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LAMPIRAN

Lampiran 1 *Source code* model prediksi menggunakan LSTM

```

from sklearn.preprocessing import MinMaxScaler
from keras.models import Sequential
from keras.models import load_model
from keras.layers import Dense
from keras.layers import LSTM
from matplotlib import pyplot
from numpy import concatenate

from modul.scrap import scrap_csv
from modul.preprocessing import series_to_supervised

from sklearn.metrics import mean_squared_error
from math import sqrt
from datetime import timedelta

import pandas as pd
from pandas import DataFrame
import numpy as np
from sklearn.metrics import mean_squared_error
from math import sqrt

def predict(file, start, end, rasio):
    currency = "EURUSD"
    interval = "5m"
    len_data = "1000"

    # df = scrap_csv(file)
    df = file

    df = df[['time', 'close', 'open', 'high', 'low', 'ma5', 'rsi',
'macd_l', 'macd_s', 'tenkan_sen', 'kijun_sen']]

    # remove realtime data doesnt valid
    # df = df[:-1]

    dataset = df[start:end]
    dataset = dataset.set_index('time')

    predict_data = dataset.tail(1)
    # print(predict_data)
    time_predict_data = predict_data.index.values[0]
    time_predict_data = pd.to_datetime(time_predict_data) +
timedelta(minutes=5)

    predict_data = predict_data.values
    predict_data = predict_data.astype('float32')

    values = dataset.values
    values = values.astype('float32')
    # normalize features
    scaler = MinMaxScaler(feature_range=(0, 1))

```

```

scaled = scaler.fit_transform(values)
scaled_predict = scaler.transform(predict_data)

# frame as supervised learning
reframed = series_to_supervised(scaled, 1, 1)
reframed = reframed.iloc[:, 0:(len(dataset.columns) + 1)]
# print(reframed)
scaled_predict = DataFrame(scaled_predict)
# print(scaled_predict)
scaled_predict.columns = reframed.columns[range(0,
(len(dataset.columns)))]

# split into train and test sets
values = reframed.values
n_train_hours = round(end*rasio)
print(n_train_hours)
train = values[:n_train_hours, :]
test = values[n_train_hours:, :]
# split into input and outputs
train_X, train_y = train[:, :-1], train[:, -1]
test_X, test_y = test[:, :-1], test[:, -1]
train_X = train_X.reshape((train_X.shape[0], 1, train_X.shape[1]))
test_X = test_X.reshape((test_X.shape[0], 1, test_X.shape[1]))

values_predict = scaled_predict.values
predict_data_x = values_predict.reshape((values_predict.shape[0], 1,
values_predict.shape[1]))

# print(train_X.shape, train_y.shape, test_X.shape, test_y.shape)

model = Sequential()
model.add(LSTM(75, input_shape=(train_X.shape[1], train_X.shape[2])))
model.add(Dense(1))
model.compile(loss='mae', optimizer='adam')
print("-----Train-----")
history = model.fit(train_X, train_y, epochs=25, batch_size=16,
validation_data=(test_X, test_y), verbose=1,
shuffle=False)
# pyplot.plot(history.history['loss'], label='train')
# pyplot.plot(history.history['val_loss'], label='test')
# pyplot.legend()
# pyplot.show()

# make a prediction
print("-----Predict-----")
yhat_predict = model.predict(predict_data_x)
# print(predict_data_x)
# predict_data_x
predict_data_x_new = predict_data_x.reshape((predict_data_x.shape[0],
predict_data_x.shape[2]))

inv_yhat_predict_new = concatenate((yhat_predict,
predict_data_x_new[:, 1:]), axis=1)
inv_yhat_predict_new = scaler.inverse_transform(inv_yhat_predict_new)
inv_yhat_predict_new = inv_yhat_predict_new[:, 0]
print(time_predict_data)
print("%.5f" % inv_yhat_predict_new[0])

```

```
pred = "%.5f" % inv_yhat_predict_new[0]
act = "%.5f" % df['close'][end+1]

return time_predict_data, act, pred

def mape(actual, pred):
    actual, pred = np.array(actual), np.array(pred)
    return np.mean(np.abs((actual - pred) / actual)) * 100

def rmse(actual, pred):
    return sqrt(mean_squared_error(actual, pred))
```

Lampiran 2 Data *history* (bulan 1 desember 2022 – 1 januari 2023)

<NO>	<DATE>	<TIME>	<OPEN>	<HIGH>	<LOW>	<CLOSE>	<TICKVOL>	<VOL>	<SPREAD>
1	2022.12.01	0:00:00	10.408	10.408	104.028	104.052	16	0	11
2	2022.12.01	0:05:00	104.065	104.069	104.005	10.401	34	0	11
3	2022.12.01	0:10:00	104.005	104.025	103.984	103.992	245	0	38
4	2022.12.01	0:15:00	103.995	1.04	103.988	103.999	495	0	45
5	2022.12.01	0:20:00	103.998	104.024	10.399	104.022	494	0	36
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
12448	2023.01.31	22:00:00	108.643	10.865	108.619	108.627	278	0	0
12449	2023.01.31	22:05:00	108.627	108.659	108.627	108.648	162	0	0
12450	2023.01.31	22:10:00	108.649	108.649	108.633	108.644	199	0	0
12451	2023.01.31	22:15:00	108.644	108.646	108.599	108.607	185	0	0
12452	2023.01.31	22:20:00	108.607	108.632	108.607	108.626	227	0	0

[https://github.com/CiciAndira/TUGAS-AKHIR/blob/main/DATA%20INPUTAN/Data%20history%20\(bulan%201%20desember%202022%20%E2%80%93%201%20januari%202023\).csv](https://github.com/CiciAndira/TUGAS-AKHIR/blob/main/DATA%20INPUTAN/Data%20history%20(bulan%201%20desember%202022%20%E2%80%93%201%20januari%202023).csv)

Lampiran 3 Data masukkan sistem

Open	High	Low	Close	Moving Average	RSI	Ichimoku Kinko Hyo				MACD	
						c line	b line	leading span a	leading span b	MACD L	MACD S
104.322	104.353	104.298	104.311	10.431	6.696	10.431	10.421	104.281	10.431	0.000694804	0.000744554
104.312	10.439	1.043	104.377	1.043	7.593	10.434	1.042	104.293	10.434	0.000720479	0.000739739
104.374	10.443	104.344	104.407	10.434	788.343	10.436	10.426	104.295	10.436	0.000756319	0.000743055
104.406	104.475	104.397	104.435	10.436	8.118	10.439	10.430	10.428	10.439	0.000798119	0.000754068
104.435	104.449	10.439	104.407	10.438	7.226	10.439	10.430	1.043	10.439	0.000799434	0.000763141
:	:	:	:	:	:	:	:	:	:	:	:
108.643	10.865	108.619	108.627	10.866	3.288	10.869	10.870	108.789	10.869	0.00073152	0.000180603
108.627	108.659	108.627	108.648	10.865	406.993	10.869	10.870	108.781	10.869	0.000662006	0.000148542
108.649	108.649	108.633	108.644	10.864	39.719	10.869	1.086	108.777	10.869	0.000609565	0.000117566
108.644	108.646	108.599	108.607	10.863	31.845	10.869	10.869	108.796	10.869	0.000532814	0.00067632
108.607	108.632	108.607	108.626	1.086	3.877	10.867	10.869	108.783	10.867	0.000441086	0.000629273

<https://github.com/CiciAndira/TUGAS-AKHIR/blob/main/DATA%20INPUTAN/data%20masukan%20sistemmm.xlsx>

Lampiran 4 Data normalisasi

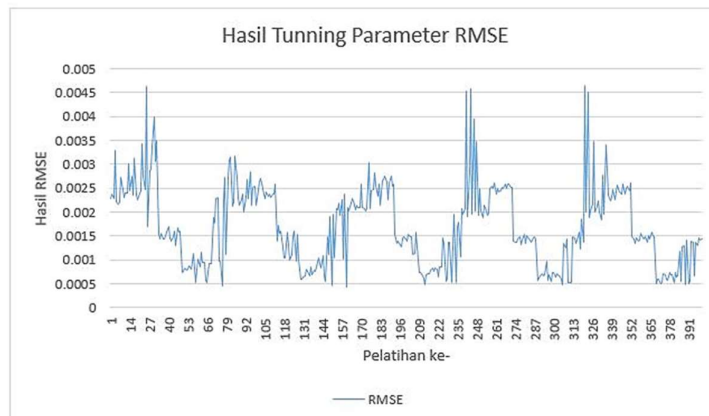
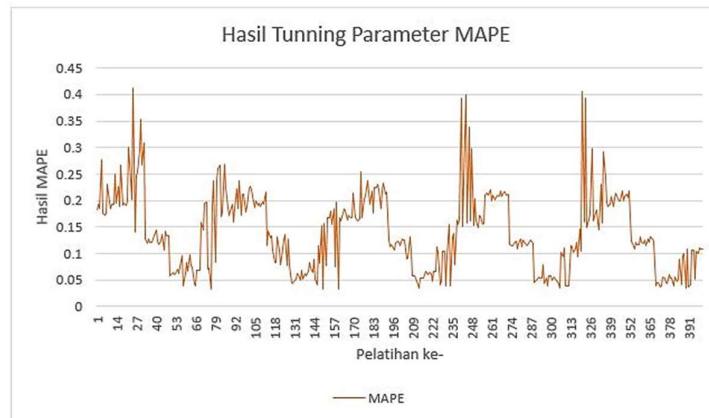
var1(t-1)	var2(t-1)	var3(t-1)	var4(t-1)	var5(t-1)	var6(t-1)	var7(t-1)	var8(t-1)	var9(t-1)	var10 (t-1)	var11 (t-1)	var1(t)
0.061743	0.061018	0.068569	0.07287	0.055775	0.757211	0.588525	0.623361	0.052708	0.012928	0.029551	0.060417
0.060417	0.061968	0.066679	0.069473	0.056772	0.72782	0.58436	0.620976	0.054436	0.012928	0.031866	0.072916
0.072916	0.060072	0.073669	0.069851	0.059687	0.834584	0.588758	0.620052	0.059813	0.015593	0.034184	0.078598
0.078598	0.071821	0.081224	0.078157	0.063446	0.869137	0.594897	0.620688	0.06365	0.023193	0.034571	0.083902
0.083902	0.077885	0.089725	0.088163	0.068012	0.897143	0.602057	0.6228	0.067972	0.031483	0.031672	0.078598
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0.880114	0.88213	0.880999	0.885784	0.881704	0.652321	0.500738	0.510929	0.877687	0.881563	0.881422	0.87822
0.87822	0.879665	0.878355	0.887106	0.883814	0.623136	0.502233	0.512639	0.877687	0.881563	0.875629	0.882574
0.882574	0.878149	0.87892	0.88484	0.886997	0.669768	0.506127	0.514879	0.880472	0.881563	0.877367	0.885607
0.885607	0.882698	0.883642	0.890503	0.888493	0.700254	0.5109	0.517741	0.881815	0.881563	0.875437	0.887121
0.887121	0.884783	0.884777	0.892771	0.88949	0.715464	0.515214	0.520995	0.882393	0.882156	0.874857	0.888447

https://github.com/CiciAndira/TUGAS-AKHIR/blob/main/DATA%20INPUTAN/Output_setelah_transform.csv

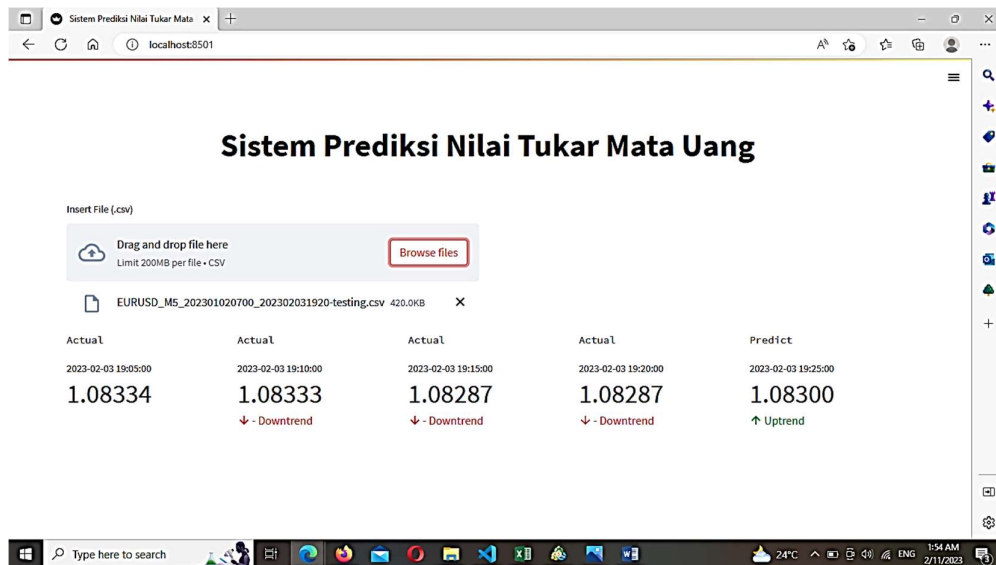
Lampiran 5 Tuning hyperparameter

No	Neuron	Batch size	Epoch	Train:Test	RMSE	MAPE
1	25	8	25	60:40	0.002276644	0.182180607
2	25	8	25	70:30	0.002387826	0.192254875
3	25	8	25	80:20	0.002287862	0.183998141
4	25	8	25	90:10	0.003297858	0.277056219
5	25	8	50	60:40	0.002204218	0.176082447
6	25	8	50	70:30	0.002167961	0.172881549
7	25	8	50	80:20	0.002204806	0.176754757
8	25	8	50	90:10	0.00274074	0.230129738
⋮	⋮	⋮	⋮	⋮	⋮	⋮
397	125	128	100	60:40	0.001297	0.099278
398	125	128	100	70:30	0.001459	0.111662
399	125	128	100	80:20	0.001427	0.109203
400	125	128	100	90:10	0.00143	0.109658

<https://github.com/CiciAndira/TUGAS-AKHIR/blob/main/DATA%20INPUTAN/Tunning%20Parameter2.xlsx>

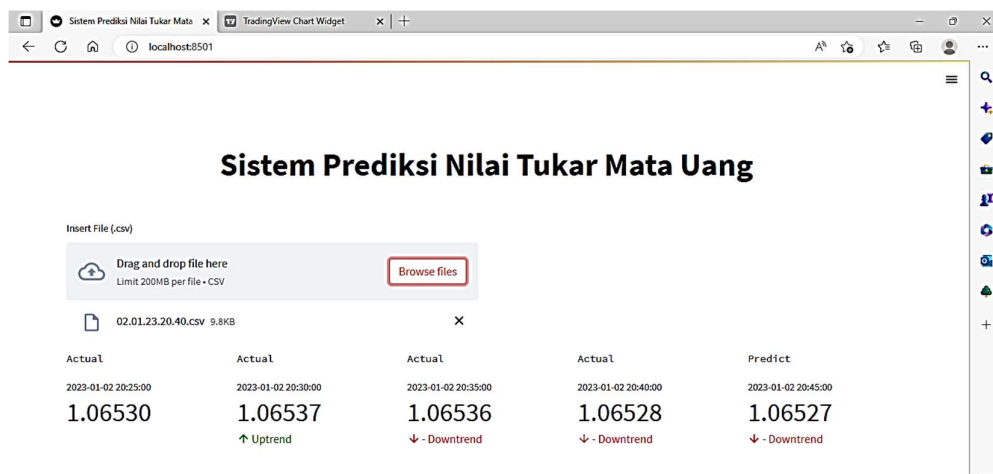
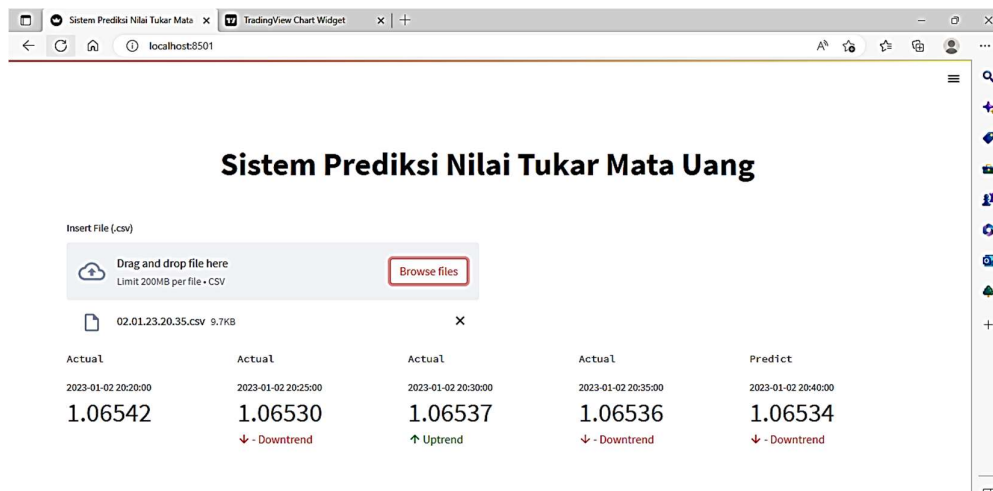
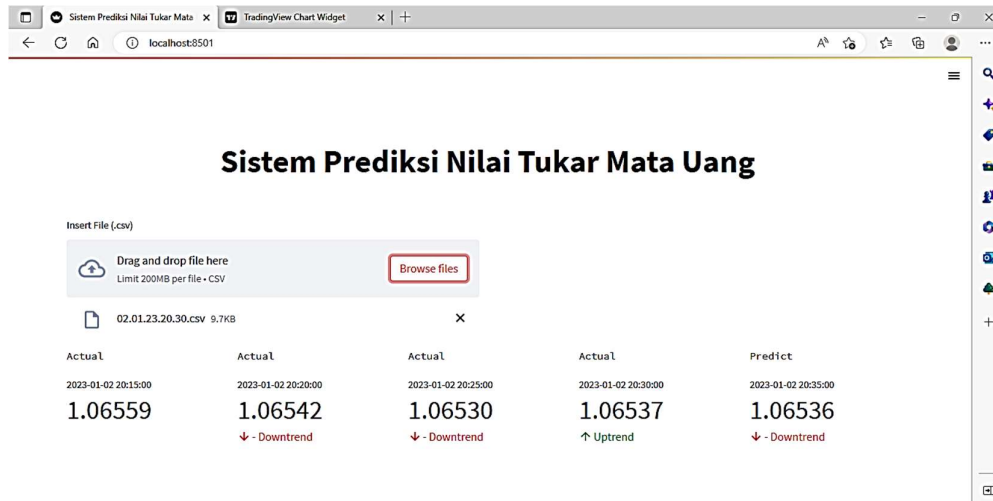


Lampiran 6 Graphical User Interface (GUI) Sistem



Lampiran 7 Hasil Percobaan Sistem (Prediksi)

1. Pengujian Transaksi menggunakan akun demo MIFX



Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

Browse files

04.01.23.22.00.csv 45.1KB

Actual	Actual	Actual	Actual	Predict
2023-01-04 21:45:00	2023-01-04 21:50:00	2023-01-04 21:55:00	2023-01-04 22:00:00	2023-01-04 22:05:00
1.06006	1.06009	1.06056	1.06054	1.06057
	↑ Uptrend	↑ Uptrend	↓ - Downtrend	↑ Uptrend

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

Browse files

04.01.23.22.05.csv 45.1KB

Actual	Actual	Actual	Actual	Predict
2023-01-04 21:50:00	2023-01-04 21:55:00	2023-01-04 22:00:00	2023-01-04 22:05:00	2023-01-04 22:10:00
1.06009	1.06056	1.06054	1.06030	1.06043
	↑ Uptrend	↓ - Downtrend	↓ - Downtrend	↑ Uptrend

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

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Limit 200MB per file • CSV

Browse files

04.01.23.22.10.csv 45.2KB

Actual	Actual	Actual	Actual	Predict
2023-01-04 21:55:00	2023-01-04 22:00:00	2023-01-04 22:05:00	2023-01-04 22:10:00	2023-01-04 22:15:00
1.06056	1.06054 ↓ - Downtrend	1.06030 ↓ - Downtrend	1.06042 ↑ Uptrend	1.06004 ↓ - Downtrend

Sistem Prediksi Nilai Tukar Mata Uang

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Drag and drop file here
Limit 200MB per file • CSV

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06.01.23.22.30.csv 79.7KB

Actual	Actual	Actual	Actual	Predict
2023-01-06 22:15:00	2023-01-06 22:20:00	2023-01-06 22:25:00	2023-01-06 22:30:00	2023-01-06 22:35:00
1.06462	1.06469 ↑ Uptrend	1.06477 ↑ Uptrend	1.06479 ↑ Uptrend	1.06442 ↓ - Downtrend

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

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06.01.23.22.35.csv 79.8KB

Actual	Actual	Actual	Actual	Predict
2023-01-06 22:20:00	2023-01-06 22:25:00	2023-01-06 22:30:00	2023-01-06 22:35:00	2023-01-06 22:40:00
1.06469	1.06477 ↑ Uptrend	1.06479 ↑ Uptrend	1.06469 ↓ - Downtrend	1.06450 ↓ - Downtrend

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

Browse files

06.01.23.22.40.csv 79.9KB

Actual	Actual	Actual	Actual	Predict
2023-01-06 22:25:00	2023-01-06 22:30:00	2023-01-06 22:35:00	2023-01-06 22:40:00	2023-01-06 22:45:00
1.06477	1.06479	1.06469	1.06459	1.06483
↑ Uptrend	↑ Uptrend	↓ - Downtrend	↓ - Downtrend	↑ Uptrend

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

Browse files

09.01.23.22.30.csv 96.8KB

Actual	Actual	Actual	Actual	Predict
2023-01-09 22:15:00	2023-01-09 22:20:00	2023-01-09 22:25:00	2023-01-09 22:30:00	2023-01-09 22:35:00
1.07439	1.07452	1.07445	1.07411	1.07409
↑ Uptrend	↑ Uptrend	↓ - Downtrend	↓ - Downtrend	↓ - Downtrend

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

Browse files

09.01.23.22.35.csv 96.9KB

Actual	Actual	Actual	Actual	Predict
2023-01-09 22:20:00	2023-01-09 22:25:00	2023-01-09 22:30:00	2023-01-09 22:35:00	2023-01-09 22:40:00
1.07452	1.07445 ↓ - Downtrend	1.07411 ↓ - Downtrend	1.07389 ↓ - Downtrend	1.07519 ↑ Uptrend

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

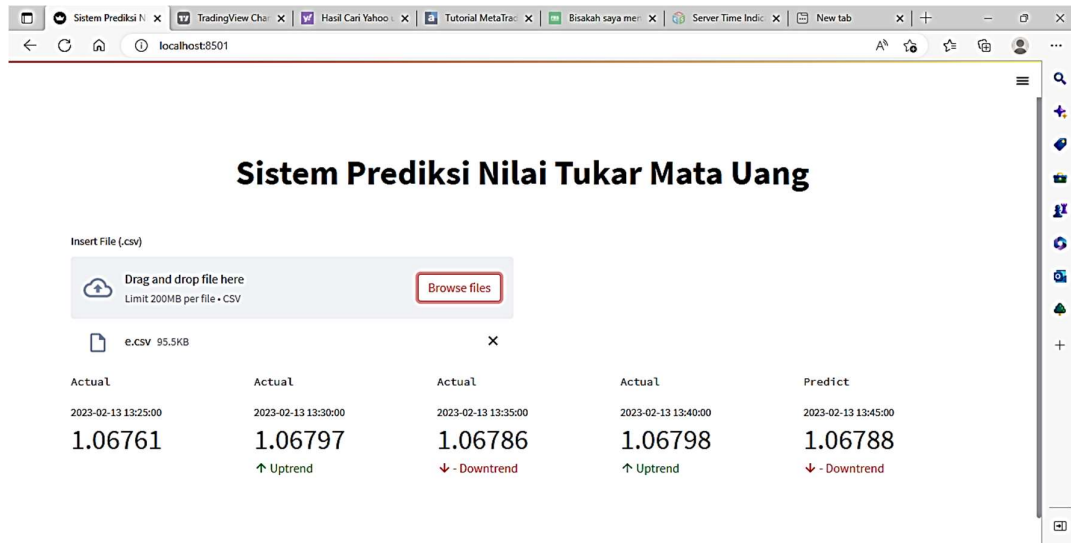
Drag and drop file here
Limit 200MB per file • CSV

Browse files

09.01.23.22.40.csv 97.0KB

Actual	Actual	Actual	Actual	Predict
2023-01-09 22:25:00	2023-01-09 22:30:00	2023-01-09 22:35:00	2023-01-09 22:40:00	2023-01-09 22:45:00
1.07445	1.07411 ↓ - Downtrend	1.07389 ↓ - Downtrend	1.07412 ↑ Uptrend	1.07393 ↓ - Downtrend

Lampiran 8 Hasil Pengujian Transaksi



Sistem Prediksi Nilai Tukar Mata Uang

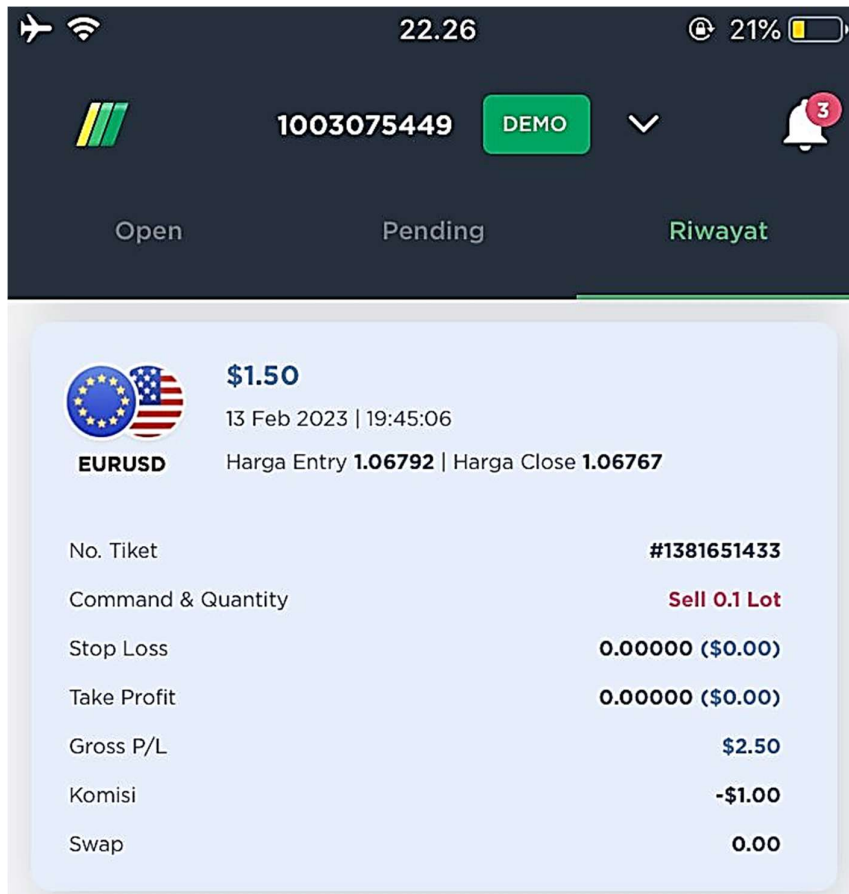
Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

Browse files

e.csv 95.5KB

Actual	Actual	Actual	Actual	Predict
2023-02-13 13:25:00	2023-02-13 13:30:00	2023-02-13 13:35:00	2023-02-13 13:40:00	2023-02-13 13:45:00
1.06761	1.06797	1.06786	1.06798	1.06788
	↑ Uptrend	↓ - Downtrend	↑ Uptrend	↓ - Downtrend



22.26 21%

1003075449 DEMO

Open Pending Riwayat

EURUSD \$1.50
13 Feb 2023 | 19:45:06
Harga Entry **1.06792** | Harga Close **1.06767**

No. Tiket	#1381651433
Command & Quantity	Sell 0.1 Lot
Stop Loss	0.00000 (\$0.00)
Take Profit	0.00000 (\$0.00)
Gross P/L	\$2.50
Komisi	-\$1.00
Swap	0.00

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)


Drag and drop file here
Limit 200MB per file • CSV

Browse files


h.csv 147.3KB

Actual	Actual	Actual	Actual	Predict
2023-02-13 13:55:00	2023-02-13 14:00:00	2023-02-13 14:05:00	2023-02-13 14:10:00	2023-02-13 14:15:00
1.06758	1.06748	1.06752	1.06764	1.06779
	↓ - Downtrend	↑ Uptrend	↑ Uptrend	↑ Uptrend

✈️ 22.36 🔒 8% 🔋

 1003075449 DEMO ▼ 🔔 3

Open Pending Riwayat

 **\$3.30**
13 Feb 2023 | 20:15:55
EURUSD Harga Entry **1.06765** | Harga Close **1.06808**

No. Tiket	#1381651776
Command & Quantity	Buy 0.1 Lot
Stop Loss	0.00000 (\$0.00)
Take Profit	0.00000 (\$0.00)
Gross P/L	\$4.30
Komisi	-\$1.00
Swap	0.00

Sistem Prediksi Nilai Tukar Mata Uang

Insert File (.csv)

Drag and drop file here
Limit 200MB per file • CSV

Browse files


k.csv 268.1KB

Actual	Actual	Actual	Actual	Predict
2023-02-13 15:20:00	2023-02-13 15:25:00	2023-02-13 15:30:00	2023-02-13 15:35:00	2023-02-13 15:40:00
1.06859	1.06818 ↓ - Downtrend	1.06838 ↑ Uptrend	1.06832 ↓ - Downtrend	1.06866 ↑ Uptrend

22.49 8%

1003075449 DEMO

Open Pending Riwayat

 **\$0.80**
13 Feb 2023 | 21:41:36
EURUSD Harga Entry **1.06838** | Harga Close **1.06820**

No. Tiket	#1381654643
Command & Quantity	Sell 0.1 Lot
Stop Loss	0.00000 (\$0.00)
Take Profit	0.00000 (\$0.00)
Gross P/L	\$1.80
Komisi	-\$1.00
Swap	0.00

2. Pengujian Transaksi menggunakan akun demo FBS

Trade Type	Price Range	Time	P/L
EURUSD sell 0.01	1.07068 → 1.07034	2023.05.26 18:00:47	0.34
EURUSD sell 0.01	1.07055 → 1.07041	2023.05.26 18:05:37	0.14
EURUSD sell 0.01	1.07055 → 1.07039	2023.05.26 18:10:52	0.16
EURUSD sell 0.01	1.07055 → 1.07040	2023.05.26 18:15:57	0.15
EURUSD buy 0.01	1.07041 → 1.07052	2023.05.26 18:20:00	0.11
EURUSD buy 0.01	1.07076 → 1.07093	2023.05.26 18:23:47	0.17
EURUSD sell 0.01	1.07104 → 1.07114	2023.05.26 18:31:57	-0.10
EURUSD buy 0.01	1.07137 → 1.07149	2023.05.26 18:33:00	0.12
EURUSD sell 0.01	1.07067 → 1.07054	2023.05.26 18:48:33	0.13
EURUSD buy 0.01	1.07137 → 1.07149	2023.05.26 19:00:36	0.12

LEMBAR PERBAIKAN SKRIPSI

“PEMANFAATAN DATA TEKNIKAL UNTUK MEMPREDIKSI NILAI TUKAR MATA UANG MENGGUNAKAN METODE PATTERN RECOGNITION”

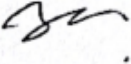

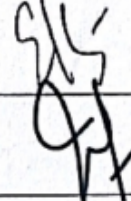
OLEH:

CICI PURNAMASARI
D421 16 314

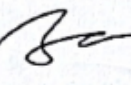
Skripsi ini telah dipertahankan pada Ujian Akhir Sarjana tanggal 08 Juni 2023.

Telah dilakukan perbaikan penulisan dan isi skripsi berdasarkan usulan dari penguji dan pembimbing skripsi.

Persetujuan perbaikan oleh tim penguji:

	Nama	Tanda Tangan
Ketua	Prof. Dr. Indrabayu, S.T., M.T., M.Bus.Sys., IPM, ASEAN.Eng	
Sekretaris	A. Ais Prayogi Alimuddin, S.T., M.Eng.	
Anggota	Elly Warni, S.T., M.T	
	Anugrayani Bustamin, S.T., M.T	

Persetujuan Perbaikan oleh pembimbing:

Pembimbing	Nama	Tanda Tangan
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II	A. Ais Prayogi Alimuddin, S.T., M.Eng.	