

## stock\_rnn\_LTSM

```
[1]: import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.preprocessing import StandardScaler, MinMaxScaler
```

```
[10]: data =pd.read_csv("GOOG.csv",date_parser= 'true')
```

```
[11]: data.head()
```

```
[11]:
```

	Date	Open	High	Low	Close	Adj Close	Volume
0	2004-08-20	50.316402	54.336334	50.062355	53.952770	53.952770	22942874
1	2004-08-23	55.168217	56.528118	54.321388	54.495735	54.495735	18342897
2	2004-08-24	55.412300	55.591629	51.591621	52.239197	52.239197	15319808
3	2004-08-25	52.284027	53.798351	51.746044	52.802086	52.802086	9232276
4	2004-08-26	52.279045	53.773445	52.134586	53.753517	53.753517	7128620

```
[12]: data_training=data[data['Date']<'2021-01-01'].copy()
```

```
[13]: data_training
```

```
[13]:
```

	Date	Open	High	Low	Close	\
0	2004-08-20	50.316402	54.336334	50.062355	53.952770	
1	2004-08-23	55.168217	56.528118	54.321388	54.495735	
2	2004-08-24	55.412300	55.591629	51.591621	52.239197	
3	2004-08-25	52.284027	53.798351	51.746044	52.802086	
4	2004-08-26	52.279045	53.773445	52.134586	53.753517	
...	...	...	...	...	...	
4116	2020-12-24	1735.000000	1746.000000	1729.109985	1738.849976	
4117	2020-12-28	1751.635010	1790.728027	1746.334961	1776.089966	
4118	2020-12-29	1787.790039	1792.439941	1756.089966	1758.719971	
4119	2020-12-30	1762.010010	1765.094971	1725.599976	1739.520020	
4120	2020-12-31	1735.420044	1758.930054	1735.420044	1751.880005	

  

	Adj Close	Volume
0	53.952770	22942874
1	54.495735	18342897
2	52.239197	15319808
3	52.802086	9232276

```

4          53.753517    7128620
...
4116    1738.849976      346800
4117    1776.089966     1393000
4118    1758.719971     1299400
4119    1739.520020     1306100
4120    1751.880005     1011900

```

[4121 rows x 7 columns]

```
[14]: data_test=data[data['Date']>='2021-01-01'].copy()
      data_test
```

```
[14]:
```

	Date	Open	High	Low	Close \
4121	2021-01-04	1757.540039	1760.650024	1707.849976	1728.239990
4122	2021-01-05	1725.000000	1747.670044	1718.015015	1740.920044
4123	2021-01-06	1702.630005	1748.000000	1699.000000	1735.290039
4124	2021-01-07	1740.060059	1788.400024	1737.050049	1787.250000
4125	2021-01-08	1787.979980	1809.839966	1773.535034	1807.209961
...	...	...	...	...	...
4310	2021-10-04	2713.989990	2714.000000	2623.330078	2675.300049
4311	2021-10-05	2680.000000	2747.239990	2680.000000	2723.540039
4312	2021-10-06	2692.510010	2757.040039	2689.729980	2747.080078
4313	2021-10-07	2777.260010	2803.089111	2771.260010	2783.709961
4314	2021-10-08	2798.120117	2806.340088	2788.586914	2801.120117

	Adj Close	Volume
4121	1728.239990	1901900
4122	1740.920044	1145300
4123	1735.290039	2602100
4124	1787.250000	2265000
4125	1807.209961	2050600
...	...	...
4310	2675.300049	1576500
4311	2723.540039	1206300
4312	2747.080078	988200
4313	2783.709961	912500
4314	2801.120117	946200

[194 rows x 7 columns]

```
[15]: training_data=data_training.drop(['Date','Adj Close'], axis =1)
```

```
[16]: training_data.head()
```

```
[16]:
```

	Open	High	Low	Close	Volume
0	50.316402	54.336334	50.062355	53.952770	22942874

```

1  55.168217  56.528118  54.321388  54.495735  18342897
2  55.412300  55.591629  51.591621  52.239197  15319808
3  52.284027  53.798351  51.746044  52.802086  9232276
4  52.279045  53.773445  52.134586  53.753517  7128620

```

```
[17]: scaler=MinMaxScaler()
```

```
[18]: training_data= scaler.fit_transform(training_data)
```

```
[19]: training_data
```

```

[19]: array([[5.10729413e-04, 2.03521039e-03, 4.38199754e-04, 2.32514214e-03,
            2.77885876e-01],
            [3.24397659e-03, 3.25522693e-03, 2.83986753e-03, 2.63049229e-03,
            2.22151352e-01],
            [3.38147960e-03, 2.73394743e-03, 1.30055252e-03, 1.36147087e-03,
            1.85522815e-01],
            ...,
            [9.79308338e-01, 9.69518841e-01, 9.62466798e-01, 9.61044247e-01,
            1.56478852e-02],
            [9.64785280e-01, 9.54297762e-01, 9.45273499e-01, 9.50246667e-01,
            1.57290641e-02],
            [9.49805947e-01, 9.50866174e-01, 9.50811033e-01, 9.57197618e-01,
            1.21644600e-02]])

```

```

[20]: X_train=[]
      y_train=[]

```

```
[21]: training_data.shape[0]
```

```
[21]: 4121
```

```

[22]: for i in range(60,training_data.shape[0]):
      X_train.append(training_data[i-60:i])
      y_train.append(training_data[i,0])

```

```
[23]: X_train, y_train = np.array(X_train), np.array(y_train)
```

```
[24]: X_train.shape
```

```
[24]: (4061, 60, 5)
```

```
[25]: y_train.shape
```

```
[25]: (4061,)
```

```
[26]: from tensorflow.keras import Sequential
```

```
[ ]:
[27]: from tensorflow.keras.layers import Dense, LSTM, Dropout
[32]: X_train.shape[1],5
[32]: (60, 5)
[28]: reg = Sequential()
[36]: reg.add(LSTM(units=50, activation='relu', return_sequences = True, input_shape_
    ↳ (X_train.shape[1],5)))
[37]: reg.add(Dropout(0.2))
[38]: reg.add(LSTM(units=60, activation='relu', return_sequences = True))
[39]: reg.add(Dropout(0.3))
[40]: reg.add(LSTM(units=80, activation='relu', return_sequences = True))
[41]: reg.add(Dropout(0.4))
[42]: reg.add(LSTM(units=120, activation='relu'))
[43]: reg.add(Dropout(0.5))
[44]: reg.add(Dense(units=1))
[45]: reg.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
lstm (LSTM)	(None, 60, 50)	11200
lstm_1 (LSTM)	(None, 60, 50)	20200
dropout (Dropout)	(None, 60, 50)	0
lstm_2 (LSTM)	(None, 60, 60)	26640
dropout_1 (Dropout)	(None, 60, 60)	0
lstm_3 (LSTM)	(None, 60, 80)	45120
dropout_2 (Dropout)	(None, 60, 80)	0

```

-----
lstm_4 (LSTM)                (None, 120)                96480
-----
dropout_3 (Dropout)          (None, 120)                 0
-----
dense (Dense)                (None, 1)                   121
=====
Total params: 199,761
Trainable params: 199,761
Non-trainable params: 0
-----

```

```
[46]: reg.compile(optimizer='adam', loss='mean_squared_error')
```

```
[47]: reg.fit(X_train, y_train, epochs=10, batch_size=32)
```

```

WARNING:tensorflow:From C:\Users\RizkN\.conda\envs\tf1\lib\site-
packages\tensorflow_core\python\ops\math_grad.py:1424: where (from
tensorflow.python.ops.array_ops) is deprecated and will be removed in a future
version.

```

```
Instructions for updating:
```

```
Use tf.where in 2.0, which has the same broadcast rule as np.where
```

```
Train on 4061 samples
```

```
Epoch 1/10
```

```
4061/4061 [=====] - 25s 6ms/sample - loss: 0.01440s -
loss: 0.
```

```
Epoch 2/10
```

```
4061/4061 [=====] - 23s 6ms/sample - loss: 0.0035
```

```
Epoch 3/10
```

```
4061/4061 [=====] - 23s 6ms/sample - loss: 0.00340s -
loss: 0.00
```

```
Epoch 4/10
```

```
4061/4061 [=====] - 21s 5ms/sample - loss: 0.0030
```

```
Epoch 5/10
```

```
4061/4061 [=====] - 21s 5ms/sample - loss: 0.0027
```

```
Epoch 6/10
```

```
4061/4061 [=====] - 21s 5ms/sample - loss: 0.0024
```

```
Epoch 7/10
```

```
4061/4061 [=====] - 23s 6ms/sample - loss: 0.00240s -
loss: 0
```

```
Epoch 8/10
```

```
4061/4061 [=====] - 23s 6ms/sample - loss: 0.0023
```

```
Epoch 9/10
```

```
4061/4061 [=====] - 23s 6ms/sample - loss: 0.0021
```

```
Epoch 10/10
```

```
4061/4061 [=====] - 24s 6ms/sample - loss: 0.0019
```

```
[47]: <tensorflow.python.keras.callbacks.History at 0x22deb3392c8>
```

```
[48]: data_test.head()
```

```
[48]:
```

	Date	Open	High	Low	Close \
4121	2021-01-04	1757.540039	1760.650024	1707.849976	1728.239990
4122	2021-01-05	1725.000000	1747.670044	1718.015015	1740.920044
4123	2021-01-06	1702.630005	1748.000000	1699.000000	1735.290039
4124	2021-01-07	1740.060059	1788.400024	1737.050049	1787.250000
4125	2021-01-08	1787.979980	1809.839966	1773.535034	1807.209961

  

	Adj Close	Volume
4121	1728.239990	1901900
4122	1740.920044	1145300
4123	1735.290039	2602100
4124	1787.250000	2265000
4125	1807.209961	2050600

```
[49]: data_training.tail(60)
```

```
[49]:
```

	Date	Open	High	Low	Close \
4061	2020-10-07	1464.290039	1468.959961	1436.000000	1460.290039
4062	2020-10-08	1465.089966	1490.000000	1465.089966	1485.930054
4063	2020-10-09	1494.699951	1516.520020	1489.449951	1515.219971
4064	2020-10-12	1543.000000	1593.859985	1532.569946	1569.150024
4065	2020-10-13	1583.729980	1590.000000	1563.199951	1571.680054
4066	2020-10-14	1578.589966	1587.683960	1550.530029	1568.079956
4067	2020-10-15	1547.150024	1575.104980	1545.030029	1559.130005
4068	2020-10-16	1565.849976	1581.130005	1563.000000	1573.010010
4069	2020-10-19	1580.459961	1588.150024	1528.000000	1534.609985
4070	2020-10-20	1527.050049	1577.500000	1525.670044	1555.930054
4071	2020-10-21	1573.329956	1618.729980	1571.630005	1593.310059
4072	2020-10-22	1593.050049	1621.989990	1585.000000	1615.329956
4073	2020-10-23	1626.069946	1642.359985	1620.510010	1641.000000
4074	2020-10-26	1625.010010	1638.239990	1576.500000	1590.449951
4075	2020-10-27	1595.670044	1606.844971	1582.780029	1604.260010
4076	2020-10-28	1559.739990	1561.349976	1514.619995	1516.619995
4077	2020-10-29	1522.359985	1593.709961	1522.239990	1567.239990
4078	2020-10-30	1672.109985	1687.000000	1604.459961	1621.010010
4079	2020-11-02	1628.160034	1660.770020	1616.030029	1626.030029
4080	2020-11-03	1631.780029	1661.699951	1616.619995	1650.209961
4081	2020-11-04	1710.280029	1771.364990	1706.030029	1749.130005
4082	2020-11-05	1781.000000	1793.640015	1750.510010	1763.369995
4083	2020-11-06	1753.949951	1772.430054	1740.349976	1761.750000
4084	2020-11-09	1790.900024	1818.060059	1760.020020	1763.000000
4085	2020-11-10	1731.089966	1763.000000	1717.300049	1740.390015
4086	2020-11-11	1750.000000	1764.219971	1747.364990	1752.709961
4087	2020-11-12	1747.630005	1768.270020	1745.599976	1749.839966
4088	2020-11-13	1757.630005	1781.040039	1744.550049	1777.020020

4089	2020-11-16	1771.699951	1799.069946	1767.689941	1781.380005
4090	2020-11-17	1776.939941	1785.000000	1767.000000	1770.150024
4091	2020-11-18	1765.229980	1773.469971	1746.140015	1746.780029
4092	2020-11-19	1738.380005	1769.589966	1737.005005	1763.920044
4093	2020-11-20	1765.209961	1774.000000	1741.859985	1742.189941
4094	2020-11-23	1749.599976	1753.900024	1717.719971	1734.859985
4095	2020-11-24	1730.500000	1771.599976	1727.689941	1768.880005
4096	2020-11-25	1772.890015	1778.540039	1756.540039	1771.430054
4097	2020-11-27	1773.089966	1804.000000	1772.439941	1793.189941
4098	2020-11-30	1781.183960	1788.064941	1755.000000	1760.739990
4099	2020-12-01	1774.369995	1824.829956	1769.369995	1798.099976
4100	2020-12-02	1798.099976	1835.650024	1789.473022	1827.949951
4101	2020-12-03	1824.010010	1847.199951	1822.650024	1826.770020
4102	2020-12-04	1824.520020	1833.160034	1816.989990	1827.989990
4103	2020-12-07	1819.000000	1832.369995	1805.780029	1819.479980
4104	2020-12-08	1810.099976	1821.900024	1796.204956	1818.550049
4105	2020-12-09	1812.010010	1834.270020	1767.810059	1784.130005
4106	2020-12-10	1769.800049	1781.310059	1740.319946	1775.329956
4107	2020-12-11	1763.060059	1784.449951	1760.000000	1781.770020
4108	2020-12-14	1775.000000	1797.390015	1757.214966	1760.060059
4109	2020-12-15	1764.420044	1771.420044	1749.949951	1767.770020
4110	2020-12-16	1772.880005	1773.000000	1756.079956	1763.000000
4111	2020-12-17	1768.510010	1771.784058	1738.660034	1747.900024
4112	2020-12-18	1754.180054	1755.109985	1720.219971	1731.010010
4113	2020-12-21	1713.510010	1740.849976	1699.000000	1739.369995
4114	2020-12-22	1734.430054	1737.405029	1712.574951	1723.500000
4115	2020-12-23	1728.109985	1747.989990	1725.040039	1732.380005
4116	2020-12-24	1735.000000	1746.000000	1729.109985	1738.849976
4117	2020-12-28	1751.635010	1790.728027	1746.334961	1776.089966
4118	2020-12-29	1787.790039	1792.439941	1756.089966	1758.719971
4119	2020-12-30	1762.010010	1765.094971	1725.599976	1739.520020
4120	2020-12-31	1735.420044	1758.930054	1735.420044	1751.880005

	Adj Close	Volume
4061	1460.290039	1746200
4062	1485.930054	1187800
4063	1515.219971	1435300
4064	1569.150024	2482600
4065	1571.680054	1601000
4066	1568.079956	1929300
4067	1559.130005	1540000
4068	1573.010010	1434700
4069	1534.609985	1607100
4070	1555.930054	2241700
4071	1593.310059	2568300
4072	1615.329956	1433600
4073	1641.000000	1375800

4074	1590.449951	1853300
4075	1604.260010	1229000
4076	1516.619995	1834000
4077	1567.239990	2003100
4078	1621.010010	4329100
4079	1626.030029	2535400
4080	1650.209961	1661700
4081	1749.130005	3570900
4082	1763.369995	2065800
4083	1761.750000	1660900
4084	1763.000000	2268300
4085	1740.390015	2636100
4086	1752.709961	1264000
4087	1749.839966	1247500
4088	1777.020020	1499900
4089	1781.380005	1246800
4090	1770.150024	1147100
4091	1746.780029	1173500
4092	1763.920044	1249900
4093	1742.189941	2313500
4094	1734.859985	2161600
4095	1768.880005	1578000
4096	1771.430054	1045800
4097	1793.189941	884900
4098	1760.739990	1823800
4099	1798.099976	1736900
4100	1827.949951	1222000
4101	1826.770020	1227300
4102	1827.989990	1378200
4103	1819.479980	1320900
4104	1818.550049	1096300
4105	1784.130005	1507600
4106	1775.329956	1362800
4107	1781.770020	1220700
4108	1760.060059	1600200
4109	1767.770020	1482300
4110	1763.000000	1513500
4111	1747.900024	1624700
4112	1731.010010	4016400
4113	1739.369995	1828400
4114	1723.500000	936700
4115	1732.380005	1033800
4116	1738.849976	346800
4117	1776.089966	1393000
4118	1758.719971	1299400
4119	1739.520020	1306100
4120	1751.880005	1011900



```
[51]: past_60_days= data_training.tail(60)
```

```
[53]: df= past_60_days.append(data_test,ignore_index= True)
```

```
[54]: df
```

```
[54]:
```

	Date	Open	High	Low	Close \
0	2020-10-07	1464.290039	1468.959961	1436.000000	1460.290039
1	2020-10-08	1465.089966	1490.000000	1465.089966	1485.930054
2	2020-10-09	1494.699951	1516.520020	1489.449951	1515.219971
3	2020-10-12	1543.000000	1593.859985	1532.569946	1569.150024
4	2020-10-13	1583.729980	1590.000000	1563.199951	1571.680054
..	...	...	...	...	...
249	2021-10-04	2713.989990	2714.000000	2623.330078	2675.300049
250	2021-10-05	2680.000000	2747.239990	2680.000000	2723.540039
251	2021-10-06	2692.510010	2757.040039	2689.729980	2747.080078
252	2021-10-07	2777.260010	2803.089111	2771.260010	2783.709961
253	2021-10-08	2798.120117	2806.340088	2788.586914	2801.120117

  

	Adj Close	Volume
0	1460.290039	1746200
1	1485.930054	1187800
2	1515.219971	1435300
3	1569.150024	2482600
4	1571.680054	1601000
..	...	...
249	2675.300049	1576500
250	2723.540039	1206300
251	2747.080078	988200
252	2783.709961	912500
253	2801.120117	946200

[254 rows x 7 columns]

```
[55]: df=df.drop(['Date', 'Adj Close'], axis =1)
```

```
[56]: df
```

```
[56]:
```

	Open	High	Low	Close	Volume
0	1464.290039	1468.959961	1436.000000	1460.290039	1746200
1	1465.089966	1490.000000	1465.089966	1485.930054	1187800
2	1494.699951	1516.520020	1489.449951	1515.219971	1435300
3	1543.000000	1593.859985	1532.569946	1569.150024	2482600
4	1583.729980	1590.000000	1563.199951	1571.680054	1601000
..	...	...	...	...	...
249	2713.989990	2714.000000	2623.330078	2675.300049	1576500
250	2680.000000	2747.239990	2680.000000	2723.540039	1206300

251	2692.510010	2757.040039	2689.729980	2747.080078	988200
252	2777.260010	2803.089111	2771.260010	2783.709961	912500
253	2798.120117	2806.340088	2788.586914	2801.120117	946200

[254 rows x 5 columns]

```
[57]: inputs = scaler.transform(df)
df
```

```
[57]:
```

	Open	High	Low	Close	Volume
0	1464.290039	1468.959961	1436.000000	1460.290039	1746200
1	1465.089966	1490.000000	1465.089966	1485.930054	1187800
2	1494.699951	1516.520020	1489.449951	1515.219971	1435300
3	1543.000000	1593.859985	1532.569946	1569.150024	2482600
4	1583.729980	1590.000000	1563.199951	1571.680054	1601000
..	...	...	...	...	...
249	2713.989990	2714.000000	2623.330078	2675.300049	1576500
250	2680.000000	2747.239990	2680.000000	2723.540039	1206300
251	2692.510010	2757.040039	2689.729980	2747.080078	988200
252	2777.260010	2803.089111	2771.260010	2783.709961	912500
253	2798.120117	2806.340088	2788.586914	2801.120117	946200

[254 rows x 5 columns]

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

```
[60]: X_test, y_test = np.array(X_test),np.array(y_test)
X_test.shape, y_test.shape
```

```
[60]: ((194, 60, 5), (194,))
```

```
[61]: y_pred=reg.predict(X_test)
```

```
[62]: y_pred
```

```
[62]: array([[0.89107555],
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```

```
[73]: scaler.scale_
```

```
[73]: array([5.63345301e-04, 5.56631737e-04, 5.63899782e-04, 5.62375381e-04,  
          1.21162615e-08])
```

```
[74]: scale=1/5.63345301e-04
```

```
[75]: scale
```

```
[75]: 1775.110217880383
```

```
[76]: y_pred =y_pred*scale
```

```
[77]: y_test=y_test*scale
```

```
[79]: y_pred
```

```
[79]: array([[1992.0985],  
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```

```
[78]: y_test
```

```

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```

```

[80]: plt.figure(figsize=(14,5))
plt.plot(y_test,color='red',label='Real google stock')

plt.plot(y_pred,color='blue',label='Predicted google stock')
plt.title( 'Google Stock Prediction' )
plt.xlabel('Time')
plt.ylabel('Google Stock Price')
plt.legend()
plt.show()

```

