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Stock Prices Prediction Using Machine

Learning and Deep Learning Techniques (wit
Python codes)

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Introduction

Predicting how the stock market will perform is one of the most difficult things to do. There are so many fa
involved in the prediction – physical factors vs. physhological, rational and irrational behaviour, etc. All thes
aspects combine to make share prices volatile and very difficult to predict with a high degree of accuracy.

Can we use machine learning (https://courses.analyticsvidhya.com/courses/introduction-to-data-science-2
utm_source=blog&utm_medium=stockpricepredictionarticle) as a game changer in this domain? Using fea
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
make unerringly accurate predictions.

(https://s3-ap-south-1.amazonaws.com/av-blog-media/wp-content/uploads/2018/10/stock-price.png)

In this article, we will work with historical data about the stock prices of a publicly listed company. We will implement a mix of machine learning algorithms (https://courses.analyticsvidhya.com/courses/introductic data-science-2/?utm_source=blog&utm_medium=stockmarketpredictionarticle) to predict the future stock of this company, starting with simple algorithms like averaging and linear regression, and then move on to advanced techniques like Auto ARIMA and LSTM.

The core idea behind this article is to showcase how these algorithms are implemented. I will briefly descri technique and provide relevant links to brush up on the concepts as and when necessary. In case you're a newcomer to the world of time series, I suggest going through the following articles first:

- A comprehensive beginner's guide to create a Time Series Forecast (https://www.analyticsvidhya.com/blog/2016/02/time-series-forecasting-codes-python/?utm_source=blog&utm_medium=stockmarketpredictionarticle)
- A Complete Tutorial on Time Series Modeling (https://www.analyticsvidhya.com/blog/2015/12/com tutorial-time-series-modeling/?utm_source=blog&utm_medium=stockmarketpredictionarticle)
- Free Course: Time Series Forecasting using Python (https://courses.analyticsvidhya.com/courses/creating-time-series-forecast-using-python?utm_source=blog&utm_medium=stockmarketpredictionarticle)

Project to Practice Time Series Forecasting

Problem Statement

Time Series forecasting & modeling plays an important role in data analysis. Time series analysis is a specialized branch of statistics used extensively in fields such as Econometrics & Operation Research.

Time Series is being widely used in analytics & data science. This is specifically designed time series pro for you and the challenge is to forecast traffic.

Practice Now (http://datahack.analyticsvidhya.com/contest/practic problem-time-series-2/? utm_source=av_blog&utm_medium=practice_blog_stock_prices)

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Understanding the Problem Statement

We'll dive into the implementation part of this article soon, but first it's important to establish what we're ai to solve. Broadly, stock market analysis is divided into two parts – Fundamental Analysis and Technical An

- Fundamental Analysis involves analyzing the company's future profitability on the basis of its current business environment and financial performance.
- Technical Analysis, on the other hand, includes reading the charts and using statistical figures to ide the trends in the stock market.

As you might have guessed, our focus will be on the technical analysis part. We'll be using a dataset from (https://www.quandl.com/) (you can find historical data for various stocks here) and for this particular proj have used the data for 'Tata Global Beverages (https://www.quandl.com/data/NSE/TATAGLOBAL-Tata-Glo Beverages-Limited)'. Time to dive in!

Note: Here is the dataset I used for the code: Download (https://s3-ap-south-1.amazonaws.com/av-blog-media/wp-content/uploads/2019/03/NSE-TATAGLOBAL11.csv)

We will first load the dataset and define the target variable for the problem:

```
#import packages
import pandas as pd
import numpy as np

#to plot within notebook
import matplotlib.pyplot as plt
%matplotlib inline

#setting figure size
from matplotlib.pylab import rcParams
rcParams['figure.figsize'] = 20,10

#for normalizing data
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler(feature_range=(0, 1))

#read the file
df = pd.read_csv('NSE-TATAGLOBAL(1).csv')

#print the head
df.head()
```

	Date	Open	High	Low	Last	Close	Total Trade Quantity	Turnover (Lacs)
0	2018-10-08	208.00	222.25	206.85	216.00	215.15	4642146.0	10062.83
1	2018-10-05	217.00	218.60	205.90	210.25	209.20	3519515.0	7407.06
2	2018-10-04	223.50	227.80	216.15	217.25	218.20	1728786.0	3815.79
3	2018-10-03	230.00	237.50	225.75	226.45	227.60	1708590.0	3960.27
4	2018-10-01	234.55	234.60	221.05	230.30	230.90	1534749.0	3486.05

There are multiple variables in the dataset – date, open, high, low, last, close, total_trade_quantity, and turn

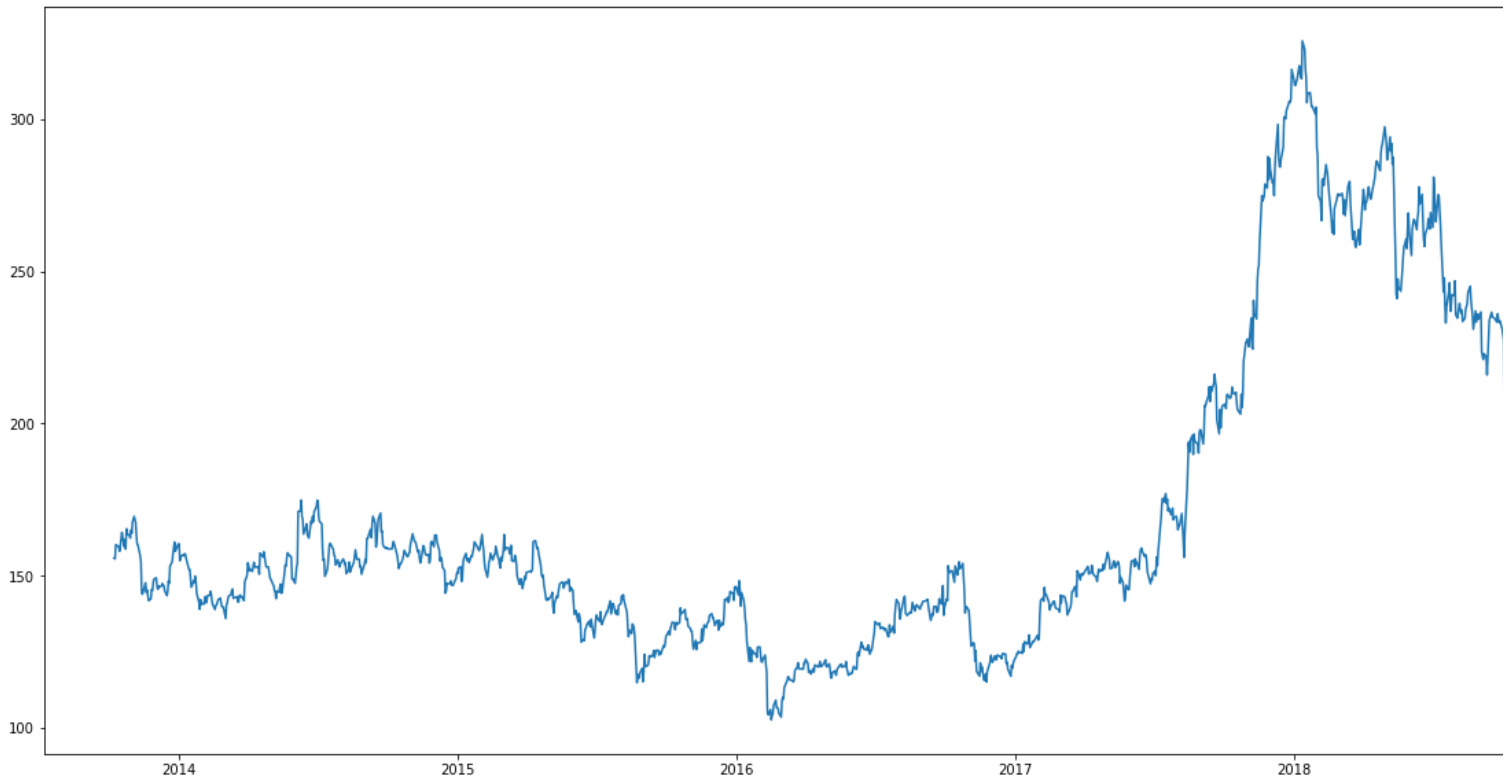
- The columns *Open* and *Close* represent the starting and final price at which the stock is traded on a particular day.
- *High*, *Low* and *Last* represent the maximum, minimum, and last price of the share for the day.
- *Total Trade Quantity* is the number of shares bought or sold in the day and *Turnover (Lacs)* is the turr

of the particular company on a given date.

Another important thing to note is that the market is closed on weekends and public holidays.Notice the ab table again, some date values are missing – 2/10/2018, 6/10/2018, 7/10/2018. Of these dates, 2nd is a na holiday while 6th and 7th fall on a weekend.

The profit or loss calculation is usually determined by the closing price of a stock for the day, hence we will consider the closing price as the target variable. Let's plot the target variable to understand how it's shapin our data:

```
#setting index as date
df['Date'] = pd.to_datetime(df.Date,format='%Y-%m-%d')
df.index = df['Date']

#plot
plt.figure(figsize=(16,8))
plt.plot(df['Close'], label='Close Price history')
```



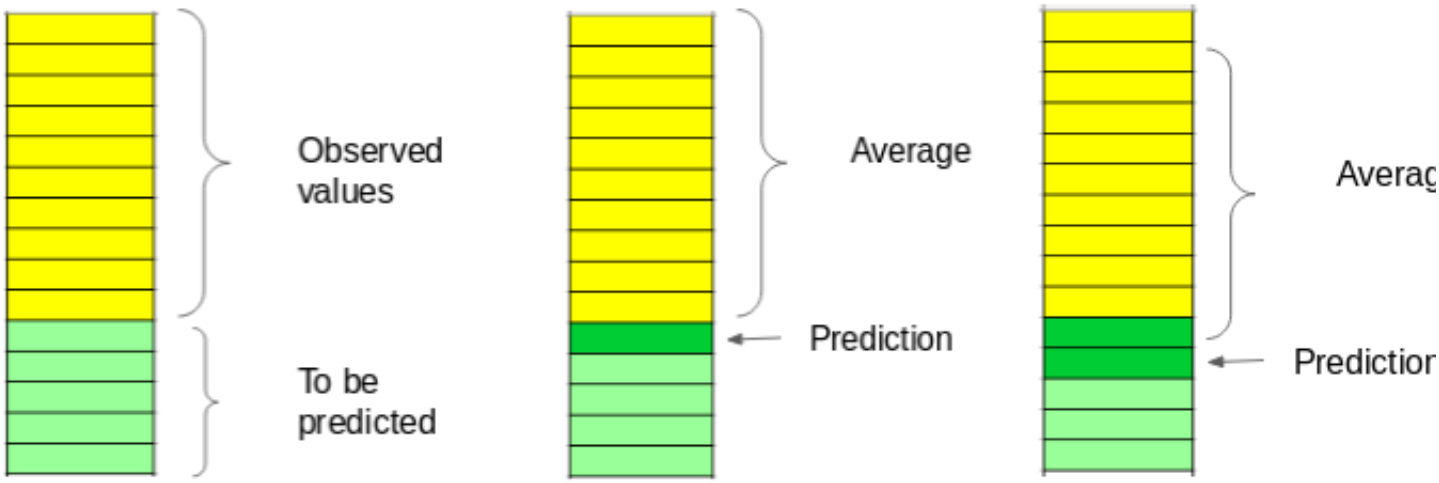
In the upcoming sections, we will explore these variables and use different techniques to predict the daily c price of the stock.

Moving Average

Introduction

'Average' is easily one of the most common things we use in our day-to-day lives. For instance, calculating t
average marks to determine overall performance, or finding the average temperature of the past few days t
an idea about today's temperature – these all are routine tasks we do on a regular basis. So this is a good
starting point to use on our dataset for making predictions.

The predicted closing price for each day will be the average of a set of previously observed values. Instead
using the simple average, we will be using the moving average technique which uses the latest set of value
each prediction. In other words, for each subsequent step, the predicted values are taken into consideratio
removing the oldest observed value from the set. Here is a simple figure that will help you understand this
more clarity.



We will implement this technique on our dataset. The first step is to create a dataframe that contains only t
Date and *Close* price columns, then split it into train and validation sets to verify our predictions.

Implementation

(https://id.analyticsvidhya.com/accounts/login/?
next=https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnd-deep-lea
techniques-python/?&utm_source=coding-window-blog&source=coding-window-blog)

run ▶ open in

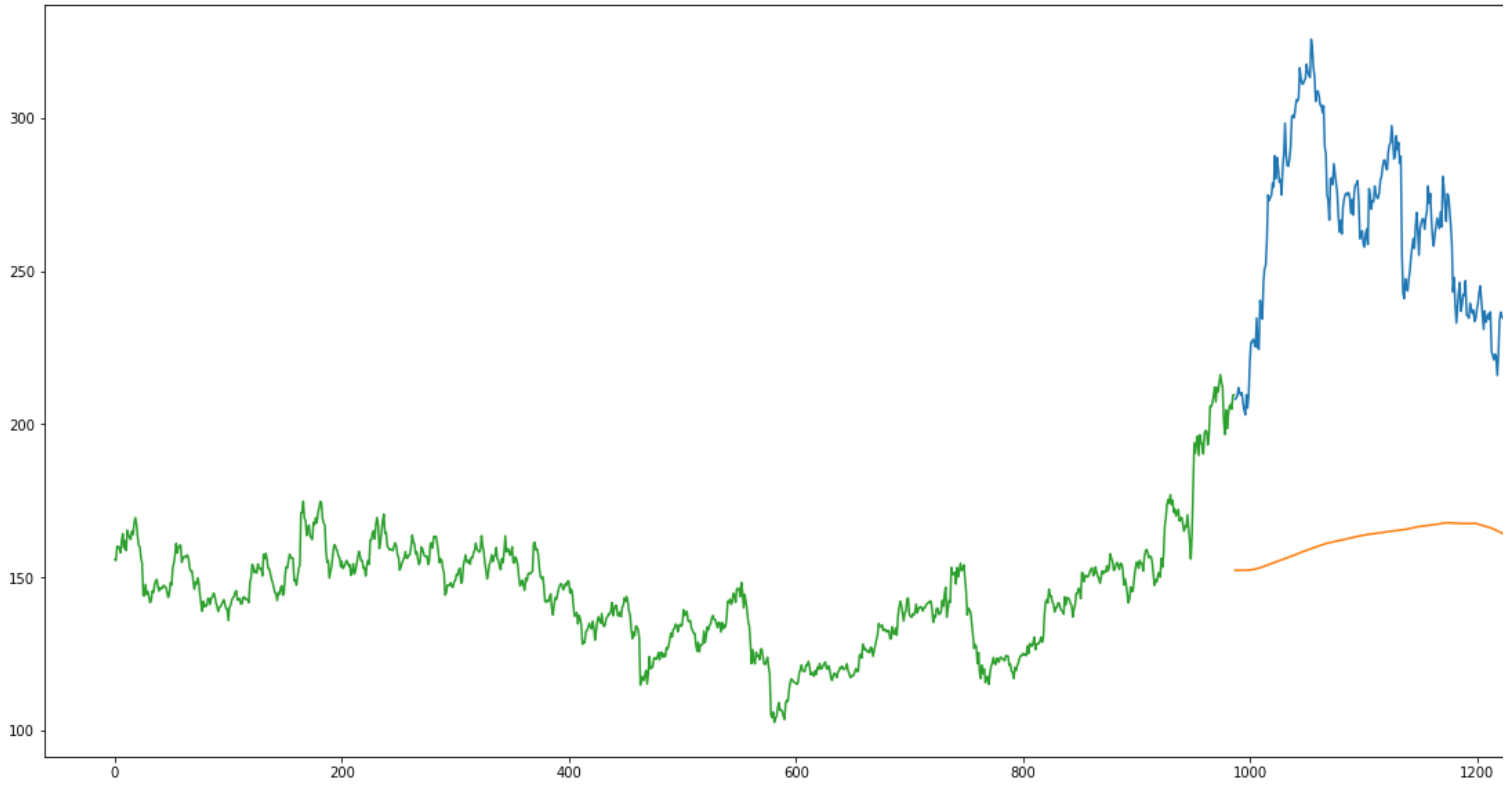
main.py

```python
# importing libraries
import pandas as pd
import numpy as np

# reading the data
df = pd.read_csv('NSE-TATAGLOBAL11.csv')

# looking at the first five rows of the data
print(df.head())
print('\n Shape of the data:')
print(df.shape)

# setting the index as date
df['Date'] = pd.to_datetime(df.Date,format='%Y-%m-%d')
df.index = df['Date']

#creating dataframe with date and the target variable
data = df.sort_index(ascending=True, axis=0)
new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close

for i in range(0,len(data)):
     new_data['Date'][i] = data['Date'][i]
     new_data['Close'][i] = data['Close'][i]

# NOTE: While splitting the data into train and validation set, we
cannot use random splitting since that will destroy the time component
So here we have set the last year's data into validation and the 4
years' data before that into train set.

# splitting into train and validation
train = new_data[:987]
```

```
Python 3.7.4 (default, Jul  9 2019, 00:06:43)
[GCC 6.3.0 20170516] on linux
```

Just checking the RMSE does not help us in understanding how the model performed. Let's visualize this to more intuitive understanding. So here is a plot of the predicted values along with the actual values.

```
#plot
valid['Predictions'] = 0
valid['Predictions'] = preds
plt.plot(train['Close'])
plt.plot(valid[['Close', 'Predictions']])
```



Inference

The RMSE value is close to 105 but the results are not very promising (as you can gather from the plot). Th predicted values are of the same range as the observed values in the train set (there is an increasing trend initially and then a slow decrease).

In the next section, we will look at two commonly used machine learning techniques – Linear Regression a kNN, and see how they perform on our stock market data.

Linear Regression

Introduction

The most basic machine learning algorithm that can be implemented on this data is linear regression. The regression model returns an equation that determines the relationship between the independent variables a the dependent variable.

The equation for linear regression can be written as:

$$Y = \theta_1 X_1 + \theta_2 X_2 + \ldots \theta_n X_n$$

Here, x_1, x_2,....x_n represent the independent variables while the coefficients θ_1, θ_2, ... θ_n represent the weigh
You can refer to the following article to study linear regression in more detail:

- A comprehensive beginners guide for Linear, Ridge and Lasso Regression (https://www.analyticsvidhya.com/blog/2017/06/a-comprehensive-guide-for-linear-ridge-and-lasso-regression/).

For our problem statement, we do not have a set of independent variables. We have only the dates instead. us use the date column to extract features like – day, month, year, mon/fri etc. and then fit a linear regressi model.

Implementation

We will first sort the dataset in ascending order and then create a separate dataset so that any new feature created does not affect the original data.

```
#setting index as date values
df['Date'] = pd.to_datetime(df.Date,format='%Y-%m-%d')
df.index = df['Date']

#sorting
data = df.sort_index(ascending=True, axis=0)

#creating a separate dataset
new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close'])

for i in range(0,len(data)):
    new_data['Date'][i] = data['Date'][i]
    new_data['Close'][i] = data['Close'][i]
```

```
#create features
from fastai.structured import  add_datepart
add_datepart(new_data, 'Date')
new_data.drop('Elapsed', axis=1, inplace=True)  #elapsed will be the time stamp
```

This creates features such as:

'Year', 'Month', 'Week', 'Day', 'Dayofweek', 'Dayofyear', 'Is_month_end', 'Is_month_start', 'Is_quarter_end', 'Is_quarter_start', 'Is_year_end', and 'Is_year_start'.

*Note: I have used add_datepart from fastai library. If you do not have it installed, you can simply use the command **pip install fastai**. Otherwise, you can create these feature using simple for loops in python. I h shown an example below.*

Apart from this, we can add our own set of features that we believe would be relevant for the predictions. F instance, my hypothesis is that the first and last days of the week could potentially affect the closing price stock far more than the other days. So I have created a feature that identifies whether a given day is Monday/Friday or Tuesday/Wednesday/Thursday. This can be done using the following lines of code:

```
new_data['mon_fri'] = 0
for i in range(0,len(new_data)):
    if (new_data['Dayofweek'][i] == 0 or new_data['Dayofweek'][i] == 4):
        new_data['mon_fri'][i] = 1
    else:
        new_data['mon_fri'][i] = 0
```

If the day of week is equal to 0 or 4, the column value will be 1, otherwise 0. Similarly, you can create multip features. *If you have some ideas for features that can be helpful in predicting stock price, please share in t comment section.*

We will now split the data into train and validation sets to check the performance of the model.

```
#split into train and validation
train = new_data[:987]
valid = new_data[987:]

x_train = train.drop('Close', axis=1)
y_train = train['Close']
x_valid = valid.drop('Close', axis=1)
y_valid = valid['Close']

#implement linear regression
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(x_train,y_train)
```

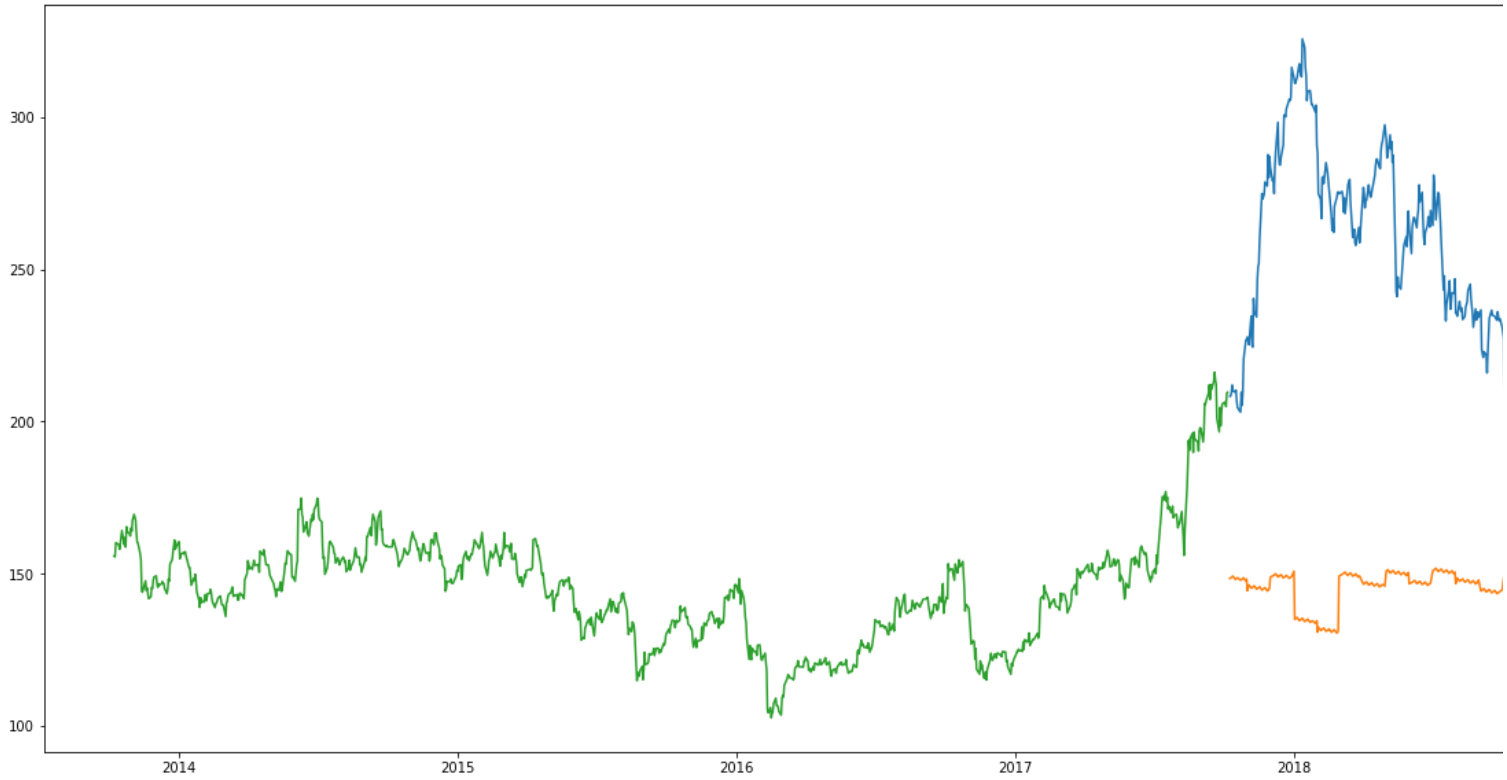
Results

```
#make predictions and find the rmse
preds = model.predict(x_valid)
rms=np.sqrt(np.mean(np.power((np.array(y_valid)-np.array(preds)),2)))
rms
```

```
121.16291596523156
```

The RMSE value is higher than the previous technique, which clearly shows that linear regression has perfo poorly. Let's look at the plot and understand why linear regression has not done well:

```
#plot
valid['Predictions'] = 0
valid['Predictions'] = preds

valid.index = new_data[987:].index
train.index = new_data[:987].index

plt.plot(train['Close'])
plt.plot(valid[['Close', 'Predictions']])
```



Inference

Linear regression is a simple technique and quite easy to interpret, but there are a few obvious disadvantag
One problem in using regression algorithms is that the model overfits to the date and month column. Inste
taking into account the previous values from the point of prediction, the model will consider the value from
same *date* a month ago, or the same *date/month* a year ago.

As seen from the plot above, for January 2016 and January 2017, there was a drop in the stock price. The r
has predicted the same for January 2018. A linear regression technique can perform well for problems suc
Big Mart sales (https://datahack.analyticsvidhya.com/contest/practice-problem-big-mart-sales-iii/) where
independent features are useful for determining the target value.

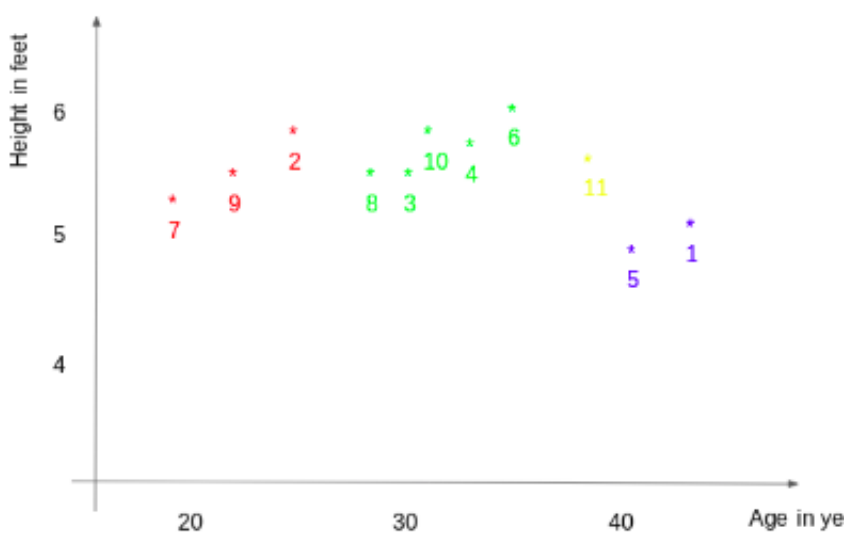
k-Nearest Neighbours

Introduction

Another interesting ML algorithm that one can use here is kNN (k nearest neighbours). Based on the indep variables, kNN finds the similarity between new data points and old data points. Let me explain this with a example.

Consider the height and age for 11 people. On the basis of given features ('Age' and 'Height'), the table can represented in a graphical format as shown below:

ID	Age	Height	Weight
1	45	5	77
2	26	5.11	47
3	30	5.6	55
4	34	5.9	59
5	40	4.8	72
6	36	5.8	60
7	19	5.3	40
8	28	5.8	60
9	23	5.5	45
10	32	5.6	58
11	38	5.5	?



To determine the weight for ID #11, kNN considers the weight of the nearest neighbors of this ID. The weig ID #11 is predicted to be the average of it's neighbors. If we consider three neighbours (k=3) for now, the w for ID#11 would be = (77+72+60)/3 = 69.66 kg.

ID	Height	Age	Weight
1	5	45	77
5	4.8	40	72
6	5.8	36	60

For a detailed understanding of kNN, you can refer to the following articles:

- Introduction to k-Nearest Neighbors: Simplified (https://www.analyticsvidhya.com/blog/2018/03/introduction-k-neighbours-algorithm-clustering/)

- A Practical Introduction to K-Nearest Neighbors Algorithm for Regression (https://www.analyticsvidhya.com/blog/2018/08/k-nearest-neighbor-introduction-regression-python/

Implementation

```
#importing libraries
from sklearn import neighbors
from sklearn.model_selection import GridSearchCV
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler(feature_range=(0, 1))
```

Using the same train and validation set from the last section:

```
#scaling data
x_train_scaled = scaler.fit_transform(x_train)
x_train = pd.DataFrame(x_train_scaled)
x_valid_scaled = scaler.fit_transform(x_valid)
x_valid = pd.DataFrame(x_valid_scaled)

#using gridsearch to find the best parameter
params = {'n_neighbors':[2,3,4,5,6,7,8,9]}
knn = neighbors.KNeighborsRegressor()
model = GridSearchCV(knn, params, cv=5)

#fit the model and make predictions
model.fit(x_train,y_train)
preds = model.predict(x_valid)
```

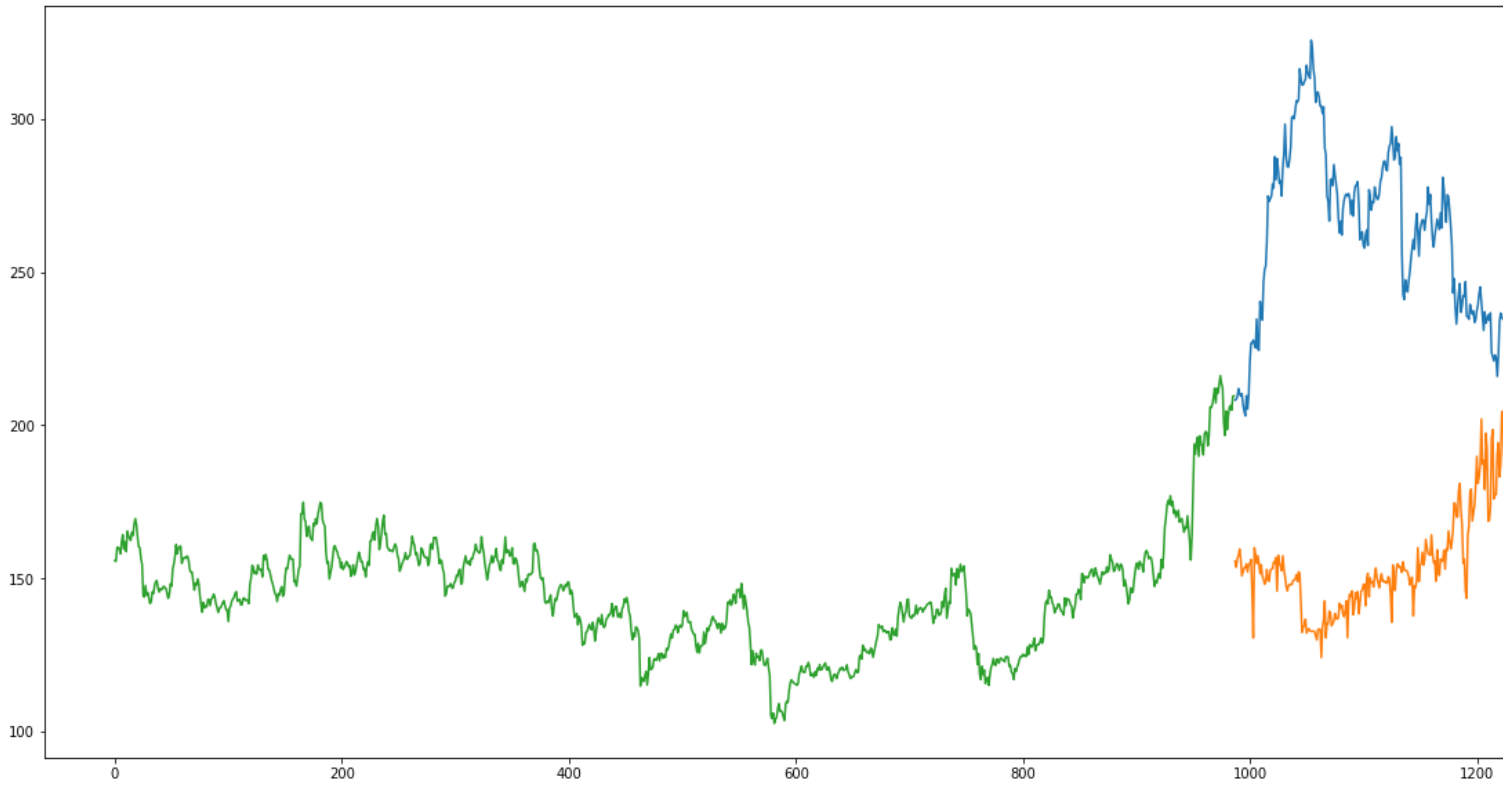
Results

```
#rmse
rms=np.sqrt(np.mean(np.power((np.array(y_valid)-np.array(preds)),2)))
rms
```

```
115.17086550026721
```

There is not a huge difference in the RMSE value, but a plot for the predicted and actual values should prov more clear understanding.

```
#plot
valid['Predictions'] = 0
valid['Predictions'] = preds
plt.plot(valid[['Close', 'Predictions']])
plt.plot(train['Close'])
```



Inference

The RMSE value is almost similar to the linear regression model and the plot shows the same pattern. Like regression, kNN also identified a drop in January 2018 since that has been the pattern for the past years. W safely say that regression algorithms have not performed well on this dataset.

Let's go ahead and look at some time series forecasting techniques to find out how they perform when fac with this stock prices prediction challenge.

Auto ARIMA

Introduction

ARIMA is a very popular statistical method for time series forecasting. ARIMA models take into account th values to predict the future values. There are three important parameters in ARIMA:

- p (past values used for forecasting the next value)
- q (past forecast errors used to predict the future values)
- d (order of differencing)

Parameter tuning for ARIMA consumes a lot of time. So we will use auto ARIMA which automatically selec best combination of (p,q,d) that provides the least error. To read more about how auto ARIMA works, refer t article:

- Build High Performance Time Series Models using Auto ARIMA (https://www.analyticsvidhya.com/blog/2018/08/auto-arima-time-series-modeling-python-r/)

Implementation

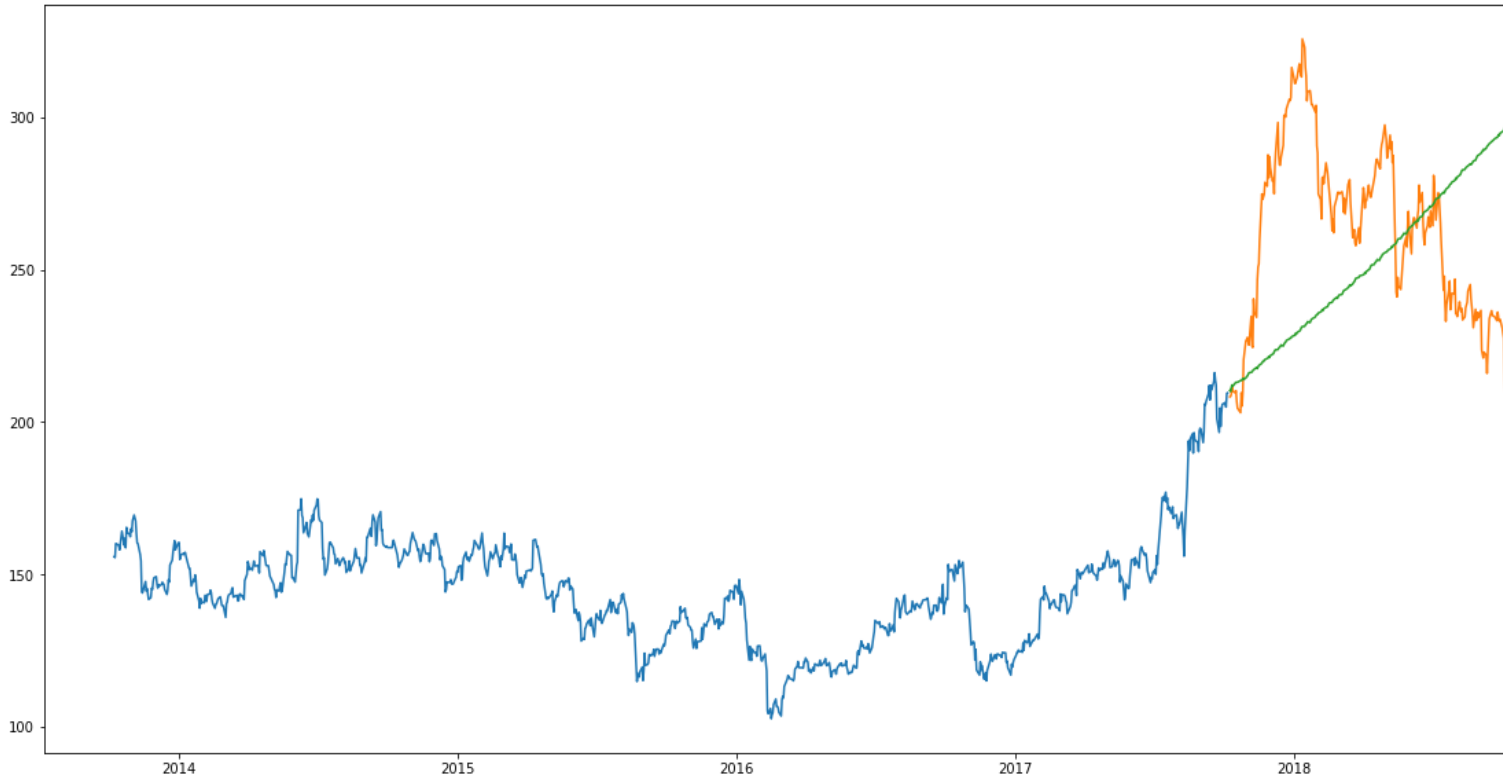
```
from pyramid.arima import auto_arima

data = df.sort_index(ascending=True, axis=0)

train = data[:987]
valid = data[987:]

training = train['Close']
validation = valid['Close']

model = auto_arima(training, start_p=1, start_q=1,max_p=3, max_q=3, m=12,start_P=0, seaso
True,d=1, D=1, trace=True,error_action='ignore',suppress_warnings=True)
model.fit(training)

forecast = model.predict(n_periods=248)
forecast = pd.DataFrame(forecast,index = valid.index,columns=['Prediction'])
```

Results

```
rms=np.sqrt(np.mean(np.power((np.array(valid['Close'])-np.array(forecast['Prediction'])),
rms
```

```
44.954584993246954
```

```
#plot
plt.plot(train['Close'])
plt.plot(valid['Close'])
plt.plot(forecast['Prediction'])
```



Inference

As we saw earlier, an auto ARIMA model uses past data to understand the pattern in the time series. Using values, the model captured an increasing trend in the series. Although the predictions using this technique better than that of the previously implemented machine learning models, these predictions are still not clos the real values.

As its evident from the plot, the model has captured a trend in the series, but does not focus on the season part. In the next section, we will implement a time series model that takes both trend and seasonality of a s into account.

Prophet

Introduction

There are a number of time series techniques that can be implemented on the stock prediction dataset, bu of these techniques require a lot of data preprocessing before fitting the model. Prophet, designed and pio by Facebook, is a time series forecasting library that requires no data preprocessing and is extremely simp implement. The input for Prophet is a dataframe with two columns: date and target (ds and y).

Prophet tries to capture the seasonality in the past data and works well when the dataset is large. Here is a interesting article that explains Prophet in a simple and intuitive manner:

- Generate Quick and Accurate Time Series Forecasts using Facebook's Prophet (https://www.analyticsvidhya.com/blog/2018/05/generate-accurate-forecasts-facebook-prophet-pyt r/).

Implementation

(https://www.analyticsvidhya.com/myfeed/?utm-source=blog&utm-medium=top-icon/)

BLOG (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/?UTM_SOURCE

COURSES (HTTPS://COURSES.ANALYTICSVIDHYA.COM)

HACKATHONS (HTTPS://DATAHACK.A

DSAT (HTTPS://DSAT.ANALYTICSVIDHYA.COM/?UTM_SOURCE=HOME_BLOG_NAVBAR)

BOOTCAMP (HTTPS://WWW.ANALYTICSVIDHYA.COM/DATA-SCIENCE-IMMERSIVE-BOOTCAMP/?UT

CONTACT (HTTPS://WWW.ANALYTICSVIDHYA.COM/CONTACT/)

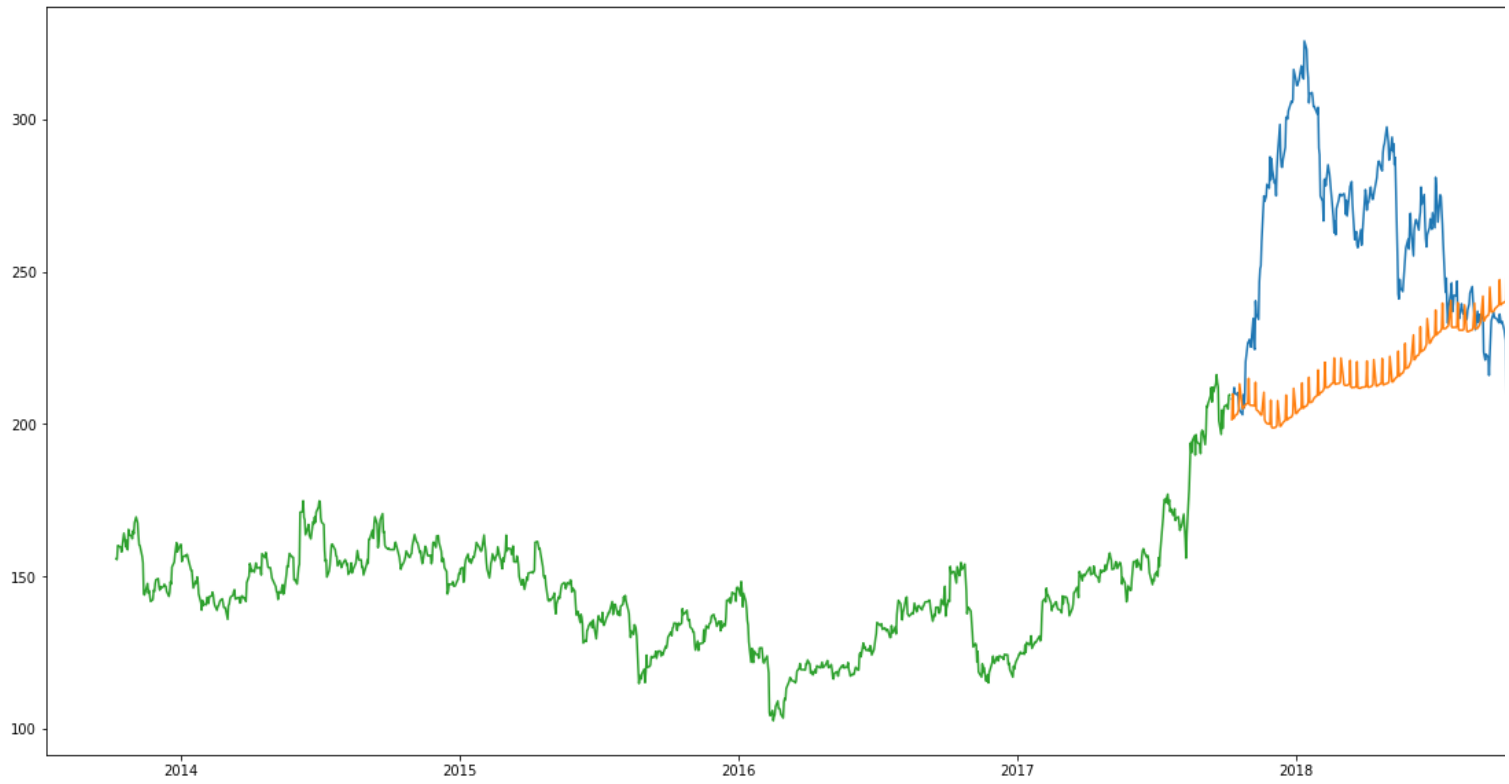
```
#importing prophet
from fbprophet import Prophet

#creating dataframe
new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close'])

for i in range(0,len(data)):
    new_data['Date'][i] = data['Date'][i]
    new_data['Close'][i] = data['Close'][i]

new_data['Date'] = pd.to_datetime(new_data.Date,format='%Y-%m-%d')
new_data.index = new_data['Date']

#preparing data
new_data.rename(columns={'Close': 'y', 'Date': 'ds'}, inplace=True)

#train and validation
train = new_data[:987]
valid = new_data[987:]

#fit the model
model = Prophet()
model.fit(train)

#predictions
close_prices = model.make_future_dataframe(periods=len(valid))
forecast = model.predict(close_prices)
```

Results

```
#rmse
forecast_valid = forecast['yhat'][987:]
rms=np.sqrt(np.mean(np.power((np.array(valid['y'])-np.array(forecast_valid)),2)))
rms
```

```
57.494461930575149
```

```
#plot
valid['Predictions'] = 0
valid['Predictions'] = forecast_valid.values

plt.plot(train['y'])
plt.plot(valid[['y', 'Predictions']])
```



Inference

Prophet (like most time series forecasting techniques) tries to capture the trend and seasonality from past This model usually performs well on time series datasets, but fails to live up to it's reputation in this case.

As it turns out, stock prices do not have a particular trend or seasonality. It highly depends on what is curre going on in the market and thus the prices rise and fall. Hence forecasting techniques like ARIMA, SARIMA Prophet would not show good results for this particular problem.

Let us go ahead and try another advanced technique – Long Short Term Memory (LSTM).

Long Short Term Memory (LSTM)

Introduction

LSTMs are widely used for sequence prediction problems and have proven to be extremely effective. The re
they work so well is because LSTM is able to store past information that is important, and forget the inform
that is not. LSTM has three gates:

- **The input gate:** The input gate adds information to the cell state
- **The forget gate:** It removes the information that is no longer required by the model
- **The output gate:** Output Gate at LSTM selects the information to be shown as output

For a more detailed understanding of LSTM and its architecture, you can go through the below article:

- Introduction to Long Short Term Memory (https://www.analyticsvidhya.com/blog/2017/12/fundame of-deep-learning-introduction-to-lstm/)

For now, let us implement LSTM as a black box and check it's performance on our particular data.

Implementation

```
#importing required libraries
from sklearn.preprocessing import MinMaxScaler
from keras.models import Sequential
from keras.layers import Dense, Dropout, LSTM

#creating dataframe
data = df.sort_index(ascending=True, axis=0)
new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close'])
for i in range(0,len(data)):
    new_data['Date'][i] = data['Date'][i]
    new_data['Close'][i] = data['Close'][i]

#setting index
```

```
new_data.index = new_data.Date
new_data.drop('Date', axis=1, inplace=True)

#creating train and test sets
dataset = new_data.values

train = dataset[0:987,:]
valid = dataset[987:,:]

#converting dataset into x_train and y_train
scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(dataset)

x_train, y_train = [], []
for i in range(60,len(train)):
    x_train.append(scaled_data[i-60:i,0])
    y_train.append(scaled_data[i,0])
x_train, y_train = np.array(x_train), np.array(y_train)

x_train = np.reshape(x_train, (x_train.shape[0],x_train.shape[1],1))

# create and fit the LSTM network
model = Sequential()
model.add(LSTM(units=50, return_sequences=True, input_shape=(x_train.shape[1],1)))
model.add(LSTM(units=50))
model.add(Dense(1))

model.compile(loss='mean_squared_error', optimizer='adam')
model.fit(x_train, y_train, epochs=1, batch_size=1, verbose=2)

#predicting 246 values, using past 60 from the train data
inputs = new_data[len(new_data) - len(valid) - 60:].values
inputs = inputs.reshape(-1,1)
inputs  = scaler.transform(inputs)
```

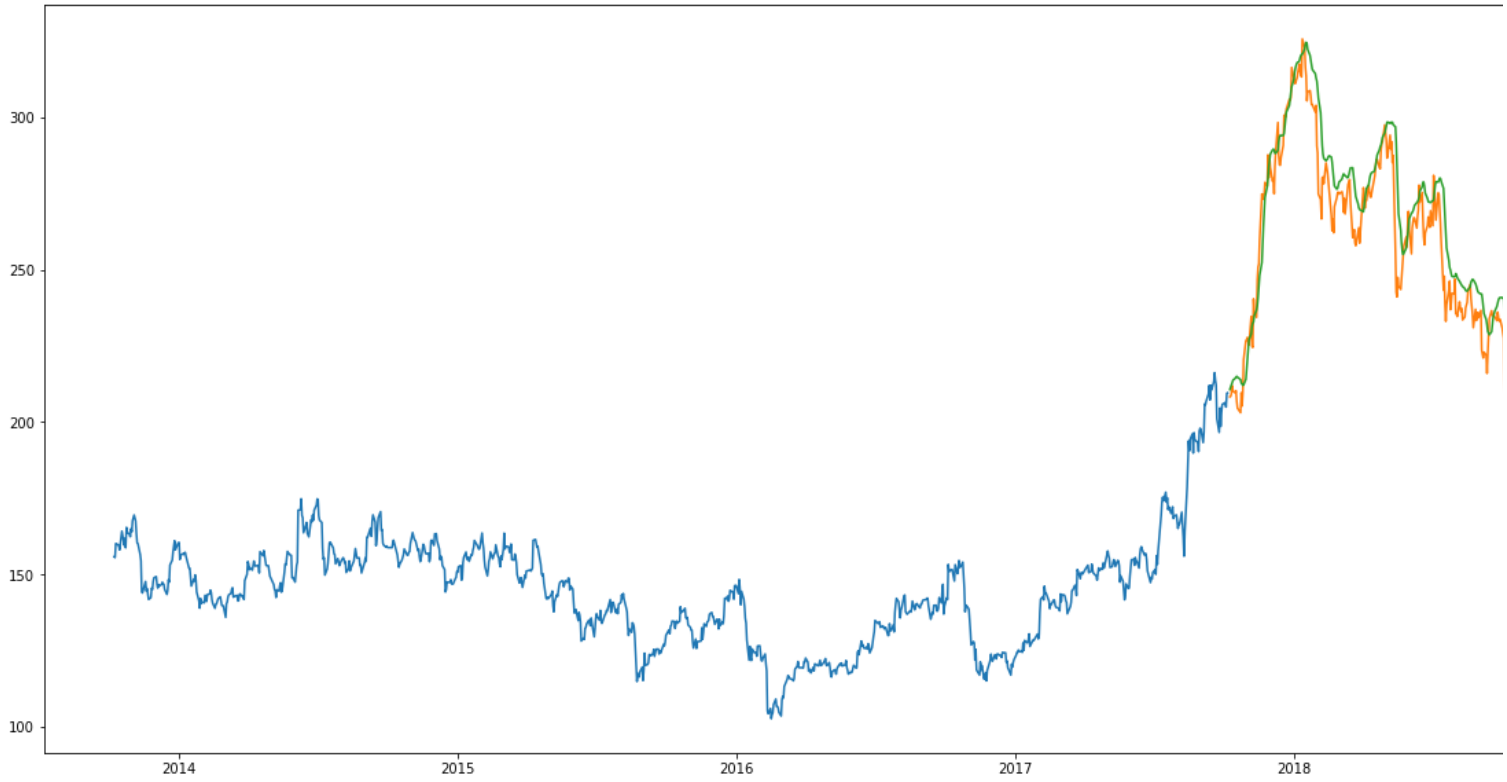
```
X_test = []
for i in range(60,inputs.shape[0]):
    X_test.append(inputs[i-60:i,0])
X_test = np.array(X_test)

X_test = np.reshape(X_test, (X_test.shape[0],X_test.shape[1],1))
closing_price = model.predict(X_test)
closing_price = scaler.inverse_transform(closing_price)
```

Results

```
rms=np.sqrt(np.mean(np.power((valid-closing_price),2)))
rms
```

```
11.772259608962642
```

```
#for plotting
train = new_data[:987]
valid = new_data[987:]
valid['Predictions'] = closing_price
plt.plot(train['Close'])
plt.plot(valid[['Close','Predictions']])
```



Inference

Wow! The LSTM model can be tuned for various parameters such as changing the number of LSTM layers, adding dropout value or increasing the number of epochs. But are the predictions from LSTM enough to ide whether the stock price will increase or decrease? Certainly not!

As I mentioned at the start of the article, stock price is affected by the news about the company and other factors like demonetization or merger/demerger of the companies. There are certain intangible factors as which can often be impossible to predict beforehand.

End Notes

Time series forecasting is a very intriguing field to work with, as I have realized during my time writing thes articles. There is a perception in the community that it's a complex field, and while there is a grain of truth i there, it's not so difficult once you get the hang of the basic techniques.

I am interested in finding out how LSTM works on a different kind of time series problem and encourage yc try it out on your own as well. If you have any questions, feel free to connect with me in the comments sect below.

You can also read this article on Analytics Vidhya's Android APP

(//play.google.com/store/apps/details?id=com.analyticsvidhya.android&utm_source=blog_article&utm_campaign=blog&pcampaignid=MKT-Other-global-all-co-prtnr-py-PartBadge-Mar2515-1)

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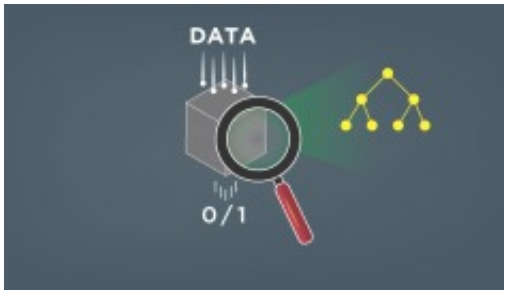

(https://www.analyticsvidhya.com/blog/2019/08/decoding-black-box-step-by-step-guide-interpretable-machine-learning-models-python/)
Decoding the Black Box: An Important Introduction to Interpretable Machine Learning Models in Python (https://www.analyticsvidhya.com/blog/2019/08/decoding-black-box-

(https://www.analyticsvidhya.com/blog/2018/06/comprehensive-guide-for-ensemble-models/)
A Comprehensive Guide to Ensemble Learning (with Python codes) (https://www.analyticsvidhya.com/blog/2018/06/comprehensive-guide-for-ensemble-models/)
June 18, 2018
In "Classification"

(https://www.analyticsvidhya.com/blog/2015/08/introduction-ensemble-learning/)
Basics of Ensemble Learning Explained in Simple English (https://www.analyticsvidhya.com/blog/2015/08/introduction-ensemble-learning/)
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In "Intermediate"

8AM–11

TAGS : AUTO ARIMA (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/AUTO-ARIMA/), KNN (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/KNN/), LINEAR REGRESSION (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/LINEAR-REGRESSION/), LIVE CODING (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/LIVE-CODING/), LSTM (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/LSTM/ MOVING AVERAGE (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/MOVING-AVERAGE/), PROPHET (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/PROPHET/), PYTHON (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/PYTHO STOCK MARKET ANALYSIS (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/STOCK-MARKET-ANALYSIS/), STOCK PREDICTION (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/STOCK-PREDICTION/), TIME SERIES (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/TIME-SERIES/), TIME SERIES FORECASTING (HTTPS://WWW.ANALYTICSVIDHYA.COM/BLOG/TAG/TIME-SERIES-FORECASTING/)

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(https://www.analyticsvidhya.com/blog/author/aishwaryasingh/)

Aishwarya Singh (Https://Www.analyticsvidhya.com/Blog/Author/Aishwaryasingh/)

An avid reader and blogger who loves exploring the endless world of data science and artificial intelligence. Fascinated by the limitless applications of ML and AI; eager to learn and discover the depths of data science.

This article is quite old and you might not get a prompt response from the author. We request you to post this comment on Analytics Vidhya's **Discussion portal** (https://discuss.analyticsvidhya.com/) to get your queries resolved

90 COMMENTS

JAMES VERDANT

October 25, 2018 at 6:53 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-155456)

Isn't the LSTM model using your "validation" data as part of its modeling to generate its predictions since it goes back 60 days. Your other techniques are only using the "training" data and don't have the benefit of lo back 60 days from the target prediction day. Is this a fair comparison?

AISHWARYA SINGH

October 26, 2018 at 12:08 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac learningnd-deep-learning-techniques-python/#comment-155466)

Hi James,

The idea isn't to compare the techniques but to see what works best for stock market prediction Certainly for this problem LSTM works well, while for other problems, other techniques might pe better. We can add a lookback component with LSTM is an added advantage

---

TERU

October 26, 2018 at 6:39 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-sto machine-learningnd-deep-learning-techniques-python/#comment-155472)

I think that you cannot say LSTM works well because what it actually does is to predic day ahead based on the recent 60 days. In other words, the model just go over all the validation data daily basis to predict “tomorrow”. This is a totally different prediction scheme from the other prediction methods, which have to predict the entire validation points without seeing any of information in the validation data. If you use the “daily ba prediction” scheme for other mothods, any of methods would produce a good result, I guess.

AISHWARYA SINGH

October 26, 2018 at 7:46 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machin learningnd-deep-learning-techniques-python/#comment-155473)

Hi Teru,

When James first pointed out, I started looking at how can I use validation other models (its simpler with LSTM). For ARIMA and PROPHET, the input c only be a univariate series so we can make prediction for one day, change t training set (add that day’s value) after each prediction and retrain before predicting for the next day. For moving average and regression it should be comparatively easier. If you both have any suggestions as to how can I upd train data with each day’s values, do share your ideas, I am really interested finding out how the results turn out to be!

JAY

October 25, 2018 at 11:54 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learninc deep-learning-techniques-python/#comment-155460)

Getting index error –

————————————————————————

IndexError Traceback (most recent call last)
in
1 #Results
—-> 2 rms=np.sqrt(np.mean(np.power((np.array(valid[‘Close’]) – np.array(valid[‘Predictions’])),2)))
3 rms

IndexError: only integers, slices (`:`), ellipsis (`…`), numpy.newaxis (`None`) and integer or boolean arrays are indices

AISHWARYA SINGH

October 26, 2018 at 11:49 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac learningnd-deep-learning-techniques-python/#comment-155464)

Hi Jay,

Please use the following command before calculating rmse `valid['Predictions'] = 0` `valid['Predictions'] = closing_price` . I have updated the same in the article

PANKAJ

October 26, 2018 at 10:26 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learninc deep-learning-techniques-python/#comment-155461)

After running the following codes-
train['Date'].min(), train['Date'].max(), valid['Date'].min(), valid['Date'].max()

(Timestamp('2013-10-08 00:00:00'),
Timestamp('2017-10-06 00:00:00'),
Timestamp('2017-10-09 00:00:00'),
Timestamp('2018-10-08 00:00:00'))

I am getting the following error :
name 'Timestamp' is not defined

Please help.

AISHWARYA SINGH

October 26, 2018 at 11:39 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac learningnd-deep-learning-techniques-python/#comment-155463)

Hi Pankaj,

The command is only
`train['Date'].min(), train['Date'].max(), valid['Date'].min(), valid['Date']`
, the timestamp is the result I got by running the above command.

VISHAL

November 13, 2018 at 3:33 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-ma
learningnd-deep-learning-techniques-python/#comment-155702)

Pankaj use below code
from pandas import Timestamp

AISHWARYA SINGH

November 13, 2018 at 4:51 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-s
price-machine-learningnd-deep-learning-techniques-python/#comment-155703)

Hi Vishal,

I believe Pankaj has accidentally pasted the result of the code, along with the comma
Thus, importing Timestamp would not solve the issue.

JOSEPH

March 4, 2019 at 5:13 pm (https://www.analyticsvidhya.com/blog/2018/10/pred
stock-price-machine-learningnd-deep-learning-techniques-python/#comment-15

It actually solved it!

ZARIEF MARZUKI LAO

October 26, 2018 at 3:35 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr
learning-techniques-python/#comment-155468)

Hi Aishwarya,

Just curious. LSTM works just TOO well !!

Is splitting dataset to train & valid step carry out after the normalizing step ?!

i.e.
#converting dataset into x_train and y_train
scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(dataset)

then

dataset = new_data

train = dataset[:987]
valid = dataset[987:]

Then this
x_train, y_train = [], []
for i in range(60,len(train)): # <- replace dataset with train ?!
x_train.append(scaled_data[i-60:i,0])
y_train.append(scaled_data[i,0])
x_train, y_train = np.array(x_train), np.array(y_train)

Guide me on this.

Thanks

AISHWARYA SINGH

October 26, 2018 at 4:42 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machlearningnd-deep-learning-techniques-python/#comment-155470)

Hi Zarief,

Yes, the train and test set are created after scaling the data using the for loop :

```
x_train, y_train = [], []
for i in range(60,len(train )):
x_train.append(scaled_data[i-60:i,0]) #we have used the scaled data here
y_train.append(scaled_data[i,0])
x_train, y_train = np.array(x_train), np.array(y_train)
```

Secondly, the command `dataset = new_data.values` will be before scaling the data, as sho the article, since `dataset` is used for scaling and hence must be defined before.

ROHIT

October 26, 2018 at 10:25 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learninc deep-learning-techniques-python/#comment-155474)

hi

I'm getting below error...
""">>> #import packages
>>> import pandas as pd

Traceback (most recent call last):
File “”, line 1, in
import pandas as pd
ImportError: No module named pandas”””””

AISHWARYA SINGH

October 29, 2018 at 10:58 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac
learningnd-deep-learning-techniques-python/#comment-155488)

Hi rohit,

Is the issue resolved? Have you worked with pandas previously?

NICK

January 18, 2019 at 10:11 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac
learningnd-deep-learning-techniques-python/#comment-156643)

Try running
pip install pandas

in a command line

SHAN

October 27, 2018 at 1:55 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr
learning-techniques-python/#comment-155476)

Hi..

Thanks for nicely elaborating LSTM implementation in the article.

However, in LSTM rms part if you can guide, as I am getting the following error :

valid[‘Predictions’] = 0.0
valid[‘Predictions’] = closing_price
rms=np.sqrt(np.mean(np.power((np.array(valid[‘Close’])-np.array(valid[‘Predictions’])),2)))
rms

##
IndexError Traceback (most recent call last)
in ()
—-> 1 valid[‘Predictions’] = 0.0
2 valid[‘Predictions’] = closing_price
3 rms=np.sqrt(np.mean(np.power((np.array(valid[‘Close’])-np.array(valid[‘Predictions’])),2)))
4 rms

IndexError: only integers, slices (`:`), ellipsis (`…`), numpy.newaxis (`None`) and integer or boolean arrays are
indices

JAY

October 27, 2018 at 3:02 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr
learning-techniques-python/#comment-155478)

Still same error –

————————————————————
IndexError Traceback (most recent call last)
in
—-> 1 valid[‘Predictions’] = closing_price

IndexError: only integers, slices (`:`), ellipsis (`…`), numpy.newaxis (`None`) and integer or boolean arrays are
indices

And also why are we doing valid[‘Predictions’] = 0 and valid[‘Predictions’] = closing_price instead of
valid[‘Predictions’] = closing_price

AISHWARYA SINGH

October 27, 2018 at 11:15 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac
learningnd-deep-learning-techniques-python/#comment-155480)

Yes you can skip the line but it will still show an error because the index hasn’t been defined. Hav
followed the code from the start? Please add the following code lines and check if it works

new_data.index = data[‘Date’] #considering the date column has been set to datetime format
valid.index = new_data[987:].index
train.index = new_data[:987].index

Let me know if this works. Other wise share the notebook you are working on and I will look into

ROBERTO

October 27, 2018 at 8:30 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-155483)

Hi,

Nice article.

I have installed fastai but I am getting the following error:
ModuleNotFoundError: No module named 'fastai.structured'

Any idea?

AISHWARYA SINGH

October 31, 2018 at 12:22 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac learningnd-deep-learning-techniques-python/#comment-155508)

Hi Roberto,

Directly clone it from here : https://github.com/fastai/fastai (https://github.com/fastai/fastai) . L know if you still face an issue.

SHREYANSH SHARMA

May 9, 2019 at 9:21 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-pri machine-learningnd-deep-learning-techniques-python/#comment-158150)

Please use the following code as fastai package has been changed:
from fastai.tabular import add_datepart

JINGMIAO

October 29, 2018 at 1:47 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-155486)

Hello AISHWARYA,
I dont know what's your motivation to spend such a long time to write this blog
But thank you soooooo much!!!

Appreciate your time for both the words and codes (easy to follow) !!!
Such a great work!!!

AISHWARYA SINGH

October 29, 2018 at 11:19 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac learningnd-deep-learning-techniques-python/#comment-155489)

Really glad you liked the article. Thank you!

VEDAMURTHY KB

October 31, 2018 at 4:09 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-155510)

new_data.index=data['Date']
valid.index=new_data[987:].index
train.index=new_data[:987].index

gives
AttributeError Traceback (most recent call last)
in ()
1 new_data.index=data['Date']
—-> 2 valid.index=new_data[987:].index
3 train.index=new_data[:987].index

AttributeError: 'numpy.ndarray' object has no attribute 'index'

valid['Predictions'] = 0
valid['Predictions'] = closing_price

gives
IndexError Traceback (most recent call last)
in ()
—-> 1 valid['Predictions'] = 0
2 valid['Predictions'] = closing_price

IndexError: only integers, slices (`:`), ellipsis (`...`), numpy.newaxis (`None`) and integer or boolean arrays are indices

V good article. I am getting above errors. Kindly help solving it

---

AISHWARYA SINGH

October 31, 2018 at 5:12 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-155513)

Hi,

Please print the validation head and see if the index values are actually the dates or just number they are numbers, change the index to dates. Please share the screenshot here or via mail (drop mail)

RAVI SHANKAR

October 31, 2018 at 4:51 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-155511)

Hi,

Thanks for putting the efforts in writing the article.

If you believe LSTM model works this well, try buying few shares of Tata Global beverages and let us know returns on the same. I guess, you would understand the concept of over-fit.

Thanks,
Ravi

AISHWARYA SINGH

October 31, 2018 at 5:08 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-155512)

Hi Ravi,

I actually did finally train my model on the complete data and predicted for next 10 days (and ch against the results for the week). The first 2 predictions weren't exactly good but next 3 were (di check the remaining). Secondly, I agree that machine learning models aren't the only thing one c trust, years of experience & awareness about what's happening in the market can beat any ml/dl model when it comes to stock predictions. I wanted to explore this domain and I have learnt mo while working on this dataset than I did while writing my previous articles.

SHAHNAWAZ

November 8, 2018 at 5:55 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-st price-machine-learningnd-deep-learning-techniques-python/#comment-155631)

This was a really useful tutorial covering different techniques.Could you please detail we can predict in future as you mentioned(10 days in future).Which area exactly we n change?
Will it be this part of the code?
#predicting 246 values, using past 60 from the train data

AISHWARYA SINGH

November 12, 2018 at 4:08 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machin learningnd-deep-learning-techniques-python/#comment-155675)

Yes exactly. You need to create a validation set with only 10 rows as input t LSTM model.

MOOBI

November 11, 2018 at 10:41 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learni deep-learning-techniques-python/#comment-155657)

Its nice tutorial, thanks. I need to know how can i predict just tomorrow's price?

AISHWARYA SINGH

November 12, 2018 at 4:05 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-ma learningnd-deep-learning-techniques-python/#comment-155674)

Hi,

To make predictions only for the next day, the validation set should have only 1 row (with past 6 values).

SANAT MISHRA

January 15, 2019 at 12:04 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-st price-machine-learningnd-deep-learning-techniques-python/#comment-156579)

can you please tell where we need to make change in code…and what change?
suppose i have csv with data from 1st jan 2001 till today (15th jan 2019), how will i pr
value for tomorrow (i.e. 16th jan 2019)

AISHWARYA SINGH

March 5, 2019 at 3:55 pm (https://www.analyticsvidhya.com/blog/2018/10/prec
stock-price-machine-learningnd-deep-learning-techniques-python/#comment-15

Hi Sanat,

When you define the input data for your LSTM model, make the input to be single row with past 60 days data. The model has been trained such that it at the past 60 days data to predict the 61st day.

PABITRA

November 12, 2018 at 7:20 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learnin
deep-learning-techniques-python/#comment-155682)

What is the difference between last and closing price?

AISHWARYA SINGH

November 13, 2018 at 10:59 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-m
learningnd-deep-learning-techniques-python/#comment-155694)

The difference is not significant. I plotted the two variables and they overlapped each other.

MIGUEL

November 13, 2018 at 12:07 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learni
deep-learning-techniques-python/#comment-155684)

Hi, thanks for the article.

I got this error:

rms=np.sqrt(np.mean(np.power((np.array(valid['Close'])-preds),2)))
ValueError: operands could not be broadcast together with shapes (1076,) (248,)

Can you help me on this?

AISHWARYA SINGH

November 13, 2018 at 10:53 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-m learningnd-deep-learning-techniques-python/#comment-155692)

Hi,

Looks like the validation set and predictions have different lengths. Can you please share your notebook with me? I have sent you a mail on the email ID you provided.

ISAAC

November 30, 2018 at 12:54 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-m learningnd-deep-learning-techniques-python/#comment-155989)

I ran into the same error as ValueError: operands could not be broadcast together with shapes (1 (248,). Guidance towards resolution would be appreciated.

AISHWARYA SINGH

December 5, 2018 at 11:56 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-s price-machine-learningnd-deep-learning-techniques-python/#comment-156034)

Could you please share the notebook Isaac?

ALEX

November 24, 2018 at 3:12 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learnin deep-learning-techniques-python/#comment-155847)

Thank you so much for the code, you inspire me a lot. I applied your algorithm for my example and it it worl fine. Now i have to make it predict the price for the next 5 years, do you know how to achieve that? I should all the data without splitting into test and train for training and somehow generate new dates in that array, t predict the value for them. I tried to modify your code but i couldn't figure it out. I'm new to ML and it's reall to understand those functions and classes.

Thank you very much in advance

AISHWARYA SINGH

December 5, 2018 at 11:44 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-ma
learningnd-deep-learning-techniques-python/#comment-156033)

Hi Alex,

Currently the model is trained to look at the recent past data and make predictions for the next d
make predictions for 5 years in future, we'll first have to change the way we train model here, and
need a, much bigger dataset as well.

SHABBIR ANASWALA

December 5, 2018 at 12:18 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learnin
deep-learning-techniques-python/#comment-156035)

Hi,

I am getting this error

x_train_scaled = scaler.fit_transform(x_train)
Traceback (most recent call last):

File "", line 1, in
x_train_scaled = scaler.fit_transform(x_train)

File "C:\ProgramData\Anaconda3\lib\site-packages\sklearn\base.py", line 517, in fit_transform
return self.fit(X, **fit_params).transform(X)

File "C:\ProgramData\Anaconda3\lib\site-packages\sklearn\preprocessing\data.py", line 308, in fit
return self.partial_fit(X, y)

File "C:\ProgramData\Anaconda3\lib\site-packages\sklearn\preprocessing\data.py", line 334, in partial_fit
estimator=self, dtype=FLOAT_DTYPES)

File "C:\ProgramData\Anaconda3\lib\site-packages\sklearn\utils\validation.py", line 433, in check_array
array = np.array(array, dtype=dtype, order=order, copy=copy)

TypeError: float() argument must be a string or a number, not 'Timestamp'

AISHWARYA SINGH

December 5, 2018 at 12:26 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-ma
learningnd-deep-learning-techniques-python/#comment-156036)

Hi Shabbir,

The data you are trying to scale has the “Date” column as well. Please follow the code from the s
you have extracted features from the date column, you can drop this column and then go ahead
the implementation.

SHABBIR ANASWALA

December 5, 2018 at 1:23 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stc
price-machine-learningnd-deep-learning-techniques-python/#comment-156038)

Thanks Aishwarya,
I am ruuning this code in spyder

while trying to import Arima I am getting below error.

from pyramid.arima import auto_arima
Traceback (most recent call last):

File “”, line 1, in
from pyramid.arima import auto_arima

ModuleNotFoundError: No module named ‘pyramid’

Please let me know if there are any work around for this?

AISHWARYA SINGH

March 5, 2019 at 1:14 pm (https://www.analyticsvidhya.com/blog/2018/10/prec
stock-price-machine-learningnd-deep-learning-techniques-python/#comment-15

Hi Shabbir,

The current code I have written is in python 3 using jupyter notebook

---

MURALIDHARAN

February 6, 2019 at 1:10 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stoc
machine-learningnd-deep-learning-techniques-python/#comment-156980)

I too got the same error as Shabbir but i am unable to resolve it.You have explained th
have extracted features from date column and you can drop this column.Can you tell
how can I drop this column?

AISHWARYA SINGH

February 7, 2019 at 11:00 am
(https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machin
learningnd-deep-learning-techniques-python/#comment-156992)

to drop a column, use the code

```
df.drop([column_name], axis=1, inplace=True)
```

RICKY

December 20, 2018 at 11:46 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learni
deep-learning-techniques-python/#comment-156248)

Hello AISHWARYA SINGH,
Nice article…I had been working FOREX data to use seasonality to predict the next days direction for many and your code under the FastAi part gave me an idea on how to go about it. Thanks for a great article.

Have you tried predicting the stock data based bulls and bears only, using classification?
I used np.log(df['close']/df.['close'].shift(1)) to find the returns and if its negative I use "np.where" to assign
and if its positive I assign 1 to it.
All I want to predict is if tomorrow would be 1 or -1.

I have not been able to get a 54% accuracy from that model.

a 60% would be very profitable when automated.

would you want to see my attempts?

AISHWARYA SINGH

March 5, 2019 at 3:18 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine
learningnd-deep-learning-techniques-python/#comment-157282)

Hi Ricky,

That's a very interesting idea. Which algorithm did you use ?

SHUBHAM SHARMA

December 28, 2018 at 5:41 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learnin deep-learning-techniques-python/#comment-156335)

Thanks for sharing valuable information. a worth reading blog. I try this algorithm for my example and it wo excellent.

AISHWARYA SINGH

December 31, 2018 at 12:14 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-m learningnd-deep-learning-techniques-python/#comment-156358)

Really glad you liked it. Thanks Shubham!

ICE

December 31, 2018 at 8:59 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learnin deep-learning-techniques-python/#comment-156352)

Hi Asihwarya,

As far as i understand, the model takes in 60 days of real data to predict the next day's value in LSTM. I wo how the results will be like if you take a predicted value to predict the next value instead. This will allow us predict say 2 years of data for long term trading.

AISHWARYA SINGH

December 31, 2018 at 12:12 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-m learningnd-deep-learning-techniques-python/#comment-156357)

If you do have the real time data, it'd be preferable to use that instead since you'll get more accu results. Otherwise definitely using the predicted values would be beneficial.

JWALA

January 2, 2019 at 9:24 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnc learning-techniques-python/#comment-156392)

Hi Aishwarya,

I am not able to download the dataset getting empty CSV file with header.
Could you please help me.

AISHWARYA SINGH

January 3, 2019 at 11:07 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-156394)

Hi,

I sent you the dataset via mail. Please check.

JWALA

January 3, 2019 at 1:02 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stoc machine-learningnd-deep-learning-techniques-python/#comment-156399)

Thank you.

It would be great help, if you can give me one real time business use case for Financia forecasting for stock prices. Thanks

---

RUN MA

January 3, 2019 at 5:44 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnc learning-techniques-python/#comment-156402)

I am also not able to download the test data (NSE-TATAGLOBAL(1).csv), could you send me? thanks!

AISHWARYA SINGH

January 4, 2019 at 10:56 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-156411)

Could you share your email id please?

CHRIS

January 4, 2019 at 2:03 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnc learning-techniques-python/#comment-156405)

Could you send me the full working code, i cant seem to get it to work

AISHWARYA SINGH

January 4, 2019 at 11:05 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-156412)

I have sent you a mail.

DOAA

January 6, 2019 at 7:59 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnc learning-techniques-python/#comment-156439)

Hi AISHWARYA SINGH,
thanks a lot for your great article .

AISHWARYA SINGH

January 8, 2019 at 10:45 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-156470)

Glad you liked it Doaa

CHAO

January 6, 2019 at 12:26 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-156441)

could you share the full code, I have strong interest in time series analysis

AISHWARYA SINGH

January 15, 2019 at 12:57 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac learningnd-deep-learning-techniques-python/#comment-156586)

Hi chao,

The code is shared within the article itself.

ROBERT

January 12, 2019 at 1:08 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-156542)

Hi Aishwarya,
The link provided in this article seems to be a lot smaller (min date is 3-2-2017) where in your article is spo about year 2013…

Could you please help me providing te Original CSV file?

Thanx!

AISHWARYA SINGH
March 5, 2019 at 5:33 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine learningnd-deep-learning-techniques-python/#comment-157285)

Hi Robert,

Shared the dataset via mail.

BHANU
March 21, 2019 at 10:15 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stoc machine-learningnd-deep-learning-techniques-python/#comment-157513)

Can you please share the data set

Thank you

AISHWARYA SINGH
March 25, 2019 at 7:51 pm (https://www.analyticsvidhya.com/blog/2018/10/pre stock-price-machine-learningnd-deep-learning-techniques-python/#comment-15

Hi Bhanu, the link for dataset is in the article itself

EMERSON OLIVEIRA
January 20, 2019 at 7:16 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-156653)

Why 987 in:

train = new_data[:987]
valid = new_data[987:]

AISHWARYA SINGH

January 22, 2019 at 6:33 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-156705)

Hi Emerson,

I have used 4 years data for training and 1 year for testing. Splitting at 987 distributes the data ir required format.

EMERSON OLIVEIRA

January 20, 2019 at 10:04 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learning deep-learning-techniques-python/#comment-156661)

How can I solve this problem:

ModuleNotFoundError: No module named 'fastai.structured'

Thanks

AISHWARYA SINGH

January 22, 2019 at 6:53 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-156706)

Hey,

Go to this link: https://github.com/fastai/fastai (https://github.com/fastai/fastai) and clone/download. The error should be resolved.

PRAMESH BAJRACHARYA

January 22, 2019 at 4:00 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-156701)

Amazing Article. Very helpful . Thanks.

@RUN

January 27, 2019 at 7:33 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-156814)

Hey Aishwarya, your article is super helpful. Thanks a ton. Keep going!!!

AISHWARYA SINGH

January 28, 2019 at 11:24 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mac learningnd-deep-learning-techniques-python/#comment-156832)

Thanks Arun!

DOAA

January 29, 2019 at 7:32 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-156858)

Hi Aishwarya,
please can you tell me about books explain how to use LSTM in stock market in details
thanks in advance

MIKEMIKEMIKE

January 30, 2019 at 4:15 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningr learning-techniques-python/#comment-156872)

Aishwaryai, I found your article very interesting. I'm not familiar with programing but I was able to follow th reason for each step in the process.

I do have a question.

You noted that there are many other factors that will ultimately affect the market. As someone who works i marketing and has to be plugged into social media I use many tools that tell me how a company is being perceived. Twitter and Facebook both offer lot of opportunity for social listening and the tools we use in advertising/marketing to measure take the temperature of the market are quite powerful.

Would it be possible to incorporate some machine learning to find patterns in the positive/negative sentim measurements that are constantly active to help predict when stock values are going to change and in whi direction? I feel like your article is using current and past market data but doesn't incorporate social percep

http://www.aclweb.org/anthology/W18-3102 (http://www.aclweb.org/anthology/W18-3102)

The study linked above only focuses on stock related posts made from verified accounts but didn't take pu perception measurements into account in their data. With how connected to social media the world has be I wonder if combining the data you used in your article with data from social listening tools used by market could create predictive tools that would essentially game the system.

SMIT

March 9, 2019 at 5:47 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine learningnd-deep-learning-techniques-python/#comment-157344)

u can use sentimental analysis…..rest u can search yourself…
….u can watch sirajvideo….for more info

MURALIDHARAN

February 11, 2019 at 8:42 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learning deep-learning-techniques-python/#comment-157022)

Hi
How I can solve this error?

AttributeError: 'DataFrame' object has no attribute 'Date'

Thanks

MURALIDHARAN

February 11, 2019 at 8:45 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learning deep-learning-techniques-python/#comment-157023)

Hi
After dropping the date column(Linear Regression method), I am getting an error like this.

AttributeError: 'DataFrame' object has no attribute 'Date'

How do I resolve this error?

MURALIDHARAN

February 11, 2019 at 12:29 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learnin deep-learning-techniques-python/#comment-157027)

Hi

Could please share the entire working code.

Thanks

JUSTIN

March 22, 2019 at 12:04 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningn learning-techniques-python/#comment-157514)

Hi,

Thanks for the article. Regarding the following line: –

#predicting 246 values, using past 60 from the train data
inputs = new_data[len(new_data) – len(valid) – 60:].values

May I know what value obtained for : –
len(new_data) ?
len(valid) ?
inputs ?

AISHWARYA SINGH

March 27, 2019 at 10:54 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-mach learningnd-deep-learning-techniques-python/#comment-157588)

Hi Justin,

Valid and closing price length is 248, input is 308, and new data 1235 same as the len of df

---

TOBIAS WANG

March 24, 2019 at 6:35 am (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnd learning-techniques-python/#comment-157539)

Hi Aishwarya,

I was suspicious of your program, since it worked it little too well, so I played around with the program, and after I tried to make it predict some future stocks (by making the validation set go to the future, and filling t rows with zeroes), and you can imagine my surprise when the prediction said the stocks would drop like a

I investigated further, and found that your data leaks in the LSTM implementation, and that's why it works s

AISHWARYA SINGH

March 25, 2019 at 7:44 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machi learningnd-deep-learning-techniques-python/#comment-157564)

Hi,

Don't fill the rows with zero! fill it with the predicted value. So you made a prediction for next day, that to predict the third day. Even if you do not use the validation set as done here, use the predic by your model. Giving it zero as input for the last 2-3 days, the model would understand that yesterday's closing price was zero, and will show a drastic drop.

TOBIAS WANG

March 25, 2019 at 8:49 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock machine-learningnd-deep-learning-techniques-python/#comment-157566)

I don't think you understand. All the rows with zeroes are stored in the validation set, v it shouldn't be seen at all. The last training data point is on March to 19th (I am using Google NASDAQ data), and the first few data points are actual stock values. How am supposed to fill it with predicted values when I can't make it predict? When I fill it with it just doesn't predict.

My point is that your LSTM implementation uses the data it is not supposed to uses, t predict the very same data. Your program is leaking data, and it's kinda misleading for reader of this article, since in reality this model has much worse accuracy than the on shown here.

I think the leaking data can be attributed to the lines that use the MinMaxScaler, as thi common cause of data leakage.

Thank you

SURGYAN

May 10, 2019 at 5:30 am (https://www.analyticsvidhya.com/blog/2018/10/predi stock-price-machine-learningnd-deep-learning-techniques-python/#comment-15

Tobia,
It was interesting observation you have, but you're missing her intuition. He

even if you think there is a data leak from LSTM model, what you're missing RMSE values, hence it looks like overfitting or may be as u said it looks like leak.
If you forget LSTM for a while, even for any predictions, we try to predict the the test data, if you tweak it by making zeroes, then u r probably missing th here. We don't tweak the test (unseen) data. Try not to fill the test data mar but with your predictions.
Regards,
SurGyan.
PS: Much appreciated Aishwarya, for the detailed explanation.

BMI

May 15, 2019 at 12:40 am (https://www.analyticsvidhya.com/blog/2018/10/pre stock-price-machine-learningnd-deep-learning-techniques-python/#comment-15

I think it is allowed to use known data. Maybe "Short Term Memory" is mea to use latest known data to help predicition. I think LSTM does this, and it c not use future data. Combination of learning and use latest known data is b way.

Thanks for very good article.

REKHA

May 17, 2019 at 11:09 pm (https://www.analyticsvidhya.com/blog/2018/10/predicting-stock-price-machine-learningnd-learning-techniques-python/#comment-158238)

hI,
Which are the other sequence prediction time series problems where LSTM can be applied

---

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