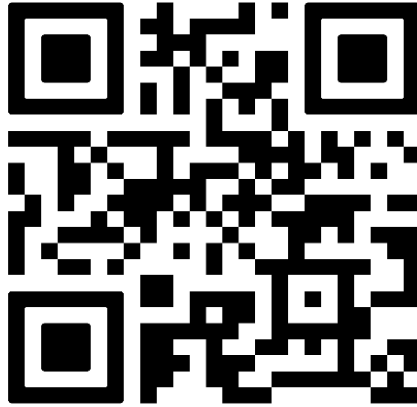


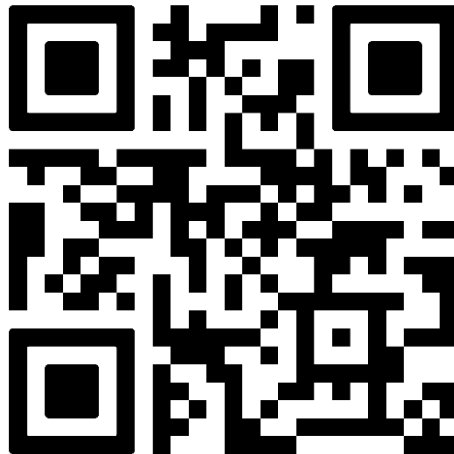
Lampiran 1 - Data Historis ASII.JK

Data historis harga saham PT Astra Internasional Tbk (ASII.JK) periode 31 Oktober 2019 - 31 Oktober 2024 dapat diakses dengan *scan QR code* di bawah ini :



<https://docs.google.com/spreadsheets/d/16BB6nr9vSd4Rk9bWEu8Qbux6D72IKz6t/edit?gid=211879374#gid=211879374>

Data historis harga saham PT Astra Internaisonal Tbk (ASII.JK) periode 31 Oktober 2019 - 31 Oktober 2024 yang telah dinormalisasi dapat diakses dengan *scan QR code* di bawah ini :



<https://docs.google.com/spreadsheets/d/1dl9s8iEqLiPjbtI57dAjULIHhwmI6aW0/edit?gid=1071243329#gid=1071243329>

Lampiran 2 - Parameter Eksperimen

Tabel 1 Lampiran 2 Parameter Eksperimen

No	Layer 1	Layer 2	Dense	BS	Epoch	DO	LR	MAPE	RMSE	MAE
1	150	100	50	32	250	0.3	0.001	1.80%	112.82	86.49
2	150	100	50	64	250	0.3	0.001	2.01%	123.33	98.96
3	150	100	50	32	300	0.3	0.001	1.66%	104.27	82.40
4	150	100	50	64	300	0.3	0.001	2.01%	123.33	98.96
5	128	64	32	64	250	0.2	0.001	1.56%	100.28	77.37
6	200	150	100	32	300	0.3	0.001	1.66%	104.27	82.40
7	150	100	50	64	250	0.3	0.0005	1.52%	98.44	74.40
8	100	50	25	32	200	0.4	0.001	1.46%	96.19	71.75
9	150	100	50	64	400	0.3	0.001	1.67%	105.58	80.88
10	150	100	50	64	250	0.1	0.001	1.54%	99.55	75.24
11	150	100	50	64	250	0.3	0.0001	2.10%	135.18	104.70
12	150	75	25	128	250	0.3	0.001	1.77%	112.28	87.22
13	100	75	50	32	300	0.2	0.001	1.66%	105.25	82.82
14	128	64	32	128	300	0.3	0.001	2.15%	132.81	107.88
15	200	150	100	64	400	0.4	0.001	1.71%	109.56	84.29
16	150	100	50	32	400	0.1	0.001	1.42%	94.16	70.26
17	100	50	25	64	200	0.3	0.0005	1.91%	122.44	94.00
18	128	64	32	64	350	0.2	0.001	1.88%	118.40	94.47
19	100	50	25	128	300	0.3	0.001	1.74%	112.32	85.61
20	150	75	25	32	250	0.2	0.0005	1.49%	97.09	72.72
21	128	100	50	32	400	0.1	0.0005	1.51%	98.11	73.20
22	150	75	50	32	350	0.2	0.0005	1.44%	94.73	70.52
23	100	64	50	64	400	0.1	0.001	1.63%	104.62	78.80
24	200	100	50	32	300	0.2	0.001	1.58%	100.95	77.61
25	150	100	64	32	400	0.1	0.0005	1.46%	95.82	71.93
26	128	75	64	32	400	0.1	0.0005	1.47%	96.32	72.41
27	100	64	32	16	400	0.1	0.001	1.56%	97.73	77.11
28	150	100	50	32	500	0.1	0.0005	1.61%	103.89	78.17
29	128	100	32	64	400	0.05	0.0005	1.57%	99.89	77.12
30	200	150	64	32	400	0.1	0.0003	1.45%	96.30	71.34

Lampiran 3 - Harga Prediksi & Harga Aktual

Tabel 2 Lampiran 3 Harga Prediksi & Harga Aktual

No	Tanggal	Harga Prediksi	Harga Aktual
1	09/01/2024	5542,061896	5575
2	10/01/2024	5502,436891	5525
3	11/01/2024	5472,231477	5550
4	12/01/2024	5480,703605	5600
5	15/01/2024	5520,892839	5525
6	16/01/2024	5471,871538	5500
7	17/01/2024	5422,738236	5400
8	18/01/2024	5383,515153	5375
9	19/01/2024	5325,319382	5350
10	22/01/2024	5304,764601	5225
11	23/01/2024	5297,514114	5125
12	24/01/2024	5192,91479	5075
13	25/01/2024	5236,129711	5050
14	26/01/2024	5101,542062	5075
15	29/01/2024	5082,464285	4930
16	30/01/2024	4969,71437	5100
17	31/01/2024	5119,744441	5125
18	01/02/2024	5040,083546	5125
19	02/02/2024	5075,374951	5325
20	05/02/2024	5256,220232	5175
21	06/02/2024	5154,404033	5250
22	07/02/2024	5199,269142	5325
23	12/02/2024	5267,512734	5300
24	13/02/2024	5262,973691	5200
25	15/02/2024	5183,856289	5125
26	16/02/2024	5164,948113	5200
27	19/02/2024	5181,031307	5125
28	20/02/2024	5143,971569	5200
29	21/02/2024	5177,047917	5250
30	22/02/2024	5214,096135	5275
31	23/02/2024	5214,403465	5125
32	26/02/2024	5113,333128	5125
33	27/02/2024	5101,191595	5175
34	28/02/2024	5125,542117	5225
35	29/02/2024	5299,452945	5225
36	01/03/2024	5232,961943	5225
37	04/03/2024	5223,312077	5200
38	05/03/2024	5194,996086	5100
39	06/03/2024	5091,459169	5175
40	07/03/2024	5108,144992	5125
41	08/03/2024	5071,080518	5150
42	13/03/2024	5087,153984	5150
43	14/03/2024	5118,92933	5275
44	15/03/2024	5240,701394	5175
45	18/03/2024	5210,573932	5150
46	19/03/2024	5172,761292	5225
47	20/03/2024	5218,485416	5275
48	21/03/2024	5242,704481	5350
49	22/03/2024	5294,89163	5375
50	25/03/2024	5286,582063	5350
51	26/03/2024	5285,144996	5300
52	27/03/2024	5260,670314	5275
53	28/03/2024	5253,882934	5150
54	01/04/2024	5172,344905	5200
55	02/04/2024	5168,748078	5275
56	03/04/2024	5222,000067	5250
57	04/04/2024	5195,453689	5175
58	05/04/2024	5131,313297	5275
59	16/04/2024	5218,012069	5100
60	17/04/2024	5123,224787	5125
61	18/04/2024	5127,332466	5100
62	19/04/2024	5118,240301	4900
63	22/04/2024	5026,451826	4950
64	23/04/2024	4978,355588	5025
65	24/04/2024	5024,811366	4910
66	25/04/2024	4920,167241	4950
67	26/04/2024	4918,235578	4880
68	29/04/2024	4859,513083	5025
69	30/04/2024	4977,433213	5150
70	02/05/2024	5116,383903	5175
71	03/05/2024	5182,440086	5225
72	06/05/2024	5221,133629	5100
73	07/05/2024	5121,848393	5050
74	08/05/2024	5058,688872	5125
75	13/05/2024	5103,684286	5075
76	14/05/2024	5106,330194	4580
77	15/05/2024	4824,079853	4530
78	16/05/2024	4706,01905	4710
79	17/05/2024	4806,799594	4800
80	20/05/2024	4786,245581	4740
81	21/05/2024	4666,85664	4700
82	22/05/2024	4585,883864	4710
83	27/05/2024	4531,28236	4550
84	28/05/2024	4437,111275	4510
85	29/05/2024	4411,750826	4460
86	30/05/2024	4491,413384	4320
87	31/05/2024	4347,051709	4290
88	03/06/2024	4381,264066	4500
89	04/06/2024	4528,09936	4580
90	05/06/2024	4607,865599	4600
91	06/06/2024	4610,248465	4560
92	07/06/2024	4523,323131	4560
93	10/06/2024	4499,596871	4510
94	11/06/2024	4429,166766	4350
95	12/06/2024	4287,82553	4360
96	13/06/2024	4317,578973	4460
97	14/06/2024	4463,392307	4420
98	19/06/2024	4451,782106	4450
99	20/06/2024	4494,885667	4450

100	21/06/2024	4464,561596	4490
101	24/06/2024	4533,319495	4430
102	25/06/2024	4478,923049	4400
103	26/06/2024	4438,095474	4420
104	27/06/2024	4450,009933	4430
105	28/06/2024	4435,285213	4460
106	01/07/2024	4518,657496	4620
107	02/07/2024	4670,889951	4530
108	03/07/2024	4632,863933	4570
109	04/07/2024	4644,500502	4550
110	05/07/2024	4620,1231	4580
111	08/07/2024	4612,972838	4640
112	09/07/2024	4633,714244	4560
113	10/07/2024	4577,79561	4540
114	11/07/2024	4568,230609	4510
115	12/07/2024	4570,225632	4540
116	15/07/2024	4590,585723	4470
117	16/07/2024	4515,466559	4380
118	17/07/2024	4421,117297	4460
119	18/07/2024	4471,917684	4540
120	19/07/2024	4540,712448	4530
121	22/07/2024	4530,281392	4520
122	23/07/2024	4525,572108	4450
123	24/07/2024	4471,727218	4530
124	25/07/2024	4549,623107	4490
125	26/07/2024	4505,418483	4610
126	29/07/2024	4639,544944	4610
127	30/07/2024	4651,756493	4540
128	31/07/2024	4597,778354	4720
129	01/08/2024	4785,044932	4740
130	02/08/2024	4788,084059	4690
131	05/08/2024	4746,927778	4560
132	06/08/2024	4645,193115	4610
133	07/08/2024	4653,66998	4630
134	08/08/2024	4649,321659	4740
135	09/08/2024	4752,507084	4760
136	12/08/2024	4756,563819	4760
137	13/08/2024	4756,131176	4760
138	14/08/2024	4764,840362	4890
139	15/08/2024	4879,878294	4890
140	16/08/2024	4870,1419	4970
141	19/08/2024	4963,809685	5025
142	20/08/2024	5009,275375	5125
143	21/08/2024	5118,011563	5075
144	22/08/2024	5114,227471	5000
145	23/08/2024	5031,708186	5100
146	26/08/2024	5114,96962	5150

147	27/08/2024	5129,565699	5150
148	28/08/2024	5100,964138	5025
149	29/08/2024	5004,411978	5075
150	30/08/2024	5028,22656	5100
151	02/09/2024	5073,596761	5200
152	03/09/2024	5180,858378	5125
153	04/09/2024	5116,959523	5050
154	05/09/2024	5052,111926	5075
155	06/09/2024	5055,986643	5050
156	09/09/2024	5030,007053	5025
157	10/09/2024	5007,725668	5025
158	11/09/2024	5009,456881	5025
159	12/09/2024	4998,024602	5025
160	13/09/2024	5013,162125	5075
161	17/09/2024	5035,977275	5075
162	18/09/2024	5027,427962	5250
163	19/09/2024	5206,383692	5275
164	20/09/2024	5220,718393	5225
165	23/09/2024	5213,683204	5225
166	24/09/2024	5220,735162	5275
167	25/09/2024	5244,645488	5225
168	26/09/2024	5181,381006	5250
169	27/09/2024	5195,740667	5100
170	30/09/2024	5079,15098	5050
171	01/10/2024	5047,881237	5175
172	02/10/2024	5143,841776	5150
173	03/10/2024	5092,698091	5250
174	04/10/2024	5177,473776	5150
175	07/10/2024	5091,122399	5100
176	08/10/2024	5069,967166	5225
177	09/10/2024	5168,754478	5075
178	10/10/2024	5060,385269	5125
179	11/10/2024	5095,843203	5075
180	14/10/2024	5062,634374	4930
181	15/10/2024	4937,525453	4930
182	16/10/2024	4940,005344	4960
183	17/10/2024	4961,625861	4950
184	18/10/2024	4947,60169	4920
185	21/10/2024	4911,89825	5100
186	22/10/2024	5060,03941	5275
187	23/10/2024	5213,18784	5300
188	24/10/2024	5229,73683	5275
189	25/10/2024	5235,455402	5225
190	28/10/2024	5205,323076	5250
191	29/10/2024	5198,236302	5125
192	30/10/2024	5103.738943	5200.0

Lampiran 4 - Kode Program Model Prediksi Harga Saham ASII.JK

File Model LSTM.ipynb

```
# Membangun model LSTM
model = Sequential()

#Layer Model
model.add(LSTM(units=150, return_sequences=True, input_shape=(X_train.shape[1],
X_train.shape[2])))
model.add(Dropout(0.1)) # Dropout 30% untuk mengurangi overfitting

model.add(LSTM(units=100, return_sequences=False))
model.add(Dropout(0.1))

model.add(Dense(units=50, activation='relu'))
model.add(Dense(units=1)) # Output: 1 nilai (prediksi harga)

# Kompilasi model
model.compile(optimizer=Adam(learning_rate=0.001), loss='mean_squared_error')

model.summary()

# Melatih model
history = model.fit(
    X_train,
    y_train,
    epochs=400,
    batch_size=32,
    validation_data=(X_test, y_test),
    verbose=1
)

# Prediksi dengan Data Test
y_pred = model.predict(X_test)

y_pred = y_pred.reshape(-1, 1)
y_test = y_test.reshape(-1, 1)

# Mengambil index kolom 'Close'
close_index = datahistoris_scaled.columns.get_loc('Close')

# Inverse transform ('Close')
y_pred_inverse = scaler.inverse_transform(
    np.hstack([
        np.zeros((len(y_pred), close_index)),
        y_pred,
        np.zeros((len(y_pred), datahistoris_scaled.shape[1] - close_index - 1))
    ])
)[: , close_index]

y_test_inverse = scaler.inverse_transform(
```

```

        np.hstack([
            np.zeros((len(y_test), close_index)),
            y_test,
            np.zeros((len(y_test), datahistoris_scaled.shape[1] - close_index - 1))
        ])
    )[:, close_index]

# Mengitung metrik evaluasi
mape = np.mean(np.abs((y_test_inverse - y_pred_inverse) / y_test_inverse)) * 100
rmse = np.sqrt(mean_squared_error(y_test_inverse, y_pred_inverse))
mae = mean_absolute_error(y_test_inverse, y_pred_inverse)

#Prediksi 7 Hari Kedepan setelah Tanggal 31 Oktober 2024
# Ambil 10 hari terakhir sebelum 31 Oktober 2024 untuk dijadikan sequence input prediksi
last_sequence = datahistoris_scaled[-sequence_length:].values

# Menyiapkan list untuk menyimpan prediksi dan label waktu
future_predictions = []
sequence = last_sequence.copy()

# Generate 7 hari prediksi
for _ in range(7):
    input_seq = sequence.reshape(1, sequence_length, X_train.shape[2])
    pred_scaled = model.predict(input_seq, verbose=0)[0][0]

    # Simpan hasil prediksi yang belum di-inverse
    future_predictions.append(pred_scaled)

    # Update sequence
    next_input = np.append(sequence[1:], [*sequence[-1][:3], pred_scaled, sequence[-1][4]],
axis=0)
    sequence = next_input

# Inverse transform prediksi ('Close')
close_index = datahistoris_scaled.columns.get_loc('Close')
dummy_preds = np.zeros((len(future_predictions), len(columns_to_scale)))
dummy_preds[:, close_index] = future_predictions
future_prices = scaler.inverse_transform(dummy_preds[:, close_index])

```