

LAMPIRAN



Lampiran 1 Code Python

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import pandas as pd
import numpy as np
import tensorflow as tf
import os
from matplotlib import pyplot as plt
from tensorflow import keras
from tensorflow.keras import layers
from keras.callbacks import EarlyStopping
from sklearn.preprocessing import MinMaxScaler
from keras.preprocessing.sequence import TimeseriesGenerator
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Activation
from keras.layers import Dropout
from keras.layers import LSTM
#Upload Data bitcoin
data = pd.read_csv("/content/BTC2.csv")
data.head()
#pembentukan dataset
# Mengubah kolom "Date" menjadi tipe data datetime
data['Date'] = pd.to_datetime(data['Date'])
# Mengurutkan data berdasarkan tanggal
data = data.sort_values('Date')

plt.figure(figsize=(12,5))
plt.plot(data['Date'], data['Close'])
plt.title('BTC Time Series Plot')
plt.xlabel('Date')
plt.ylabel('BTC Price (USD)')
plt.grid(True)
plt.show()

summary_stats = data['Close'].describe()
print(summary_stats)
# Mengambil kolom "Harga Penutupan" sebagai data yang akan
diprediksi
price_data = data['Close'].values.reshape(-1, 1)
#Mengecek Missing Value
data.isna().sum()
data.fillna(data.mean(), inplace=True)
#Mengecek Missing Value
data.isna().sum()
#Normalisasi data
scaler = MinMaxScaler(feature_range=(0, 1))

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normalized_data = scaler.fit_transform(price_data)
normalized_data
print(normalized_data)
import pandas as pd

# assume predicted_data is a numpy array or a list
normalized_data = normalized_data # your predicted data

# create a pandas dataframe from the predicted data
df = pd.DataFrame(normalized_data, columns=['Hasil
Normalisasi'])

# save the dataframe to a CSV file
df.to_csv('normalized_data.csv', index=False)
#Training dan Testing
train_size = int(len(normalized_data) * 0.8)
train_data = normalized_data[:train_size, :]
test_data = normalized_data[train_size:, :]
print("Jumlah data training BTC", len(train_data))
print("Jumlah data testing BTC", len(test_data))
# Mengubah data menjadi bentuk yang sesuai untuk LSTM
def create_dataset(dataset, look_back=1):
    X, Y = [], []
    for i in range(len(dataset) - look_back):
        X.append(dataset[i:(i + look_back), 0])
        Y.append(dataset[i + look_back, 0])
    return np.array(X), np.array(Y)
look_back = 7 # Jumlah hari sebelumnya yang digunakan untuk
prediksi
train_X, train_Y = create_dataset(train_data, look_back)
test_X, test_Y = create_dataset(test_data, look_back)
# Reshape input untuk memenuhi kebutuhan input LSTM [sampel,
waktu, fitur]
train_X = np.reshape(train_X, (train_X.shape[0],
train_X.shape[1],
1))
test_X = np.reshape(test_X, (test_X.shape[0], test_X.shape[1],
1))
#MODEL BTC
model = Sequential()
model.add(LSTM(units=50, return_sequences=True,
input_shape=(look_back, 1)))
model.add(LSTM(units=50))
model.add(Dense(units=1))
model.compile(optimizer='adam', loss='mean_squared_error')

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mc =
tf.keras.callbacks.ModelCheckpoint('./model_v1/Forecast_Model.
h5', monitor='val_loss', mode='min', verbose=1,
save_best_only=True)

history=model.fit(train_X, train_Y, epochs=100, batch_size=64,
callbacks=[mc], validation_data=(test_X,test_Y),
shuffle=False)
#Pot training vs validation
def plot_graphs(history, metric):
    plt.plot(history.history[metric])
    plt.plot(history.history[f'val_{metric}'])
    plt.xlabel("Epochs")
    plt.ylabel(metric)
    plt.title(f"Training vs Validation {metric}")
    plt.legend([metric, f'val_{metric}'])
    plt.show()

plot_graphs(history, "loss")
# Melakukan prediksi
predicted_data = model.predict(test_X)
predicted_data = scaler.inverse_transform(predicted_data)
# Memprediksi 2 minggu ke depan
last_week = normalized_data[-look_back:, :]
forecast = []
for _ in range(30):
    input_data = np.reshape(last_week, (1, look_back, 1))
    next_day_price = model.predict(input_data)
    forecast.append(next_day_price[0][0])
    last_week = np.concatenate((last_week[1:], next_day_price),
axis=0)
import pandas as pd

# assume predicted_data is a numpy array or a list
predicted_data = predicted_data # your predicted data

# create a pandas dataframe from the predicted data
df = pd.DataFrame(predicted_data, columns=['Predicted Price'])

# save the dataframe to a CSV file
df.to_csv('predicted_data.csv', index=False)
# Mengubah kembali data prediksi menjadi skala asli
forecast = np.array(forecast)
forecast = forecast.reshape(-1, 1)

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forecast = scaler.inverse_transform(forecast)
# Mencetak hasil prediksi
last_date = data['Date'].values[-1]
forecast_dates = [last_date + pd.Timedelta(days=i+1) for i in
range(len(forecast))]

for i in range(len(forecast)):
    print("Date:", forecast_dates[i], "Forecasted Price:",
forecast[i][0])

import pandas as pd

# assume predicted_data is a numpy array or a list
forecast_data = forecast # your predicted data

# create a pandas dataframe from the predicted data
df = pd.DataFrame(forecast, columns=['forecast Price'])

# save the dataframe to a CSV file
df.to_csv('forecast_data.csv', index=False)
# Menghitung MAPE
def calculate_mape(actual, predicted):
    return np.mean(np.abs((actual - predicted) / actual)) * 100
# Menghitung MAPE
actual_prices = scaler.inverse_transform(test_Y.reshape(-1,
1))
mape = calculate_mape(actual_prices, predicted_data)
print("MAPE:", mape)
# Plot prediksi
plt.subplots(figsize = (15,6))
plt.plot(data['Date'], price_data, label='Actual Price')
plt.plot(data['Date'].values[train_size+look_back:],
predicted_data, label='Predicted Price')
plt.title('Prediksi Harga')
plt.legend()
plt.show()
data = pd.read_csv("/content/HASIL PERAMALAN BTC.csv")

data['Date'] = pd.to_datetime(data['Date'])

data = data.sort_values('Date')
import matplotlib.pyplot as plt

plt.figure(figsize=(15,6))

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plt.plot(data['Date'], data['Forecast'], label='Forecasting  
Price')  
  
plt.title('Prediksi Harga 30 hari selanjutnya')  
plt.xlabel('Date')  
plt.ylabel('Price')  
plt.legend()  
plt.show()
```



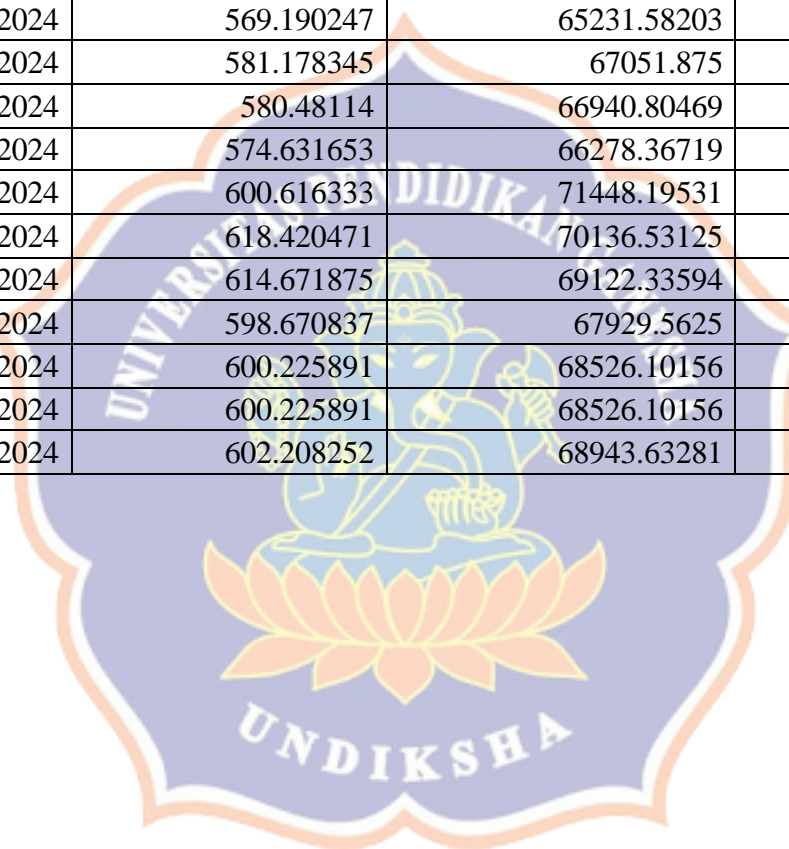
Lampiran 2 Contoh Hasil Normalisasi Data

Hasil Normalisasi BTC	Hasil Normalisasi ETH	Hasil Normalisasi BNB
0.054357368	0.033279673	0.037098715
0.05630359	0.034511838	0.036462105
0.055043673	0.034279159	0.035982242
0.054155812	0.033787183	0.036557671
0.049163871	0.030895171	0.034376531
0.052908096	0.033501713	0.03506256
0.052754154	0.032922684	0.035461007
0.055381291	0.033950926	0.03570174
0.04754189	0.030203682	0.033027121
0.040183144	0.027806749	0.030008456
0.041892964	0.029021732	0.032448263
0.041860547	0.029537171	0.033159417
0.045118789	0.029846865	0.033320573
0.043800045	0.028742477	0.03403923
0.039894008	0.026051538	0.031775926
0.044478357	0.029121512	0.034036838
0.043412253	0.028751779	0.034333895
0.046614931	0.031968097	0.0379715
0.047863837	0.030961075	0.038657015
0.05466006	0.032645367	0.035555158
0.05678216	0.033694367	0.035179172
0.059074145	0.033737734	0.034544114
0.063858336	0.034828432	0.036818099
0.060355468	0.032850491	0.037450896
0.063170784	0.0337821	0.038873216
0.066894592	0.034263483	0.041032709
0.075958928	0.039201346	0.044169225
0.084138528	0.042279106	0.042644138
0.086394784	0.041948887	0.041646044
0.088681162	0.042501243	0.042094661
0.100130045	0.044139371	0.039955452
0.118119557	0.048101285	0.039490228

Lampiran 3 Data Penelitian Aktual

Date	Data Aktual BNB (USD)	Data Aktual BTC (USD)	Data Aktual ETH (USD)
5/26/2019	34.104851	8673.21582	267.069641
5/27/2019	33.680679	8805.77832	272.86264
5/28/2019	33.360947	8719.961914	271.768707
5/29/2019	33.744354	8659.487305	269.455688
5/30/2019	32.291065	8319.472656	255.858948
5/31/2019	32.748165	8574.501953	268.113556
6/1/2019	33.013649	8564.016602	265.391266
6/2/2019	33.174049	8742.958008	270.225525
6/3/2019	31.391956	8208.995117	252.607925
6/4/2019	29.380625	7707.770996	241.338791
6/5/2019	31.006264	7824.231445	247.05101
6/6/2019	31.480104	7822.023438	249.474335
6/7/2019	31.587482	8043.951172	250.930359
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.....
4/16/2024	537.829346	63811.86328	3084.920166
4/17/2024	534.416016	61276.69141	2984.727539
4/18/2024	552.172119	63512.75391	3066.027588
4/19/2024	554.889282	63843.57031	3059.278564
4/20/2024	570.96051	64994.44141	3157.627197
4/21/2024	579.619934	64926.64453	3147.288574
4/22/2024	605.5755	66837.67969	3201.6521
4/23/2024	606.840637	66407.27344	3219.911621
4/24/2024	608.086121	64276.89844	3139.805176
4/25/2024	614.005005	64481.70703	3156.509521
4/26/2024	597.705444	63755.32031	3130.164795
4/27/2024	595.72052	63419.14063	3252.168213
4/28/2024	600.071167	63113.23047	3262.774658
4/29/2024	592.831238	63841.12109	3215.428955
4/30/2024	578.488037	60636.85547	3012.286865
5/1/2024	561.408203	58254.01172	2969.784668
5/2/2024	560.526733	59123.43359	2988.168457
5/3/2024	587.010437	62889.83594	3103.541992
5/4/2024	585.846558	63891.47266	3117.576416
5/5/2024	592.140381	64031.13281	3137.249023
5/6/2024	588.475952	63161.94922	3062.72876

5/7/2024	577.486206	62334.81641	3006.577148
5/8/2024	588.197449	61187.94141	2973.657227
5/9/2024	596.031982	63049.96094	3036.020508
5/10/2024	585.622192	60792.77734	2909.79126
5/11/2024	592.027893	60793.71094	2911.602051
5/12/2024	594.424561	61448.39453	2928.701904
5/13/2024	591.606934	62901.44922	2949.359619
5/14/2024	566.707031	61552.78906	2881.157959
5/15/2024	582.074341	66267.49219	3037.056641
5/16/2024	569.190247	65231.58203	2945.131104
5/17/2024	581.178345	67051.875	3094.118652
5/18/2024	580.48114	66940.80469	3122.948975
5/19/2024	574.631653	66278.36719	3071.843018
5/20/2024	600.616333	71448.19531	3663.855469
5/21/2024	618.420471	70136.53125	3789.312744
5/22/2024	614.671875	69122.33594	3737.217773
5/23/2024	598.670837	67929.5625	3776.927246
5/24/2024	600.225891	68526.10156	3726.93457
5/25/2024	600.225891	68526.10156	3726.93457
5/26/2024	602.208252	68943.63281	3767.151123



Lampiran 4. Data Forecasting dan Data Aktual

Date	forecast Price BTC (USD)	Data Aktual BTC (USD)	forecast Price ETH (USD)	Data Aktual Price ETH (USD)	forecast Price BNB (USD)	Data Aktual Price BNB (USD)
5/26/2024	66090.625	63419.14063	3607.5118	3252.168213	605.42596	595.72052
5/27/2024	65197.26	63113.23047	3613.12555	3262.774658	608.969	600.071167
5/28/2024	64236.582	63841.12109	3618.7292	3215.428955	612.52313	592.831238
5/29/2024	63265.17	60636.85547	3624.0032	3012.286865	615.99774	578.488037
5/30/2024	62309.83	58254.01172	3629.0578	2969.784668	619.47217	561.408203
5/31/2024	61359.867	59123.43359	3633.8689	2988.168457	622.90247	560.526733
6/1/2024	60423.17	62889.83594	3638.5837	3103.541992	626.32214	587.010437
6/2/2024	62040.47266	63891.47266	3643.30096	3117.576416	629.7418	585.846558
6/3/2024	62180.13281	64031.13281	3648.059	3137.249023	633.16595	592.140381
6/4/2024	61310.94922	63161.94922	3652.87524	3062.72876	636.59564	588.475952
6/5/2024	60483.81641	62334.81641	3657.7437	3006.577148	640.0304	577.486206
6/6/2024	59336.94141	61187.94141	3662.6512	2973.657227	643.469	588.197449
6/7/2024	61198.96094	63049.96094	3667.5832	3036.020508	646.90985	596.031982
6/8/2024	58941.77734	60792.77734	3672.5295	2909.79126	650.3516	585.622192
6/9/2024	58942.71094	60793.71094	3677.48346	2911.602051	653.79315	592.027893
6/10/2024	59597.39453	61448.39453	3682.44147	2928.701904	657.23285	594.424561
6/11/2024	61050.44922	62901.44922	3687.40155	2949.359619	660.6697	591.606934
6/12/2024	59701.78906	61552.78906	3692.36206	2881.157959	664.1025	566.707031
6/13/2024	64416.49219	66267.49219	3697.3209	3037.056641	667.5298	582.074341
6/14/2024	63380.58203	65231.58203	3702.27576	2945.131104	670.9508	569.190247
6/15/2024	65200.875	67051.875	3707.22345	3094.118652	674.3639	581.178345
6/16/2024	65089.80469	66940.80469	3712.16095	3122.948975	677.7678	580.48114
6/17/2024	64427.36719	66278.36719	3717.0844	3071.843018	681.1614	574.631653
6/18/2024	69597.19531	71448.19531	3721.99023	3663.855469	684.5433	600.616333
6/19/2024	68285.53125	70136.53125	3726.8749	3789.312744	687.91223	618.420471
6/20/2024	67271.33594	69122.33594	3731.7346	3737.217773	691.26715	614.671875
6/21/2024	66078.5625	67929.5625	3736.5657	3776.927246	694.60645	598.670837

6/22/2 024	66675.10156	68526.1 0156	3741.3646	3726.93 457	697.92896	600.22 5891
6/23/2 024	66675.10156	68526.1 0156	3746.12744	3726.93 457	701.2334	600.22 5891
6/24/2 024	67092.63281	68943.6 3281	3750.8508	3767.15 1123	704.5187	602.20 8252



2734.586	2713.043	2718.819	2735.622	2698.668	2784.417	2756.017	2839.011
2713.043	2718.819	2735.622	2698.668	2784.417	2756.017	2839.011	2885.2
2718.819	2735.622	2698.668	2784.417	2756.017	2839.011	2885.2	2863.95
2735.622	2698.668	2784.417	2756.017	2839.011	2885.2	2863.95	3247.535
2698.668	2784.417	2756.017	2839.011	2885.2	2863.95	3247.535	3453.747
2784.417	2756.017	2839.011	2885.2	2863.95	3247.535	3453.747	3458.641
2756.017	2839.011	2885.2	2863.95	3247.535	3453.747	3458.641	3473.518
2839.011	2885.2	2863.95	3247.535	3453.747	3458.641	3473.518	3435.143
2885.2	2863.95	3247.535	3453.747	3458.641	3473.518	3435.143	3423.011

C. BNB

t-7	t-6	t-5	t-4	t-3	t-2	t-1	Target
560.5267	587.0104	585.8466	592.1404	588.476	577.4862	588.1974	596.032
587.0104	585.8466	592.1404	588.476	577.4862	588.1974	596.032	585.6222
585.8466	592.1404	588.476	577.4862	588.1974	596.032	585.6222	592.0279
592.1404	588.476	577.4862	588.1974	596.032	585.6222	592.0279	594.4246
588.476	577.4862	588.1974	596.032	585.6222	592.0279	594.4246	591.6069
577.4862	588.1974	596.032	585.6222	592.0279	594.4246	591.6069	566.707
588.1974	596.032	585.6222	592.0279	594.4246	591.6069	566.707	582.0743
596.032	585.6222	592.0279	594.4246	591.6069	566.707	582.0743	569.1902
...
...
...
585.6222	592.0279	594.4246	591.6069	566.707	582.0743	569.1902	581.1783
592.0279	594.4246	591.6069	566.707	582.0743	569.1902	581.1783	580.4811
594.4246	591.6069	566.707	582.0743	569.1902	581.1783	580.4811	574.6317
591.6069	566.707	582.0743	569.1902	581.1783	580.4811	574.6317	600.6163
566.707	582.0743	569.1902	581.1783	580.4811	574.6317	600.6163	618.4205
582.0743	569.1902	581.1783	580.4811	574.6317	600.6163	618.4205	614.6719
569.1902	581.1783	580.4811	574.6317	600.6163	618.4205	614.6719	598.6708
581.1783	580.4811	574.6317	600.6163	618.4205	614.6719	598.6708	600.2259
580.4811	574.6317	600.6163	618.4205	614.6719	598.6708	600.2259	600.2259
574.6317	600.6163	618.4205	614.6719	598.6708	600.2259	600.2259	602.2083

RIWAYAT HIDUP



I Gede Suparba Putra lahir di Singaraja pada tanggal 23 November 2001. Penulis lahir dari pasangan suami istri Bapak I Nyoman Sunendra dan Ibu Ni Nyoman Arniti. Penulis berkebangsaan Indonesia. Penulis beralamat di Jalan Srikandi Gang Jeruk Singaraja, Buleleng, Bali. Penulis memiliki riwayat Pendidikan di SD Negeri 1 Banyuasri pada tahun 2014, lalu penulis melanjutkan Pendidikan SMP Negeri 1 Singaraja dan lulus pada tahun 2017. Pada tahun 2020, penulis lulus dari SMA Negeri 1 Singaraja. Penulis melanjutkan ke jenjang perkuliahan dan memilih untuk mengambil program studi S1 Ilmu Komputer di Universitas Pendidikan Ganesha.

