Tugas Mandiri Pertemuan 14_Andrean Yonathan_Institut Teknologi Sepuluh Nopember

Latihan (1)

Melakukan import library yang dibutuhkan

In [1]:
```
# Import library pandas
import pandas as pd

# Import library numpy
import numpy as np

# Import library matplotlib untuk visualisasi
import matplotlib.pyplot as plt

# Import library for build model
from keras.layers import Dense,Dropout,SimpleRNN,LSTM
from keras.models import Sequential

# Import library untuk data preprocessing
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score
```

Load Dataset

In [2]:
```
#Panggil file (load file bernama Stock.csv) dan simpan dalam DataFrame
dataset = "Stock.csv"
data = pd.read_csv(dataset)
```

In [3]:
```
# tampilkan 5 baris data
data.head()
```

Out[3]:

	Date	Open	High	Low	Close	Volume	Name
0	2006-01-03	56.45	56.66	55.46	56.53	3716300	UTX
1	2006-01-04	56.80	56.80	55.94	56.79	3114000	UTX
2	2006-01-05	56.30	56.49	55.63	55.98	3118900	UTX
3	2006-01-06	56.45	56.67	56.10	56.16	2874300	UTX
4	2006-01-09	56.37	56.90	56.16	56.80	2467200	UTX

Review Data

In [4]:
```
# Melihat informasi lebih detail mengenai struktur DataFrame dapat dilihat menggunakan fungsi info()
data.info()
```

Out[4]:
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3020 entries, 0 to 3019
Data columns (total 7 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Date    3020 non-null   object
 1   Open    3019 non-null   float64
 2   High    3020 non-null   float64
 3   Low     3020 non-null   float64
 4   Close   3020 non-null   float64
 5   Volume  3020 non-null   int64
 6   Name    3020 non-null   object
dtypes: float64(4), int64(1), object(2)
memory usage: 165.3+ KB
```

In [5]:
```
# Pilom "low" yang akan kita gunakan dalam membangun model
# Slice kolom "low"

low_data = data.iloc[:,3:4].values
```

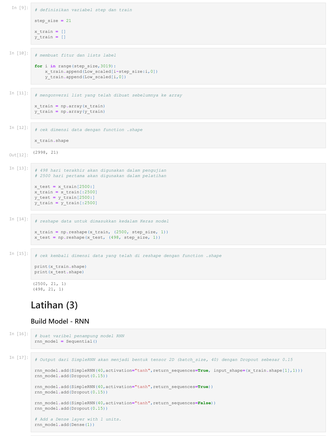
In [6]:
```
# cek output low_data
low_data
```

Out[6]:
```
array([[ 55.46],
       [ 55.94],
       [ 55.63],
       ...,
       [126.92],
       [127.29],
       [127.57]])
```

In [7]:
```
# Visualizing low_data

plt.figure(figsize=(14,10))
plt.plot(low_data, color = "blue")
plt.title("Microsoft Stock Prices",fontsize=14)
plt.xlabel("Days",fontsize=12)
plt.ylabel("Scaled Price",fontsize=12)
plt.grid()
plt.show()
```

Out[7]:



Latihan (2)

Data Preprocessing

In [8]:
```
# Membiasakan data antara 1 dan 0 (scaling) pada low data

scaler = MinMaxScaler(feature_range=(0,1))
low_scaled = scaler.fit_transform(low_data)
```

In [9]:
```
# definisikan variabel step dan train

step_size = 21

x_train = []
y_train = []
```

In [10]:
```
# membuat fitur dan lists label

for i in range(step_size,3019):
    x_train.append(low_scaled[i-step_size:i,0])
    y_train.append(low_scaled[i,0])
```

In [11]:
```
# mengonversi list yang telah dibuat sebelumnya ke array

x_train = np.array(x_train)
y_train = np.array(y_train)
```

In [12]:
```
# cek dimensi data dengan function .shape

x_train.shape
```

Out[12]:
```
(2998, 21)
```

In [13]:
```
# 498 hari terakhir akan dipakainan dalam penyajian
# 2500 hari pertama akan dipakainan dalam pelatihan

x_test = x_train[2500:]
x_train = x_train[:2500]
y_test = y_train[2500:]
y_train = y_train[:2500]
```

In [14]:
```
# reshape data untuk dimasukkan kedalam Keras model

x_train = np.reshape(x_train, (2500, step_size, 1))
x_test = np.reshape(x_test, (498, step_size, 1))
```

In [15]:
```
# cek kembali dimensi data yang telah di reshape dengan function .shape

print(x_train.shape)
print(x_test.shape)
```

Out[15]:
```
(2500, 21, 1)
(498, 21, 1)
```

Latihan (3)

Build Model - RNN

In [16]:
```
# Buat variabel penampung model RNN
rnn_model = Sequential()
```

In [17]:
```
# Output dari SimpleRNN akan menjadi bentuk tensor 2D (batch_size, 40) dengan Dropout sebesar 0.15

rnn_model.add(SimpleRNN(40,activation="tanh",return_sequences=True, input_shape=(x_train.shape[1],1)))
rnn_model.add(Dropout(0.15))

rnn_model.add(SimpleRNN(40,activation="tanh",return_sequences=True))
rnn_model.add(Dropout(0.15))

rnn_model.add(SimpleRNN(40,activation="tanh",return_sequences=False))
rnn_model.add(Dropout(0.15))

# Add a Dense layer with 1 units.
rnn_model.add(Dense(1))
```

In [18]:
```
# menambahkan loss function kedalam model RNN dengan tipe MSE

rnn_model.compile(optimizer="adam",loss="MSE")
```

In [19]:
```
# fit the model RNN, dengan epoch 20 dan batch size 25

rnn_model.fit(x_train,y_train,epochs=20,batch_size=25)
```

Out[19]:
```
Epoch 1/20
100/100 [==============================] - 1s 20ms/step - loss: 0.1512
Epoch 2/20
100/100 [==============================] - 2s 25ms/step - loss: 0.0472
Epoch 3/20
100/100 [==============================] - 2s 25ms/step - loss: 0.0282
Epoch 4/20
100/100 [==============================] - 3s 27ms/step - loss: 0.0195
Epoch 5/20
100/100 [==============================] - 2s 25ms/step - loss: 0.0146
Epoch 6/20
100/100 [==============================] - 2s 23ms/step - loss: 0.0124: 0s - loss: 0.012
Epoch 7/20
100/100 [==============================] - 2s 23ms/step - loss: 0.0103
Epoch 8/20
100/100 [==============================] - 3s 29ms/step - loss: 0.0086: 0s - loss: 0
Epoch 9/20
100/100 [==============================] - 4s 40ms/step - loss: 0.0074
Epoch 10/20
100/100 [==============================] - 3s 29ms/step - loss: 0.0069
Epoch 11/20
100/100 [==============================] - 4s 42ms/step - loss: 0.0059
Epoch 12/20
100/100 [==============================] - 3s 34ms/step - loss: 0.0051
Epoch 13/20
100/100 [==============================] - 3s 34ms/step - loss: 0.0049
Epoch 14/20
100/100 [==============================] - 3s 34ms/step - loss: 0.0045
Epoch 15/20
100/100 [==============================] - 4s 37ms/step - loss: 0.0043
Epoch 16/20
100/100 [==============================] - 4s 35ms/step - loss: 0.0042
Epoch 17/20
100/100 [==============================] - 3s 34ms/step - loss: 0.0034
Epoch 18/20
100/100 [==============================] - 4s 37ms/step - loss: 0.0031
Epoch 19/20
100/100 [==============================] - 4s 39ms/step - loss: 0.0030
Epoch 20/20
100/100 [==============================] - 4s 38ms/step - loss: 0.0030
<keras.callbacks.History at 0x2c8b8e94f40>
```

In [20]:
```
# Prediksi Model RNN
rnn_predictions = rnn_model.predict(x_test)

rnn_score = r2_score(y_test,rnn_predictions)
```

In [21]:
```
rnn_score
```

Out[21]:
```
0.9816376115967863
```

Latihan (4)

Build Model - LSTM

In [22]:
```
# Buat variabel penampung model LSTM
lstm_model = Sequential()
```

In [23]:
```
# Add a LSTM layer with 40 internal units. dengan Dropout sebesar 0.15

lstm_model.add(LSTM(40,activation="tanh",return_sequences=True, input_shape=(x_train.shape[1],1)))
lstm_model.add(Dropout(0.15))

lstm_model.add(LSTM(40,activation="tanh",return_sequences=True))
lstm_model.add(Dropout(0.15))

lstm_model.add(LSTM(40,activation="tanh",return_sequences=False))
lstm_model.add(Dropout(0.15))

# Add a Dense layer with 1 units.
lstm_model.add(Dense(1))
```

In [24]:
```
# menambahkan loss function kedalam model lstm dengan tipe MSE

lstm_model.compile(optimizer="adam",loss="MSE")
```

In [25]:
```
# fit lstm model, dengan epoch 20 dan batch size 25

lstm_model.fit(x_train,y_train,epochs=20,batch_size=25)
```

Out[25]:
```
Epoch 1/20
100/100 [==============================] - 10s 43ms/step - loss: 0.0169
Epoch 2/20
100/100 [==============================] - 4s 42ms/step - loss: 0.0036
Epoch 3/20
100/100 [==============================] - 4s 44ms/step - loss: 0.0031
Epoch 4/20
100/100 [==============================] - 4s 39ms/step - loss: 0.0028
Epoch 5/20
100/100 [==============================] - 7s 66ms/step - loss: 0.0026
Epoch 6/20
100/100 [==============================] - 4s 44ms/step - loss: 0.0026
Epoch 7/20
100/100 [==============================] - 5s 51ms/step - loss: 0.0026
Epoch 8/20
100/100 [==============================] - 5s 46ms/step - loss: 0.0023: 0s -
Epoch 9/20
100/100 [==============================] - 4s 43ms/step - loss: 0.0023
Epoch 10/20
100/100 [==============================] - 4s 44ms/step - loss: 0.0021
Epoch 11/20
100/100 [==============================] - 4s 43ms/step - loss: 0.0022
Epoch 12/20
100/100 [==============================] - 4s 44ms/step - loss: 0.0021
Epoch 13/20
100/100 [==============================] - 4s 44ms/step - loss: 0.0019
Epoch 14/20
100/100 [==============================] - 3s 35ms/step - loss: 0.0019
Epoch 15/20
100/100 [==============================] - 4s 41ms/step - loss: 0.0019: 2s
Epoch 16/20
100/100 [==============================] - 4s 36ms/step - loss: 0.0018
Epoch 17/20
100/100 [==============================] - 3s 34ms/step - loss: 0.0017
Epoch 18/20
100/100 [==============================] - 4s 35ms/step - loss: 0.0017
Epoch 19/20
100/100 [==============================] - 4s 37ms/step - loss: 0.0016
Epoch 20/20
100/100 [==============================] - 3s 35ms/step - loss: 0.0015
<keras.callbacks.History at 0x2c8b8e82f10>
```

In [26]:
```
# Prediksi Model LSTM
lstm_predictions = lstm_model.predict(x_test)

lstm_score = r2_score(y_test,lstm_predictions)
```

In [27]:
```
lstm_score
```

Out[27]:
```
0.9516942212175596
```

Latihan (5)

Evaluation

In [28]:
```
# Cetak nilai prediksi masing-masing model dengan menyimpan nya*2 square

print("R^2 Score of RNN:",rnn_score)
print("R^2 Score of LSTM:",lstm_score)
```

Out[28]:
```
R^2 Score of RNN: 0.9816376115967863
R^2 Score of LSTM: 0.9516942212175596
```

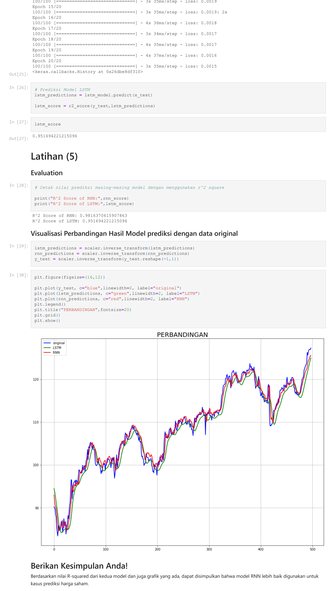
Visualisasi Perbandingan Hasil Model prediksi dengan data original

In [29]:
```
lstm_predictions = scaler.inverse_transform(lstm_predictions)
rnn_predictions = scaler.inverse_transform(rnn_predictions)
y_test = scaler.inverse_transform(y_test.reshape(-1,1))
```

In [30]:
```
plt.figure(figsize=(16,12))

plt.plot(y_test, c="blue", linewidth=2, label="original")
plt.plot(lstm_predictions, c="green",linewidth=2, label="LSTM")
plt.plot(rnn_predictions, c="red",linewidth=2, label="RNN")
plt.grid()
plt.title("PERBANDINGAN",fontsize=20)
plt.grid()
plt.show()
```

Out[30]:



Berikan Kesimpulan Anda!

Berdasarkan nilai R-squared dari kedua model dan juga grafik yang ada, dapat disimpulkan bahwa model RNN lebih baik digunakan untuk kasus prediksi harga saham.