DMV7 Time Series Data Analysis

October 26, 2023

[2]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from statsmodels.tsa.arima.model import ARIMA
from statsmodels.tsa.seasonal import STL

df = pd.read_csv("C:/Users/hp/Downloads/Practical_Data/stock.txt",␣
 ↪parse_dates=['Date'], index_col=['Date'])
df.head()
```

[2]:

Date	Open	High	Low	Close	Volume	OpenInt
2012-05-18	42.05	45.00	38.00	38.23	580438450	0
2012-05-21	36.53	36.66	33.00	34.03	169418988	0
2012-05-22	32.61	33.59	30.94	31.00	101876406	0
2012-05-23	31.37	32.50	31.36	32.00	73678512	0
2012-05-24	32.95	33.21	31.77	33.03	42560731	0

[3]:
```
df.describe()
```

[3]:

	Open	High	Low	Close	Volume	OpenInt
count	1381.000000	1381.000000	1381.000000	1381.000000	1.381000e+03	1381.0
mean	83.543667	84.384940	82.630555	83.543827	3.770716e+07	0.0
std	43.981535	44.161698	43.756570	44.015093	3.294912e+07	0.0
min	18.080000	18.270000	17.550000	17.730000	5.913000e+06	0.0
25%	46.750000	47.530000	45.960000	46.700000	1.843043e+07	0.0
50%	78.600000	79.690000	77.930000	78.790000	2.812660e+07	0.0
75%	117.710000	118.600000	116.700000	117.650000	4.601640e+07	0.0
max	182.360000	182.900000	180.570000	182.660000	5.804384e+08	0.0

```
75%         0.0
max         0.0
```

[4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 1381 entries, 2012-05-18 to 2017-11-10
Data columns (total 6 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   Open     1381 non-null   float64
 1   High     1381 non-null   float64
 2   Low      1381 non-null   float64
 3   Close    1381 non-null   float64
 4   Volume   1381 non-null   int64
 5   OpenInt  1381 non-null   int64
dtypes: float64(4), int64(2)
memory usage: 75.5 KB
```

[5]:
```
df.isna().sum()
```

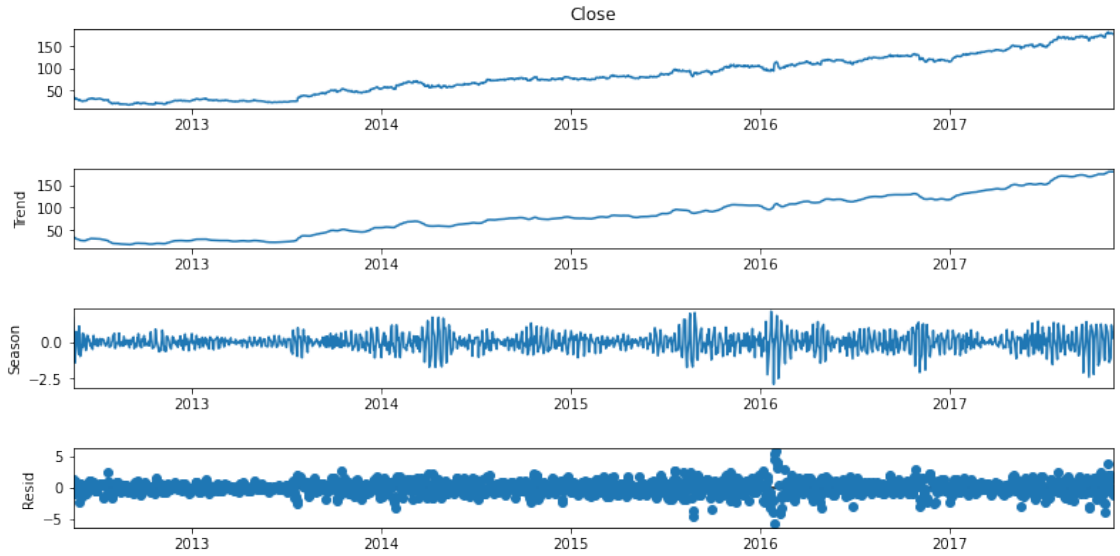
[5]:
```
Open       0
High       0
Low        0
Close      0
Volume     0
OpenInt    0
dtype: int64
```

[6]:
```
df.isnull().sum()
```

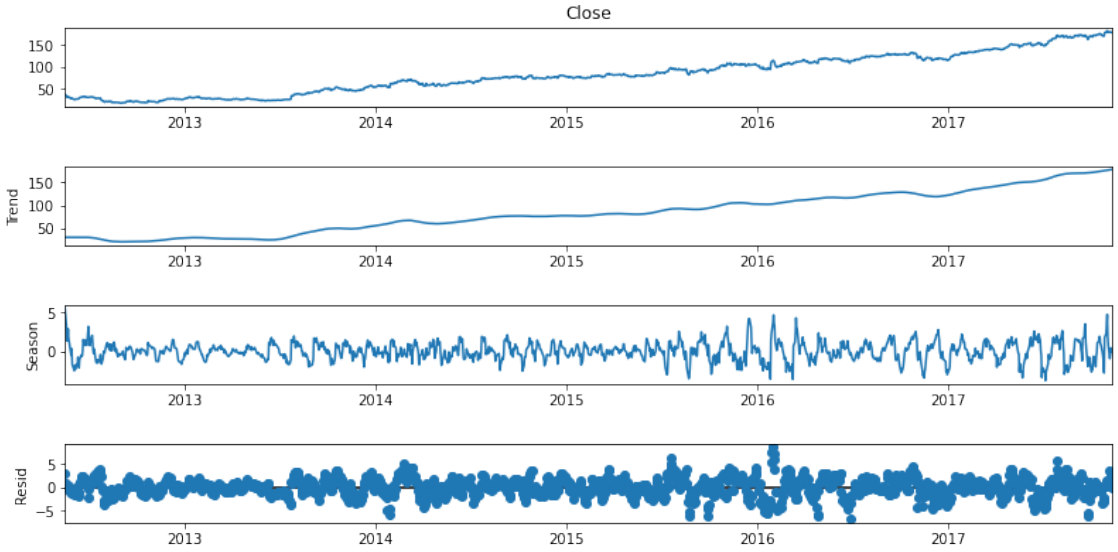
[6]:
```
Open       0
High       0
Low        0
Close      0
Volume     0
OpenInt    0
dtype: int64
```

[7]:
```
df["30-day-average"] = df['Close'].rolling(window=30).mean()
df["60-day-average"] = df['Close'].rolling(window=60).mean()
df[["Close", "30-day-average", "60-day-average"]].plot(figsize=(12,6),␣
 ↪label="Moving averages")
plt.legend()
plt.xlabel("Date")
plt.ylabel("Price")
plt.show()
```

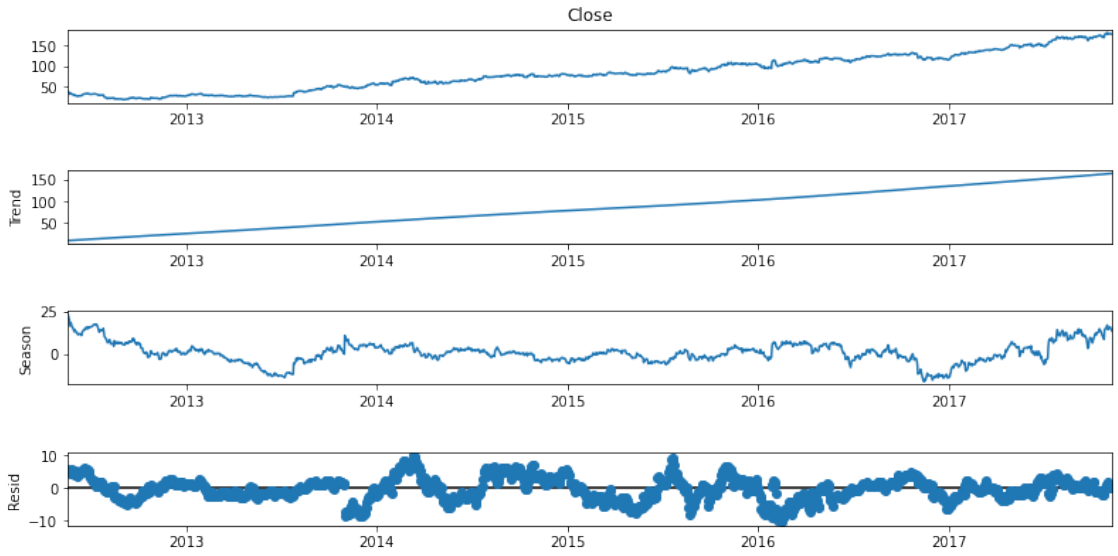
[8]:
```
result = STL( df["Close"] , period=7).fit()
fig = result.plot()
fig.set_size_inches(12,6)
```



[9]:
```
result = STL( df["Close"] , period=30).fit()
fig = result.plot()
fig.set_size_inches(12,6)
```

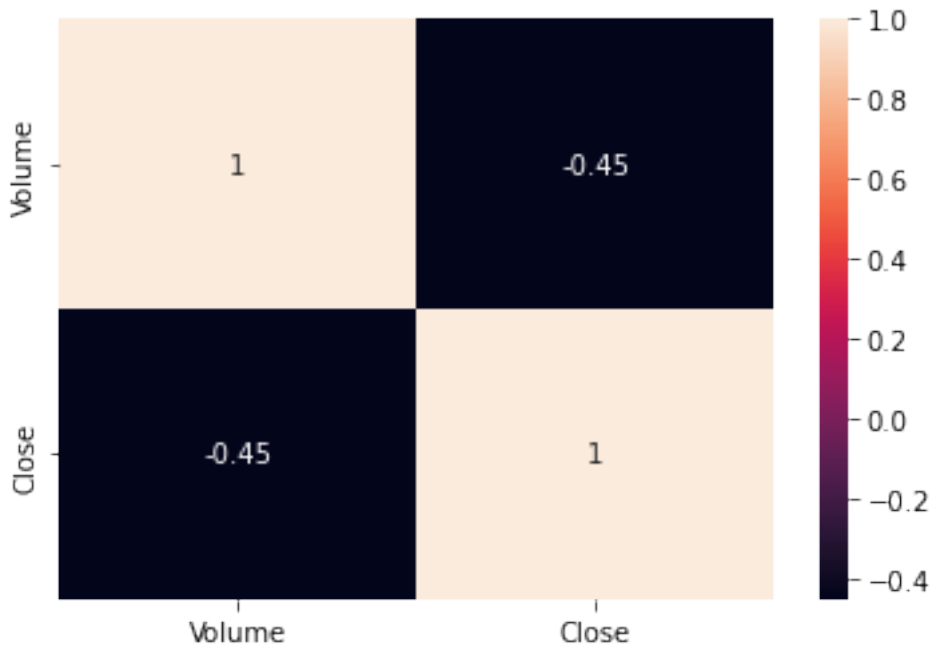


[10]:
```
result = STL( df["Close"] , period=365).fit()
fig = result.plot()
fig.set_size_inches(12,6)
```



[11]:
```
corrr = df[["Volume", "Close"]].corr()
sns.heatmap(corrr, annot=True)
```

[11]: <AxesSubplot:>



[12]:
```
model = ARIMA( df["Close"] , order=(2,1,2))
results = model.fit()

forecast_steps = 365
forecast = results.forecast(forecast_steps)
forecast = forecast[1:]
forecast_index = pd.date_range(start=df.index[-1], periods=forecast_steps,␣
 ↪closed='right')

plt.figure(figsize=(12,6))
plt.plot(forecast_index, forecast, label="Forecasted Value", color="Blue")
plt.plot(df.index, df['Close'], label="Actual Value", color="Red")
plt.legend()
plt.show()
```

```
C:\Users\hp\anaconda3\lib\site-packages\statsmodels\tsa\base\tsa_model.py:471:
ValueWarning: A date index has been provided, but it has no associated frequency
information and so will be ignored when e.g. forecasting.
  self._init_dates(dates, freq)
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```

```
  self._init_dates(dates, freq)
C:\Users\hp\anaconda3\lib\site-packages\statsmodels\tsa\base\tsa_model.py:834:
ValueWarning: No supported index is available. Prediction results will be given
with an integer index beginning at `start`.
  return get_prediction_index(
C:\Users\hp\AppData\Local\Temp\ipykernel_3496\930545061.py:7: FutureWarning:
Argument `closed` is deprecated in favor of `inclusive`.
  forecast_index = pd.date_range(start=df.index[-1], periods=forecast_steps,
closed='right')
```

[ ]: