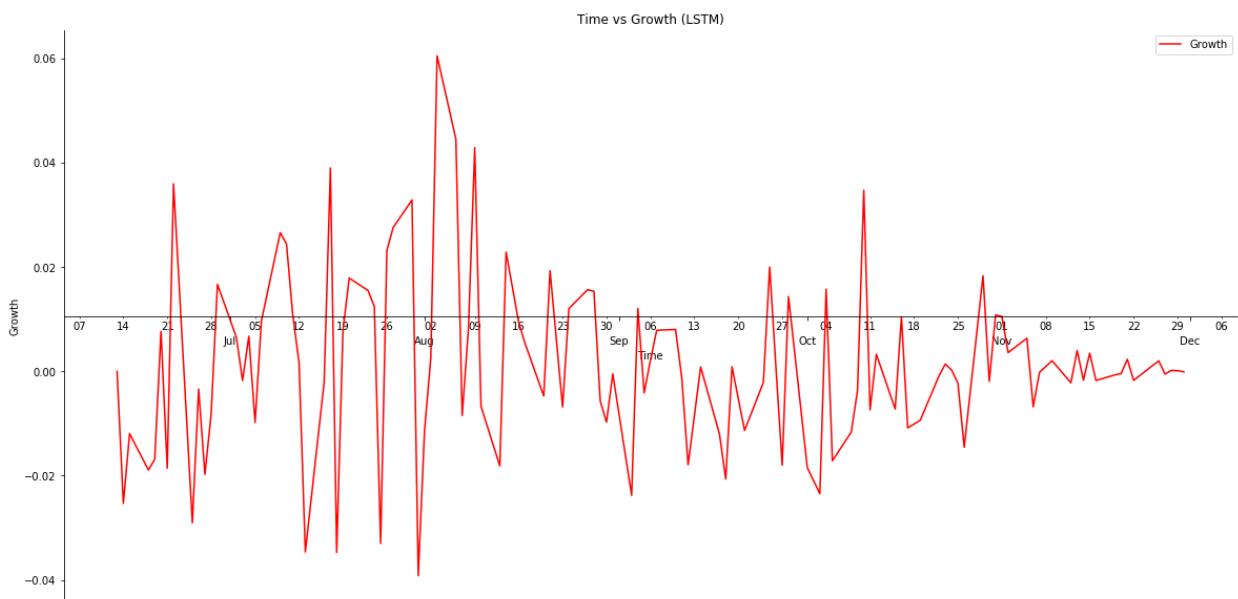
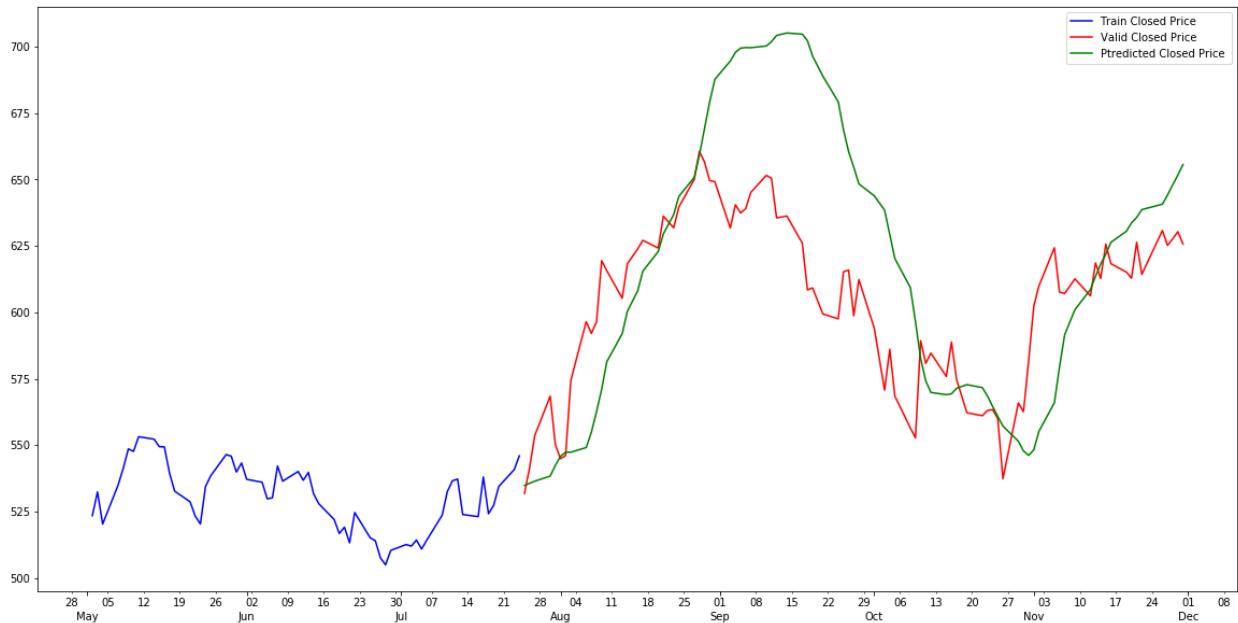


6.3 Graphical Analysis of Bank

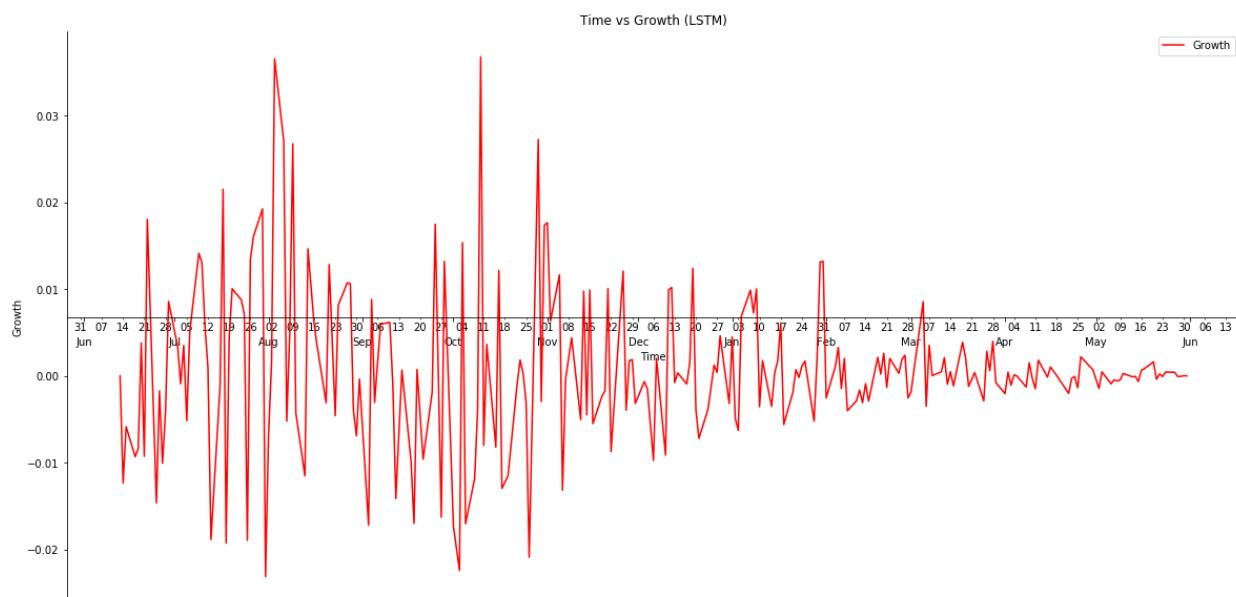
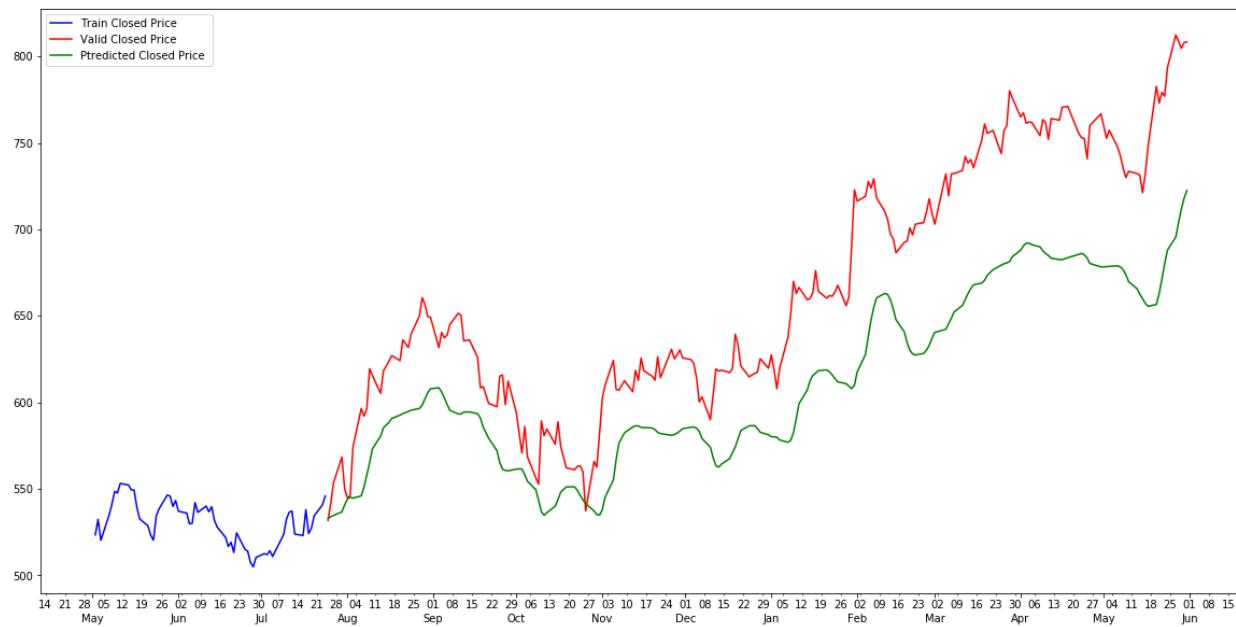
3 Months' Time Span (Axis)



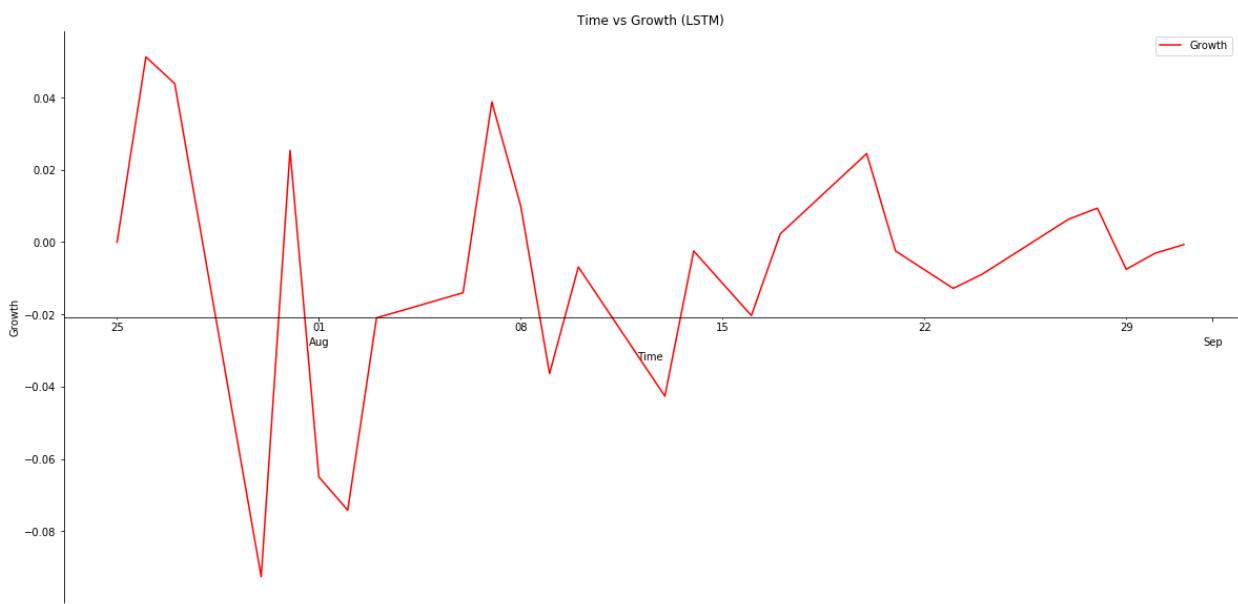
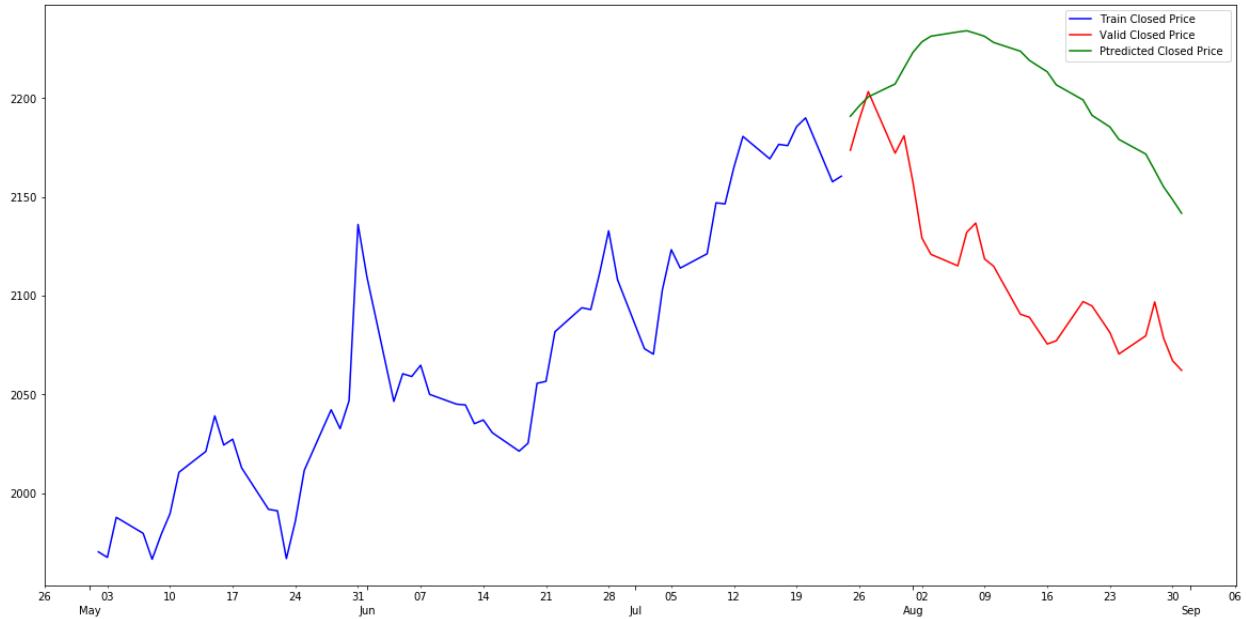
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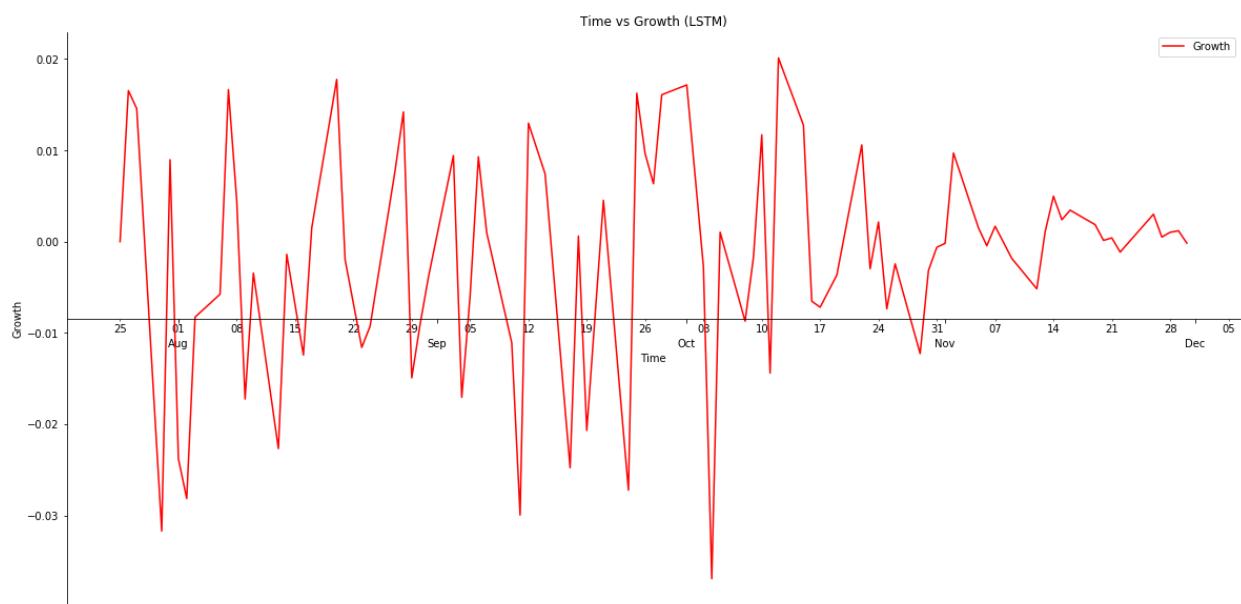
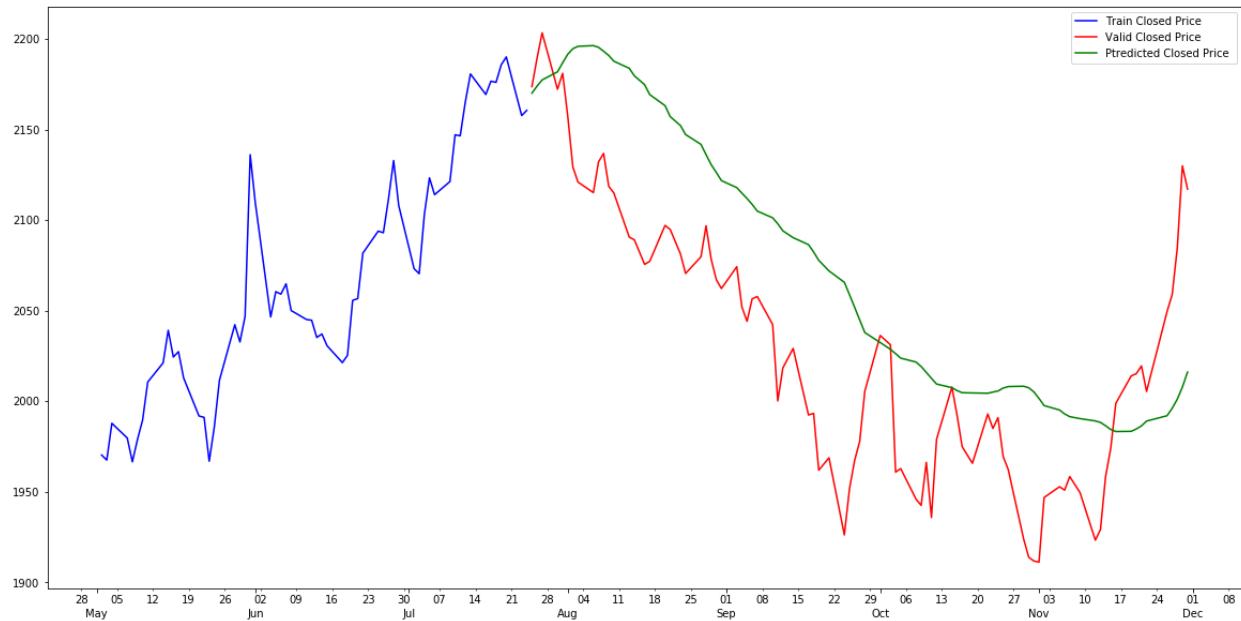
12 Months' Time Span (Axis)



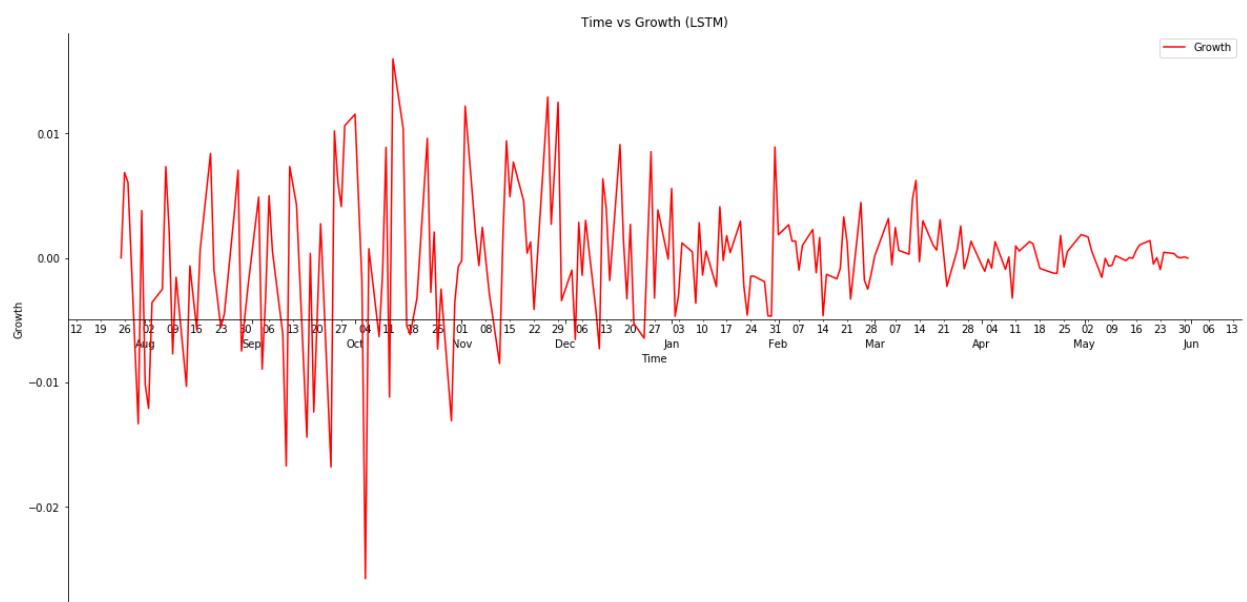
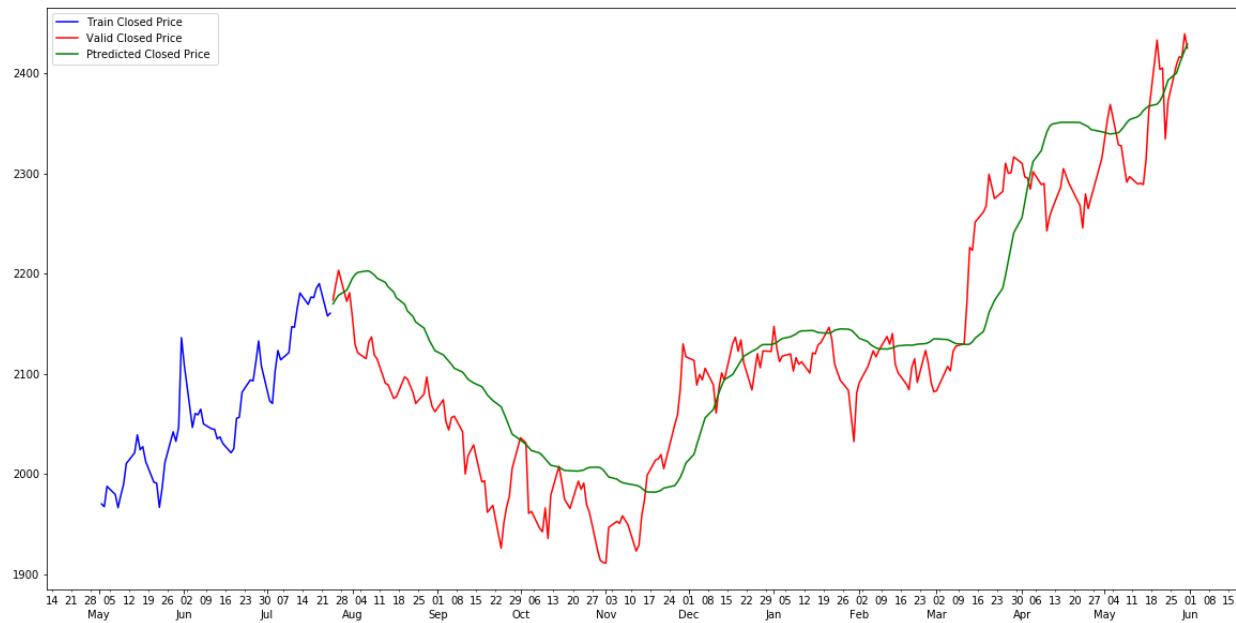
3 Months' Time Span (HDFC)



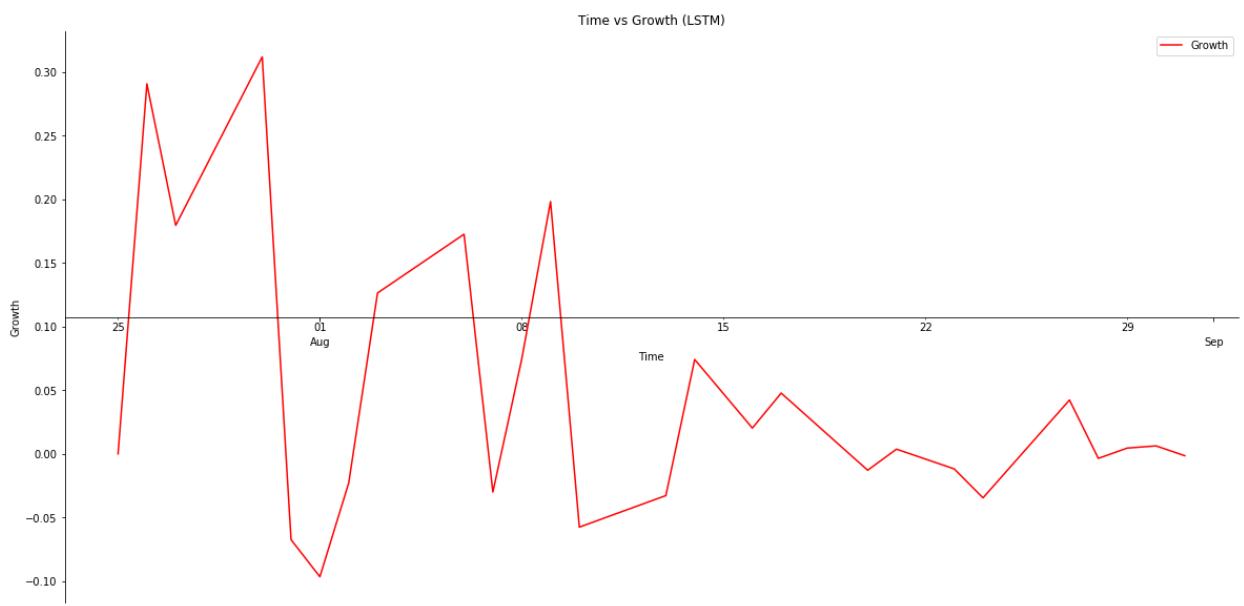
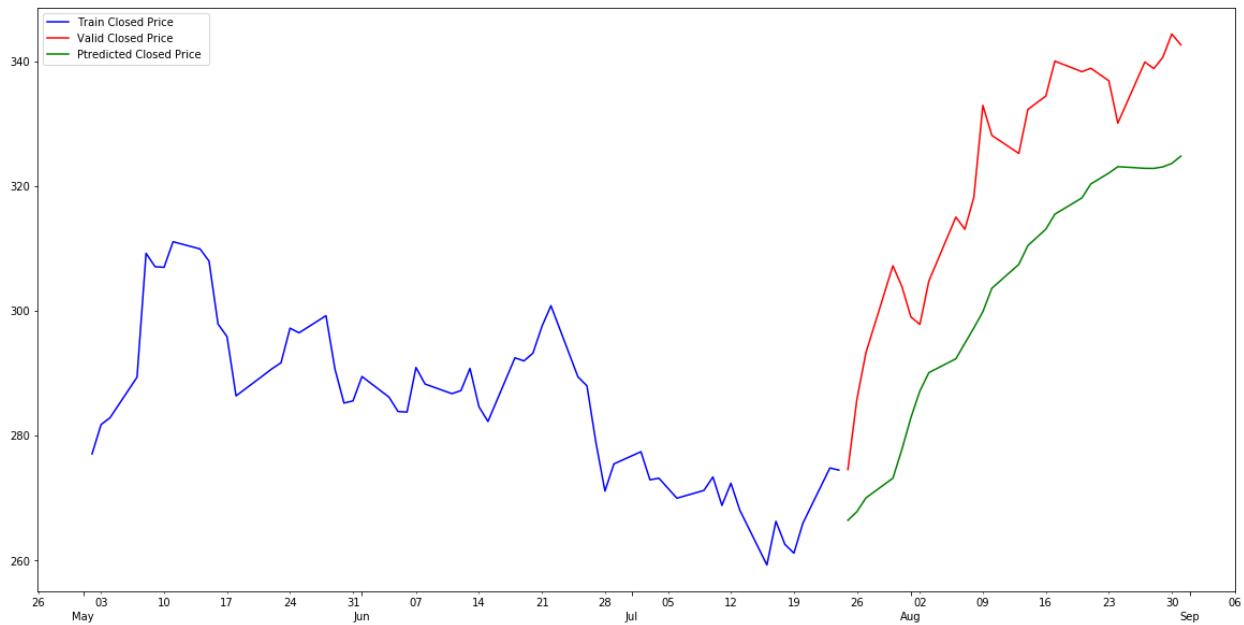
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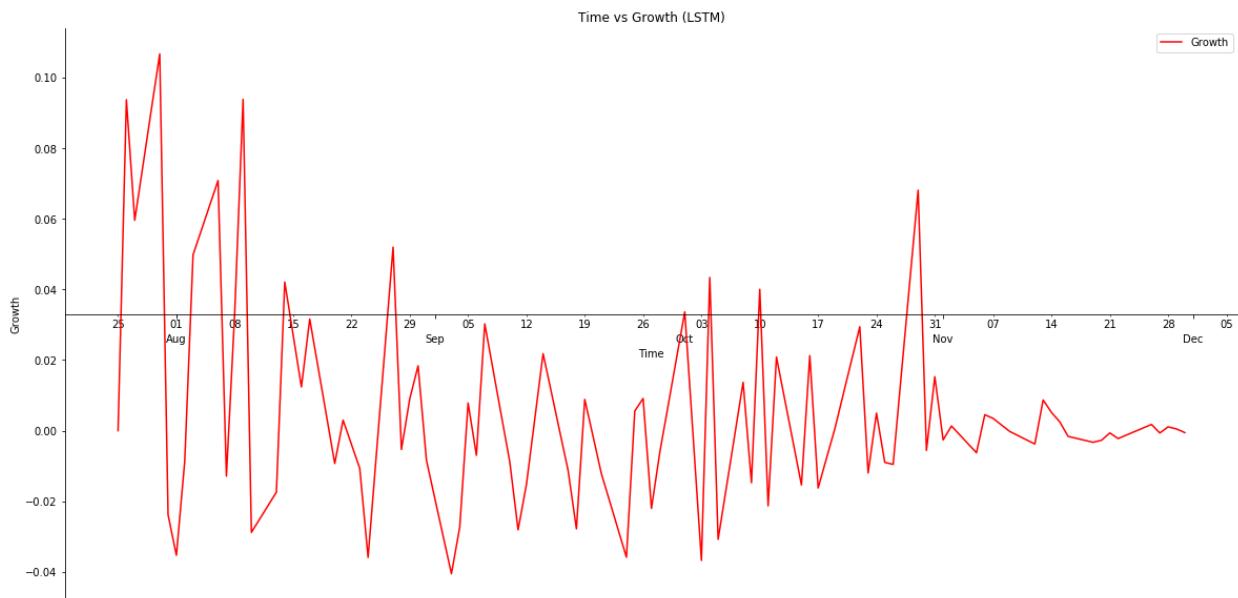
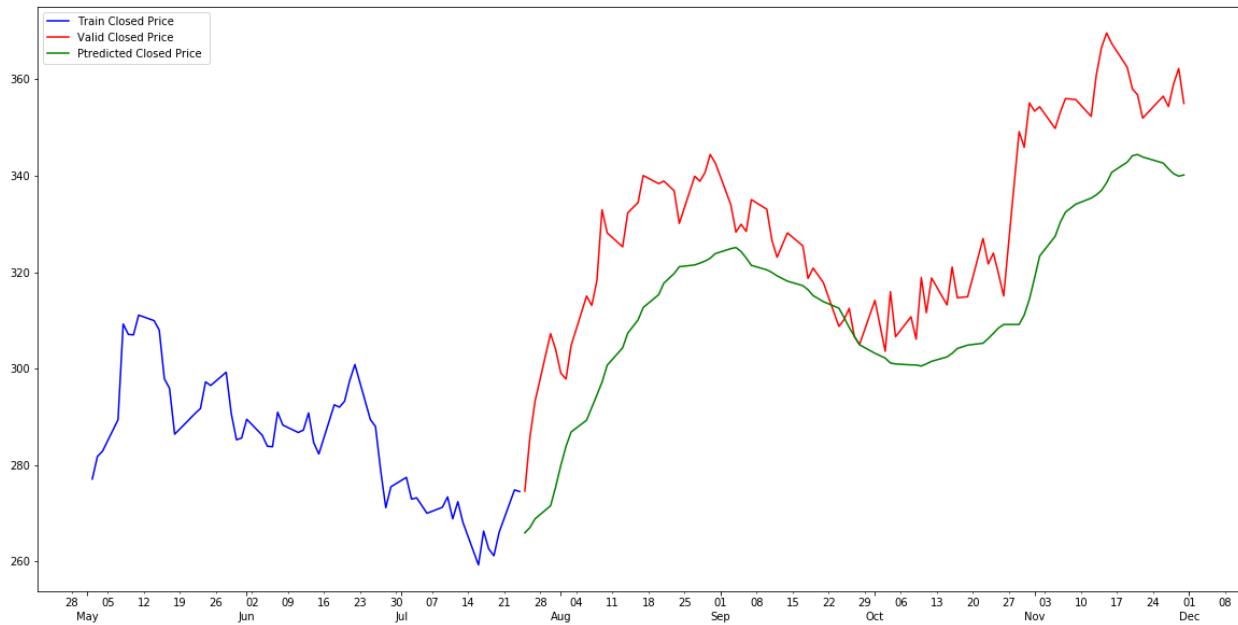
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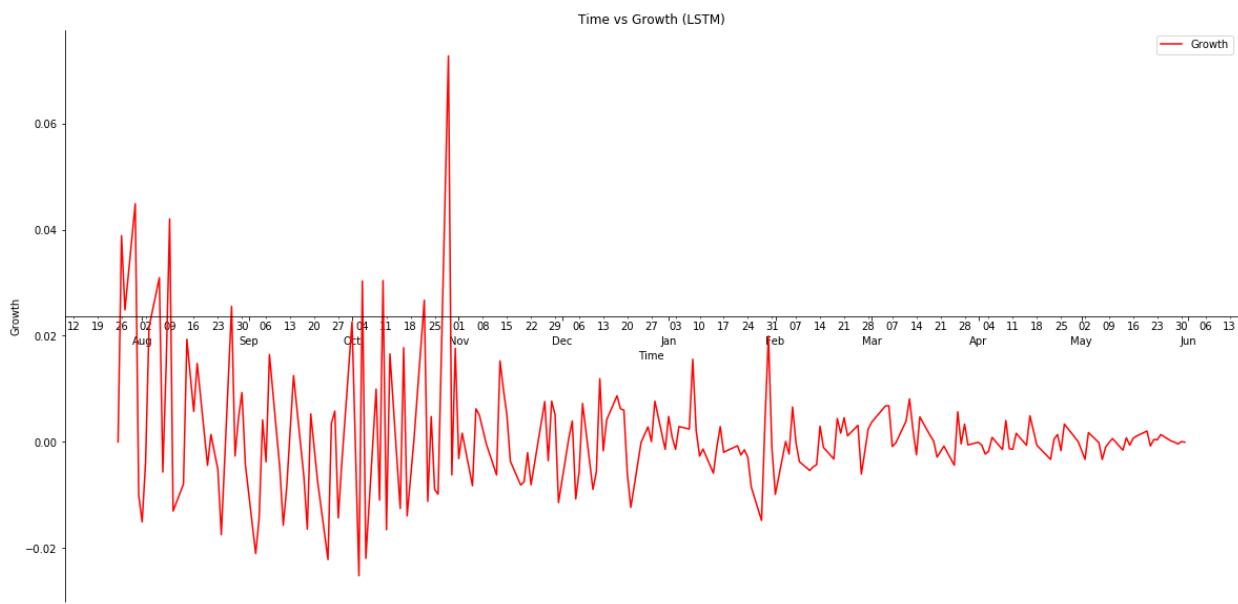
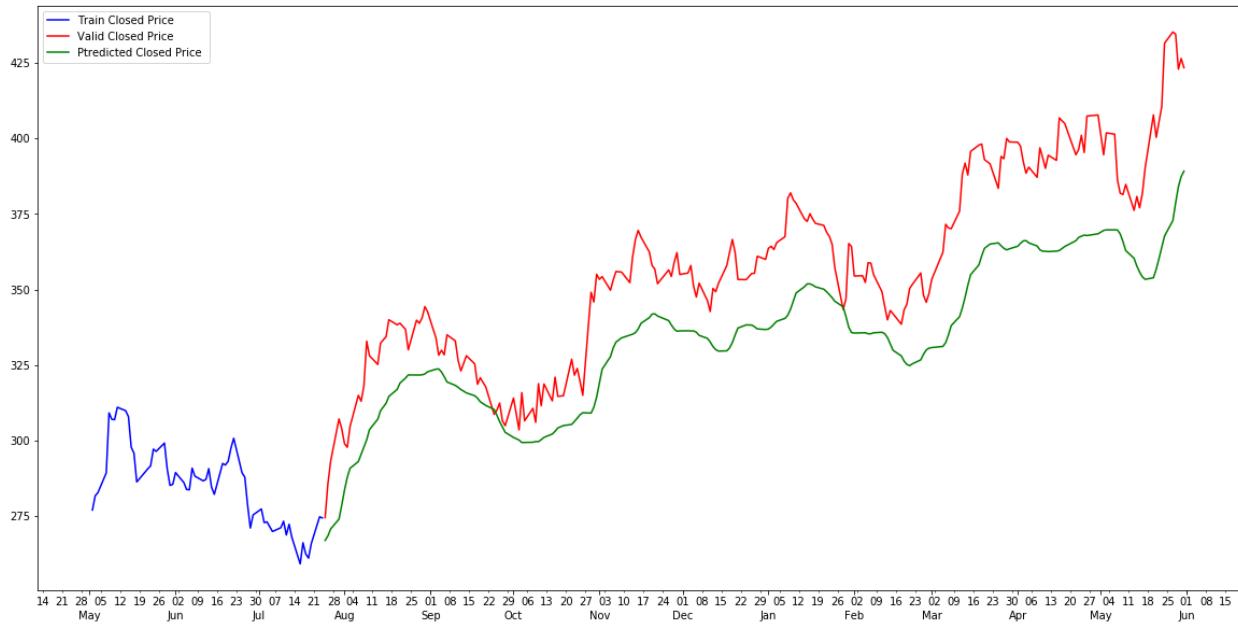
3 Months' Time Span (ICICI)



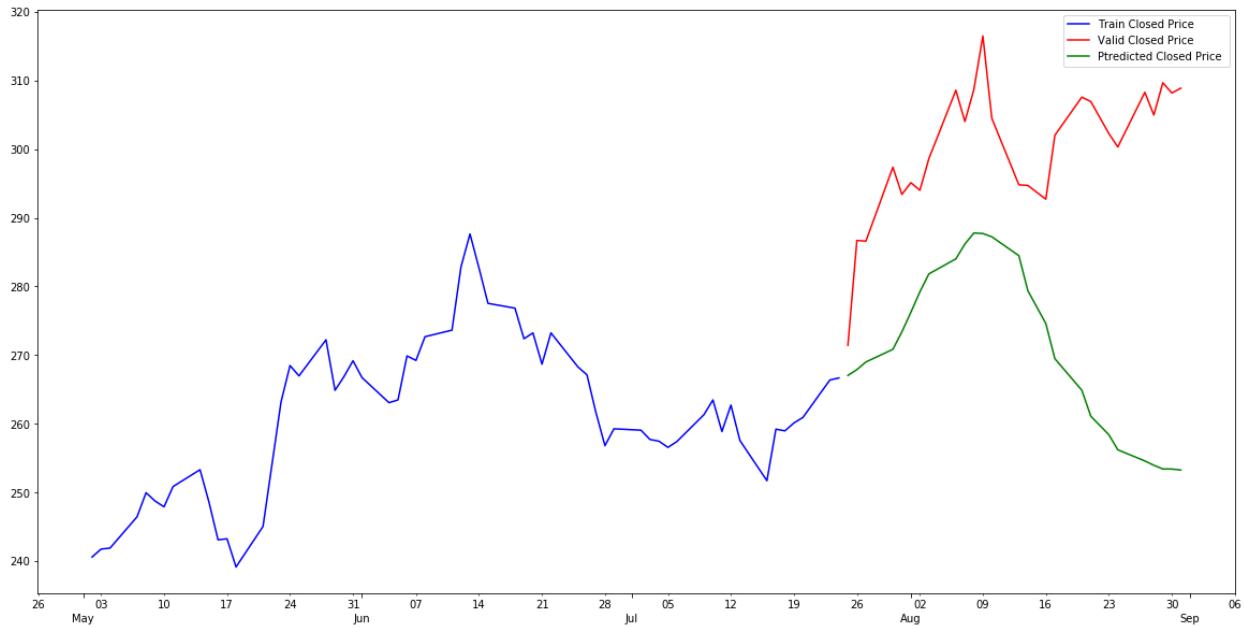
6 Months' Time Span (ICICI)



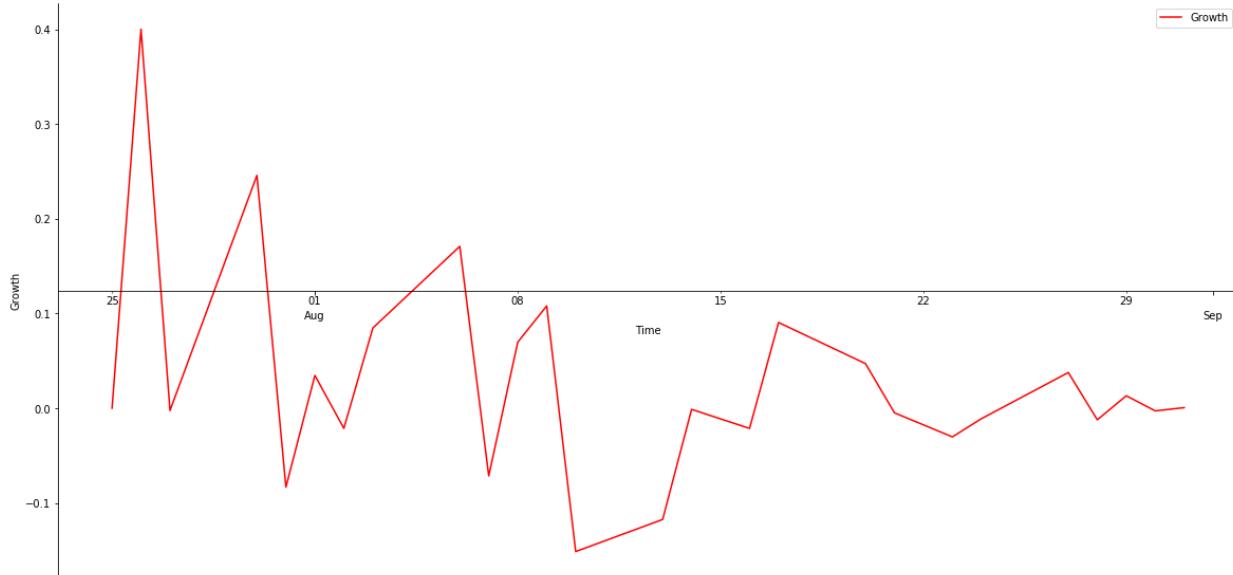
12 Months' Time Span (ICICI)



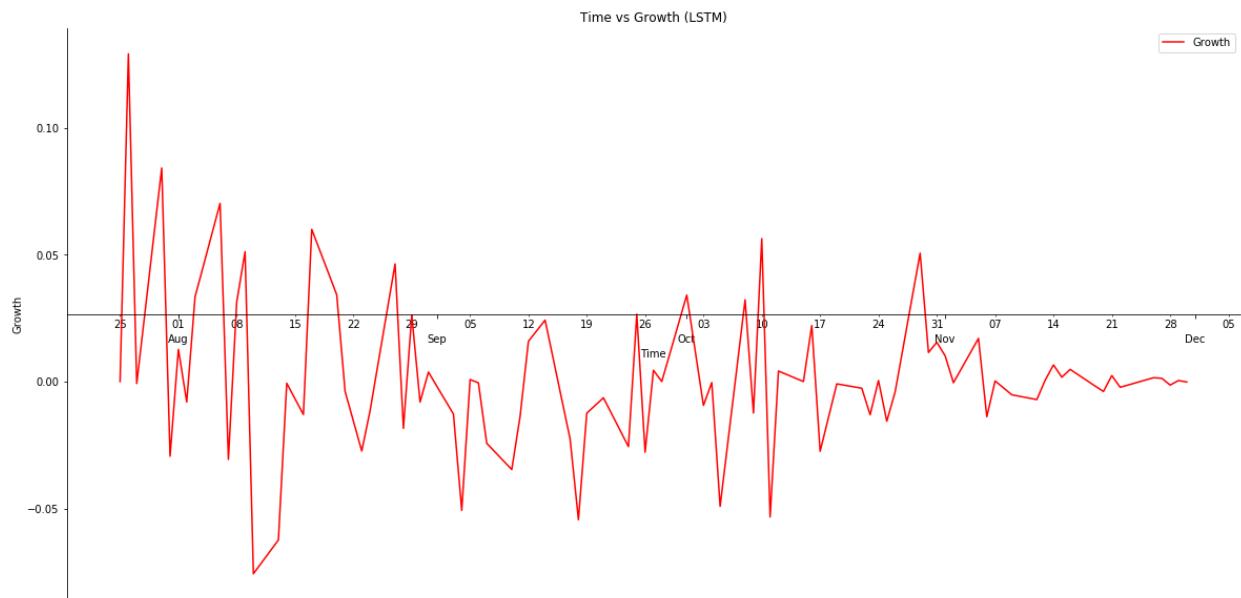
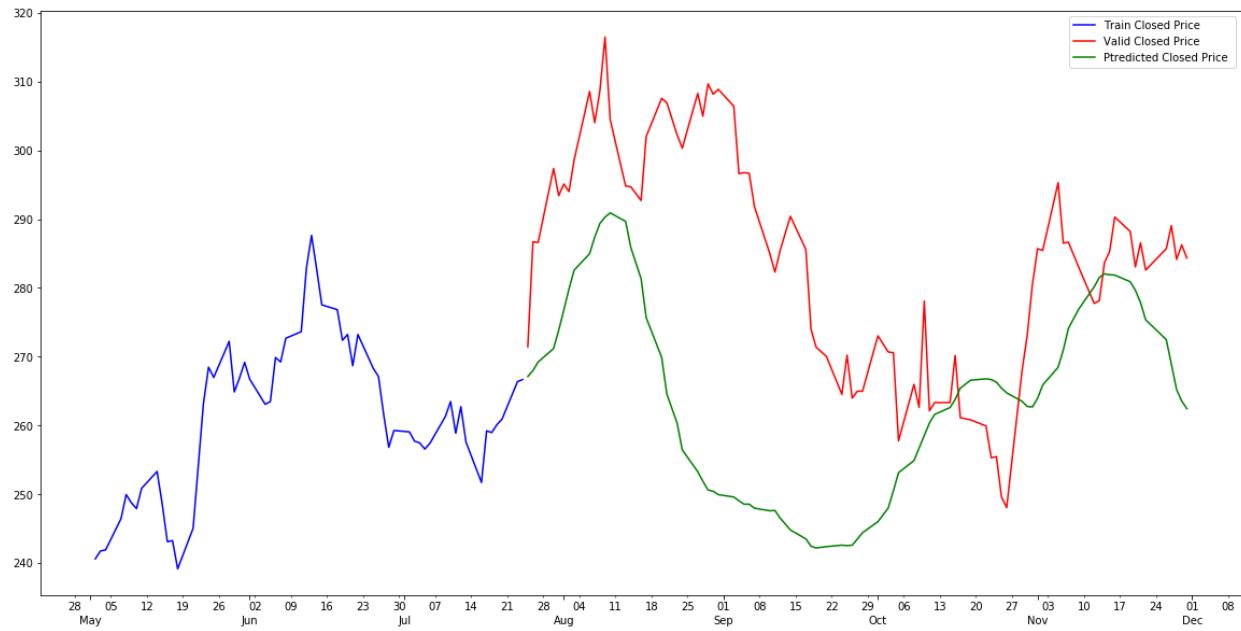
3 Months' Time Span (SBI)



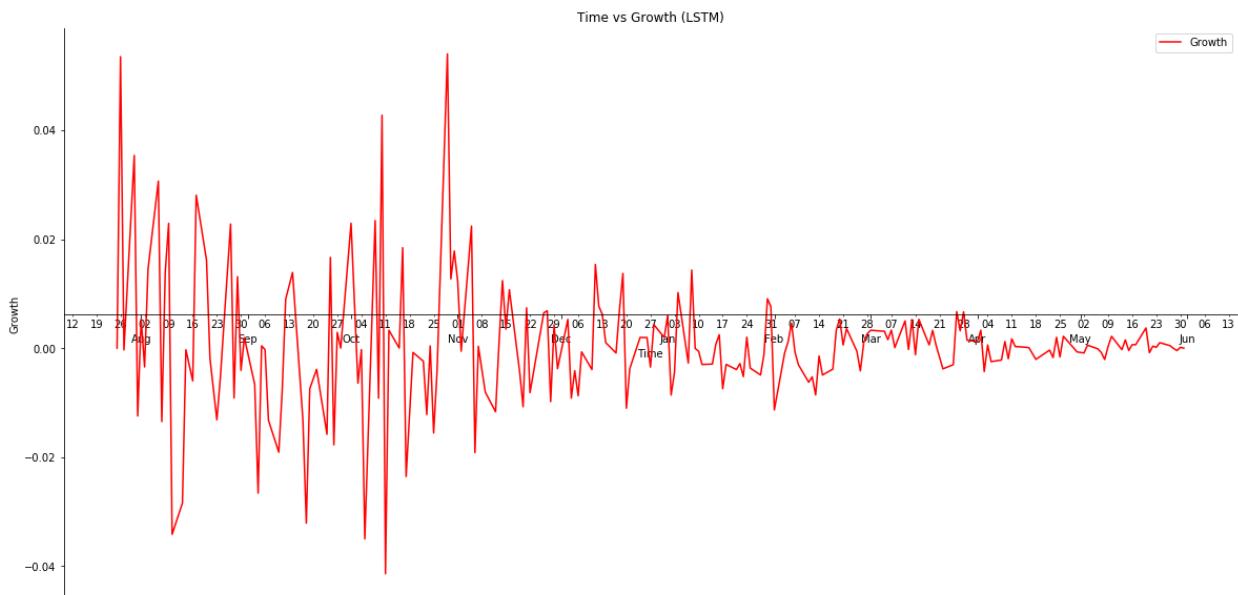
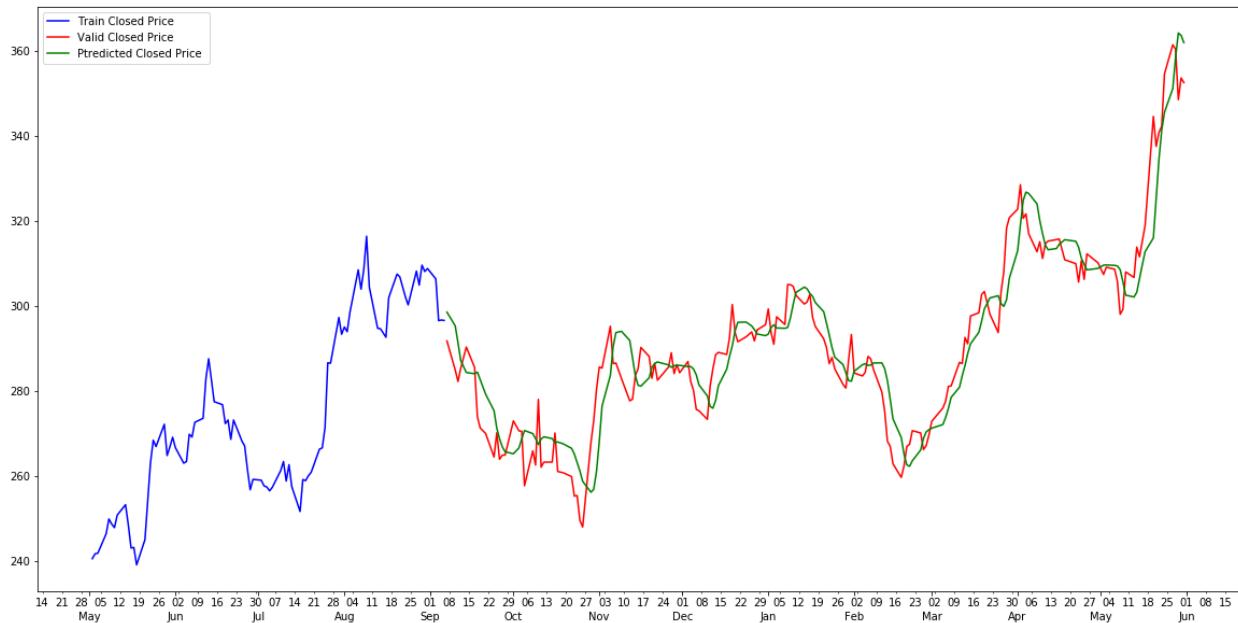
Time vs Growth (LSTM)



6 Months' Time Span (SBI)



12 Months' Time Span (SBI)



Chapter 7: Summary

In this paper, we analyze the growth of the companies from different sector and try to find out which is the best time span for predicting the future price of the share. So, this draws an important conclusion that companies from a certain sector have some 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.

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Zhu HM, Li R, Li S (2014) Modelling dynamic dependence between crude oil prices and asia-pacific stock market returns. International Review of Economics & Finance 29:208-223