

```

# This Python 3 environment comes with many helpful analytics
libraries installed
# It is defined by the kaggle/python Docker image:
https://github.com/kaggle/docker-python
# For example, here's several helpful packages to load

import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)

# Input data files are available in the read-only "../input/"
directory
# For example, running this (by clicking run or pressing Shift+Enter)
will list all files under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# You can write up to 20GB to the current directory (/kaggle/working/)
that gets preserved as output when you create a version using "Save &
Run All"
# You can also write temporary files to /kaggle/temp/, but they won't
be saved outside of the current session

/kaggle/input/sarima-and-lstm/kaggle-EGF.xlsx

import pandas as pd # Data manipulation
import numpy as np # Numerical operations
import matplotlib.pyplot as plt # Data visualization
import seaborn as sns # Statistical data visualization
import tensorflow as tf
import optuna
from sklearn.preprocessing import RobustScaler
from sklearn.metrics import mean_squared_error # RMSE calculation
from scipy.stats import randint
from sklearn.model_selection import GridSearchCV # Grid
hyperparameter search
import joblib # Model saving/loading
import warnings
warnings.filterwarnings("ignore") # Ignore warnings
from sklearn.model_selection import train_test_split, cross_val_score
from statsmodels.tsa.statespace.sarimax import SARIMAX
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense, Dropout
from sklearn.preprocessing import MinMaxScaler

data = pd.read_excel('/kaggle/input/sarima-and-lstm/kaggle-EGF.xlsx')
data.head()

```

	Date	CPI National	Year on Year Inflation	Advances by
banks \				
0	2012-01-01		10.108950	3492649
1	2012-02-01		11.156968	3567035
2	2012-03-01		10.842391	3606844
3	2012-04-01		11.256580	3602125
4	2012-05-01		12.290578	3626809
	Auto Sales Period)	Consumer Confidence Index	Call Money Rate (End of	
0	15722	29.480		
10.90				
1	24172	29.935		
11.52				
2	23286	30.390		
11.27				
3	21337	29.175		
11.33				
4	23713	27.960		
10.85				
	IMF Commodity Prices	National Consumer Price Index \		
0	136.29	79.84		
1	140.04	80.80		
2	140.11	81.58		
3	139.73	82.43		
4	134.00	83.78		
	Credit to the Private Sector	Deposits of Banks ... \		
0	3017343.29	5682167 ...		
1	2973088.24	5716810 ...		
2	2959743.01	5920093 ...		
3	2966975.64	5935537 ...		
4	2924350.78	6021033 ...		
	KIBOR 1 Year Interest Rate	KIBOR 6 months Interest Rate \		
0	11.75	11.65		
1	11.74	11.65		
2	11.81	11.70		
3	11.85	11.75		
4	11.87	11.76		
	Karachi Stock Exchange All Shares Index	Lending Rate \		
0	8225.97	5.88		
1	8946.64	5.85		
2	9649.95	5.74		

3		9812.71	5.76
4		9714.33	5.88
International Oil Prices SBP Policy Rate Public Sector Borrowing			
\			
0	106.71	12.0	3402132.3
1	112.71	12.0	3496690.9
2	117.83	12.0	3534390.5
3	113.76	12.0	3602892.8
4	104.34	12.0	3691756.4
Real Output - Quantum Index of Large-Scale Manufacturing Industries			
\			
0		87.502708	
1		87.634954	
2		87.735341	
3		87.883433	
4		88.100621	
Real Effective Exchange Rate Weighted Average Overnight Repo Rate			
0	104.7421		10.983810
1	102.9416		11.652252
2	104.0896		11.255238
3	105.7597		11.309048
4	107.3915		11.110455

[5 rows x 25 columns]

data.columns

```
Index(['Date', 'CPI National Year on Year Inflation', 'Advances by
banks',
      'Auto Sales', 'Consumer Confidence Index',
      'Call Money Rate (End of Period)', 'IMF Commodity Prices',
      'National Consumer Price Index', 'Credit to the Private
Sector',
```

```

        'Deposits of Banks', 'Deposit Rate',
        'Pakistani Rupee to US Dollar Nominal Exchange Rate',
        'Economic Policy Uncertainty', 'Fertilizers Sales',
        'Karachi Stock Exchange 100 Index', 'KIBOR 1 Year Interest
Rate',
        'KIBOR 6 months Interest Rate',
        'Karachi Stock Exchange All Shares Index', 'Lending Rate',
        'International Oil Prices', 'SBP Policy Rate',
        'Public Sector Borrowing',
        'Real Output - Quantum Index of Large-Scale Manufacturing
Industries',
        'Real Effective Exchange Rate',
        'Weighted Average Overnight Repo Rate '],
        dtype='object')

```

```
data.info()
```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 142 entries, 0 to 141
Data columns (total 25 columns):
#   Column
Non-Null Count  Dtype
---  ---
0   Date
142 non-null    datetime64[ns]
1   CPI National Year on Year Inflation
142 non-null    float64
2   Advances by banks
142 non-null    int64
3   Auto Sales
142 non-null    int64
4   Consumer Confidence Index
142 non-null    float64
5   Call Money Rate (End of Period)
142 non-null    float64
6   IMF Commodity Prices
142 non-null    float64
7   National Consumer Price Index
142 non-null    float64
8   Credit to the Private Sector
142 non-null    float64
9   Deposits of Banks
142 non-null    int64
10  Deposit Rate
142 non-null    float64
11  Pakistani Rupee to US Dollar Nominal Exchange Rate
142 non-null    float64
12  Economic Policy Uncertainty
142 non-null    float64

```

```

13 Fertilizers Sales
142 non-null float64
14 Karachi Stock Exchange 100 Index
142 non-null float64
15 KIBOR 1 Year Interest Rate
142 non-null float64
16 KIBOR 6 months Interest Rate
142 non-null float64
17 Karachi Stock Exchange All Shares Index
142 non-null float64
18 Lending Rate
142 non-null float64
19 International Oil Prices
142 non-null float64
20 SBP Policy Rate
142 non-null float64
21 Public Sector Borrowing
142 non-null float64
22 Real Output - Quantum Index of Large-Scale Manufacturing
Industries 142 non-null float64
23 Real Effective Exchange Rate
142 non-null float64
24 Weighted Average Overnight Repo Rate
142 non-null float64
dtypes: datetime64[ns](1), float64(21), int64(3)
memory usage: 27.9 KB

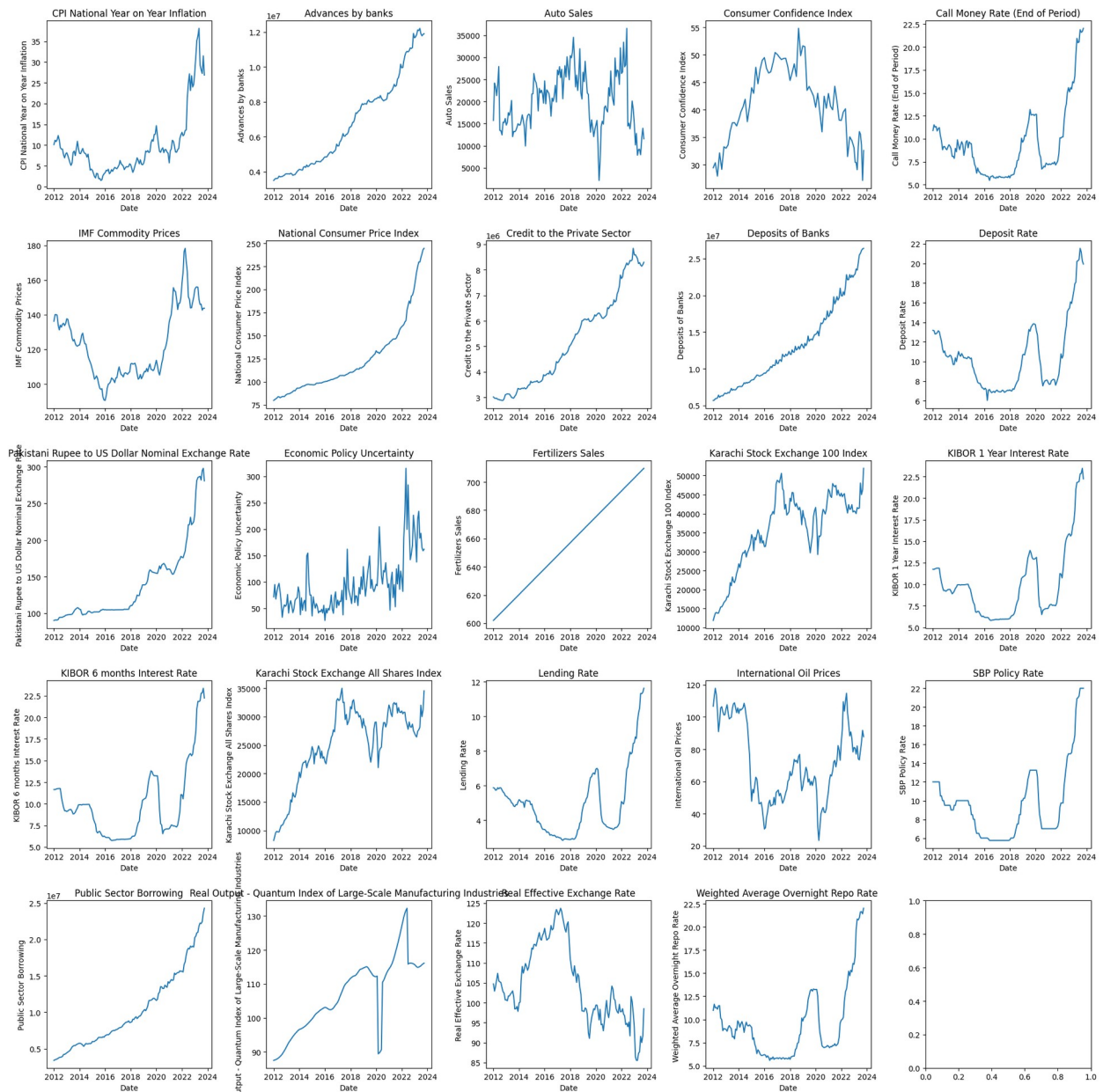
# Specifying columns for plotting to avoid redundancy in later plots
columns_to_plot = ['CPI National Year on Year Inflation', 'Advances by
banks',
                  'Auto Sales', 'Consumer Confidence Index',
                  'Call Money Rate (End of Period)', 'IMF Commodity
Prices',
                  'National Consumer Price Index', 'Credit to the
Private Sector',
                  'Deposits of Banks', 'Deposit Rate',
                  'Pakistani Rupee to US Dollar Nominal Exchange
Rate',
                  'Economic Policy Uncertainty', 'Fertilizers Sales',
                  'Karachi Stock Exchange 100 Index', 'KIBOR 1 Year
Interest Rate',
                  'KIBOR 6 months Interest Rate', 'Karachi Stock
Exchange All Shares Index',
                  'Lending Rate', 'International Oil Prices', 'SBP
Policy Rate',
                  'Public Sector Borrowing', 'Real Output - Quantum
Index of Large-Scale Manufacturing Industries',
                  'Real Effective Exchange Rate', 'Weighted Average
Overnight Repo Rate ']

```

```
# Subplots for visualizing all columns
fig, axes = plt.subplots(nrows=5, ncols=5, figsize=(20, 20))
axes = axes.flatten() # Flatten for easy indexing

for i, column in enumerate(columns_to_plot):
    axes[i].plot(data['Date'], data[column])
    axes[i].set_title(column)
    axes[i].set_xlabel('Date')
    axes[i].set_ylabel(column)

plt.tight_layout()
plt.savefig('mega_plot.png', bbox_inches='tight', dpi=700) # Save
image
plt.show()
```



#Robust Scaling

```
numeric_columns = data.select_dtypes(include=['float64',
'int64']).columns
```

```
scaler_robust = RobustScaler()
data_robust_scaled =
scaler_robust.fit_transform(data[numeric_columns])
```

```
data_robust_scaled_df = pd.DataFrame(data_robust_scaled,
columns=numeric_columns)
```

```
date_column = data.iloc[:, 0] # Extract the Date column
```

```

# Combine Date column with scaled data
data_final = pd.concat([date_column, data_robust_scaled_df], axis=1)

data_final.to_csv('data_final.csv', index=False)

# Fit the Robust Scaler
scaler_robust = RobustScaler()
scaler_robust.fit(data_final[numeric_columns])

# Extract median and IQR
median = scaler_robust.center_
iqr = scaler_robust.scale_ * 1.349 # IQR is the scale multiplied by 1.349

print(median)
print(iqr)

[ 0.00000000e+00  0.00000000e+00  0.00000000e+00 -3.46511014e-16
 0.00000000e+00  0.00000000e+00  1.65666092e-16  1.70002901e-16
 0.00000000e+00  0.00000000e+00  0.00000000e+00  1.19479079e-16
-1.05514555e-15  2.94902991e-16  0.00000000e+00  1.81061763e-16
 0.00000000e+00  1.97975317e-16 -1.63280847e-16  0.00000000e+00
-1.18394877e-16  4.23272528e-16 -4.69242700e-16  2.06432094e-16]
[1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349
1.349
 1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349 1.349
1.349]

num_features = len(columns_to_plot) - 1 # Excluding 'CPI National
Year on Year Inflation'
fig, axes = plt.subplots(nrows=num_features, ncols=1, figsize=(15, 3 *
num_features))
axes = axes.flatten()

axis_index = 0

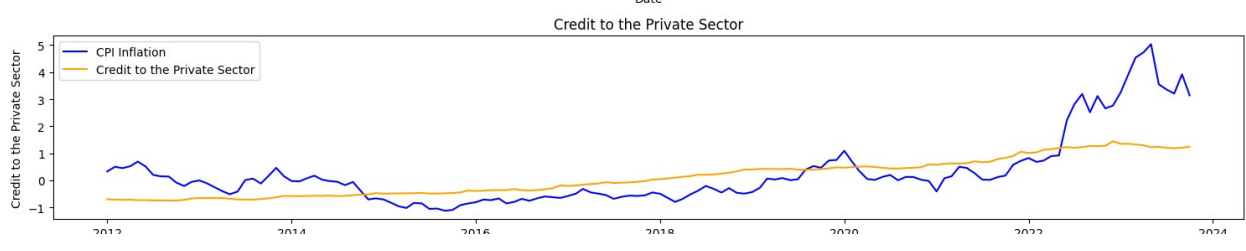
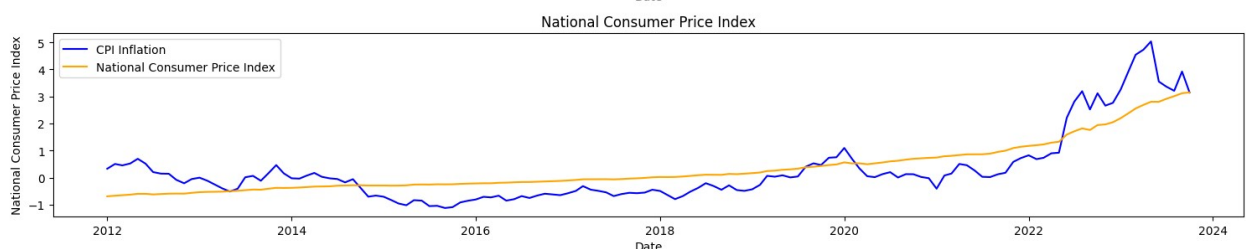
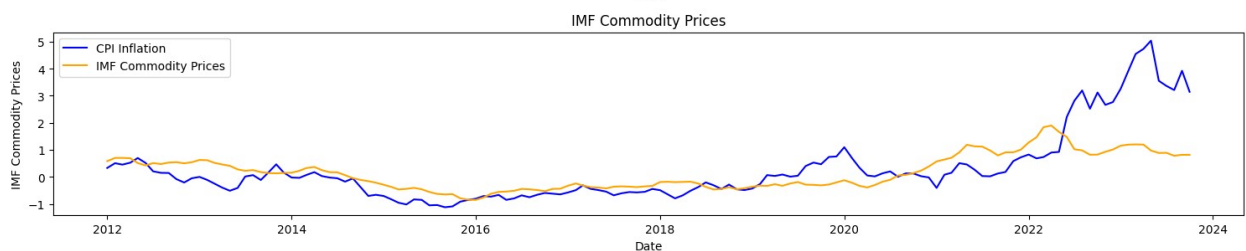
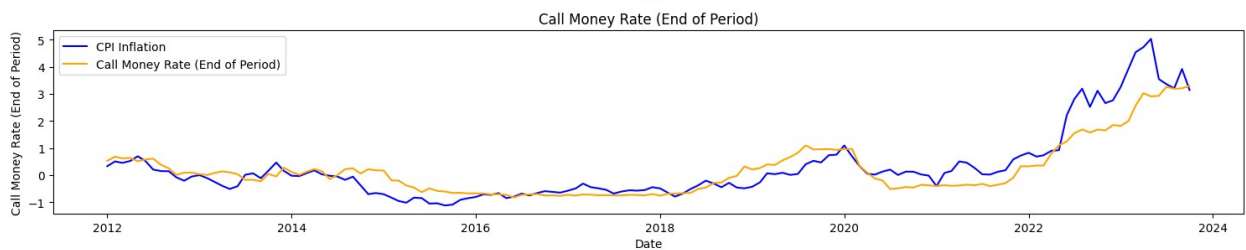
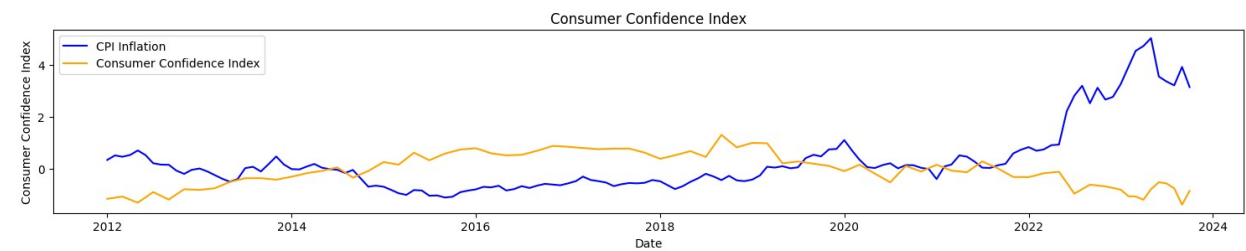
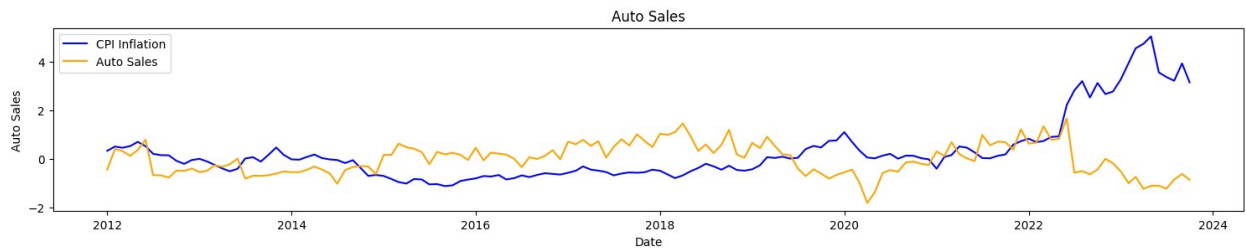
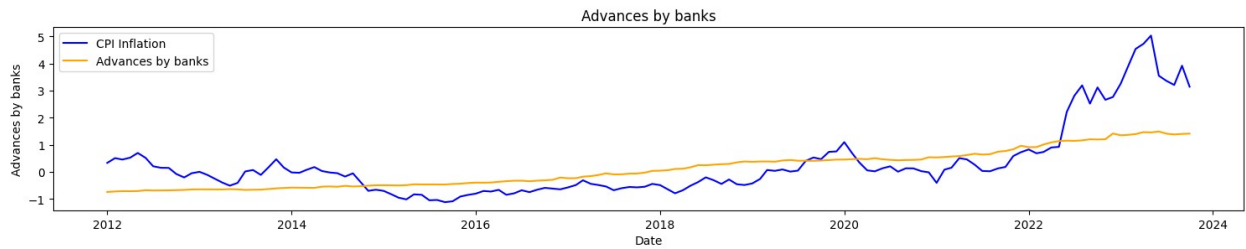
# Plot inflation against each feature in vertical stack
for column in columns_to_plot:
    if column != 'CPI National Year on Year Inflation':
        axes[axis_index].plot(data_final['Date'], data_final['CPI
National Year on Year Inflation'], label='CPI Inflation',
color='blue')
        axes[axis_index].plot(data_final['Date'], data_final[column],
label=column, color='orange')
        axes[axis_index].set_title(column)
        axes[axis_index].set_xlabel('Date')
        axes[axis_index].set_ylabel(column)
        axes[axis_index].legend()
        axis_index += 1 # Move to the next axis

plt.tight_layout()

```



```
plt.savefig('inflation_with_other_features_vertical.png',  
bbox_inches='tight', dpi=700)  
plt.show()
```



```

correlation_matrix = data_final.corr()

correlation_df = correlation_matrix.reset_index()

print("Full Correlation Matrix:")
print(correlation_df)
correlation_df.to_csv('correlation_matrix.csv', index=False)

```

Full Correlation Matrix:

	index	Date \
0	Date	1.000000
1	CPI National Year on Year Inflation	0.603017
2	Advances by banks	0.974914
3	Auto Sales	0.036645
4	Consumer Confidence Index	0.014757
5	Call Money Rate (End of Period)	0.461505
6	IMF Commodity Prices	0.394833
7	National Consumer Price Index	0.892593
8	Credit to the Private Sector	0.978526
9	Deposits of Banks	0.968122
10	Deposit Rate	0.356620
11	Pakistani Rupee to US Dollar Nominal Exchange ...	0.863029
12	Economic Policy Uncertainty	0.673248
13	Fertilizers Sales	1.000000
14	Karachi Stock Exchange 100 Index	0.793263
15	KIBOR 1 Year Interest Rate	0.458511
16	KIBOR 6 months Interest Rate	0.457517
17	Karachi Stock Exchange All Shares Index	0.766253
18	Lending Rate	0.357916
19	International Oil Prices	-0.269378
20	SBP Policy Rate	0.392377
21	Public Sector Borrowing	0.956981
22	Real Output - Quantum Index of Large-Scale Man...	0.856377
23	Real Effective Exchange Rate	-0.510061
24	Weighted Average Overnight Repo Rate	0.451645

	CPI National Year on Year Inflation	Advances by banks	Auto Sales
\			
0	0.603017	0.974914	0.036645
1	1.000000	0.736868	-0.409953
2	0.736868	1.000000	-0.034060
3	-0.409953	-0.034060	1.000000
4	-0.636394	-0.151371	0.498338
5	0.912959	0.618141	-0.475026

6	0.671660	0.519574	-0.086777
7	0.861178	0.943666	-0.191489
8	0.703579	0.996188	0.007264
9	0.743842	0.984389	-0.043101
10	0.884982	0.524920	-0.542243
11	0.889720	0.929779	-0.282410
12	0.710863	0.751849	-0.151344
13	0.602969	0.974906	0.036708
14	0.186786	0.682180	0.342347
15	0.909306	0.618401	-0.448479
16	0.909275	0.616120	-0.462095
17	0.127017	0.648588	0.366158
18	0.866633	0.515563	-0.577412
19	0.339944	-0.099074	-0.137835
20	0.891873	0.554791	-0.524968
21	0.780024	0.981329	-0.114928
22	0.361808	0.815789	0.395199
23	-0.683340	-0.624020	0.401467
24	0.902836	0.606591	-0.498851

	Consumer Confidence Index	Call Money Rate (End of Period) \
0	0.014757	0.461505
1	-0.636394	0.912959
2	-0.151371	0.618141
3	0.498338	-0.475026
4	1.000000	-0.634330
5	-0.634330	1.000000
6	-0.722407	0.568077
7	-0.315553	0.754977
8	-0.128660	0.576354
9	-0.182659	0.606824
10	-0.691696	0.984278

11	-0.380251	0.808827
12	-0.357715	0.654796
13	0.014890	0.461494
14	0.469545	0.020059
15	-0.626079	0.994103
16	-0.627664	0.995257
17	0.528375	-0.025938
18	-0.678899	0.976750
19	-0.679263	0.392122
20	-0.657587	0.991734
21	-0.225686	0.654605
22	0.223711	0.245486
23	0.601700	-0.699258
24	-0.625945	0.996661

	IMF Commodity Prices	National Consumer Price Index \
0	0.394833	0.892593
1	0.671660	0.861178
2	0.519574	0.943666
3	-0.086777	-0.191489
4	-0.722407	-0.315553
5	0.568077	0.754977
6	1.000000	0.578001
7	0.578001	1.000000
8	0.521040	0.921649
9	0.552572	0.966099
10	0.547373	0.671185
11	0.575766	0.986253
12	0.556060	0.744163
13	0.394710	0.892563
14	0.037374	0.587282
15	0.581562	0.748205
16	0.574346	0.747106
17	-0.025817	0.533723
18	0.515064	0.679494
19	0.647879	0.004676
20	0.540593	0.698606
21	0.557108	0.979056
22	0.348806	0.683663
23	-0.639421	-0.609898
24	0.542811	0.739877

	Credit to the Private Sector ...	KIBOR 1 Year Interest Rate \
0	0.978526 ...	0.458511
1	0.703579 ...	0.909306
2	0.996188 ...	0.618401
3	0.007264 ...	-0.448479
4	-0.128660 ...	-0.626079
5	0.576354 ...	0.994103

6	0.521040	...	0.581562
7	0.921649	...	0.748205
8	1.000000	...	0.577429
9	0.978191	...	0.603013
10	0.482143	...	0.979486
11	0.904285	...	0.804019
12	0.744675	...	0.655065
13	0.978510	...	0.458504
14	0.693803	...	0.014799
15	0.577429	...	1.000000
16	0.575020	...	0.999462
17	0.662138	...	-0.029304
18	0.471026	...	0.968289
19	-0.109157	...	0.421342
20	0.510734	...	0.991210
21	0.971120	...	0.649525
22	0.834633	...	0.266617
23	-0.610448	...	-0.713885
24	0.564257	...	0.992736

KIBOR 6 months Interest Rate		Karachi Stock Exchange All Shares	
Index \			
0	0.457517		
0.766253			
1	0.909275		
0.127017			
2	0.616120		
0.648588			
3	-0.462095		
0.366158			
4	-0.627664		
0.528375			
5	0.995257		-
0.025938			
6	0.574346		-
0.025817			
7	0.747106		
0.533723			
8	0.575020		
0.662138			
9	0.600799		
0.656467			
10	0.982756		-
0.152172			
11	0.803552		
0.440410			
12	0.656942		
0.293445			
13	0.457512		

0.766307		
14	0.012312	
0.992866		
15	0.999462	-
0.029304		
16	1.000000	-
0.032020		
17	-0.032020	
1.000000		
18	0.972950	-
0.144108		
19	0.411226	-
0.501971		
20	0.993427	-
0.102020		
21	0.648427	
0.614488		
22	0.256352	
0.808544		
23	-0.710590	
0.045561		
24	0.995201	-
0.040919		

	Lending Rate	International Oil Prices	SBP Policy Rate \
0	0.357916	-0.269378	0.392377
1	0.866633	0.339944	0.891873
2	0.515563	-0.099074	0.554791
3	-0.577412	-0.137835	-0.524968
4	-0.678899	-0.679263	-0.657587
5	0.976750	0.392122	0.991734
6	0.515064	0.647879	0.540593
7	0.679494	0.004676	0.698606
8	0.471026	-0.109157	0.510734
9	0.511938	-0.095473	0.539534
10	0.988005	0.434089	0.992329
11	0.743355	0.035627	0.762918
12	0.588465	0.155029	0.619521
13	0.357887	-0.269441	0.392369
14	-0.096283	-0.487781	-0.059248
15	0.968289	0.421342	0.991210
16	0.972950	0.411226	0.993427
17	-0.144108	-0.501971	-0.102020
18	1.000000	0.396894	0.986153
19	0.396894	1.000000	0.421929
20	0.986153	0.421929	1.000000
21	0.568997	-0.076053	0.592834
22	0.098916	-0.165907	0.164139
23	-0.673537	-0.374034	-0.703015

24	0.981179	0.373010	0.995624
----	----------	----------	----------

Public Sector Borrowing \

0	0.956981
1	0.780024
2	0.981329
3	-0.114928
4	-0.225686
5	0.654605
6	0.557108
7	0.979056
8	0.971120
9	0.994772
10	0.563304
11	0.962937
12	0.750109
13	0.956955
14	0.659919
15	0.649525
16	0.648427
17	0.614488
18	0.568997
19	-0.076053
20	0.592834
21	1.000000
22	0.762989
23	-0.620165
24	0.641103

Real Output - Quantum Index of Large-Scale Manufacturing Industries \

0	0.856377
1	0.361808
2	0.815789
3	0.395199
4	0.223711
5	0.245486
6	0.348806
7	0.683663
8	0.834633
9	0.801423

10	0.115380
11	0.623742
12	0.498460
13	0.856392
14	0.815754
15	0.266617
16	0.256352
17	0.808544
18	0.098916
19	-0.165907
20	0.164139
21	0.762989
22	1.000000
23	-0.317532
24	0.221595

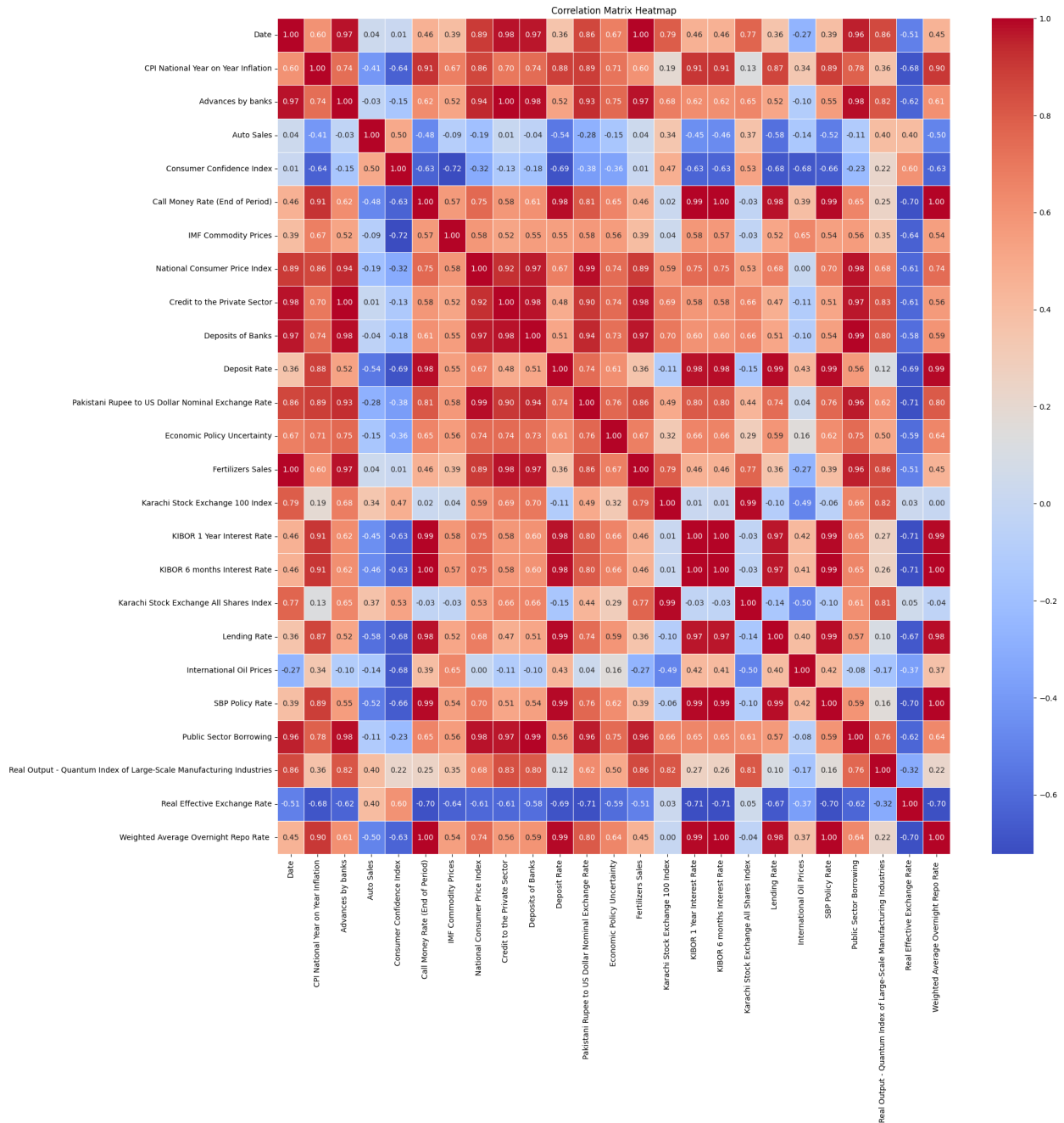
	Real Effective Exchange Rate	Weighted Average Overnight Repo Rate
0	-0.510061	
0.451645		
1	-0.683340	
0.902836		
2	-0.624020	
0.606591		
3	0.401467	-
0.498851		
4	0.601700	-
0.625945		
5	-0.699258	
0.996661		
6	-0.639421	
0.542811		
7	-0.609898	
0.739877		
8	-0.610448	

0.564257	
9	-0.581165
0.590719	
10	-0.690619
0.987526	
11	-0.705382
0.798920	
12	-0.588290
0.644973	
13	-0.510000
0.451643	
14	0.029521
0.003143	
15	-0.713885
0.992736	
16	-0.710590
0.995201	
17	0.045561
0.040919	-
18	-0.673537
0.981179	
19	-0.374034
0.373010	
20	-0.703015
0.995624	
21	-0.620165
0.641103	
22	-0.317532
0.221595	
23	1.000000
0.704181	-
24	-0.704181
1.000000	

[25 rows x 26 columns]

#Heatmap

```
plt.figure(figsize=(20,20))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm',
fmt='.2f', linewidths=0.5)
plt.title('Correlation Matrix Heatmap')
plt.savefig('full_correlation_heatmap.png', bbox_inches='tight',
dpi=900)
plt.show()
```



```
# Threshold for multicollinearity
threshold = 0.8
```

```
# Pairs with multicollinearity
multicollinear_pairs_filtered = []
```

```
# Loop to find highly correlated feature pairs
for i in range(correlation_matrix.shape[0]):
    for j in range(i + 1, correlation_matrix.shape[1]): # only upper triangle
```

```

        corr_value = correlation_matrix.iloc[i, j]
        feature1 = correlation_matrix.columns[i]
        feature2 = correlation_matrix.columns[j]

        # Exclude pairs with 'Date' or 'CPI National Year on Year
Inflation'
        if abs(corr_value) >= threshold and feature1 != 'Date' and
feature2 != 'Date' and feature1 != 'CPI National Year on Year
Inflation' and feature2 != 'CPI National Year on Year Inflation':
            multicollinear_pairs_filtered.append((feature1, feature2,
corr_value))

print("Highly Correlated Feature Pairs (Excluding Date and CPI
Inflation):")
for pair in multicollinear_pairs_filtered:
    print(f"{pair[0]} and {pair[1]}: correlation = {pair[2]:.2f}")

multicollinear_filtered_df =
pd.DataFrame(multicollinear_pairs_filtered, columns=['Feature 1',
'Feature 2', 'Correlation'])
multicollinear_filtered_df.to_csv('filtered_multicollinear_pairs.csv',
index=False)

```

Highly Correlated Feature Pairs (Excluding Date and CPI Inflation):

Advances by banks and National Consumer Price Index: correlation = 0.94

Advances by banks and Credit to the Private Sector: correlation = 1.00

Advances by banks and Deposits of Banks: correlation = 0.98

Advances by banks and Pakistani Rupee to US Dollar Nominal Exchange Rate: correlation = 0.93

Advances by banks and Fertilizers Sales: correlation = 0.97

Advances by banks and Public Sector Borrowing: correlation = 0.98

Advances by banks and Real Output - Quantum Index of Large-Scale Manufacturing Industries: correlation = 0.82

Call Money Rate (End of Period) and Deposit Rate: correlation = 0.98

Call Money Rate (End of Period) and Pakistani Rupee to US Dollar Nominal Exchange Rate: correlation = 0.81

Call Money Rate (End of Period) and KIBOR 1 Year Interest Rate: correlation = 0.99

Call Money Rate (End of Period) and KIBOR 6 months Interest Rate: correlation = 1.00

Call Money Rate (End of Period) and Lending Rate: correlation = 0.98

Call Money Rate (End of Period) and SBP Policy Rate: correlation = 0.99

Call Money Rate (End of Period) and Weighted Average Overnight Repo Rate : correlation = 1.00

National Consumer Price Index and Credit to the Private Sector: correlation = 0.92

National Consumer Price Index and Deposits of Banks: correlation = 0.97

National Consumer Price Index and Pakistani Rupee to US Dollar Nominal Exchange Rate: correlation = 0.99

National Consumer Price Index and Fertilizers Sales: correlation = 0.89

National Consumer Price Index and Public Sector Borrowing: correlation = 0.98

Credit to the Private Sector and Deposits of Banks: correlation = 0.98

Credit to the Private Sector and Pakistani Rupee to US Dollar Nominal Exchange Rate: correlation = 0.90

Credit to the Private Sector and Fertilizers Sales: correlation = 0.98

Credit to the Private Sector and Public Sector Borrowing: correlation = 0.97

Credit to the Private Sector and Real Output - Quantum Index of Large-Scale Manufacturing Industries: correlation = 0.83

Deposits of Banks and Pakistani Rupee to US Dollar Nominal Exchange Rate: correlation = 0.94

Deposits of Banks and Fertilizers Sales: correlation = 0.97

Deposits of Banks and Public Sector Borrowing: correlation = 0.99

Deposits of Banks and Real Output - Quantum Index of Large-Scale Manufacturing Industries: correlation = 0.80

Deposit Rate and KIBOR 1 Year Interest Rate: correlation = 0.98

Deposit Rate and KIBOR 6 months Interest Rate: correlation = 0.98

Deposit Rate and Lending Rate: correlation = 0.99

Deposit Rate and SBP Policy Rate: correlation = 0.99

Deposit Rate and Weighted Average Overnight Repo Rate : correlation = 0.99

Pakistani Rupee to US Dollar Nominal Exchange Rate and Fertilizers Sales: correlation = 0.86

Pakistani Rupee to US Dollar Nominal Exchange Rate and KIBOR 1 Year Interest Rate: correlation = 0.80

Pakistani Rupee to US Dollar Nominal Exchange Rate and KIBOR 6 months Interest Rate: correlation = 0.80

Pakistani Rupee to US Dollar Nominal Exchange Rate and Public Sector Borrowing: correlation = 0.96

Fertilizers Sales and Public Sector Borrowing: correlation = 0.96

Fertilizers Sales and Real Output - Quantum Index of Large-Scale Manufacturing Industries: correlation = 0.86

Karachi Stock Exchange 100 Index and Karachi Stock Exchange All Shares Index: correlation = 0.99

Karachi Stock Exchange 100 Index and Real Output - Quantum Index of Large-Scale Manufacturing Industries: correlation = 0.82

KIBOR 1 Year Interest Rate and KIBOR 6 months Interest Rate: correlation = 1.00

KIBOR 1 Year Interest Rate and Lending Rate: correlation = 0.97

KIBOR 1 Year Interest Rate and SBP Policy Rate: correlation = 0.99

KIBOR 1 Year Interest Rate and Weighted Average Overnight Repo Rate : correlation = 0.99

KIBOR 6 months Interest Rate and Lending Rate: correlation = 0.97

KIBOR 6 months Interest Rate and SBP Policy Rate: correlation = 0.99

KIBOR 6 months Interest Rate and Weighted Average Overnight Repo Rate : correlation = 1.00
Karachi Stock Exchange All Shares Index and Real Output - Quantum Index of Large-Scale Manufacturing Industries: correlation = 0.81
Lending Rate and SBP Policy Rate: correlation = 0.99
Lending Rate and Weighted Average Overnight Repo Rate : correlation = 0.98
SBP Policy Rate and Weighted Average Overnight Repo Rate : correlation = 1.00

Feature Engineering

```
data_final['Interest Rate Spread'] = data_final['KIBOR 1 Year Interest Rate'] - data_final['KIBOR 6 months Interest Rate']
data_final['Exchange Rate Differential'] = data_final['Real Effective Exchange Rate'] - data_final['Pakistani Rupee to US Dollar Nominal Exchange Rate']
data_final['Inflation Expectations'] = data_final['Call Money Rate (End of Period)'] - data_final['SBP Policy Rate']
data_final['Banking Activity Index'] = data_final['Advances by banks'] + data_final['Public Sector Borrowing'] - data_final['Deposits of Banks']
data_final['Stock Market Volatility'] = data_final['Karachi Stock Exchange 100 Index'].pct_change()
data_final['Commodity Price Index'] = data_final['IMF Commodity Prices'] / data_final['International Oil Prices']
```

Feature Selection

```
columns_to_drop = [
    'Credit to the Private Sector',
    'Deposits of Banks',
    'Fertilizers Sales',
    'KIBOR 6 months Interest Rate',
    'Weighted Average Overnight Repo Rate ',
    'Karachi Stock Exchange All Shares Index'
]

data_final_cleaned = data_final.drop(columns=columns_to_drop)
data_final_cleaned.to_csv('data_final_cleaned.csv', index=False)

train = data_final_cleaned.loc[data_final_cleaned['Date'] <= '10/01/2022']
test = data_final_cleaned.loc[data_final_cleaned['Date'] > '10/01/2022']

print(train.shape)
print(test.shape)

(130, 25)
(12, 25)
```

```

# Extract Year, Month, and Day from the 'Date' column
train['Year'] = train['Date'].dt.year
train['Month'] = train['Date'].dt.month
train['Day'] = train['Date'].dt.day
# Optionally drop the original 'Date' column
train = train.drop(columns=['Date'])

# Extract Year, Month, and Day from the 'Date' column
test['Year'] = test['Date'].dt.year
test['Month'] = test['Date'].dt.month
test['Day'] = test['Date'].dt.day
# Optionally drop the original 'Date' column
test = test.drop(columns=['Date'])

# Split the data into features (X) and target (y)
X_train = train.drop(columns=['CPI National Year on Year Inflation'])
y_train = train['CPI National Year on Year Inflation']

X_test = test.drop(columns=['CPI National Year on Year Inflation'])
y_test = test['CPI National Year on Year Inflation']

# Save the datasets to CSV files
X_train.to_csv('X_train.csv', index=False)
X_test.to_csv('X_test.csv', index=False)
y_train.to_csv('y_train.csv', index=False)
y_test.to_csv('y_test.csv', index=False)

print("Data saved successfully: X_train, X_test, y_train, y_test.")
Data saved successfully: X_train, X_test, y_train, y_test.

# Load the datasets from CSV files (preventing data leaks)
X_train = pd.read_csv('X_train.csv')
X_test = pd.read_csv('X_test.csv')
y_train = pd.read_csv('y_train.csv')
y_test = pd.read_csv('y_test.csv')

# Verify the shapes
print("X_train shape:", X_train.shape)
print("X_test shape:", X_test.shape)
print("y_train shape:", y_train.shape)
print("y_test shape:", y_test.shape)

X_train shape: (130, 26)
X_test shape: (12, 26)
y_train shape: (130, 1)
y_test shape: (12, 1)

print(X_train.isnull().sum())
print(y_train.isnull().sum())

```

Advances by banks
0
Auto Sales
0
Consumer Confidence Index
0
Call Money Rate (End of Period)
0
IMF Commodity Prices
0
National Consumer Price Index
0
Deposit Rate
0
Pakistani Rupee to US Dollar Nominal Exchange Rate
0
Economic Policy Uncertainty
0
Karachi Stock Exchange 100 Index
0
KIBOR 1 Year Interest Rate
0
Lending Rate
0
International Oil Prices
0
SBP Policy Rate
0
Public Sector Borrowing
0
Real Output - Quantum Index of Large-Scale Manufacturing Industries
0
Real Effective Exchange Rate
0
Interest Rate Spread
0
Exchange Rate Differential
0
Inflation Expectations
0
Banking Activity Index
0
Stock Market Volatility
1
Commodity Price Index
0
Year
0
Month
0


```

Day
0
dtype: int64
CPI National Year on Year Inflation    0
dtype: int64

X_train.fillna(X_train.mean(), inplace=True)
y_train.fillna(y_train.mean(), inplace=True)

def sarima_objective(trial):
    param_grid_sarima = {
        'order': (
            trial.suggest_int('p', 0, 3), # AR term
            trial.suggest_int('d', 0, 2), # Differencing term
            trial.suggest_int('q', 0, 3)  # MA term
        ),
        'seasonal_order': (
            trial.suggest_int('P', 0, 3), # Seasonal AR term
            trial.suggest_int('D', 0, 2), # Seasonal differencing
term
            trial.suggest_int('Q', 0, 3), # Seasonal MA term
            trial.suggest_int('s', 1, 12) # Season length (e.g., 12
for monthly data)
        ),
        'trend': trial.suggest_categorical('trend', ['n', 'c', 't',
'ct']), # No trend, constant, linear trend, constant + linear trend
        'enforce_stationarity':
trial.suggest_categorical('enforce_stationarity', [True, False]),
        'enforce_invertibility':
trial.suggest_categorical('enforce_invertibility', [True, False])
    }
# Train SARIMA model
    try:
        sarima_model = SARIMAX(
            y_train,
            order=param_grid_sarima['order'],
            seasonal_order=param_grid_sarima['seasonal_order'],
            trend=param_grid_sarima['trend'], # Include trend
parameter
            enforce_stationarity=param_grid_sarima['enforce_stationarity'], #
Include enforce_stationarity

            enforce_invertibility=param_grid_sarima['enforce_invertibility'] #
Include enforce_invertibility
        ).fit(dispatch=False, maxiter=500) # Set maxiter to 500 for
better convergence

        # Predict and calculate RMSE
        y_pred_sarima = sarima_model.forecast(steps=len(y_test))

```

```

    rmse_sarima = mean_squared_error(y_test, y_pred_sarima,
squared=False)
    return rmse_sarima # Minimize RMSE
except Exception as e:
    return np.inf # Return a large value if the model fails

study_sarima = optuna.create_study(direction='minimize')
study_sarima.optimize(sarima_objective, n_trials=75)

[I 2024-12-30 10:04:47,547] A new study created in memory with name:
no-name-40ec1505-e9da-4536-9760-ff00a78e607c
[I 2024-12-30 10:04:51,433] Trial 0 finished with value:
0.788093789188179 and parameters: {'p': 2, 'd': 0, 'q': 2, 'P': 2,
'D': 0, 'Q': 0, 's': 5, 'trend': 't', 'enforce_stationarity': True,
'enforce_invertibility': True}. Best is trial 0 with value:
0.788093789188179.
[I 2024-12-30 10:04:51,770] Trial 1 finished with value:
1.8642720899249536 and parameters: {'p': 3, 'd': 2, 'q': 0, 'P': 3,
'D': 0, 'Q': 1, 's': 5, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': True}. Best is trial 0 with value:
0.788093789188179.
[I 2024-12-30 10:04:52,800] Trial 2 finished with value:
1.2975994784891978 and parameters: {'p': 0, 'd': 1, 'q': 3, 'P': 1,
'D': 1, 'Q': 1, 's': 12, 'trend': 'n', 'enforce_stationarity': True,
'enforce_invertibility': True}. Best is trial 0 with value:
0.788093789188179.
[I 2024-12-30 10:04:55,550] Trial 3 finished with value:
0.7911615415082605 and parameters: {'p': 1, 'd': 0, 'q': 0, 'P': 3,
'D': 0, 'Q': 0, 's': 7, 'trend': 't', 'enforce_stationarity': True,
'enforce_invertibility': True}. Best is trial 0 with value:
0.788093789188179.
[I 2024-12-30 10:04:58,837] Trial 4 finished with value:
1.104043967902359 and parameters: {'p': 2, 'd': 0, 'q': 3, 'P': 2,
'D': 2, 'Q': 0, 's': 12, 'trend': 'n', 'enforce_stationarity': True,
'enforce_invertibility': True}. Best is trial 0 with value:
0.788093789188179.
[I 2024-12-30 10:05:05,704] Trial 5 finished with value:
2.5299799650841095 and parameters: {'p': 2, 'd': 2, 'q': 1, 'P': 3,
'D': 2, 'Q': 1, 's': 8, 'trend': 'n', 'enforce_stationarity': True,
'enforce_invertibility': True}. Best is trial 0 with value:
0.788093789188179.
[I 2024-12-30 10:05:06,532] Trial 6 finished with value:
0.833213324358568 and parameters: {'p': 1, 'd': 1, 'q': 1, 'P': 0,
'D': 0, 'Q': 1, 's': 9, 'trend': 'ct', 'enforce_stationarity': True,
'enforce_invertibility': False}. Best is trial 0 with value:
0.788093789188179.
[I 2024-12-30 10:05:06,538] Trial 7 finished with value: inf and
parameters: {'p': 0, 'd': 2, 'q': 2, 'P': 1, 'D': 1, 'Q': 3, 's': 1,
'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility':
True}. Best is trial 0 with value: 0.788093789188179.

```

[I 2024-12-30 10:05:06,542] Trial 8 finished with value: inf and parameters: {'p': 1, 'd': 0, 'q': 3, 'P': 3, 'D': 1, 'Q': 1, 's': 1, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 0 with value: 0.788093789188179.

[I 2024-12-30 10:05:09,370] Trial 9 finished with value: 0.7698671034929507 and parameters: {'p': 0, 'd': 1, 'q': 2, 'P': 3, 'D': 1, 'Q': 1, 's': 6, 'trend': 'ct', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 9 with value: 0.7698671034929507.

[I 2024-12-30 10:05:10,363] Trial 10 finished with value: 2.3151908348652066 and parameters: {'p': 0, 'd': 1, 'q': 2, 'P': 2, 'D': 2, 'Q': 3, 's': 4, 'trend': 'ct', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 9 with value: 0.7698671034929507.

[I 2024-12-30 10:05:11,936] Trial 11 finished with value: 0.9284852925755201 and parameters: {'p': 3, 'd': 0, 'q': 2, 'P': 2, 'D': 0, 'Q': 0, 's': 5, 'trend': 'c', 'enforce_stationarity': True, 'enforce_invertibility': False}. Best is trial 9 with value: 0.7698671034929507.

[I 2024-12-30 10:05:13,801] Trial 12 finished with value: 1.3305865990309869 and parameters: {'p': 2, 'd': 1, 'q': 2, 'P': 2, 'D': 1, 'Q': 2, 's': 3, 'trend': 'ct', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 9 with value: 0.7698671034929507.

[I 2024-12-30 10:05:15,544] Trial 13 finished with value: 0.7066757999924086 and parameters: {'p': 2, 'd': 0, 'q': 1, 'P': 1, 'D': 0, 'Q': 2, 's': 9, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:16,346] Trial 14 finished with value: 0.8150784235582367 and parameters: {'p': 1, 'd': 1, 'q': 1, 'P': 0, 'D': 1, 'Q': 2, 's': 10, 'trend': 'c', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:21,083] Trial 15 finished with value: 0.7639015285619518 and parameters: {'p': 3, 'd': 0, 'q': 1, 'P': 1, 'D': 0, 'Q': 2, 's': 10, 'trend': 'ct', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:23,272] Trial 16 finished with value: 1.783039227272886 and parameters: {'p': 3, 'd': 0, 'q': 0, 'P': 1, 'D': 0, 'Q': 2, 's': 10, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:29,208] Trial 17 finished with value: 0.7515524371666548 and parameters: {'p': 3, 'd': 0, 'q': 1, 'P': 1, 'D': 0, 'Q': 3, 's': 10, 'trend': 'ct', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:32,249] Trial 18 finished with value: 1.0015610438852627 and parameters: {'p': 3, 'd': 0, 'q': 1, 'P': 0, 'D': 0, 'Q': 3, 's': 8, 'trend': 't', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:36,464] Trial 19 finished with value: 1.438644540587124 and parameters: {'p': 2, 'd': 0, 'q': 0, 'P': 1, 'D': 0, 'Q': 3, 's': 11, 'trend': 'c', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:40,801] Trial 20 finished with value: 0.7416891378168812 and parameters: {'p': 3, 'd': 0, 'q': 1, 'P': 0, 'D': 0, 'Q': 3, 's': 8, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:45,034] Trial 21 finished with value: 0.7416891378168812 and parameters: {'p': 3, 'd': 0, 'q': 1, 'P': 0, 'D': 0, 'Q': 3, 's': 8, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:49,408] Trial 22 finished with value: 0.7416891378168812 and parameters: {'p': 3, 'd': 0, 'q': 1, 'P': 0, 'D': 0, 'Q': 3, 's': 8, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:50,652] Trial 23 finished with value: 0.8268142781274753 and parameters: {'p': 2, 'd': 0, 'q': 1, 'P': 0, 'D': 0, 'Q': 2, 's': 7, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:55,247] Trial 24 finished with value: 0.781197662478376 and parameters: {'p': 3, 'd': 0, 'q': 0, 'P': 0, 'D': 1, 'Q': 3, 's': 9, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:56,198] Trial 25 finished with value: 0.8179915509788529 and parameters: {'p': 2, 'd': 1, 'q': 1, 'P': 0, 'D': 0, 'Q': 2, 's': 9, 'trend': 't', 'enforce_stationarity': True, 'enforce_invertibility': True}. Best is trial 13 with value: 0.7066757999924086.

[I 2024-12-30 10:05:58,002] Trial 26 finished with value: 0.671492283824593 and parameters: {'p': 3, 'd': 0, 'q': 1, 'P': 0, 'D': 0, 'Q': 3, 's': 6, 'trend': 't', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 26 with value: 0.671492283824593.

[I 2024-12-30 10:05:58,512] Trial 27 finished with value: 0.6184411571133739 and parameters: {'p': 2, 'd': 0, 'q': 0, 'P': 1, 'D': 0, 'Q': 2, 's': 6, 'trend': 't', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 27 with value: 0.6184411571133739.

0.6184411571133739.
[I 2024-12-30 10:05:59,320] Trial 28 finished with value:
1.2108853877157264 and parameters: {'p': 2, 'd': 1, 'q': 0, 'P': 1,
'D': 1, 'Q': 2, 's': 6, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 27 with value:
0.6184411571133739.
[I 2024-12-30 10:05:59,891] Trial 29 finished with value:
0.8916708017336086 and parameters: {'p': 2, 'd': 0, 'q': 0, 'P': 1,
'D': 0, 'Q': 2, 's': 3, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 27 with value:
0.6184411571133739.
[I 2024-12-30 10:06:00,420] Trial 30 finished with value:
0.5505120225996982 and parameters: {'p': 1, 'd': 0, 'q': 0, 'P': 1,
'D': 0, 'Q': 2, 's': 4, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 30 with value:
0.5505120225996982.
[I 2024-12-30 10:06:00,939] Trial 31 finished with value:
0.5505120225996982 and parameters: {'p': 1, 'd': 0, 'q': 0, 'P': 1,
'D': 0, 'Q': 2, 's': 4, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 30 with value:
0.5505120225996982.
[I 2024-12-30 10:06:01,455] Trial 32 finished with value:
0.5505120225996982 and parameters: {'p': 1, 'd': 0, 'q': 0, 'P': 1,
'D': 0, 'Q': 2, 's': 4, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 30 with value:
0.5505120225996982.
[I 2024-12-30 10:06:01,960] Trial 33 finished with value:
0.5505120225996982 and parameters: {'p': 1, 'd': 0, 'q': 0, 'P': 1,
'D': 0, 'Q': 2, 's': 4, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 30 with value:
0.5505120225996982.
[I 2024-12-30 10:06:02,399] Trial 34 finished with value:
0.9039529342058917 and parameters: {'p': 1, 'd': 0, 'q': 0, 'P': 1,
'D': 0, 'Q': 2, 's': 3, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 30 with value:
0.5505120225996982.
[I 2024-12-30 10:06:02,898] Trial 35 finished with value:
0.4792963437748878 and parameters: {'p': 1, 'd': 0, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 4, 'trend': 't', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 35 with value:
0.4792963437748878.
[I 2024-12-30 10:06:03,256] Trial 36 finished with value:
0.8643044999866492 and parameters: {'p': 1, 'd': 2, 'q': 0, 'P': 2,
'D': 0, 'Q': 1, 's': 2, 'trend': 'c', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 35 with value:
0.4792963437748878.
[I 2024-12-30 10:06:03,487] Trial 37 finished with value:
0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,

'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:03,854] Trial 38 finished with value:
1.1400910522788463 and parameters: {'p': 1, 'd': 2, 'q': 0, 'P': 2,
'D': 1, 'Q': 1, 's': 5, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:04,083] Trial 39 finished with value:
1.692515234138904 and parameters: {'p': 0, 'd': 1, 'q': 0, 'P': 2,
'D': 2, 'Q': 2, 's': 2, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:04,241] Trial 40 finished with value:
1.4713648580955518 and parameters: {'p': 1, 'd': 2, 'q': 0, 'P': 3,
'D': 0, 'Q': 1, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:04,469] Trial 41 finished with value:
0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:04,639] Trial 42 finished with value:
0.7316684921487854 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 5, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:04,984] Trial 43 finished with value:
1.1894989251830996 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 2, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:05,154] Trial 44 finished with value:
0.5771819520577236 and parameters: {'p': 0, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 3, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:05,572] Trial 45 finished with value:
0.45009232592140686 and parameters: {'p': 1, 'd': 1, 'q': 3, 'P': 2,
'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:05,973] Trial 46 finished with value:
0.6101626171901703 and parameters: {'p': 1, 'd': 1, 'q': 3, 'P': 2,
'D': 0, 'Q': 1, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

[I 2024-12-30 10:06:06,671] Trial 47 finished with value:
0.8128843323811776 and parameters: {'p': 0, 'd': 1, 'q': 3, 'P': 3,

'D': 1, 'Q': 2, 's': 5, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:07,552] Trial 48 finished with value: 2.307336108153759 and parameters: {'p': 1, 'd': 1, 'q': 3, 'P': 2, 'D': 2, 'Q': 2, 's': 5, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:07,603] Trial 49 finished with value: inf and parameters: {'p': 1, 'd': 1, 'q': 2, 'P': 2, 'D': 0, 'Q': 0, 's': 1, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:07,935] Trial 50 finished with value: 1.3658154489707468 and parameters: {'p': 1, 'd': 1, 'q': 2, 'P': 3, 'D': 1, 'Q': 1, 's': 3, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:08,198] Trial 51 finished with value: 0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:08,430] Trial 52 finished with value: 0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:08,767] Trial 53 finished with value: 1.1894989251830996 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 2, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:08,956] Trial 54 finished with value: 0.5797152196469805 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 3, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:09,150] Trial 55 finished with value: 0.7586731655021364 and parameters: {'p': 0, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 5, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:09,381] Trial 56 finished with value: 1.1420104239347884 and parameters: {'p': 1, 'd': 2, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.

[I 2024-12-30 10:06:09,431] Trial 57 finished with value: inf and parameters: {'p': 1, 'd': 1, 'q': 3, 'P': 2, 'D': 0, 'Q': 2, 's': 3,

'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:09,905] Trial 58 finished with value: 0.7974236687308695 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 3, 'D': 0, 'Q': 2, 's': 7, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:10,783] Trial 59 finished with value: 1.630837218794855 and parameters: {'p': 1, 'd': 1, 'q': 1, 'P': 2, 'D': 0, 'Q': 1, 's': 6, 'trend': 'ct', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:11,089] Trial 60 finished with value: 0.7578238622501186 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 5, 'trend': 'c', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:11,320] Trial 61 finished with value: 0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:11,549] Trial 62 finished with value: 0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:11,720] Trial 63 finished with value: 0.7316684921487854 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 5, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:11,907] Trial 64 finished with value: 0.5797152196469805 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 3, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:12,142] Trial 65 finished with value: 0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:12,386] Trial 66 finished with value: 1.3001823422583496 and parameters: {'p': 0, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q': 3, 's': 2, 'trend': 'n', 'enforce_stationarity': False, 'enforce_invertibility': False}. Best is trial 37 with value: 0.439095473913692.
[I 2024-12-30 10:06:12,616] Trial 67 finished with value: 0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,


```

'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.
[I 2024-12-30 10:06:12,991] Trial 68 finished with value:
0.6144821795774884 and parameters: {'p': 2, 'd': 1, 'q': 0, 'P': 3,
'D': 0, 'Q': 2, 's': 3, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.
[I 2024-12-30 10:06:13,207] Trial 69 finished with value:
1.8704165591009967 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 6, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.
[I 2024-12-30 10:06:13,472] Trial 70 finished with value:
0.7944648953586938 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 1, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.
[I 2024-12-30 10:06:13,701] Trial 71 finished with value:
0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.
[I 2024-12-30 10:06:13,872] Trial 72 finished with value:
0.7316684921487854 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 5, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.
[I 2024-12-30 10:06:14,100] Trial 73 finished with value:
0.439095473913692 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.
[I 2024-12-30 10:06:14,677] Trial 74 finished with value:
0.8687891321472277 and parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2,
'D': 0, 'Q': 2, 's': 3, 'trend': 'ct', 'enforce_stationarity': False,
'enforce_invertibility': False}. Best is trial 37 with value:
0.439095473913692.

```

```

print("Best SARIMA Parameters:", study_sarima.best_params)

```

```

Best SARIMA Parameters: {'p': 1, 'd': 1, 'q': 0, 'P': 2, 'D': 0, 'Q':
2, 's': 4, 'trend': 'n', 'enforce_stationarity': False,
'enforce_invertibility': False}

```

```

# Train a final SARIMA model with the best parameters

```

```

best_sarima_params = study_sarima.best_params
best_order = (best_sarima_params['p'], best_sarima_params['d'],
best_sarima_params['q'])
best_seasonal_order = (best_sarima_params['P'],

```

```

best_sarima_params['D'], best_sarima_params['Q'],
best_sarima_params['s'])

final_sarima_model = SARIMAX(
    y_train,
    order=best_order,
    seasonal_order=best_seasonal_order,
    enforce_stationarity=False,
    enforce_invertibility=False
).fit(dispatch=False)

# Forecast and evaluate the final model
y_pred_final = final_sarima_model.forecast(steps=len(y_test))
final_rmse = mean_squared_error(y_test, y_pred_final, squared=False)
print(f"Optimized SARIMA RMSE: {final_rmse}")

Optimized SARIMA RMSE: 0.439095473913692

# Prepare data (scaling and reshaping for LSTM input)
scaler = MinMaxScaler()
X_train_scaled = scaler.fit_transform(X_train) # Scale features
X_test_scaled = scaler.transform(X_test)

# LSTM expects 3D input: [samples, time steps, features]
X_train_reshaped = X_train_scaled.reshape(X_train_scaled.shape[0], 1,
X_train_scaled.shape[1])
X_test_reshaped = X_test_scaled.reshape(X_test_scaled.shape[0], 1,
X_test_scaled.shape[1])

y_train_reshaped = y_train.values # Ensure y_train is in numpy format
y_test_reshaped = y_test.values

def lstm_objective(trial):
    # Define the hyperparameter search space
    n_units = trial.suggest_int("n_units", 32, 256) # Number of LSTM
units
    dropout_rate = trial.suggest_float("dropout_rate", 0.1, 0.5) #
Dropout rate
    learning_rate = trial.suggest_float("learning_rate", 1e-4, 1e-2,
log=True) # Learning rate
    batch_size = trial.suggest_int("batch_size", 16, 64) # Batch size
    epochs = trial.suggest_int("epochs", 10, 50) # Number of epochs

    # Build the LSTM model
    model = Sequential([
        LSTM(n_units, activation='tanh', input_shape=(1,
X_train_scaled.shape[1])),
        Dropout(dropout_rate),
        Dense(1) # Output layer
    ])

```

```

model.compile(optimizer=tf.keras.optimizers.Adam(learning_rate=learning_rate),
               loss='mse')

    # Train the model
    try:
        history = model.fit(X_train_resaped, y_train_resaped,
                            epochs=epochs, batch_size=batch_size,
verbose=0)
        # Evaluate on test data
        y_pred_lstm = model.predict(X_test_resaped).flatten() #
    Flatten for comparison
        rmse_lstm = mean_squared_error(y_test_resaped, y_pred_lstm,
squared=False)
        return rmse_lstm # Minimize RMSE
    except Exception as e:
        return np.inf # Return a large value if the model fails

# Run Optuna study for LSTM
study_lstm = optuna.create_study(direction="minimize")
study_lstm.optimize(lstm_objective, n_trials=500)

# Run Optuna study for LSTM
study_lstm = optuna.create_study(direction="minimize")
study_lstm.optimize(lstm_objective, n_trials=500)

[I 2024-12-30 10:31:57,803] A new study created in memory with name:
no-name-4a0972fa-d2e8-4f76-a9b6-fc1ec0b1e58d

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:32:00,840] Trial 0 finished with value:
0.6940975968256382 and parameters: {'n_units': 42, 'dropout_rate':
0.35144971356121524, 'learning_rate': 0.003601257760255217,
'batch_size': 38, 'epochs': 32}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:32:03,761] Trial 1 finished with value:
2.221271190151909 and parameters: {'n_units': 102, 'dropout_rate':
0.17273927754200352, 'learning_rate': 0.000290595251551165,
'batch_size': 41, 'epochs': 29}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:32:06,403] Trial 2 finished with value:
3.2040096794537707 and parameters: {'n_units': 66, 'dropout_rate':
0.32593389285294705, 'learning_rate': 0.0002006178354750186,

```

'batch_size': 57, 'epochs': 25}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:32:10,151] Trial 3 finished with value:
1.2367740361203952 and parameters: {'n_units': 120, 'dropout_rate':
0.27749089659037407, 'learning_rate': 0.008063346020368834,
'batch_size': 19, 'epochs': 44}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:32:13,343] Trial 4 finished with value:
3.0787318418214924 and parameters: {'n_units': 43, 'dropout_rate':
0.32999441142693753, 'learning_rate': 0.00013488243730627248,
'batch_size': 58, 'epochs': 44}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:32:16,951] Trial 5 finished with value:
0.7671152849627841 and parameters: {'n_units': 223, 'dropout_rate':
0.23499700791217581, 'learning_rate': 0.0008084985743147629,
'batch_size': 40, 'epochs': 39}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:32:20,145] Trial 6 finished with value:
0.8086181018944345 and parameters: {'n_units': 77, 'dropout_rate':
0.444527239900525, 'learning_rate': 0.004400467684502137,
'batch_size': 44, 'epochs': 43}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:32:22,978] Trial 7 finished with value:
2.15003368367752 and parameters: {'n_units': 148, 'dropout_rate':
0.44857694892487876, 'learning_rate': 0.0003482629177669902,
'batch_size': 47, 'epochs': 28}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:32:26,465] Trial 8 finished with value:
1.0549856608075974 and parameters: {'n_units': 164, 'dropout_rate':
0.25330444868701496, 'learning_rate': 0.0028997703909399335,
'batch_size': 50, 'epochs': 47}. Best is trial 0 with value:
0.6940975968256382.

1/1 ————— 0s 150ms/step

[I 2024-12-30 10:32:29,809] Trial 9 finished with value: 0.6806655796440192 and parameters: {'n_units': 36, 'dropout_rate': 0.39935505722535525, 'learning_rate': 0.0032965406263737768, 'batch_size': 38, 'epochs': 45}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:32:32,261] Trial 10 finished with value: 0.9224396878965064 and parameters: {'n_units': 200, 'dropout_rate': 0.1073582596854066, 'learning_rate': 0.001627265773541801, 'batch_size': 27, 'epochs': 11}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:32:35,383] Trial 11 finished with value: 0.7414981216062299 and parameters: {'n_units': 32, 'dropout_rate': 0.38237707190419096, 'learning_rate': 0.009091208725700769, 'batch_size': 34, 'epochs': 35}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 184ms/step

[I 2024-12-30 10:32:38,058] Trial 12 finished with value: 0.8793892272870645 and parameters: {'n_units': 81, 'dropout_rate': 0.3889983976967667, 'learning_rate': 0.0015868164014601206, 'batch_size': 30, 'epochs': 19}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:32:41,553] Trial 13 finished with value: 0.7223432616129272 and parameters: {'n_units': 53, 'dropout_rate': 0.4949121055560882, 'learning_rate': 0.0038930681038086873, 'batch_size': 35, 'epochs': 50}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:32:44,800] Trial 14 finished with value: 0.7782799327607262 and parameters: {'n_units': 118, 'dropout_rate': 0.38647054775106093, 'learning_rate': 0.0007085408526385361, 'batch_size': 23, 'epochs': 35}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 169ms/step

[I 2024-12-30 10:32:47,483] Trial 15 finished with value: 0.8508911395392059 and parameters: {'n_units': 181, 'dropout_rate': 0.3388136940715186, 'learning_rate': 0.0022391515825874978,

'batch_size': 53, 'epochs': 19}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:32:50,689] Trial 16 finished with value:
1.0180579933847753 and parameters: {'n_units': 94, 'dropout_rate':
0.42833961485705246, 'learning_rate': 0.00548170777941269,
'batch_size': 36, 'epochs': 35}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 150ms/step

[I 2024-12-30 10:32:53,516] Trial 17 finished with value:
0.9934896877375033 and parameters: {'n_units': 32, 'dropout_rate':
0.2038131859701365, 'learning_rate': 0.0015240465728144055,
'batch_size': 16, 'epochs': 23}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:32:57,015] Trial 18 finished with value:
1.119097893418726 and parameters: {'n_units': 253, 'dropout_rate':
0.4926943632268701, 'learning_rate': 0.0005742716701138178,
'batch_size': 64, 'epochs': 40}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:33:00,054] Trial 19 finished with value:
0.7081946749312714 and parameters: {'n_units': 62, 'dropout_rate':
0.3587125552024139, 'learning_rate': 0.0027268900254406618,
'batch_size': 30, 'epochs': 32}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:33:03,259] Trial 20 finished with value:
1.249795902696951 and parameters: {'n_units': 123, 'dropout_rate':
0.29824040161903403, 'learning_rate': 0.005951622931988546,
'batch_size': 45, 'epochs': 39}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:33:06,248] Trial 21 finished with value:
0.711774692769836 and parameters: {'n_units': 60, 'dropout_rate':
0.361126875448311, 'learning_rate': 0.002640772206327574,
'batch_size': 29, 'epochs': 32}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:33:09,279] Trial 22 finished with value: 0.7243956045620681 and parameters: {'n_units': 54, 'dropout_rate': 0.4224756659353607, 'learning_rate': 0.0030822399948701646, 'batch_size': 33, 'epochs': 32}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:33:12,140] Trial 23 finished with value: 0.9282634844281642 and parameters: {'n_units': 82, 'dropout_rate': 0.35955899659576884, 'learning_rate': 0.0010822534394530298, 'batch_size': 25, 'epochs': 25}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:33:14,441] Trial 24 finished with value: 0.9515836770160244 and parameters: {'n_units': 46, 'dropout_rate': 0.3019114859220676, 'learning_rate': 0.006146999325524533, 'batch_size': 37, 'epochs': 11}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 177ms/step

[I 2024-12-30 10:33:18,164] Trial 25 finished with value: 1.0637610234639423 and parameters: {'n_units': 101, 'dropout_rate': 0.4092736465267091, 'learning_rate': 0.003910606634271806, 'batch_size': 31, 'epochs': 50}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:33:20,779] Trial 26 finished with value: 1.0386481098170877 and parameters: {'n_units': 73, 'dropout_rate': 0.4596053452277462, 'learning_rate': 0.0019750820393470044, 'batch_size': 39, 'epochs': 18}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:33:24,011] Trial 27 finished with value: 0.8794906470694451 and parameters: {'n_units': 45, 'dropout_rate': 0.37108573789221705, 'learning_rate': 0.001151760551755359, 'batch_size': 23, 'epochs': 37}. Best is trial 9 with value: 0.6806655796440192.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:33:26,511] Trial 28 finished with value: 1.0607692470077403 and parameters: {'n_units': 138, 'dropout_rate': 0.3073674223826475, 'learning_rate': 0.0031720319883557723,

'batch_size': 43, 'epochs': 15}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:33:29,481] Trial 29 finished with value:
0.6874870198758554 and parameters: {'n_units': 32, 'dropout_rate':
0.1538242149105515, 'learning_rate': 0.009927026779511839,
'batch_size': 40, 'epochs': 32}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:33:32,347] Trial 30 finished with value:
0.7877755663729388 and parameters: {'n_units': 91, 'dropout_rate':
0.13497047636392207, 'learning_rate': 0.009714406950150288,
'batch_size': 41, 'epochs': 28}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:33:35,240] Trial 31 finished with value:
0.8187803846048625 and parameters: {'n_units': 35, 'dropout_rate':
0.21913439016338093, 'learning_rate': 0.0068588734712439715,
'batch_size': 38, 'epochs': 31}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 177ms/step

[I 2024-12-30 10:33:38,107] Trial 32 finished with value:
0.7363383909399224 and parameters: {'n_units': 65, 'dropout_rate':
0.14359024035770332, 'learning_rate': 0.004657271202524644,
'batch_size': 32, 'epochs': 25}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 172ms/step

[I 2024-12-30 10:33:47,128] Trial 33 finished with value:
0.8111731064959355 and parameters: {'n_units': 62, 'dropout_rate':
0.27089982850395267, 'learning_rate': 0.0020853093689521033,
'batch_size': 48, 'epochs': 29}. Best is trial 9 with value:
0.6806655796440192.

1/1 ————— 0s 171ms/step

[I 2024-12-30 10:33:50,791] Trial 34 finished with value:
0.6577413571582066 and parameters: {'n_units': 47, 'dropout_rate':
0.34151772475366804, 'learning_rate': 0.007547444090027426,
'batch_size': 42, 'epochs': 42}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 169ms/step

[I 2024-12-30 10:33:54,515] Trial 35 finished with value: 0.6905877920475233 and parameters: {'n_units': 46, 'dropout_rate': 0.19083897801439684, 'learning_rate': 0.008401616324174063, 'batch_size': 43, 'epochs': 43}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 183ms/step

[I 2024-12-30 10:33:58,040] Trial 36 finished with value: 0.8482053564580073 and parameters: {'n_units': 48, 'dropout_rate': 0.1682340901398319, 'learning_rate': 0.0075492475006740944, 'batch_size': 52, 'epochs': 42}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:34:01,795] Trial 37 finished with value: 0.7378111622657559 and parameters: {'n_units': 42, 'dropout_rate': 0.19519341601619966, 'learning_rate': 0.009876699636726917, 'batch_size': 42, 'epochs': 46}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:34:05,407] Trial 38 finished with value: 1.0497442233081826 and parameters: {'n_units': 74, 'dropout_rate': 0.10381443863933511, 'learning_rate': 0.004975569374294059, 'batch_size': 46, 'epochs': 47}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:34:08,937] Trial 39 finished with value: 1.1603663362802497 and parameters: {'n_units': 114, 'dropout_rate': 0.17282927261876407, 'learning_rate': 0.007187263332505974, 'batch_size': 56, 'epochs': 42}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:34:12,401] Trial 40 finished with value: 0.7969296306909153 and parameters: {'n_units': 32, 'dropout_rate': 0.24565975119796624, 'learning_rate': 0.008003109689847155, 'batch_size': 49, 'epochs': 45}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:34:15,798] Trial 41 finished with value: 0.8012608424706895 and parameters: {'n_units': 49, 'dropout_rate': 0.33499337646366684, 'learning_rate': 0.0038879533642453136,

'batch_size': 40, 'epochs': 42}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:34:19,069] Trial 42 finished with value:
2.650416028614783 and parameters: {'n_units': 69, 'dropout_rate':
0.1398014088617594, 'learning_rate': 0.00022689227448706027,
'batch_size': 42, 'epochs': 37}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 167ms/step

[I 2024-12-30 10:34:22,380] Trial 43 finished with value:
0.8808340713430682 and parameters: {'n_units': 41, 'dropout_rate':
0.27857080889792607, 'learning_rate': 0.005622095578332376,
'batch_size': 37, 'epochs': 40}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:34:25,921] Trial 44 finished with value:
0.9652637634673357 and parameters: {'n_units': 58, 'dropout_rate':
0.31381387708743963, 'learning_rate': 0.008362422329703122,
'batch_size': 44, 'epochs': 48}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:34:29,396] Trial 45 finished with value:
1.110649045104392 and parameters: {'n_units': 85, 'dropout_rate':
0.16691363308511506, 'learning_rate': 0.00044651645141006427,
'batch_size': 35, 'epochs': 44}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:34:32,497] Trial 46 finished with value:
0.6919378366325593 and parameters: {'n_units': 40, 'dropout_rate':
0.4022128746707014, 'learning_rate': 0.004451298952479531,
'batch_size': 39, 'epochs': 34}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:34:35,578] Trial 47 finished with value:
0.677258811392501 and parameters: {'n_units': 39, 'dropout_rate':
0.4707357745436297, 'learning_rate': 0.004824748053805606,
'batch_size': 47, 'epochs': 37}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:34:38,721] Trial 48 finished with value: 0.6645091787164499 and parameters: {'n_units': 50, 'dropout_rate': 0.4472128752852223, 'learning_rate': 0.006686421069945143, 'batch_size': 51, 'epochs': 37}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:34:41,821] Trial 49 finished with value: 3.3564773646291175 and parameters: {'n_units': 54, 'dropout_rate': 0.46484898694510546, 'learning_rate': 0.00012533635834041765, 'batch_size': 56, 'epochs': 38}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:34:45,064] Trial 50 finished with value: 0.8814999773281104 and parameters: {'n_units': 194, 'dropout_rate': 0.47612569792380743, 'learning_rate': 0.006609010867959976, 'batch_size': 60, 'epochs': 36}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:34:48,244] Trial 51 finished with value: 0.7525264413127097 and parameters: {'n_units': 41, 'dropout_rate': 0.44557681498457913, 'learning_rate': 0.009880375262834494, 'batch_size': 51, 'epochs': 40}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:34:51,454] Trial 52 finished with value: 0.6837013272813733 and parameters: {'n_units': 32, 'dropout_rate': 0.4253859282044336, 'learning_rate': 0.005228810275549012, 'batch_size': 46, 'epochs': 44}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:34:54,955] Trial 53 finished with value: 0.6835970900950463 and parameters: {'n_units': 33, 'dropout_rate': 0.4353493138813918, 'learning_rate': 0.004852240864130338, 'batch_size': 47, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:34:58,366] Trial 54 finished with value: 0.7490109303729442 and parameters: {'n_units': 56, 'dropout_rate': 0.42859820183530417, 'learning_rate': 0.003585146966315848,

'batch_size': 47, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:35:01,853] Trial 55 finished with value: 0.9937266781481467 and parameters: {'n_units': 162, 'dropout_rate': 0.48097991197108525, 'learning_rate': 0.005268027840589358, 'batch_size': 54, 'epochs': 45}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:35:05,228] Trial 56 finished with value: 0.7735356253664999 and parameters: {'n_units': 69, 'dropout_rate': 0.40562199548355643, 'learning_rate': 0.003343038726287287, 'batch_size': 50, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:35:08,791] Trial 57 finished with value: 0.9903006263951168 and parameters: {'n_units': 236, 'dropout_rate': 0.4337436876720841, 'learning_rate': 0.002367917045155739, 'batch_size': 46, 'epochs': 41}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:35:12,255] Trial 58 finished with value: 0.6607434975471044 and parameters: {'n_units': 37, 'dropout_rate': 0.45134806702958385, 'learning_rate': 0.004331334584659872, 'batch_size': 54, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:35:15,656] Trial 59 finished with value: 0.8466094978062699 and parameters: {'n_units': 51, 'dropout_rate': 0.4574183889411892, 'learning_rate': 0.0065438623117285, 'batch_size': 54, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:35:18,989] Trial 60 finished with value: 0.7945179853203687 and parameters: {'n_units': 79, 'dropout_rate': 0.4977340943404078, 'learning_rate': 0.003982396122708885, 'batch_size': 60, 'epochs': 46}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:35:22,172] Trial 61 finished with value: 0.714181716838935 and parameters: {'n_units': 37, 'dropout_rate': 0.4139387565792433, 'learning_rate': 0.004787183887611907, 'batch_size': 49, 'epochs': 44}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:35:25,534] Trial 62 finished with value: 0.7136176820502683 and parameters: {'n_units': 39, 'dropout_rate': 0.3894930948213834, 'learning_rate': 0.005751056434204585, 'batch_size': 51, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:35:28,888] Trial 63 finished with value: 0.8227950667749905 and parameters: {'n_units': 32, 'dropout_rate': 0.4390828272642292, 'learning_rate': 0.002826438605625375, 'batch_size': 45, 'epochs': 46}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:35:32,088] Trial 64 finished with value: 0.7095932129611415 and parameters: {'n_units': 52, 'dropout_rate': 0.4744572096307341, 'learning_rate': 0.004267389818487972, 'batch_size': 54, 'epochs': 43}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:35:35,135] Trial 65 finished with value: 0.8369662678746286 and parameters: {'n_units': 56, 'dropout_rate': 0.45137065016664535, 'learning_rate': 0.0017175244279974834, 'batch_size': 49, 'epochs': 39}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 179ms/step

[I 2024-12-30 10:35:38,120] Trial 66 finished with value: 0.773055187181624 and parameters: {'n_units': 62, 'dropout_rate': 0.4188344673803813, 'learning_rate': 0.005151916959999733, 'batch_size': 47, 'epochs': 34}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:35:41,461] Trial 67 finished with value: 0.9277179358154635 and parameters: {'n_units': 49, 'dropout_rate': 0.375169988116852, 'learning_rate': 0.0013632542803839521,

'batch_size': 44, 'epochs': 47}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:35:44,860] Trial 68 finished with value:
0.7067226041182444 and parameters: {'n_units': 68, 'dropout_rate':
0.34857163669383284, 'learning_rate': 0.0024711565747124885,
'batch_size': 59, 'epochs': 50}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:35:48,172] Trial 69 finished with value:
0.6870365215280992 and parameters: {'n_units': 44, 'dropout_rate':
0.40148845885141343, 'learning_rate': 0.006201426902349657,
'batch_size': 63, 'epochs': 45}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:35:51,302] Trial 70 finished with value:
0.6820494981334658 and parameters: {'n_units': 36, 'dropout_rate':
0.46650307060295537, 'learning_rate': 0.003033072075518928,
'batch_size': 52, 'epochs': 41}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:35:54,522] Trial 71 finished with value:
0.7653885577559661 and parameters: {'n_units': 37, 'dropout_rate':
0.46686248742629527, 'learning_rate': 0.0033024412839219876,
'batch_size': 52, 'epochs': 41}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:35:57,714] Trial 72 finished with value:
1.2714929054140196 and parameters: {'n_units': 44, 'dropout_rate':
0.4465983604199113, 'learning_rate': 0.000778625509706475,
'batch_size': 48, 'epochs': 41}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:36:00,862] Trial 73 finished with value:
0.8160372400011645 and parameters: {'n_units': 35, 'dropout_rate':
0.4838757704837387, 'learning_rate': 0.003587754586595022,
'batch_size': 53, 'epochs': 38}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:36:04,100] Trial 74 finished with value: 0.7299682317153712 and parameters: {'n_units': 59, 'dropout_rate': 0.43060643281823313, 'learning_rate': 0.007293789522957905, 'batch_size': 57, 'epochs': 43}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:36:07,398] Trial 75 finished with value: 0.7102588702326498 and parameters: {'n_units': 47, 'dropout_rate': 0.39124037830058706, 'learning_rate': 0.004635358204622093, 'batch_size': 46, 'epochs': 44}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:36:10,806] Trial 76 finished with value: 0.7652251168118752 and parameters: {'n_units': 32, 'dropout_rate': 0.45722962887224944, 'learning_rate': 0.0028656391910313705, 'batch_size': 55, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:36:14,186] Trial 77 finished with value: 0.665489359962305 and parameters: {'n_units': 39, 'dropout_rate': 0.42268653482992413, 'learning_rate': 0.004119049193104302, 'batch_size': 42, 'epochs': 47}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:36:17,645] Trial 78 finished with value: 0.955684548690197 and parameters: {'n_units': 40, 'dropout_rate': 0.490144180894464, 'learning_rate': 0.0018487170161842416, 'batch_size': 42, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 150ms/step

[I 2024-12-30 10:36:20,980] Trial 79 finished with value: 0.8890289035694396 and parameters: {'n_units': 65, 'dropout_rate': 0.4399505873808, 'learning_rate': 0.004276002927967899, 'batch_size': 51, 'epochs': 47}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:36:24,305] Trial 80 finished with value: 3.310390473173351 and parameters: {'n_units': 52, 'dropout_rate': 0.4683130105843489, 'learning_rate': 0.00010319573030422943, 'batch_size': 44, 'epochs': 46}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:36:27,669] Trial 81 finished with value: 0.8066181263656206 and parameters: {'n_units': 39, 'dropout_rate': 0.42286410869219815, 'learning_rate': 0.005893117202830051, 'batch_size': 48, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:36:31,168] Trial 82 finished with value: 0.7978950225512313 and parameters: {'n_units': 47, 'dropout_rate': 0.4522703076255741, 'learning_rate': 0.0052656284463040446, 'batch_size': 41, 'epochs': 45}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:36:34,314] Trial 83 finished with value: 0.7145821923965399 and parameters: {'n_units': 32, 'dropout_rate': 0.41766301216466745, 'learning_rate': 0.00868024637037683, 'batch_size': 39, 'epochs': 38}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:36:37,646] Trial 84 finished with value: 0.7305475100482401 and parameters: {'n_units': 43, 'dropout_rate': 0.39754571193498445, 'learning_rate': 0.007440614237369283, 'batch_size': 37, 'epochs': 42}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:36:40,694] Trial 85 finished with value: 0.6815775204769667 and parameters: {'n_units': 60, 'dropout_rate': 0.4381239975111938, 'learning_rate': 0.0038579122407264924, 'batch_size': 50, 'epochs': 36}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 150ms/step

[I 2024-12-30 10:36:43,692] Trial 86 finished with value: 0.6839784950200231 and parameters: {'n_units': 58, 'dropout_rate': 0.43758764230644315, 'learning_rate': 0.0035893442086354856, 'batch_size': 53, 'epochs': 36}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:36:46,654] Trial 87 finished with value: 0.7081696441005232 and parameters: {'n_units': 75, 'dropout_rate':

0.37398148880228044, 'learning_rate': 0.00310494131547285,
'batch_size': 50, 'epochs': 34}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:36:49,900] Trial 88 finished with value:
0.7404534660400593 and parameters: {'n_units': 132, 'dropout_rate':
0.48626881653208825, 'learning_rate': 0.002164163903631771,
'batch_size': 52, 'epochs': 40}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:36:53,138] Trial 89 finished with value:
0.9110676324057598 and parameters: {'n_units': 110, 'dropout_rate':
0.46534047568407927, 'learning_rate': 0.002544209619910005,
'batch_size': 43, 'epochs': 37}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:36:56,097] Trial 90 finished with value:
0.6882770630295091 and parameters: {'n_units': 52, 'dropout_rate':
0.447960180253033, 'learning_rate': 0.0038539734852581224,
'batch_size': 35, 'epochs': 33}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:36:59,257] Trial 91 finished with value:
0.7282377547848019 and parameters: {'n_units': 38, 'dropout_rate':
0.4274489872944584, 'learning_rate': 0.004135276600026425,
'batch_size': 45, 'epochs': 39}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:37:02,404] Trial 92 finished with value:
0.6898022330756273 and parameters: {'n_units': 45, 'dropout_rate':
0.4114956279991934, 'learning_rate': 0.004765959206753585,
'batch_size': 47, 'epochs': 36}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:37:05,621] Trial 93 finished with value:
0.7138725220388121 and parameters: {'n_units': 36, 'dropout_rate':
0.45638030936485297, 'learning_rate': 0.006587181574686673,
'batch_size': 49, 'epochs': 43}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:37:08,524] Trial 94 finished with value: 0.7013835420422817 and parameters: {'n_units': 50, 'dropout_rate': 0.4732713881434526, 'learning_rate': 0.00549145812999106, 'batch_size': 45, 'epochs': 30}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:37:11,955] Trial 95 finished with value: 0.7905916466275011 and parameters: {'n_units': 64, 'dropout_rate': 0.31990246843032805, 'learning_rate': 0.004916988467335952, 'batch_size': 41, 'epochs': 46}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:37:15,227] Trial 96 finished with value: 0.7921528229004121 and parameters: {'n_units': 56, 'dropout_rate': 0.4344875948906157, 'learning_rate': 0.007761075479554144, 'batch_size': 50, 'epochs': 44}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:37:18,762] Trial 97 finished with value: 0.8827316377531025 and parameters: {'n_units': 86, 'dropout_rate': 0.4198944636299512, 'learning_rate': 0.0034071354758036503, 'batch_size': 48, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:37:22,004] Trial 98 finished with value: 0.9297307519366036 and parameters: {'n_units': 71, 'dropout_rate': 0.38299083335972245, 'learning_rate': 0.0061367522324143045, 'batch_size': 46, 'epochs': 41}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:37:25,577] Trial 99 finished with value: 0.858447781836441 and parameters: {'n_units': 153, 'dropout_rate': 0.4427957720416066, 'learning_rate': 0.002958485684128984, 'batch_size': 56, 'epochs': 47}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:37:28,966] Trial 100 finished with value: 0.6982287921075732 and parameters: {'n_units': 36, 'dropout_rate':

0.39742214918692037, 'learning_rate': 0.004306701856747849,
'batch_size': 38, 'epochs': 45}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 150ms/step

[I 2024-12-30 10:37:31,992] Trial 101 finished with value:
0.7030883942137143 and parameters: {'n_units': 58, 'dropout_rate':
0.4358524943681966, 'learning_rate': 0.00402844832412921,
'batch_size': 53, 'epochs': 36}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:37:35,064] Trial 102 finished with value:
0.6858767917564431 and parameters: {'n_units': 44, 'dropout_rate':
0.4098851332134393, 'learning_rate': 0.0036476966100870128,
'batch_size': 51, 'epochs': 35}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 172ms/step

[I 2024-12-30 10:37:38,162] Trial 103 finished with value:
0.7200325092201234 and parameters: {'n_units': 61, 'dropout_rate':
0.2878577825837312, 'learning_rate': 0.0056554739527646235,
'batch_size': 55, 'epochs': 37}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:37:41,257] Trial 104 finished with value:
0.6845081207784319 and parameters: {'n_units': 42, 'dropout_rate':
0.4631716226997914, 'learning_rate': 0.004572712046655224,
'batch_size': 52, 'epochs': 39}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:37:44,532] Trial 105 finished with value:
0.762096725632775 and parameters: {'n_units': 212, 'dropout_rate':
0.4995920055908774, 'learning_rate': 0.006832956901768269,
'batch_size': 43, 'epochs': 33}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:37:47,677] Trial 106 finished with value:
0.7410504525970733 and parameters: {'n_units': 48, 'dropout_rate':
0.3487213017623334, 'learning_rate': 0.0035403946549127526,
'batch_size': 40, 'epochs': 38}. Best is trial 34 with value:
0.6577413571582066.

1/1 ————— 0s 182ms/step

[I 2024-12-30 10:37:58,577] Trial 107 finished with value: 0.9851886706541644 and parameters: {'n_units': 176, 'dropout_rate': 0.42652807114272606, 'learning_rate': 0.002665880732986428, 'batch_size': 50, 'epochs': 42}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 173ms/step

[I 2024-12-30 10:38:02,191] Trial 108 finished with value: 0.696630931609336 and parameters: {'n_units': 54, 'dropout_rate': 0.4443228491879158, 'learning_rate': 0.005056615667719918, 'batch_size': 54, 'epochs': 40}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 177ms/step

[I 2024-12-30 10:38:06,193] Trial 109 finished with value: 0.7268591720923161 and parameters: {'n_units': 36, 'dropout_rate': 0.477984751688428, 'learning_rate': 0.009197584165249925, 'batch_size': 53, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 172ms/step

[I 2024-12-30 10:38:09,579] Trial 110 finished with value: 3.0484910750567824 and parameters: {'n_units': 32, 'dropout_rate': 0.43753864352112515, 'learning_rate': 0.00030010763174415106, 'batch_size': 48, 'epochs': 35}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:38:12,954] Trial 111 finished with value: 0.7178282918382055 and parameters: {'n_units': 41, 'dropout_rate': 0.46084092524681886, 'learning_rate': 0.00449957210839813, 'batch_size': 52, 'epochs': 39}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:38:16,165] Trial 112 finished with value: 0.7576074426177973 and parameters: {'n_units': 42, 'dropout_rate': 0.47022437654842514, 'learning_rate': 0.0031002035736238634, 'batch_size': 57, 'epochs': 36}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:38:19,607] Trial 113 finished with value: 0.6989178435248244 and parameters: {'n_units': 49, 'dropout_rate':

0.4552392059410868, 'learning_rate': 0.0038676746086710664, 'batch_size': 55, 'epochs': 43}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:38:22,921] Trial 114 finished with value: 0.695429088166268 and parameters: {'n_units': 39, 'dropout_rate': 0.46100999697797906, 'learning_rate': 0.004596305807490571, 'batch_size': 51, 'epochs': 39}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:38:26,436] Trial 115 finished with value: 0.6989087782810207 and parameters: {'n_units': 45, 'dropout_rate': 0.3646769425705019, 'learning_rate': 0.005230231726417101, 'batch_size': 52, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:38:30,202] Trial 116 finished with value: 1.0616576806502607 and parameters: {'n_units': 55, 'dropout_rate': 0.44968056977571846, 'learning_rate': 0.00618283573485584, 'batch_size': 16, 'epochs': 41}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:38:33,360] Trial 117 finished with value: 0.7878774066437109 and parameters: {'n_units': 35, 'dropout_rate': 0.49045272848337146, 'learning_rate': 0.0032289130195124723, 'batch_size': 49, 'epochs': 37}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 177ms/step

[I 2024-12-30 10:38:36,878] Trial 118 finished with value: 0.7298163351487026 and parameters: {'n_units': 50, 'dropout_rate': 0.4296301161668189, 'learning_rate': 0.0023291206370009655, 'batch_size': 47, 'epochs': 47}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:38:40,101] Trial 119 finished with value: 0.6862190210395313 and parameters: {'n_units': 59, 'dropout_rate': 0.4799547557819272, 'learning_rate': 0.0036794500362016904, 'batch_size': 58, 'epochs': 38}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:38:43,445] Trial 120 finished with value: 0.6947360666185141 and parameters: {'n_units': 42, 'dropout_rate': 0.4145988617774887, 'learning_rate': 0.004232575656577022, 'batch_size': 45, 'epochs': 44}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:38:46,580] Trial 121 finished with value: 0.7438758132939199 and parameters: {'n_units': 32, 'dropout_rate': 0.40694543419190493, 'learning_rate': 0.003628446767536289, 'batch_size': 51, 'epochs': 37}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:38:49,687] Trial 122 finished with value: 0.7641767590250821 and parameters: {'n_units': 45, 'dropout_rate': 0.42390338822109414, 'learning_rate': 0.004815259642061584, 'batch_size': 53, 'epochs': 35}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:38:52,751] Trial 123 finished with value: 0.7500748006642454 and parameters: {'n_units': 39, 'dropout_rate': 0.44142802380879664, 'learning_rate': 0.003353728083821441, 'batch_size': 49, 'epochs': 34}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:38:55,746] Trial 124 finished with value: 2.0352791489908473 and parameters: {'n_units': 47, 'dropout_rate': 0.3960107984731372, 'learning_rate': 0.0006031751288018934, 'batch_size': 50, 'epochs': 33}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:38:58,503] Trial 125 finished with value: 0.8157384664374191 and parameters: {'n_units': 52, 'dropout_rate': 0.4114110251963056, 'learning_rate': 0.005822541063094756, 'batch_size': 42, 'epochs': 23}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:39:01,695] Trial 126 finished with value: 0.7329950000786313 and parameters: {'n_units': 42, 'dropout_rate':

0.4334734177412639, 'learning_rate': 0.003931810379589908, 'batch_size': 46, 'epochs': 40}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:39:04,802] Trial 127 finished with value: 0.848047727723519 and parameters: {'n_units': 66, 'dropout_rate': 0.44945167244833806, 'learning_rate': 0.00703469667099032, 'batch_size': 54, 'epochs': 36}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 201ms/step

[I 2024-12-30 10:39:08,214] Trial 128 finished with value: 0.7344184180719739 and parameters: {'n_units': 37, 'dropout_rate': 0.4201192735063785, 'learning_rate': 0.0028240063722323227, 'batch_size': 51, 'epochs': 42}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:39:11,854] Trial 129 finished with value: 1.0773367174186623 and parameters: {'n_units': 101, 'dropout_rate': 0.4705906969807109, 'learning_rate': 0.00533086035804188, 'batch_size': 36, 'epochs': 45}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:39:15,691] Trial 130 finished with value: 1.0873870567683164 and parameters: {'n_units': 45, 'dropout_rate': 0.4076116845702307, 'learning_rate': 0.0044452860967593025, 'batch_size': 18, 'epochs': 46}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:39:18,870] Trial 131 finished with value: 0.7084935140551728 and parameters: {'n_units': 60, 'dropout_rate': 0.48501138902720126, 'learning_rate': 0.003667286002774453, 'batch_size': 61, 'epochs': 38}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:39:22,006] Trial 132 finished with value: 0.6821702388196493 and parameters: {'n_units': 57, 'dropout_rate': 0.47806382830182337, 'learning_rate': 0.0038066498430627165, 'batch_size': 59, 'epochs': 39}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:39:25,189] Trial 133 finished with value: 0.7623841693599559 and parameters: {'n_units': 54, 'dropout_rate': 0.459008834721104, 'learning_rate': 0.004127153715243465, 'batch_size': 63, 'epochs': 39}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:39:28,385] Trial 134 finished with value: 0.8155324358001066 and parameters: {'n_units': 36, 'dropout_rate': 0.4673633055704481, 'learning_rate': 0.002985555121523197, 'batch_size': 52, 'epochs': 41}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:39:31,415] Trial 135 finished with value: 0.6989659420138178 and parameters: {'n_units': 47, 'dropout_rate': 0.43910036190943236, 'learning_rate': 0.0050025434960524464, 'batch_size': 48, 'epochs': 37}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:39:34,397] Trial 136 finished with value: 1.2529227182268203 and parameters: {'n_units': 40, 'dropout_rate': 0.45237058437633726, 'learning_rate': 0.000989304113179024, 'batch_size': 44, 'epochs': 35}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 177ms/step

[I 2024-12-30 10:39:38,026] Trial 137 finished with value: 1.3052200898623088 and parameters: {'n_units': 254, 'dropout_rate': 0.46348254182312904, 'learning_rate': 0.008230034469568617, 'batch_size': 56, 'epochs': 40}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:39:41,726] Trial 138 finished with value: 0.6762557091822421 and parameters: {'n_units': 32, 'dropout_rate': 0.47846301846194117, 'learning_rate': 0.0033954178010633584, 'batch_size': 33, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:39:45,288] Trial 139 finished with value: 0.6740034908061899 and parameters: {'n_units': 32, 'dropout_rate':

0.47684259256053463, 'learning_rate': 0.0026069222107510804, 'batch_size': 28, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:39:48,882] Trial 140 finished with value: 0.7192331099199748 and parameters: {'n_units': 32, 'dropout_rate': 0.4942642732478457, 'learning_rate': 0.0020318875579204616, 'batch_size': 28, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:39:52,554] Trial 141 finished with value: 0.6800478601304176 and parameters: {'n_units': 35, 'dropout_rate': 0.4812707935699493, 'learning_rate': 0.0026936618507564162, 'batch_size': 24, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:39:56,239] Trial 142 finished with value: 0.693750187846386 and parameters: {'n_units': 32, 'dropout_rate': 0.47470682068454156, 'learning_rate': 0.00264850496508375, 'batch_size': 25, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:39:59,924] Trial 143 finished with value: 0.6987684781829238 and parameters: {'n_units': 40, 'dropout_rate': 0.4832524245819179, 'learning_rate': 0.00236760891783109, 'batch_size': 22, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:40:03,659] Trial 144 finished with value: 0.6884057096080416 and parameters: {'n_units': 36, 'dropout_rate': 0.47833587949252404, 'learning_rate': 0.003265197969068692, 'batch_size': 30, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:40:07,466] Trial 145 finished with value: 0.7039908548938336 and parameters: {'n_units': 36, 'dropout_rate': 0.48863514654654133, 'learning_rate': 0.002867304850781531, 'batch_size': 25, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:40:11,120] Trial 146 finished with value: 0.8325185737150046 and parameters: {'n_units': 52, 'dropout_rate': 0.4717230425280756, 'learning_rate': 0.0025853364044820235, 'batch_size': 32, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:40:14,770] Trial 147 finished with value: 1.1062466417194166 and parameters: {'n_units': 32, 'dropout_rate': 0.49831630248902464, 'learning_rate': 0.0014422358306757379, 'batch_size': 33, 'epochs': 47}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:40:18,662] Trial 148 finished with value: 0.7774368133113339 and parameters: {'n_units': 49, 'dropout_rate': 0.3355160497795326, 'learning_rate': 0.003368211970758359, 'batch_size': 23, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:40:22,209] Trial 149 finished with value: 0.7134025025396704 and parameters: {'n_units': 39, 'dropout_rate': 0.45393625047317293, 'learning_rate': 0.003926045571897995, 'batch_size': 27, 'epochs': 46}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:40:25,770] Trial 150 finished with value: 0.7007323085423272 and parameters: {'n_units': 57, 'dropout_rate': 0.44433032090881186, 'learning_rate': 0.003077657879193295, 'batch_size': 40, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:40:29,347] Trial 151 finished with value: 0.7021281712294186 and parameters: {'n_units': 43, 'dropout_rate': 0.46171709450120985, 'learning_rate': 0.004476874182492593, 'batch_size': 34, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:40:32,575] Trial 152 finished with value: 0.8606170440873196 and parameters: {'n_units': 45, 'dropout_rate':

0.46708210139533174, 'learning_rate': 0.006387073389223831, 'batch_size': 26, 'epochs': 49}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:40:36,084] Trial 153 finished with value: 0.7387767755325992 and parameters: {'n_units': 36, 'dropout_rate': 0.4800831121743925, 'learning_rate': 0.005637289185473812, 'batch_size': 28, 'epochs': 47}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:40:39,561] Trial 154 finished with value: 0.7668301734790933 and parameters: {'n_units': 42, 'dropout_rate': 0.4316229246958571, 'learning_rate': 0.004174490607640372, 'batch_size': 30, 'epochs': 43}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 171ms/step

[I 2024-12-30 10:40:43,270] Trial 155 finished with value: 0.8857111588697557 and parameters: {'n_units': 49, 'dropout_rate': 0.4465601234839439, 'learning_rate': 0.004723914241409679, 'batch_size': 24, 'epochs': 48}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 182ms/step

[I 2024-12-30 10:40:46,821] Trial 156 finished with value: 3.3020677783832273 and parameters: {'n_units': 38, 'dropout_rate': 0.4574002148569861, 'learning_rate': 0.00020003026236381884, 'batch_size': 43, 'epochs': 42}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:40:50,529] Trial 157 finished with value: 0.725190444728824 and parameters: {'n_units': 35, 'dropout_rate': 0.48945166235992654, 'learning_rate': 0.0035204031706509414, 'batch_size': 22, 'epochs': 50}. Best is trial 34 with value: 0.6577413571582066.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:40:53,868] Trial 158 finished with value: 0.6367928715008743 and parameters: {'n_units': 32, 'dropout_rate': 0.46994082855839714, 'learning_rate': 0.0038115344314832663, 'batch_size': 54, 'epochs': 46}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:40:57,198] Trial 159 finished with value: 0.7180944615471079 and parameters: {'n_units': 39, 'dropout_rate': 0.47539495890713346, 'learning_rate': 0.0031121895885598476, 'batch_size': 55, 'epochs': 45}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:41:00,557] Trial 160 finished with value: 0.7505187406398146 and parameters: {'n_units': 32, 'dropout_rate': 0.4376381848885775, 'learning_rate': 0.0038470865658500855, 'batch_size': 38, 'epochs': 44}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:41:04,288] Trial 161 finished with value: 0.8336510796043417 and parameters: {'n_units': 43, 'dropout_rate': 0.47244506098902966, 'learning_rate': 0.004327938962276087, 'batch_size': 20, 'epochs': 47}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:41:07,707] Trial 162 finished with value: 0.7046978949887199 and parameters: {'n_units': 32, 'dropout_rate': 0.12208728825768189, 'learning_rate': 0.004842088439660907, 'batch_size': 53, 'epochs': 49}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:41:11,112] Trial 163 finished with value: 0.715669929829433 and parameters: {'n_units': 47, 'dropout_rate': 0.46208180572449237, 'learning_rate': 0.005385750612703921, 'batch_size': 58, 'epochs': 47}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:41:14,314] Trial 164 finished with value: 0.9191988911291689 and parameters: {'n_units': 128, 'dropout_rate': 0.2561716532114706, 'learning_rate': 0.003481272575253951, 'batch_size': 53, 'epochs': 39}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:41:17,762] Trial 165 finished with value: 0.7399562607685698 and parameters: {'n_units': 41, 'dropout_rate':

0.4498179197839737, 'learning_rate': 0.0038672786135450815, 'batch_size': 50, 'epochs': 46}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:41:21,481] Trial 166 finished with value: 1.009852240577549 and parameters: {'n_units': 241, 'dropout_rate': 0.46614117991948417, 'learning_rate': 0.002898099816265247, 'batch_size': 54, 'epochs': 45}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:41:24,612] Trial 167 finished with value: 0.7079634426031169 and parameters: {'n_units': 52, 'dropout_rate': 0.4829171363254036, 'learning_rate': 0.004215512037132407, 'batch_size': 47, 'epochs': 38}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:41:27,512] Trial 168 finished with value: 0.6903603321951436 and parameters: {'n_units': 63, 'dropout_rate': 0.42870784684814833, 'learning_rate': 0.003258863953356549, 'batch_size': 31, 'epochs': 27}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:41:30,781] Trial 169 finished with value: 0.6910742941486915 and parameters: {'n_units': 37, 'dropout_rate': 0.4427684225021136, 'learning_rate': 0.006053045784389834, 'batch_size': 57, 'epochs': 43}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:41:34,189] Trial 170 finished with value: 0.8255295857549915 and parameters: {'n_units': 45, 'dropout_rate': 0.45852164849998855, 'learning_rate': 0.0021879207060837183, 'batch_size': 52, 'epochs': 48}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:41:37,232] Trial 171 finished with value: 0.6846283033308469 and parameters: {'n_units': 43, 'dropout_rate': 0.4197550885780681, 'learning_rate': 0.0038761655728075575, 'batch_size': 51, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:41:40,368] Trial 172 finished with value: 0.6802732663328664 and parameters: {'n_units': 36, 'dropout_rate': 0.4214690082245643, 'learning_rate': 0.0036093621993633263, 'batch_size': 41, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:41:43,537] Trial 173 finished with value: 0.6995542404828284 and parameters: {'n_units': 36, 'dropout_rate': 0.4245329093910302, 'learning_rate': 0.004554113064501184, 'batch_size': 39, 'epochs': 37}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 181ms/step

[I 2024-12-30 10:41:46,683] Trial 174 finished with value: 0.7423449675238686 and parameters: {'n_units': 39, 'dropout_rate': 0.4528271074208236, 'learning_rate': 0.0036576278110813103, 'batch_size': 41, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:41:50,003] Trial 175 finished with value: 0.9570127050010061 and parameters: {'n_units': 32, 'dropout_rate': 0.4353419388478613, 'learning_rate': 0.0050203588312394635, 'batch_size': 42, 'epochs': 41}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:41:53,135] Trial 176 finished with value: 0.9278919846683046 and parameters: {'n_units': 36, 'dropout_rate': 0.4763906496348412, 'learning_rate': 0.0025663400888417615, 'batch_size': 45, 'epochs': 38}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:41:56,370] Trial 177 finished with value: 0.703334042474863 and parameters: {'n_units': 49, 'dropout_rate': 0.4866897917256813, 'learning_rate': 0.003395511750796359, 'batch_size': 36, 'epochs': 40}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:41:59,876] Trial 178 finished with value: 0.8271220825386296 and parameters: {'n_units': 56, 'dropout_rate':

0.3270218542173457, 'learning_rate': 0.004071914965406293,
'batch_size': 49, 'epochs': 50}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:42:03,265] Trial 179 finished with value:
0.8853895468059072 and parameters: {'n_units': 42, 'dropout_rate':
0.4454931831285778, 'learning_rate': 0.00733173177831582,
'batch_size': 44, 'epochs': 46}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:42:06,686] Trial 180 finished with value:
0.8118546009304998 and parameters: {'n_units': 36, 'dropout_rate':
0.466643447311197, 'learning_rate': 0.002784815057241777,
'batch_size': 61, 'epochs': 49}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:42:09,823] Trial 181 finished with value:
0.7054765003013308 and parameters: {'n_units': 42, 'dropout_rate':
0.4165924855972749, 'learning_rate': 0.0035813155695366347,
'batch_size': 51, 'epochs': 36}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:42:12,846] Trial 182 finished with value:
0.7785628744635027 and parameters: {'n_units': 32, 'dropout_rate':
0.4385405214165751, 'learning_rate': 0.004007522563793751,
'batch_size': 50, 'epochs': 35}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:42:15,881] Trial 183 finished with value:
0.8057062127055297 and parameters: {'n_units': 47, 'dropout_rate':
0.42016419726090687, 'learning_rate': 0.0031203601182738603,
'batch_size': 52, 'epochs': 37}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:42:19,023] Trial 184 finished with value:
0.6952271457002154 and parameters: {'n_units': 41, 'dropout_rate':
0.3994462827557727, 'learning_rate': 0.004506641757478315,
'batch_size': 48, 'epochs': 34}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:42:22,179] Trial 185 finished with value: 0.7061465102499537 and parameters: {'n_units': 45, 'dropout_rate': 0.4261242458699558, 'learning_rate': 0.0037477150729063793, 'batch_size': 55, 'epochs': 39}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:42:25,212] Trial 186 finished with value: 0.687412714720803 and parameters: {'n_units': 52, 'dropout_rate': 0.4320212880630908, 'learning_rate': 0.005313042538932737, 'batch_size': 54, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:42:28,315] Trial 187 finished with value: 0.7738276945395927 and parameters: {'n_units': 38, 'dropout_rate': 0.4142834338026764, 'learning_rate': 0.0032692383311221872, 'batch_size': 46, 'epochs': 38}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:42:31,745] Trial 188 finished with value: 0.7882518439047963 and parameters: {'n_units': 32, 'dropout_rate': 0.49365132877462525, 'learning_rate': 0.004325103942093464, 'batch_size': 41, 'epochs': 48}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 150ms/step

[I 2024-12-30 10:42:34,999] Trial 189 finished with value: 0.7352982808553443 and parameters: {'n_units': 40, 'dropout_rate': 0.2233222392679154, 'learning_rate': 0.004878619135315201, 'batch_size': 51, 'epochs': 44}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 184ms/step

[I 2024-12-30 10:42:38,066] Trial 190 finished with value: 0.667378687494114 and parameters: {'n_units': 45, 'dropout_rate': 0.45573393582836014, 'learning_rate': 0.003779451169722281, 'batch_size': 53, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:42:41,065] Trial 191 finished with value: 0.7202061732236601 and parameters: {'n_units': 46, 'dropout_rate':

0.4549439014678791, 'learning_rate': 0.003699975179747862, 'batch_size': 52, 'epochs': 35}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:42:44,099] Trial 192 finished with value: 0.7048155290401052 and parameters: {'n_units': 37, 'dropout_rate': 0.4713963490561723, 'learning_rate': 0.003939781887375253, 'batch_size': 54, 'epochs': 37}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:42:47,135] Trial 193 finished with value: 0.7354933613807885 and parameters: {'n_units': 50, 'dropout_rate': 0.4619077295710962, 'learning_rate': 0.0034299639639577702, 'batch_size': 53, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 169ms/step

[I 2024-12-30 10:42:50,153] Trial 194 finished with value: 0.7998320331644808 and parameters: {'n_units': 57, 'dropout_rate': 0.45204810238894505, 'learning_rate': 0.0030279631465485934, 'batch_size': 50, 'epochs': 34}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:42:52,590] Trial 195 finished with value: 1.5025219940396515 and parameters: {'n_units': 42, 'dropout_rate': 0.47922193473778024, 'learning_rate': 0.004312588841998229, 'batch_size': 42, 'epochs': 13}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:42:55,689] Trial 196 finished with value: 0.8785526859066207 and parameters: {'n_units': 35, 'dropout_rate': 0.44306748713876953, 'learning_rate': 0.004623884460755529, 'batch_size': 53, 'epochs': 39}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 184ms/step

[I 2024-12-30 10:43:07,716] Trial 197 finished with value: 0.7259831829598709 and parameters: {'n_units': 45, 'dropout_rate': 0.3881987428080256, 'learning_rate': 0.003700757110782282, 'batch_size': 51, 'epochs': 40}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 178ms/step

[I 2024-12-30 10:43:11,245] Trial 198 finished with value: 0.7880047663853602 and parameters: {'n_units': 39, 'dropout_rate': 0.3063761730834027, 'learning_rate': 0.0027986408316930528, 'batch_size': 49, 'epochs': 37}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:43:14,613] Trial 199 finished with value: 0.7136716483680723 and parameters: {'n_units': 53, 'dropout_rate': 0.4229030224155674, 'learning_rate': 0.0067614905109020275, 'batch_size': 55, 'epochs': 35}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 169ms/step

[I 2024-12-30 10:43:18,623] Trial 200 finished with value: 0.7306334328337801 and parameters: {'n_units': 43, 'dropout_rate': 0.4648367407699575, 'learning_rate': 0.0039894386078425425, 'batch_size': 40, 'epochs': 50}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 225ms/step

[I 2024-12-30 10:43:22,107] Trial 201 finished with value: 0.7479187396290625 and parameters: {'n_units': 32, 'dropout_rate': 0.4114190682049791, 'learning_rate': 0.003342170407685315, 'batch_size': 52, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:43:25,640] Trial 202 finished with value: 0.8500520530576468 and parameters: {'n_units': 36, 'dropout_rate': 0.405745203202569, 'learning_rate': 0.00359798578804604, 'batch_size': 51, 'epochs': 35}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:43:29,112] Trial 203 finished with value: 0.6578640369014312 and parameters: {'n_units': 48, 'dropout_rate': 0.4332148087409551, 'learning_rate': 0.004125562096263052, 'batch_size': 43, 'epochs': 38}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:43:32,483] Trial 204 finished with value: 0.7184609883321301 and parameters: {'n_units': 48, 'dropout_rate': 0.4307998965453858, 'learning_rate': 0.0041899323495579455,

'batch_size': 42, 'epochs': 38}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:43:36,123] Trial 205 finished with value:
0.7678903419974502 and parameters: {'n_units': 191, 'dropout_rate':
0.435546055207243, 'learning_rate': 0.004993813342093222,
'batch_size': 43, 'epochs': 38}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:43:39,876] Trial 206 finished with value:
0.9094463061031359 and parameters: {'n_units': 63, 'dropout_rate':
0.44692565140489526, 'learning_rate': 0.005742935746587637,
'batch_size': 41, 'epochs': 49}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:43:43,142] Trial 207 finished with value:
0.7888306943375011 and parameters: {'n_units': 41, 'dropout_rate':
0.4569933006703946, 'learning_rate': 0.004641757660428903,
'batch_size': 43, 'epochs': 37}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 167ms/step

[I 2024-12-30 10:43:46,484] Trial 208 finished with value:
0.9226451381420091 and parameters: {'n_units': 147, 'dropout_rate':
0.47350988286979995, 'learning_rate': 0.003931543252782746,
'batch_size': 46, 'epochs': 39}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:43:49,971] Trial 209 finished with value:
0.8770782692009106 and parameters: {'n_units': 54, 'dropout_rate':
0.44210411237295943, 'learning_rate': 0.008520041372650096,
'batch_size': 45, 'epochs': 47}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:43:53,383] Trial 210 finished with value:
0.7215404853606894 and parameters: {'n_units': 37, 'dropout_rate':
0.4232394444739994, 'learning_rate': 0.0030756179979467384,
'batch_size': 44, 'epochs': 44}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:43:56,667] Trial 211 finished with value: 0.680638864287771 and parameters: {'n_units': 45, 'dropout_rate': 0.4049936292421173, 'learning_rate': 0.0035230142174434145, 'batch_size': 53, 'epochs': 37}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:43:59,868] Trial 212 finished with value: 0.6889518440012306 and parameters: {'n_units': 49, 'dropout_rate': 0.42068422901879454, 'learning_rate': 0.00422757484137647, 'batch_size': 53, 'epochs': 37}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:44:03,030] Trial 213 finished with value: 0.6978539165276911 and parameters: {'n_units': 45, 'dropout_rate': 0.34321623347500385, 'learning_rate': 0.003268534691879193, 'batch_size': 56, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:44:06,227] Trial 214 finished with value: 0.7235027584298742 and parameters: {'n_units': 40, 'dropout_rate': 0.40275525813611907, 'learning_rate': 0.0035703796555290415, 'batch_size': 54, 'epochs': 38}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:44:09,616] Trial 215 finished with value: 0.6933696659449349 and parameters: {'n_units': 35, 'dropout_rate': 0.4832291164122129, 'learning_rate': 0.004001073437650389, 'batch_size': 28, 'epochs': 37}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:44:12,178] Trial 216 finished with value: 1.2823898117436479 and parameters: {'n_units': 32, 'dropout_rate': 0.432329736421467, 'learning_rate': 0.002993835645358506, 'batch_size': 52, 'epochs': 18}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:44:15,501] Trial 217 finished with value: 0.7008322772770348 and parameters: {'n_units': 44, 'dropout_rate': 0.4163633880864744, 'learning_rate': 0.004566508050743403,

'batch_size': 53, 'epochs': 45}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:44:18,797] Trial 218 finished with value:
0.6982224637391504 and parameters: {'n_units': 50, 'dropout_rate':
0.46516269236431074, 'learning_rate': 0.0034924172501868554,
'batch_size': 47, 'epochs': 42}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:44:22,046] Trial 219 finished with value:
0.7293599257639639 and parameters: {'n_units': 39, 'dropout_rate':
0.4520612654361217, 'learning_rate': 0.0025200874520467974,
'batch_size': 39, 'epochs': 40}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 173ms/step

[I 2024-12-30 10:44:25,573] Trial 220 finished with value:
0.8672405620210317 and parameters: {'n_units': 60, 'dropout_rate':
0.37793064387633635, 'learning_rate': 0.005321570067635343,
'batch_size': 49, 'epochs': 49}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:44:28,720] Trial 221 finished with value:
0.6805601814111532 and parameters: {'n_units': 43, 'dropout_rate':
0.40864541344764316, 'learning_rate': 0.0038812030459253384,
'batch_size': 50, 'epochs': 36}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:44:31,843] Trial 222 finished with value:
1.8734106556810959 and parameters: {'n_units': 95, 'dropout_rate':
0.4030578777887395, 'learning_rate': 0.0004359655961780277,
'batch_size': 51, 'epochs': 35}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:44:34,905] Trial 223 finished with value:
0.7241011154210893 and parameters: {'n_units': 36, 'dropout_rate':
0.3932116544050722, 'learning_rate': 0.003876459838157717,
'batch_size': 48, 'epochs': 36}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 178ms/step

[I 2024-12-30 10:44:38,128] Trial 224 finished with value: 0.6894076413720269 and parameters: {'n_units': 43, 'dropout_rate': 0.41344429524234566, 'learning_rate': 0.004339095749678755, 'batch_size': 50, 'epochs': 37}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:44:41,233] Trial 225 finished with value: 0.7362552582280327 and parameters: {'n_units': 40, 'dropout_rate': 0.43960054342187826, 'learning_rate': 0.0033471869070538242, 'batch_size': 54, 'epochs': 38}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:44:44,264] Trial 226 finished with value: 0.6974440367360649 and parameters: {'n_units': 46, 'dropout_rate': 0.43061780781976916, 'learning_rate': 0.003789123028458244, 'batch_size': 52, 'epochs': 36}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:44:47,905] Trial 227 finished with value: 0.737402066515671 and parameters: {'n_units': 32, 'dropout_rate': 0.364979801314684, 'learning_rate': 0.0041372754066468604, 'batch_size': 20, 'epochs': 46}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:44:50,931] Trial 228 finished with value: 0.6932075495716148 and parameters: {'n_units': 54, 'dropout_rate': 0.47512301875200447, 'learning_rate': 0.004836014923447247, 'batch_size': 34, 'epochs': 34}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 182ms/step

[I 2024-12-30 10:44:54,529] Trial 229 finished with value: 0.7177387587597399 and parameters: {'n_units': 37, 'dropout_rate': 0.42594686917641167, 'learning_rate': 0.002755331517265528, 'batch_size': 42, 'epochs': 48}. Best is trial 158 with value: 0.6367928715008743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:44:57,862] Trial 230 finished with value: 0.6758565203226945 and parameters: {'n_units': 49, 'dropout_rate': 0.4072298885524571, 'learning_rate': 0.0036017094464531408,

'batch_size': 40, 'epochs': 41}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:45:01,087] Trial 231 finished with value:
0.7177031612135162 and parameters: {'n_units': 47, 'dropout_rate':
0.411700447107623, 'learning_rate': 0.003597820125916258,
'batch_size': 38, 'epochs': 40}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:45:04,382] Trial 232 finished with value:
0.8292470570866352 and parameters: {'n_units': 51, 'dropout_rate':
0.39587232382727583, 'learning_rate': 0.003254245477951982,
'batch_size': 41, 'epochs': 42}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:45:07,639] Trial 233 finished with value:
0.7112561040577269 and parameters: {'n_units': 42, 'dropout_rate':
0.4057520989676453, 'learning_rate': 0.0038728760501938607,
'batch_size': 40, 'epochs': 41}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:45:10,827] Trial 234 finished with value:
0.8300641104305047 and parameters: {'n_units': 107, 'dropout_rate':
0.4685013782351086, 'learning_rate': 0.0035265690341580707,
'batch_size': 50, 'epochs': 39}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:45:14,246] Trial 235 finished with value:
0.8034971939876199 and parameters: {'n_units': 58, 'dropout_rate':
0.42055927163241985, 'learning_rate': 0.004433504158911041,
'batch_size': 53, 'epochs': 50}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:45:17,300] Trial 236 finished with value:
1.505387648061854 and parameters: {'n_units': 36, 'dropout_rate':
0.48626906389643887, 'learning_rate': 0.0029575190223619986,
'batch_size': 43, 'epochs': 36}. Best is trial 158 with value:
0.6367928715008743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:45:20,463] Trial 237 finished with value: 0.614237177198272 and parameters: {'n_units': 41, 'dropout_rate': 0.45741677209381215, 'learning_rate': 0.007775766992509574, 'batch_size': 64, 'epochs': 41}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:45:23,690] Trial 238 finished with value: 0.7036228907217198 and parameters: {'n_units': 32, 'dropout_rate': 0.459331701865676, 'learning_rate': 0.007838997779793395, 'batch_size': 40, 'epochs': 41}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:45:26,860] Trial 239 finished with value: 0.6417930546129573 and parameters: {'n_units': 40, 'dropout_rate': 0.4500173202159924, 'learning_rate': 0.009508918879375224, 'batch_size': 63, 'epochs': 41}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:45:30,241] Trial 240 finished with value: 0.668901777400579 and parameters: {'n_units': 39, 'dropout_rate': 0.4419783496051646, 'learning_rate': 0.006735156342336089, 'batch_size': 61, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:45:33,416] Trial 241 finished with value: 0.8105257434933332 and parameters: {'n_units': 39, 'dropout_rate': 0.44213982325997, 'learning_rate': 0.009207672806296549, 'batch_size': 64, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:45:36,639] Trial 242 finished with value: 0.7497446539045701 and parameters: {'n_units': 36, 'dropout_rate': 0.4472846968038741, 'learning_rate': 0.00785025142843992, 'batch_size': 62, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:45:39,933] Trial 243 finished with value: 0.6764909057096522 and parameters: {'n_units': 48, 'dropout_rate': 0.451085458898442, 'learning_rate': 0.007710832380441603, 'batch_size': 61, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:45:43,145] Trial 244 finished with value: 0.6756794555996026 and parameters: {'n_units': 47, 'dropout_rate': 0.4568929464206185, 'learning_rate': 0.008984024243497443, 'batch_size': 63, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:45:46,372] Trial 245 finished with value: 0.6658149927667889 and parameters: {'n_units': 49, 'dropout_rate': 0.29424406501337513, 'learning_rate': 0.009613701066205006, 'batch_size': 64, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:45:49,629] Trial 246 finished with value: 0.6719455019625424 and parameters: {'n_units': 49, 'dropout_rate': 0.4551068204437926, 'learning_rate': 0.009781784374209582, 'batch_size': 63, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:45:52,899] Trial 247 finished with value: 0.7146618319649053 and parameters: {'n_units': 50, 'dropout_rate': 0.2785510658619382, 'learning_rate': 0.009534139030298532, 'batch_size': 63, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:45:56,123] Trial 248 finished with value: 0.6992575456363616 and parameters: {'n_units': 48, 'dropout_rate': 0.4539204568428718, 'learning_rate': 0.009372234083079302, 'batch_size': 64, 'epochs': 43}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:45:59,410] Trial 249 finished with value: 0.6887044129619689 and parameters: {'n_units': 45, 'dropout_rate': 0.3002084999305092, 'learning_rate': 0.009883853727496682, 'batch_size': 62, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:46:02,752] Trial 250 finished with value: 0.6744157579484897 and parameters: {'n_units': 47, 'dropout_rate':

0.4581641805504636, 'learning_rate': 0.008603953493197454,
'batch_size': 62, 'epochs': 43}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:46:06,002] Trial 251 finished with value:
0.7426331834150426 and parameters: {'n_units': 52, 'dropout_rate':
0.2885172709189044, 'learning_rate': 0.008438512046010047,
'batch_size': 62, 'epochs': 43}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:46:09,335] Trial 252 finished with value:
0.6854309332791652 and parameters: {'n_units': 48, 'dropout_rate':
0.2863027270049008, 'learning_rate': 0.008528394621244184,
'batch_size': 63, 'epochs': 43}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:46:12,563] Trial 253 finished with value:
0.6569781069995844 and parameters: {'n_units': 45, 'dropout_rate':
0.4520229285795982, 'learning_rate': 0.007513552333207798,
'batch_size': 61, 'epochs': 42}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:46:15,821] Trial 254 finished with value:
0.7292747830056109 and parameters: {'n_units': 45, 'dropout_rate':
0.45552969163935014, 'learning_rate': 0.007407599367296893,
'batch_size': 61, 'epochs': 44}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:46:19,044] Trial 255 finished with value:
0.6680983092571824 and parameters: {'n_units': 42, 'dropout_rate':
0.44798795692316923, 'learning_rate': 0.008824685639990214,
'batch_size': 60, 'epochs': 42}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:46:22,226] Trial 256 finished with value:
0.6836805141152031 and parameters: {'n_units': 51, 'dropout_rate':
0.44954277911782015, 'learning_rate': 0.008936029795478246,
'batch_size': 61, 'epochs': 42}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:46:25,416] Trial 257 finished with value: 0.6642998248300882 and parameters: {'n_units': 43, 'dropout_rate': 0.45934655107726907, 'learning_rate': 0.009872829795791689, 'batch_size': 60, 'epochs': 41}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:46:28,653] Trial 258 finished with value: 0.6687434298267839 and parameters: {'n_units': 41, 'dropout_rate': 0.45991419631843267, 'learning_rate': 0.009862051997298286, 'batch_size': 60, 'epochs': 41}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:46:31,840] Trial 259 finished with value: 0.6989278978320008 and parameters: {'n_units': 41, 'dropout_rate': 0.45860161243245934, 'learning_rate': 0.009956145988613186, 'batch_size': 60, 'epochs': 41}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:46:35,078] Trial 260 finished with value: 0.6646336327179344 and parameters: {'n_units': 48, 'dropout_rate': 0.4609069014407495, 'learning_rate': 0.007969805839927525, 'batch_size': 59, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:46:38,291] Trial 261 finished with value: 0.8245834075376404 and parameters: {'n_units': 54, 'dropout_rate': 0.31323262488155446, 'learning_rate': 0.008026180679344063, 'batch_size': 59, 'epochs': 41}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:46:41,480] Trial 262 finished with value: 0.6785351663636917 and parameters: {'n_units': 48, 'dropout_rate': 0.4603339611489688, 'learning_rate': 0.008955809477220711, 'batch_size': 60, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:46:44,676] Trial 263 finished with value: 0.6894058340088765 and parameters: {'n_units': 49, 'dropout_rate':

0.4609667494868938, 'learning_rate': 0.008834834389481605,
'batch_size': 60, 'epochs': 42}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:46:47,934] Trial 264 finished with value:
0.8092175924850068 and parameters: {'n_units': 48, 'dropout_rate':
0.45298814698231943, 'learning_rate': 0.0073132289886694525,
'batch_size': 64, 'epochs': 42}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:46:51,162] Trial 265 finished with value:
0.6794910604413549 and parameters: {'n_units': 54, 'dropout_rate':
0.4652333105230741, 'learning_rate': 0.008872820233896114,
'batch_size': 62, 'epochs': 43}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:46:54,342] Trial 266 finished with value:
0.7195051524798636 and parameters: {'n_units': 47, 'dropout_rate':
0.4482453892813641, 'learning_rate': 0.00813980963396434,
'batch_size': 60, 'epochs': 41}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:46:57,604] Trial 267 finished with value:
0.9013011394477637 and parameters: {'n_units': 54, 'dropout_rate':
0.4587833690126688, 'learning_rate': 0.009880624573020594,
'batch_size': 63, 'epochs': 44}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:47:00,852] Trial 268 finished with value:
0.6952192165507631 and parameters: {'n_units': 44, 'dropout_rate':
0.4697750655345703, 'learning_rate': 0.006952924897873265,
'batch_size': 59, 'epochs': 43}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:47:04,351] Trial 269 finished with value:
1.1361302501216786 and parameters: {'n_units': 160, 'dropout_rate':
0.4503810681356762, 'learning_rate': 0.007874470079063415,
'batch_size': 61, 'epochs': 41}. Best is trial 237 with value:
0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:47:07,566] Trial 270 finished with value: 0.6460154091350816 and parameters: {'n_units': 50, 'dropout_rate': 0.45757085487601, 'learning_rate': 0.008933054314396836, 'batch_size': 62, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:47:10,804] Trial 271 finished with value: 0.6719095007159779 and parameters: {'n_units': 42, 'dropout_rate': 0.446238238113421, 'learning_rate': 0.008351209586977782, 'batch_size': 62, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:47:13,999] Trial 272 finished with value: 0.6574924852873725 and parameters: {'n_units': 52, 'dropout_rate': 0.44538935062432883, 'learning_rate': 0.00843492665811351, 'batch_size': 62, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:47:17,206] Trial 273 finished with value: 0.667352463184932 and parameters: {'n_units': 56, 'dropout_rate': 0.44345304948310066, 'learning_rate': 0.008729994828366127, 'batch_size': 63, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:47:20,429] Trial 274 finished with value: 0.6627964565479469 and parameters: {'n_units': 56, 'dropout_rate': 0.443890150929241, 'learning_rate': 0.008694484697159431, 'batch_size': 62, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:47:23,642] Trial 275 finished with value: 0.6634949690614792 and parameters: {'n_units': 58, 'dropout_rate': 0.44411087591590115, 'learning_rate': 0.008590881066149731, 'batch_size': 63, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:47:26,876] Trial 276 finished with value: 0.6804928397805238 and parameters: {'n_units': 60, 'dropout_rate': 0.4429712188771953, 'learning_rate': 0.008422531935562933,

'batch_size': 62, 'epochs': 42}. Best is trial 237 with value: 0.614237177198272.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:47:30,102] Trial 277 finished with value: 0.603805493431743 and parameters: {'n_units': 59, 'dropout_rate': 0.4439407616392725, 'learning_rate': 0.009900593323094878, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:47:33,357] Trial 278 finished with value: 0.6504133509012464 and parameters: {'n_units': 69, 'dropout_rate': 0.4448475554875307, 'learning_rate': 0.009923783646647122, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 170ms/step

[I 2024-12-30 10:47:36,734] Trial 279 finished with value: 0.7469004433100332 and parameters: {'n_units': 68, 'dropout_rate': 0.43963062061814906, 'learning_rate': 0.009951750141063004, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:47:39,949] Trial 280 finished with value: 0.6484209350961581 and parameters: {'n_units': 59, 'dropout_rate': 0.4468652968127393, 'learning_rate': 0.009261075613256842, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:47:43,099] Trial 281 finished with value: 0.8681919590025285 and parameters: {'n_units': 65, 'dropout_rate': 0.4452885748116086, 'learning_rate': 0.006910788581871158, 'batch_size': 64, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:47:46,303] Trial 282 finished with value: 1.1801505250190514 and parameters: {'n_units': 73, 'dropout_rate': 0.43981536589211856, 'learning_rate': 0.007982269307095762, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:47:49,537] Trial 283 finished with value: 0.7079300745973689 and parameters: {'n_units': 67, 'dropout_rate': 0.44319587735908983, 'learning_rate': 0.009237878588739708, 'batch_size': 62, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:47:52,776] Trial 284 finished with value: 0.8149791315387032 and parameters: {'n_units': 62, 'dropout_rate': 0.26517768657632723, 'learning_rate': 0.007315929333157904, 'batch_size': 63, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:47:55,945] Trial 285 finished with value: 0.7053867722212516 and parameters: {'n_units': 58, 'dropout_rate': 0.4471809410905886, 'learning_rate': 0.00837851714691634, 'batch_size': 61, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:47:59,185] Trial 286 finished with value: 0.6910725003215838 and parameters: {'n_units': 59, 'dropout_rate': 0.43584007327336904, 'learning_rate': 0.009174108993047037, 'batch_size': 63, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:48:02,430] Trial 287 finished with value: 0.6536935299093112 and parameters: {'n_units': 56, 'dropout_rate': 0.2922854971128326, 'learning_rate': 0.007573717779170294, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:48:05,658] Trial 288 finished with value: 0.7207434758722772 and parameters: {'n_units': 56, 'dropout_rate': 0.2869285846301747, 'learning_rate': 0.00754039586514987, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:48:09,045] Trial 289 finished with value: 0.6756915529824411 and parameters: {'n_units': 64, 'dropout_rate': 0.2997065515938407, 'learning_rate': 0.0066404926205216085,

'batch_size': 64, 'epochs': 40}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:48:12,236] Trial 290 finished with value:
0.7505672487387874 and parameters: {'n_units': 54, 'dropout_rate':
0.2934544098414864, 'learning_rate': 0.009150941309584118,
'batch_size': 63, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:48:15,496] Trial 291 finished with value:
0.7039587103975502 and parameters: {'n_units': 61, 'dropout_rate':
0.4361215193711199, 'learning_rate': 0.007679263982300408,
'batch_size': 59, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:48:18,732] Trial 292 finished with value:
0.7599785163516802 and parameters: {'n_units': 56, 'dropout_rate':
0.4502694755087217, 'learning_rate': 0.009836143323503264,
'batch_size': 60, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:48:21,869] Trial 293 finished with value:
0.8575413794625851 and parameters: {'n_units': 57, 'dropout_rate':
0.4477327924678024, 'learning_rate': 0.00867560741564123,
'batch_size': 58, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:48:25,146] Trial 294 finished with value:
0.6955791710377542 and parameters: {'n_units': 53, 'dropout_rate':
0.4360654744813641, 'learning_rate': 0.006631957154185641,
'batch_size': 62, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:48:28,423] Trial 295 finished with value:
1.035791523638368 and parameters: {'n_units': 71, 'dropout_rate':
0.44305206111888457, 'learning_rate': 0.009911725954815846,
'batch_size': 64, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:48:31,590] Trial 296 finished with value: 0.7152119959731117 and parameters: {'n_units': 77, 'dropout_rate': 0.4531462124008319, 'learning_rate': 0.008082873306369729, 'batch_size': 61, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:48:34,840] Trial 297 finished with value: 0.6386715852403453 and parameters: {'n_units': 60, 'dropout_rate': 0.450935165163723, 'learning_rate': 0.007293620836539884, 'batch_size': 63, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 179ms/step

[I 2024-12-30 10:48:38,067] Trial 298 finished with value: 0.6943037320540485 and parameters: {'n_units': 63, 'dropout_rate': 0.2708195054684112, 'learning_rate': 0.008932787139088932, 'batch_size': 63, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:48:41,366] Trial 299 finished with value: 0.7531044938124594 and parameters: {'n_units': 62, 'dropout_rate': 0.30809638657633764, 'learning_rate': 0.007313911199527323, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:48:44,598] Trial 300 finished with value: 0.7155334232860838 and parameters: {'n_units': 58, 'dropout_rate': 0.4638436050133631, 'learning_rate': 0.008168817443670966, 'batch_size': 63, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 10s 10s/step

[I 2024-12-30 10:48:57,733] Trial 301 finished with value: 0.7284195555412266 and parameters: {'n_units': 67, 'dropout_rate': 0.4537419423381805, 'learning_rate': 0.00917441450425822, 'batch_size': 62, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 178ms/step

[I 2024-12-30 10:49:01,689] Trial 302 finished with value: 0.7497927200825959 and parameters: {'n_units': 53, 'dropout_rate': 0.4622024081950435, 'learning_rate': 0.009949110830397505,

'batch_size': 64, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 178ms/step

[I 2024-12-30 10:49:05,423] Trial 303 finished with value:
0.7236192587382588 and parameters: {'n_units': 57, 'dropout_rate':
0.2948473705227573, 'learning_rate': 0.007453165954324543,
'batch_size': 62, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 175ms/step

[I 2024-12-30 10:49:09,473] Trial 304 finished with value:
0.9646224991814012 and parameters: {'n_units': 211, 'dropout_rate':
0.4507780417876819, 'learning_rate': 0.008669398262841715,
'batch_size': 63, 'epochs': 43}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:49:13,177] Trial 305 finished with value:
0.7226251564697191 and parameters: {'n_units': 61, 'dropout_rate':
0.4669284172610326, 'learning_rate': 0.008186629433108364,
'batch_size': 60, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 189ms/step

[I 2024-12-30 10:49:16,802] Trial 306 finished with value:
0.7185494180730264 and parameters: {'n_units': 54, 'dropout_rate':
0.4306853127827029, 'learning_rate': 0.006158249232711211,
'batch_size': 64, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 169ms/step

[I 2024-12-30 10:49:20,346] Trial 307 finished with value:
0.6598696906432305 and parameters: {'n_units': 52, 'dropout_rate':
0.44385930322466804, 'learning_rate': 0.008907768464318507,
'batch_size': 59, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 167ms/step

[I 2024-12-30 10:49:23,882] Trial 308 finished with value:
0.6651878046919601 and parameters: {'n_units': 52, 'dropout_rate':
0.43418379161395537, 'learning_rate': 0.007209606178170899,
'batch_size': 62, 'epochs': 40}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:49:27,335] Trial 309 finished with value: 0.7070798217631308 and parameters: {'n_units': 53, 'dropout_rate': 0.3200389741910395, 'learning_rate': 0.007262834011732692, 'batch_size': 63, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 170ms/step

[I 2024-12-30 10:49:30,724] Trial 310 finished with value: 0.7220169720964288 and parameters: {'n_units': 58, 'dropout_rate': 0.44139659196821196, 'learning_rate': 0.006545545990374369, 'batch_size': 62, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:49:34,205] Trial 311 finished with value: 1.0764572887958714 and parameters: {'n_units': 69, 'dropout_rate': 0.43345317070194533, 'learning_rate': 0.0077927776414332284, 'batch_size': 58, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:49:37,636] Trial 312 finished with value: 0.7236983739703985 and parameters: {'n_units': 63, 'dropout_rate': 0.4330567049732927, 'learning_rate': 0.007073745571660095, 'batch_size': 63, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:49:41,004] Trial 313 finished with value: 0.6797718751667639 and parameters: {'n_units': 51, 'dropout_rate': 0.440226397064695, 'learning_rate': 0.008024915182622569, 'batch_size': 62, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:49:44,612] Trial 314 finished with value: 0.6641433233774373 and parameters: {'n_units': 57, 'dropout_rate': 0.44770309403291175, 'learning_rate': 0.008990485359070696, 'batch_size': 64, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 183ms/step

[I 2024-12-30 10:49:48,147] Trial 315 finished with value: 0.9706515106184759 and parameters: {'n_units': 58, 'dropout_rate': 0.4307133482371802, 'learning_rate': 0.00877208566796802,

'batch_size': 64, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:49:51,524] Trial 316 finished with value:
0.6611051385547484 and parameters: {'n_units': 54, 'dropout_rate':
0.44604583416318927, 'learning_rate': 0.009122450729728941,
'batch_size': 63, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:49:55,073] Trial 317 finished with value:
0.6871000896833575 and parameters: {'n_units': 52, 'dropout_rate':
0.44944143879720244, 'learning_rate': 0.007731663635712929,
'batch_size': 61, 'epochs': 45}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 170ms/step

[I 2024-12-30 10:49:58,676] Trial 318 finished with value:
0.6631805702369599 and parameters: {'n_units': 64, 'dropout_rate':
0.4392156958978086, 'learning_rate': 0.009234362492292248,
'batch_size': 64, 'epochs': 45}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 170ms/step

[I 2024-12-30 10:50:02,341] Trial 319 finished with value:
0.7448017767850867 and parameters: {'n_units': 66, 'dropout_rate':
0.4383008605595694, 'learning_rate': 0.0071037364684668385,
'batch_size': 62, 'epochs': 45}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:50:05,988] Trial 320 finished with value:
0.6553759575926708 and parameters: {'n_units': 63, 'dropout_rate':
0.42997626841892267, 'learning_rate': 0.008240162766632215,
'batch_size': 64, 'epochs': 46}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:50:09,602] Trial 321 finished with value:
0.6378781464033929 and parameters: {'n_units': 65, 'dropout_rate':
0.4503763284837669, 'learning_rate': 0.008218775709953668,
'batch_size': 64, 'epochs': 45}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:50:13,069] Trial 322 finished with value: 0.659527071688383 and parameters: {'n_units': 69, 'dropout_rate': 0.4547485829010049, 'learning_rate': 0.008357570900274915, 'batch_size': 64, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 171ms/step

[I 2024-12-30 10:50:16,691] Trial 323 finished with value: 0.8638090768899808 and parameters: {'n_units': 80, 'dropout_rate': 0.4488288293367853, 'learning_rate': 0.00916749840395816, 'batch_size': 64, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:50:20,183] Trial 324 finished with value: 0.848000065445481 and parameters: {'n_units': 71, 'dropout_rate': 0.4539256411426097, 'learning_rate': 0.008513522702564466, 'batch_size': 64, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:50:23,628] Trial 325 finished with value: 0.6864146940400606 and parameters: {'n_units': 69, 'dropout_rate': 0.44418686044649863, 'learning_rate': 0.009345859879620439, 'batch_size': 64, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:50:27,090] Trial 326 finished with value: 0.669901199123005 and parameters: {'n_units': 64, 'dropout_rate': 0.45228325328075203, 'learning_rate': 0.008207915231604586, 'batch_size': 63, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:50:30,896] Trial 327 finished with value: 0.7430689612052287 and parameters: {'n_units': 72, 'dropout_rate': 0.44069285657033835, 'learning_rate': 0.009071767396447212, 'batch_size': 63, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:50:34,283] Trial 328 finished with value: 0.7998343790241367 and parameters: {'n_units': 75, 'dropout_rate': 0.45865209295941356, 'learning_rate': 0.006367227354530009,

'batch_size': 64, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:50:37,688] Trial 329 finished with value: 0.6895554508243782 and parameters: {'n_units': 85, 'dropout_rate': 0.42843159850634854, 'learning_rate': 0.009951230596171479, 'batch_size': 63, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:50:41,000] Trial 330 finished with value: 0.6555584566264709 and parameters: {'n_units': 67, 'dropout_rate': 0.4473682211023583, 'learning_rate': 0.007775878998964538, 'batch_size': 64, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:50:44,309] Trial 331 finished with value: 0.6860118352937161 and parameters: {'n_units': 67, 'dropout_rate': 0.44449207844433686, 'learning_rate': 0.00832590572955306, 'batch_size': 64, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:50:47,760] Trial 332 finished with value: 0.7496387498984776 and parameters: {'n_units': 63, 'dropout_rate': 0.198875297401575, 'learning_rate': 0.007771043207023559, 'batch_size': 62, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:50:51,150] Trial 333 finished with value: 0.7057594302359693 and parameters: {'n_units': 118, 'dropout_rate': 0.35486567521872525, 'learning_rate': 0.009989031052566917, 'batch_size': 64, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:50:54,483] Trial 334 finished with value: 0.8919726902866099 and parameters: {'n_units': 66, 'dropout_rate': 0.4661848004699143, 'learning_rate': 0.00888874397851771, 'batch_size': 63, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 167ms/step

[I 2024-12-30 10:50:57,818] Trial 335 finished with value: 0.6957473227918626 and parameters: {'n_units': 73, 'dropout_rate': 0.4545289016938673, 'learning_rate': 0.007583867784392405, 'batch_size': 61, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:51:01,145] Trial 336 finished with value: 1.0748069910899072 and parameters: {'n_units': 62, 'dropout_rate': 0.447287104326899, 'learning_rate': 0.008390994009756328, 'batch_size': 63, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:51:04,502] Trial 337 finished with value: 1.1672383276649578 and parameters: {'n_units': 69, 'dropout_rate': 0.18108839235868313, 'learning_rate': 0.0009913343368286682, 'batch_size': 64, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:51:07,807] Trial 338 finished with value: 0.7338227031146151 and parameters: {'n_units': 76, 'dropout_rate': 0.4365429925183575, 'learning_rate': 0.00911120859777998, 'batch_size': 62, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:51:10,710] Trial 339 finished with value: 0.6329816252237325 and parameters: {'n_units': 60, 'dropout_rate': 0.4702082318466619, 'learning_rate': 0.00760698681968508, 'batch_size': 63, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:51:13,496] Trial 340 finished with value: 0.7437873945955397 and parameters: {'n_units': 60, 'dropout_rate': 0.44848486897983425, 'learning_rate': 0.0070562164416359385, 'batch_size': 63, 'epochs': 27}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:51:16,790] Trial 341 finished with value: 1.2331935002571806 and parameters: {'n_units': 62, 'dropout_rate': 0.47002594766036915, 'learning_rate': 0.001197282660286536,

'batch_size': 64, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:51:20,183] Trial 342 finished with value:
0.6675705578463826 and parameters: {'n_units': 67, 'dropout_rate':
0.42678368599912386, 'learning_rate': 0.007765161698517352,
'batch_size': 63, 'epochs': 45}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 149ms/step

[I 2024-12-30 10:51:23,041] Trial 343 finished with value:
0.7231649161150089 and parameters: {'n_units': 61, 'dropout_rate':
0.4382642360918105, 'learning_rate': 0.006776732676308888,
'batch_size': 62, 'epochs': 30}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:51:26,252] Trial 344 finished with value:
0.756729444638117 and parameters: {'n_units': 66, 'dropout_rate':
0.4687936436818931, 'learning_rate': 0.008212550662780567,
'batch_size': 64, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 148ms/step

[I 2024-12-30 10:51:29,512] Trial 345 finished with value:
0.8797166743506304 and parameters: {'n_units': 59, 'dropout_rate':
0.4554140701927291, 'learning_rate': 0.007456644346622744,
'batch_size': 61, 'epochs': 43}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:51:32,893] Trial 346 finished with value:
0.7143420423608163 and parameters: {'n_units': 57, 'dropout_rate':
0.4449642316429222, 'learning_rate': 0.006051881727414594,
'batch_size': 62, 'epochs': 47}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:51:35,875] Trial 347 finished with value:
0.6990649543806924 and parameters: {'n_units': 141, 'dropout_rate':
0.4615949551649377, 'learning_rate': 0.008812452495341691,
'batch_size': 63, 'epochs': 31}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:51:39,217] Trial 348 finished with value: 0.6730935135072964 and parameters: {'n_units': 72, 'dropout_rate': 0.4353646494026373, 'learning_rate': 0.008308718476014105, 'batch_size': 64, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:51:42,446] Trial 349 finished with value: 0.7001277343106466 and parameters: {'n_units': 80, 'dropout_rate': 0.4550169167225329, 'learning_rate': 0.007486891184608828, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:51:45,043] Trial 350 finished with value: 0.8075378693280124 and parameters: {'n_units': 63, 'dropout_rate': 0.44702710251036676, 'learning_rate': 0.008939231544909268, 'batch_size': 63, 'epochs': 22}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:51:47,770] Trial 351 finished with value: 0.6663161983086093 and parameters: {'n_units': 57, 'dropout_rate': 0.4314065065304831, 'learning_rate': 0.006858077878636399, 'batch_size': 62, 'epochs': 25}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:51:51,333] Trial 352 finished with value: 0.7431327925092627 and parameters: {'n_units': 69, 'dropout_rate': 0.47173679617468467, 'learning_rate': 0.00810227263939882, 'batch_size': 61, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:51:54,015] Trial 353 finished with value: 0.6717425110833756 and parameters: {'n_units': 61, 'dropout_rate': 0.44132090238657756, 'learning_rate': 0.009276327850237492, 'batch_size': 63, 'epochs': 23}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:51:57,198] Trial 354 finished with value: 0.6682413347058987 and parameters: {'n_units': 64, 'dropout_rate': 0.45262171155212355, 'learning_rate': 0.006221112913616619,

'batch_size': 64, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:52:00,008] Trial 355 finished with value:
0.7307598660615345 and parameters: {'n_units': 57, 'dropout_rate':
0.4636520198498549, 'learning_rate': 0.007685546548794349,
'batch_size': 62, 'epochs': 28}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:52:03,282] Trial 356 finished with value:
0.7590678930188572 and parameters: {'n_units': 67, 'dropout_rate':
0.15363650233945167, 'learning_rate': 0.008491969313635463,
'batch_size': 63, 'epochs': 43}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:52:06,489] Trial 357 finished with value:
0.8170472480897515 and parameters: {'n_units': 56, 'dropout_rate':
0.43991623780881395, 'learning_rate': 0.00913562273543516,
'batch_size': 64, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:52:10,085] Trial 358 finished with value:
1.0317728887071693 and parameters: {'n_units': 172, 'dropout_rate':
0.4503440661898039, 'learning_rate': 0.00999772155632521,
'batch_size': 62, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:52:12,526] Trial 359 finished with value:
0.819231864909635 and parameters: {'n_units': 54, 'dropout_rate':
0.426930450386487, 'learning_rate': 0.007297928831762932,
'batch_size': 63, 'epochs': 15}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:52:15,712] Trial 360 finished with value:
0.6997736401609844 and parameters: {'n_units': 61, 'dropout_rate':
0.21021900702328922, 'learning_rate': 0.008407613846209312,
'batch_size': 61, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:52:19,063] Trial 361 finished with value: 0.7471569746112445 and parameters: {'n_units': 76, 'dropout_rate': 0.45966884177652145, 'learning_rate': 0.006666968329587159, 'batch_size': 64, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:52:22,447] Trial 362 finished with value: 1.3124396997761498 and parameters: {'n_units': 71, 'dropout_rate': 0.4449256690626185, 'learning_rate': 0.0008240519141756848, 'batch_size': 63, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:52:25,690] Trial 363 finished with value: 0.7476273243053133 and parameters: {'n_units': 59, 'dropout_rate': 0.4357638060445887, 'learning_rate': 0.00785174381539564, 'batch_size': 62, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:52:28,890] Trial 364 finished with value: 1.0400072406901137 and parameters: {'n_units': 54, 'dropout_rate': 0.4556872972679374, 'learning_rate': 0.008964741625528277, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:52:32,117] Trial 365 finished with value: 0.6902953730559885 and parameters: {'n_units': 65, 'dropout_rate': 0.47258397791976925, 'learning_rate': 0.009233019870630653, 'batch_size': 61, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:52:35,470] Trial 366 finished with value: 0.7249452780015583 and parameters: {'n_units': 58, 'dropout_rate': 0.4625679580366223, 'learning_rate': 0.009993814389002072, 'batch_size': 64, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:52:38,805] Trial 367 finished with value: 0.6483835787102217 and parameters: {'n_units': 67, 'dropout_rate': 0.44799105651283583, 'learning_rate': 0.007024483337228652,

'batch_size': 63, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:52:42,065] Trial 368 finished with value:
0.9320140088001765 and parameters: {'n_units': 66, 'dropout_rate':
0.43611757997971384, 'learning_rate': 0.0016495403200103636,
'batch_size': 62, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:52:45,327] Trial 369 finished with value:
0.8465060958978652 and parameters: {'n_units': 74, 'dropout_rate':
0.4541094125340622, 'learning_rate': 0.006856618577328071,
'batch_size': 61, 'epochs': 43}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:52:48,616] Trial 370 finished with value:
0.6918017228868178 and parameters: {'n_units': 70, 'dropout_rate':
0.4427448531355113, 'learning_rate': 0.007515612964702132,
'batch_size': 63, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:52:51,805] Trial 371 finished with value:
0.6757941395184243 and parameters: {'n_units': 63, 'dropout_rate':
0.42720647236702664, 'learning_rate': 0.00643725878130494,
'batch_size': 63, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:52:55,192] Trial 372 finished with value:
0.6756969873652207 and parameters: {'n_units': 66, 'dropout_rate':
0.4619008714033371, 'learning_rate': 0.005846285118322562,
'batch_size': 62, 'epochs': 43}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:52:58,607] Trial 373 finished with value:
0.9368459180327005 and parameters: {'n_units': 132, 'dropout_rate':
0.4502690753296009, 'learning_rate': 0.008282556073726716,
'batch_size': 63, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:53:01,927] Trial 374 finished with value: 0.7670002644415383 and parameters: {'n_units': 78, 'dropout_rate': 0.4703145554349153, 'learning_rate': 0.007206293514723957, 'batch_size': 61, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:53:05,157] Trial 375 finished with value: 0.8173148081666054 and parameters: {'n_units': 52, 'dropout_rate': 0.4394057298270955, 'learning_rate': 0.0077141977642456025, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:53:08,556] Trial 376 finished with value: 0.8607851270799131 and parameters: {'n_units': 72, 'dropout_rate': 0.44943775874889225, 'learning_rate': 0.00809350935897926, 'batch_size': 62, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:53:11,765] Trial 377 finished with value: 0.6539079195899861 and parameters: {'n_units': 53, 'dropout_rate': 0.4303430326719293, 'learning_rate': 0.007041641379720478, 'batch_size': 63, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:53:14,968] Trial 378 finished with value: 3.1610203877939638 and parameters: {'n_units': 62, 'dropout_rate': 0.4273951589477626, 'learning_rate': 0.0002088222147094553, 'batch_size': 64, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 169ms/step

[I 2024-12-30 10:53:18,197] Trial 379 finished with value: 0.789351005243273 and parameters: {'n_units': 52, 'dropout_rate': 0.43227819096908693, 'learning_rate': 0.006346962908390753, 'batch_size': 61, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 151ms/step

[I 2024-12-30 10:53:21,324] Trial 380 finished with value: 0.658652056288586 and parameters: {'n_units': 52, 'dropout_rate': 0.4562656608366394, 'learning_rate': 0.006920802488560599,

'batch_size': 63, 'epochs': 39}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 170ms/step

[I 2024-12-30 10:53:24,529] Trial 381 finished with value:
0.6769152704884095 and parameters: {'n_units': 51, 'dropout_rate':
0.4623999452454566, 'learning_rate': 0.005978421346101723,
'batch_size': 62, 'epochs': 40}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:53:27,727] Trial 382 finished with value:
0.8600113348117118 and parameters: {'n_units': 54, 'dropout_rate':
0.47610782508031557, 'learning_rate': 0.00699955861218283,
'batch_size': 63, 'epochs': 39}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:53:30,916] Trial 383 finished with value:
0.7623997387429108 and parameters: {'n_units': 56, 'dropout_rate':
0.4682909098113728, 'learning_rate': 0.006668026135379753,
'batch_size': 59, 'epochs': 39}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:53:34,119] Trial 384 finished with value:
0.7111708112296578 and parameters: {'n_units': 50, 'dropout_rate':
0.456072933463391, 'learning_rate': 0.007195695329759734,
'batch_size': 57, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:53:37,293] Trial 385 finished with value:
0.672113428199041 and parameters: {'n_units': 51, 'dropout_rate':
0.4567972012126208, 'learning_rate': 0.005819134906260309,
'batch_size': 61, 'epochs': 39}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:53:40,514] Trial 386 finished with value:
0.7348821273537514 and parameters: {'n_units': 85, 'dropout_rate':
0.23408502484906604, 'learning_rate': 0.001913098165397657,
'batch_size': 62, 'epochs': 40}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:53:42,809] Trial 387 finished with value: 1.0691361072950654 and parameters: {'n_units': 60, 'dropout_rate': 0.4666074812021438, 'learning_rate': 0.007645306215031366, 'batch_size': 63, 'epochs': 10}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:53:45,975] Trial 388 finished with value: 0.7124820515237495 and parameters: {'n_units': 55, 'dropout_rate': 0.45151248741686323, 'learning_rate': 0.0065260926006390505, 'batch_size': 60, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:53:49,234] Trial 389 finished with value: 0.670820471079306 and parameters: {'n_units': 47, 'dropout_rate': 0.28284369997049785, 'learning_rate': 0.00795307830957405, 'batch_size': 62, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:53:52,433] Trial 390 finished with value: 3.2952239247324813 and parameters: {'n_units': 60, 'dropout_rate': 0.4456262708458314, 'learning_rate': 0.00015118289631563345, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:53:55,625] Trial 391 finished with value: 0.8358210159374657 and parameters: {'n_units': 92, 'dropout_rate': 0.4587654037004139, 'learning_rate': 0.0071429089105918, 'batch_size': 63, 'epochs': 39}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:53:58,982] Trial 392 finished with value: 0.7553388233145613 and parameters: {'n_units': 51, 'dropout_rate': 0.47866920021047116, 'learning_rate': 0.008227717041759374, 'batch_size': 63, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:54:02,200] Trial 393 finished with value: 0.8555830130171925 and parameters: {'n_units': 70, 'dropout_rate': 0.4328497233354923, 'learning_rate': 0.0072313118496953035, 'batch_size': 61, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:54:05,423] Trial 394 finished with value: 0.7619049352344951 and parameters: {'n_units': 55, 'dropout_rate': 0.46670358257999184, 'learning_rate': 0.008522208797481574, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:54:08,669] Trial 395 finished with value: 0.6768889617469767 and parameters: {'n_units': 46, 'dropout_rate': 0.4444117635076441, 'learning_rate': 0.0062740367387476145, 'batch_size': 62, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:54:11,970] Trial 396 finished with value: 1.031575748182309 and parameters: {'n_units': 60, 'dropout_rate': 0.4534908965820672, 'learning_rate': 0.007745078852921421, 'batch_size': 63, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:54:15,226] Trial 397 finished with value: 0.7094965356184842 and parameters: {'n_units': 67, 'dropout_rate': 0.4222740607418028, 'learning_rate': 0.0068804040410717785, 'batch_size': 64, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:54:18,454] Trial 398 finished with value: 0.672113972060699 and parameters: {'n_units': 51, 'dropout_rate': 0.2723805869165983, 'learning_rate': 0.009127837316355228, 'batch_size': 62, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 150ms/step

[I 2024-12-30 10:54:21,654] Trial 399 finished with value: 0.6380587103473243 and parameters: {'n_units': 55, 'dropout_rate': 0.43892567025779355, 'learning_rate': 0.008331815258517084, 'batch_size': 63, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:54:24,887] Trial 400 finished with value: 0.7289206631329908 and parameters: {'n_units': 48, 'dropout_rate':

0.4366181543027605, 'learning_rate': 0.007647167552745985, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 199ms/step

[I 2024-12-30 10:54:27,834] Trial 401 finished with value: 0.8068981084966198 and parameters: {'n_units': 45, 'dropout_rate': 0.45871886288817487, 'learning_rate': 0.008240502998240855, 'batch_size': 63, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:54:31,093] Trial 402 finished with value: 0.6440418164868441 and parameters: {'n_units': 64, 'dropout_rate': 0.4492574787857829, 'learning_rate': 0.005758109472741054, 'batch_size': 64, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:54:34,248] Trial 403 finished with value: 0.664710979786065 and parameters: {'n_units': 75, 'dropout_rate': 0.25382548298189755, 'learning_rate': 0.006643121559552437, 'batch_size': 64, 'epochs': 39}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:54:37,434] Trial 404 finished with value: 0.844264817381795 and parameters: {'n_units': 66, 'dropout_rate': 0.4626516220673574, 'learning_rate': 0.005741311549893657, 'batch_size': 64, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:54:40,604] Trial 405 finished with value: 0.9043507195899934 and parameters: {'n_units': 64, 'dropout_rate': 0.4744544232823352, 'learning_rate': 0.005652792258232689, 'batch_size': 63, 'epochs': 39}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:54:43,800] Trial 406 finished with value: 0.6746278192925461 and parameters: {'n_units': 70, 'dropout_rate': 0.42715910922122957, 'learning_rate': 0.006147655908319572, 'batch_size': 61, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:54:47,016] Trial 407 finished with value: 0.8683464798719321 and parameters: {'n_units': 60, 'dropout_rate': 0.45110028362057186, 'learning_rate': 0.006961210306479144, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:54:50,187] Trial 408 finished with value: 1.6216527293963567 and parameters: {'n_units': 64, 'dropout_rate': 0.4380677462465214, 'learning_rate': 0.00046157129719579584, 'batch_size': 60, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:54:53,617] Trial 409 finished with value: 0.7688595598545181 and parameters: {'n_units': 81, 'dropout_rate': 0.4544654832701546, 'learning_rate': 0.007655424278155377, 'batch_size': 62, 'epochs': 47}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:54:57,106] Trial 410 finished with value: 0.7382935156025606 and parameters: {'n_units': 152, 'dropout_rate': 0.4661577981480509, 'learning_rate': 0.006299530572886492, 'batch_size': 63, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:55:00,482] Trial 411 finished with value: 0.7310870557694623 and parameters: {'n_units': 59, 'dropout_rate': 0.4310600201816339, 'learning_rate': 0.007155816591213494, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:55:03,732] Trial 412 finished with value: 0.753797637941506 and parameters: {'n_units': 70, 'dropout_rate': 0.3428003905865091, 'learning_rate': 0.008095574682980038, 'batch_size': 63, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:55:07,134] Trial 413 finished with value: 0.7550271078790335 and parameters: {'n_units': 188, 'dropout_rate':

0.44507079908481517, 'learning_rate': 0.007179536199944078, 'batch_size': 62, 'epochs': 39}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:55:10,151] Trial 414 finished with value: 0.635368772360593 and parameters: {'n_units': 54, 'dropout_rate': 0.4586047073277164, 'learning_rate': 0.008389904448274962, 'batch_size': 64, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:55:13,176] Trial 415 finished with value: 0.7344671662074536 and parameters: {'n_units': 58, 'dropout_rate': 0.47129092923382354, 'learning_rate': 0.008614885629190846, 'batch_size': 64, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:55:16,085] Trial 416 finished with value: 0.889298340147856 and parameters: {'n_units': 53, 'dropout_rate': 0.4600090735347493, 'learning_rate': 0.007531380435672163, 'batch_size': 64, 'epochs': 30}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:55:19,105] Trial 417 finished with value: 0.6780976988510539 and parameters: {'n_units': 63, 'dropout_rate': 0.45039045185484694, 'learning_rate': 0.009463980476773983, 'batch_size': 63, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:55:22,017] Trial 418 finished with value: 0.8398644784511922 and parameters: {'n_units': 55, 'dropout_rate': 0.4797618614141756, 'learning_rate': 0.006678143133082587, 'batch_size': 64, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:55:24,921] Trial 419 finished with value: 0.691420787214213 and parameters: {'n_units': 50, 'dropout_rate': 0.420482875608453, 'learning_rate': 0.008064382876371219, 'batch_size': 61, 'epochs': 29}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:55:27,917] Trial 420 finished with value: 0.7123287196959881 and parameters: {'n_units': 68, 'dropout_rate': 0.4399951214479757, 'learning_rate': 0.008521804206382074, 'batch_size': 62, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:55:30,917] Trial 421 finished with value: 0.7366913566616035 and parameters: {'n_units': 60, 'dropout_rate': 0.12219454861061502, 'learning_rate': 0.009897102655386271, 'batch_size': 63, 'epochs': 33}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:55:34,340] Trial 422 finished with value: 1.3586234372497632 and parameters: {'n_units': 56, 'dropout_rate': 0.4637454199489327, 'learning_rate': 0.007601861026634206, 'batch_size': 64, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:55:37,677] Trial 423 finished with value: 0.6999217072822733 and parameters: {'n_units': 76, 'dropout_rate': 0.45600613066557294, 'learning_rate': 0.008671477414307807, 'batch_size': 62, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:55:40,931] Trial 424 finished with value: 0.7500063866494504 and parameters: {'n_units': 50, 'dropout_rate': 0.44854523393990975, 'learning_rate': 0.00998609476230801, 'batch_size': 63, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:55:43,934] Trial 425 finished with value: 0.9305684432590428 and parameters: {'n_units': 219, 'dropout_rate': 0.33267549562664983, 'learning_rate': 0.00650603344361729, 'batch_size': 64, 'epochs': 27}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:55:47,126] Trial 426 finished with value: 0.7576066075653638 and parameters: {'n_units': 63, 'dropout_rate':

0.43309000527603186, 'learning_rate': 0.007108499774203277, 'batch_size': 61, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:55:49,981] Trial 427 finished with value: 0.740468459146735 and parameters: {'n_units': 45, 'dropout_rate': 0.4869539247207906, 'learning_rate': 0.007876961883883222, 'batch_size': 63, 'epochs': 29}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 162ms/step

[I 2024-12-30 10:55:53,254] Trial 428 finished with value: 0.698523858102269 and parameters: {'n_units': 54, 'dropout_rate': 0.4719166434520609, 'learning_rate': 0.008884393824289698, 'batch_size': 60, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 187ms/step

[I 2024-12-30 10:56:09,487] Trial 429 finished with value: 0.7472127608511583 and parameters: {'n_units': 60, 'dropout_rate': 0.4406523879800871, 'learning_rate': 0.008291736549429201, 'batch_size': 62, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 183ms/step

[I 2024-12-30 10:56:13,360] Trial 430 finished with value: 0.7220164077824207 and parameters: {'n_units': 66, 'dropout_rate': 0.3693701457164264, 'learning_rate': 0.0074896522848819005, 'batch_size': 64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 182ms/step

[I 2024-12-30 10:56:16,807] Trial 431 finished with value: 0.7909964595916131 and parameters: {'n_units': 72, 'dropout_rate': 0.4563208802041932, 'learning_rate': 0.005491661723104016, 'batch_size': 63, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 173ms/step

[I 2024-12-30 10:56:20,391] Trial 432 finished with value: 0.7358972460472237 and parameters: {'n_units': 50, 'dropout_rate': 0.3039180398776876, 'learning_rate': 0.006855247517598648, 'batch_size': 61, 'epochs': 39}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 172ms/step

[I 2024-12-30 10:56:24,090] Trial 433 finished with value: 0.6490058714383109 and parameters: {'n_units': 56, 'dropout_rate': 0.46584724476126127, 'learning_rate': 0.009267468111896854, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 173ms/step

[I 2024-12-30 10:56:27,842] Trial 434 finished with value: 0.6819869777211797 and parameters: {'n_units': 57, 'dropout_rate': 0.47536251614417546, 'learning_rate': 0.009241250556207966, 'batch_size': 64, 'epochs': 44}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 172ms/step

[I 2024-12-30 10:56:30,757] Trial 435 finished with value: 1.219304027527922 and parameters: {'n_units': 63, 'dropout_rate': 0.4658756013499636, 'learning_rate': 0.009953275797538628, 'batch_size': 64, 'epochs': 20}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 178ms/step

[I 2024-12-30 10:56:34,460] Trial 436 finished with value: 0.6811595476130482 and parameters: {'n_units': 68, 'dropout_rate': 0.46556654411752346, 'learning_rate': 0.00806031516508213, 'batch_size': 63, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 190ms/step

[I 2024-12-30 10:56:38,099] Trial 437 finished with value: 0.7950035889827264 and parameters: {'n_units': 58, 'dropout_rate': 0.46145561284046693, 'learning_rate': 0.006126371070242527, 'batch_size': 64, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:56:41,608] Trial 438 finished with value: 0.7104420353187177 and parameters: {'n_units': 45, 'dropout_rate': 0.4531851646534815, 'learning_rate': 0.00749192669182101, 'batch_size': 62, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 171ms/step

[I 2024-12-30 10:56:45,260] Trial 439 finished with value: 0.7461265318202689 and parameters: {'n_units': 55, 'dropout_rate':

0.4774215642821077, 'learning_rate': 0.008488778472797767,
'batch_size': 63, 'epochs': 47}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:56:48,792] Trial 440 finished with value:
1.1882783311309328 and parameters: {'n_units': 62, 'dropout_rate':
0.46674719813292054, 'learning_rate': 0.00933298848547218,
'batch_size': 64, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 173ms/step

[I 2024-12-30 10:56:52,360] Trial 441 finished with value:
0.6634660480291561 and parameters: {'n_units': 66, 'dropout_rate':
0.4912699523258636, 'learning_rate': 0.006575916037484432,
'batch_size': 63, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 167ms/step

[I 2024-12-30 10:56:55,929] Trial 442 finished with value:
0.7119463137512119 and parameters: {'n_units': 74, 'dropout_rate':
0.4826504272029308, 'learning_rate': 0.008085132593622361,
'batch_size': 62, 'epochs': 43}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:56:59,677] Trial 443 finished with value:
0.6357037691462822 and parameters: {'n_units': 112, 'dropout_rate':
0.45765192425342205, 'learning_rate': 0.0070612287851031675,
'batch_size': 64, 'epochs': 45}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 173ms/step

[I 2024-12-30 10:57:03,276] Trial 444 finished with value:
2.466182816818412 and parameters: {'n_units': 136, 'dropout_rate':
0.45905930645017773, 'learning_rate': 0.000292935857287323,
'batch_size': 63, 'epochs': 42}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 188ms/step

[I 2024-12-30 10:57:06,882] Trial 445 finished with value:
0.7084262083067991 and parameters: {'n_units': 103, 'dropout_rate':
0.4496562942131922, 'learning_rate': 0.0060983578540845, 'batch_size':
64, 'epochs': 41}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:57:10,592] Trial 446 finished with value: 0.7321633085277466 and parameters: {'n_units': 98, 'dropout_rate': 0.47126860777614643, 'learning_rate': 0.006932267641644844, 'batch_size': 62, 'epochs': 45}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:57:13,955] Trial 447 finished with value: 0.7538865019818848 and parameters: {'n_units': 239, 'dropout_rate': 0.44732113137255064, 'learning_rate': 0.007221451138118004, 'batch_size': 63, 'epochs': 30}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 166ms/step

[I 2024-12-30 10:57:17,798] Trial 448 finished with value: 0.7343767943110721 and parameters: {'n_units': 247, 'dropout_rate': 0.4250827603170497, 'learning_rate': 0.00564739144615621, 'batch_size': 64, 'epochs': 43}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:57:21,108] Trial 449 finished with value: 0.6239668509795304 and parameters: {'n_units': 48, 'dropout_rate': 0.4594197947799569, 'learning_rate': 0.00644085124861256, 'batch_size': 62, 'epochs': 40}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:57:24,488] Trial 450 finished with value: 0.6965870099362655 and parameters: {'n_units': 45, 'dropout_rate': 0.31284638400329096, 'learning_rate': 0.0063327580359426846, 'batch_size': 62, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:57:27,869] Trial 451 finished with value: 0.6764870993688732 and parameters: {'n_units': 41, 'dropout_rate': 0.4722069143008836, 'learning_rate': 0.0075741080386085005, 'batch_size': 61, 'epochs': 42}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:57:31,429] Trial 452 finished with value: 0.7287559764171982 and parameters: {'n_units': 126, 'dropout_rate': 0.4621228312962092, 'learning_rate': 0.00543375406909224,

'batch_size': 62, 'epochs': 44}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 167ms/step

[I 2024-12-30 10:57:34,858] Trial 453 finished with value:
0.973726396279804 and parameters: {'n_units': 119, 'dropout_rate':
0.43681828944088935, 'learning_rate': 0.009271281125513096,
'batch_size': 60, 'epochs': 40}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:57:38,377] Trial 454 finished with value:
0.6638481661695107 and parameters: {'n_units': 48, 'dropout_rate':
0.32260967012477154, 'learning_rate': 0.007799779712725731,
'batch_size': 64, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:57:41,872] Trial 455 finished with value:
0.7007740818372664 and parameters: {'n_units': 109, 'dropout_rate':
0.4433639186954892, 'learning_rate': 0.00640923761767577,
'batch_size': 63, 'epochs': 43}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 167ms/step

[I 2024-12-30 10:57:45,304] Trial 456 finished with value:
0.6910742277567361 and parameters: {'n_units': 114, 'dropout_rate':
0.4831553249551519, 'learning_rate': 0.008711603442928904,
'batch_size': 62, 'epochs': 41}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:57:48,412] Trial 457 finished with value:
0.6296563462171482 and parameters: {'n_units': 49, 'dropout_rate':
0.417186985283134, 'learning_rate': 0.0072368683098644184,
'batch_size': 64, 'epochs': 33}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:57:51,332] Trial 458 finished with value:
0.7745075274821185 and parameters: {'n_units': 55, 'dropout_rate':
0.4663184279510443, 'learning_rate': 0.0071106703617080606,
'batch_size': 64, 'epochs': 30}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:57:54,383] Trial 459 finished with value: 0.9030557302526684 and parameters: {'n_units': 41, 'dropout_rate': 0.4176838870121339, 'learning_rate': 0.009987858692355737, 'batch_size': 63, 'epochs': 33}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:57:57,412] Trial 460 finished with value: 0.7330940219151628 and parameters: {'n_units': 50, 'dropout_rate': 0.45018595873489375, 'learning_rate': 0.007710867235653889, 'batch_size': 61, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:58:00,404] Trial 461 finished with value: 0.7265891975301433 and parameters: {'n_units': 59, 'dropout_rate': 0.456276397007425, 'learning_rate': 0.006811877814810328, 'batch_size': 64, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:58:03,391] Trial 462 finished with value: 0.6394537542342076 and parameters: {'n_units': 54, 'dropout_rate': 0.42777544364693576, 'learning_rate': 0.008381282948997421, 'batch_size': 64, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:58:06,473] Trial 463 finished with value: 0.6936151654606052 and parameters: {'n_units': 90, 'dropout_rate': 0.4286550899739268, 'learning_rate': 0.009029595296206705, 'batch_size': 64, 'epochs': 33}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 172ms/step

[I 2024-12-30 10:58:09,788] Trial 464 finished with value: 0.7049210107561747 and parameters: {'n_units': 201, 'dropout_rate': 0.41690566453441336, 'learning_rate': 0.008290833171193399, 'batch_size': 63, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:58:12,775] Trial 465 finished with value: 0.6495952791752638 and parameters: {'n_units': 60, 'dropout_rate': 0.42996413306345077, 'learning_rate': 0.009102243169801011,

'batch_size': 64, 'epochs': 31}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:58:15,710] Trial 466 finished with value:
0.6740936001018375 and parameters: {'n_units': 62, 'dropout_rate':
0.42194640268376626, 'learning_rate': 0.009134275686262962,
'batch_size': 64, 'epochs': 31}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 158ms/step

[I 2024-12-30 10:58:18,732] Trial 467 finished with value:
1.1078172484076703 and parameters: {'n_units': 59, 'dropout_rate':
0.42861105610645434, 'learning_rate': 0.001299570785401363,
'batch_size': 64, 'epochs': 33}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 156ms/step

[I 2024-12-30 10:58:21,576] Trial 468 finished with value:
0.6740551788664567 and parameters: {'n_units': 64, 'dropout_rate':
0.4346004527847311, 'learning_rate': 0.009121840971469158,
'batch_size': 64, 'epochs': 29}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:58:24,569] Trial 469 finished with value:
0.6654251667996148 and parameters: {'n_units': 56, 'dropout_rate':
0.42495224915925056, 'learning_rate': 0.007721815312222105,
'batch_size': 63, 'epochs': 32}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:58:27,480] Trial 470 finished with value:
0.7559009522077632 and parameters: {'n_units': 61, 'dropout_rate':
0.43593515099143554, 'learning_rate': 0.008435312570752748,
'batch_size': 63, 'epochs': 31}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:58:30,381] Trial 471 finished with value:
0.8758767464133211 and parameters: {'n_units': 66, 'dropout_rate':
0.418843962688574, 'learning_rate': 0.009954309626278874,
'batch_size': 64, 'epochs': 30}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:58:33,341] Trial 472 finished with value: 0.6814166678443176 and parameters: {'n_units': 55, 'dropout_rate': 0.43994669545923004, 'learning_rate': 0.0060388942933847535, 'batch_size': 62, 'epochs': 33}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:58:36,265] Trial 473 finished with value: 0.6687777332446092 and parameters: {'n_units': 60, 'dropout_rate': 0.4135354916496569, 'learning_rate': 0.007267032832456413, 'batch_size': 63, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:58:39,201] Trial 474 finished with value: 0.8568669089933759 and parameters: {'n_units': 69, 'dropout_rate': 0.43022465552730493, 'learning_rate': 0.008065674263220957, 'batch_size': 64, 'epochs': 30}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:58:42,217] Trial 475 finished with value: 0.7249166970758298 and parameters: {'n_units': 54, 'dropout_rate': 0.4732803915958287, 'learning_rate': 0.00997675041754634, 'batch_size': 62, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:58:45,146] Trial 476 finished with value: 1.1591863480413065 and parameters: {'n_units': 58, 'dropout_rate': 0.44167206991480074, 'learning_rate': 0.008632909146653168, 'batch_size': 64, 'epochs': 33}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 180ms/step

[I 2024-12-30 10:58:48,090] Trial 477 finished with value: 0.6513837060349569 and parameters: {'n_units': 64, 'dropout_rate': 0.45762623528847746, 'learning_rate': 0.006729188401648001, 'batch_size': 63, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

[I 2024-12-30 10:58:51,006] Trial 478 finished with value: 0.8453193610591281 and parameters: {'n_units': 73, 'dropout_rate': 0.46072240877665316, 'learning_rate': 0.0065371369988892845,

'batch_size': 63, 'epochs': 32}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:58:54,082] Trial 479 finished with value:
0.8534615164766785 and parameters: {'n_units': 168, 'dropout_rate':
0.46761146187790614, 'learning_rate': 0.006806990100575471,
'batch_size': 64, 'epochs': 31}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 159ms/step

[I 2024-12-30 10:58:57,268] Trial 480 finished with value:
0.8001929121402571 and parameters: {'n_units': 158, 'dropout_rate':
0.45912220883490423, 'learning_rate': 0.005919968393355432,
'batch_size': 63, 'epochs': 34}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:59:00,263] Trial 481 finished with value:
0.7694859906872911 and parameters: {'n_units': 64, 'dropout_rate':
0.47788458407636336, 'learning_rate': 0.009153611098183191,
'batch_size': 64, 'epochs': 33}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:59:03,206] Trial 482 finished with value:
0.7166786424736417 and parameters: {'n_units': 68, 'dropout_rate':
0.4486921511016571, 'learning_rate': 0.00740295036366623,
'batch_size': 62, 'epochs': 32}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 164ms/step

[I 2024-12-30 10:59:06,131] Trial 483 finished with value:
0.6867433207008348 and parameters: {'n_units': 78, 'dropout_rate':
0.42360464608895815, 'learning_rate': 0.008052607021197433,
'batch_size': 63, 'epochs': 31}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 160ms/step

[I 2024-12-30 10:59:09,192] Trial 484 finished with value:
0.8189645402555766 and parameters: {'n_units': 64, 'dropout_rate':
0.4323802058708116, 'learning_rate': 0.006438533736742612,
'batch_size': 64, 'epochs': 34}. Best is trial 277 with value:
0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:59:12,105] Trial 485 finished with value: 0.7072591271466249 and parameters: {'n_units': 61, 'dropout_rate': 0.4524677063545169, 'learning_rate': 0.009209708650937426, 'batch_size': 62, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:59:15,053] Trial 486 finished with value: 0.6859220995637014 and parameters: {'n_units': 71, 'dropout_rate': 0.4659844941406723, 'learning_rate': 0.008444821112051217, 'batch_size': 63, 'epochs': 30}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:59:18,502] Trial 487 finished with value: 0.6591978807947653 and parameters: {'n_units': 57, 'dropout_rate': 0.4415980899852129, 'learning_rate': 0.006950533326215931, 'batch_size': 64, 'epochs': 46}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 155ms/step

[I 2024-12-30 10:59:21,430] Trial 488 finished with value: 0.654484909502356 and parameters: {'n_units': 66, 'dropout_rate': 0.45981574905455136, 'learning_rate': 0.007607300951046656, 'batch_size': 63, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 157ms/step

[I 2024-12-30 10:59:24,386] Trial 489 finished with value: 0.668055893578728 and parameters: {'n_units': 62, 'dropout_rate': 0.48018610520544813, 'learning_rate': 0.005999856635263509, 'batch_size': 62, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 165ms/step

[I 2024-12-30 10:59:27,273] Trial 490 finished with value: 0.7990180344216861 and parameters: {'n_units': 54, 'dropout_rate': 0.47177246873691214, 'learning_rate': 0.005515583964463135, 'batch_size': 61, 'epochs': 29}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 169ms/step

[I 2024-12-30 10:59:30,267] Trial 491 finished with value: 0.6928852761429746 and parameters: {'n_units': 65, 'dropout_rate': 0.45950999936615633, 'learning_rate': 0.007409529042561656,

'batch_size': 63, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:59:33,239] Trial 492 finished with value: 0.757530175443389 and parameters: {'n_units': 58, 'dropout_rate': 0.4646005539774895, 'learning_rate': 0.009173907208234675, 'batch_size': 62, 'epochs': 33}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 161ms/step

[I 2024-12-30 10:59:36,148] Trial 493 finished with value: 0.7856971153963306 and parameters: {'n_units': 52, 'dropout_rate': 0.4577055858944128, 'learning_rate': 0.008080741085232874, 'batch_size': 63, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 153ms/step

[I 2024-12-30 10:59:39,117] Trial 494 finished with value: 2.1289374878068554 and parameters: {'n_units': 60, 'dropout_rate': 0.4703976007225777, 'learning_rate': 0.0008450779403871087, 'batch_size': 64, 'epochs': 30}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 152ms/step

[I 2024-12-30 10:59:41,971] Trial 495 finished with value: 0.7328517168449995 and parameters: {'n_units': 70, 'dropout_rate': 0.2946233758131975, 'learning_rate': 0.0069307018757202975, 'batch_size': 61, 'epochs': 30}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 168ms/step

[I 2024-12-30 10:59:44,971] Trial 496 finished with value: 1.4865862347252088 and parameters: {'n_units': 50, 'dropout_rate': 0.4898045208852021, 'learning_rate': 0.008769816885479903, 'batch_size': 63, 'epochs': 32}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 163ms/step

[I 2024-12-30 10:59:47,994] Trial 497 finished with value: 0.6822669253046214 and parameters: {'n_units': 66, 'dropout_rate': 0.45228565966975853, 'learning_rate': 0.009919073519004448, 'batch_size': 62, 'epochs': 31}. Best is trial 277 with value: 0.603805493431743.

1/1 ————— 0s 154ms/step

```
[I 2024-12-30 10:59:50,973] Trial 498 finished with value:
0.7444550356885494 and parameters: {'n_units': 56, 'dropout_rate':
0.43747990152357813, 'learning_rate': 0.00757503734258881,
'batch_size': 64, 'epochs': 33}. Best is trial 277 with value:
0.603805493431743.
```

```
1/1 ————— 0s 161ms/step
```

```
[I 2024-12-30 10:59:53,887] Trial 499 finished with value:
0.7608277257472502 and parameters: {'n_units': 82, 'dropout_rate':
0.4758579404867773, 'learning_rate': 0.006322182262989268,
'batch_size': 63, 'epochs': 28}. Best is trial 277 with value:
0.603805493431743.
```

```
# Display the best parameters
```

```
print("Best LSTM Parameters:", study_lstm.best_params)
```

```
Best LSTM Parameters: {'n_units': 59, 'dropout_rate':
0.4439407616392725, 'learning_rate': 0.009900593323094878,
'batch_size': 64, 'epochs': 42}
```

```
# Train the final LSTM model using the best parameters
```

```
best_lstm_params = study_lstm.best_params
```

```
final_model = Sequential([
    LSTM(best_lstm_params['n_units'], activation='relu',
input_shape=(1, X_train_scaled.shape[1])),
    Dropout(best_lstm_params['dropout_rate']),
    Dense(1)
])
```

```
final_model.compile(optimizer=tf.keras.optimizers.Adam(learning_rate=best_lstm_params['learning_rate']),
                    loss='mse')
```

```
final_model.fit(X_train_resaped, y_train_resaped,
                epochs=best_lstm_params['epochs'],
                batch_size=best_lstm_params['batch_size'])
```

```
# Forecast and evaluate the final LSTM model
```

```
y_pred_final_lstm = final_model.predict(X_test_resaped).flatten()
```

```
final_rmse_lstm = mean_squared_error(y_test_resaped,
```

```
y_pred_final_lstm, squared=False)
```

```
print(f"Optimized LSTM RMSE: {final_rmse_lstm}")
```

```
Epoch 1/42
```

```
3/3 ————— 2s 4ms/step - loss: 0.4670
```

```
Epoch 2/42
```

```
3/3 ————— 0s 4ms/step - loss: 0.4275
```

```
Epoch 3/42
```

```
3/3 ————— 0s 4ms/step - loss: 0.2030
```

```
Epoch 4/42
```

```
3/3 ————— 0s 4ms/step - loss: 0.1345
```

```
Epoch 5/42
```



```
3/3 _____ 0s 4ms/step - loss: 0.1894
Epoch 6/42
3/3 _____ 0s 4ms/step - loss: 0.1700
Epoch 7/42
3/3 _____ 0s 4ms/step - loss: 0.1552
Epoch 8/42
3/3 _____ 0s 4ms/step - loss: 0.1228
Epoch 9/42
3/3 _____ 0s 4ms/step - loss: 0.1240
Epoch 10/42
3/3 _____ 0s 4ms/step - loss: 0.1887
Epoch 11/42
3/3 _____ 0s 3ms/step - loss: 0.1640
Epoch 12/42
3/3 _____ 0s 4ms/step - loss: 0.1400
Epoch 13/42
3/3 _____ 0s 3ms/step - loss: 0.1181
Epoch 14/42
3/3 _____ 0s 3ms/step - loss: 0.1657
Epoch 15/42
3/3 _____ 0s 4ms/step - loss: 0.1212
Epoch 16/42
3/3 _____ 0s 3ms/step - loss: 0.1101
Epoch 17/42
3/3 _____ 0s 4ms/step - loss: 0.1256
Epoch 18/42
3/3 _____ 0s 4ms/step - loss: 0.1092
Epoch 19/42
3/3 _____ 0s 4ms/step - loss: 0.0957
Epoch 20/42
3/3 _____ 0s 4ms/step - loss: 0.1534
Epoch 21/42
3/3 _____ 0s 4ms/step - loss: 0.1380
Epoch 22/42
3/3 _____ 0s 4ms/step - loss: 0.1170
Epoch 23/42
3/3 _____ 0s 4ms/step - loss: 0.1570
Epoch 24/42
3/3 _____ 0s 4ms/step - loss: 0.0886
Epoch 25/42
3/3 _____ 0s 4ms/step - loss: 0.0856
Epoch 26/42
3/3 _____ 0s 4ms/step - loss: 0.0904
Epoch 27/42
3/3 _____ 0s 4ms/step - loss: 0.0870
Epoch 28/42
3/3 _____ 0s 4ms/step - loss: 0.1128
Epoch 29/42
3/3 _____ 0s 4ms/step - loss: 0.0979
```

```

Epoch 30/42
3/3 _____ 0s 4ms/step - loss: 0.2327
Epoch 31/42
3/3 _____ 0s 4ms/step - loss: 0.2804
Epoch 32/42
3/3 _____ 0s 4ms/step - loss: 0.1382
Epoch 33/42
3/3 _____ 0s 4ms/step - loss: 0.2482
Epoch 34/42
3/3 _____ 0s 4ms/step - loss: 0.2409
Epoch 35/42
3/3 _____ 0s 4ms/step - loss: 0.1874
Epoch 36/42
3/3 _____ 0s 4ms/step - loss: 0.2667
Epoch 37/42
3/3 _____ 0s 4ms/step - loss: 0.2283
Epoch 38/42
3/3 _____ 0s 4ms/step - loss: 0.1865
Epoch 39/42
3/3 _____ 0s 4ms/step - loss: 0.1238
Epoch 40/42
3/3 _____ 0s 4ms/step - loss: 0.2818
Epoch 41/42
3/3 _____ 0s 4ms/step - loss: 0.1349
Epoch 42/42
3/3 _____ 0s 4ms/step - loss: 0.2527
1/1 _____ 0s 177ms/step
Optimized LSTM RMSE: 0.7257744268267967

```

```

sarima_pred = final_sarima_model.forecast(steps=len(y_test))
y_pred_lstm = final_model.predict(X_test_resaped).flatten()

```

```

1/1 _____ 0s 188ms/step

```

```

def ensemble_objective(trial):
    # Suggest weights for each model
    w_sarima = trial.suggest_float('w_sarima', 0.0, 1.0) # Weight for
SARIMA
    w_lstm = trial.suggest_float('w_lstm', 0.0, 1.0)      # Weight for
LSTM

    # Normalize weights to ensure they sum to 1
    total_weight = w_sarima + w_lstm
    w_sarima /= total_weight
    w_lstm /= total_weight

    # Combine predictions with weighted average
    ensemble_pred = (
        w_sarima * sarima_pred +
        w_lstm * y_pred_lstm
    )

```

```

)

# Calculate RMSE for the ensemble
rmse_ensemble = mean_squared_error(y_test, ensemble_pred,
squared=False)
return rmse_ensemble # Minimize RMSE

# Optimize ensemble weights using Optuna
study_ensemble = optuna.create_study(direction='minimize')
study_ensemble.optimize(ensemble_objective, n_trials=500)

[I 2024-12-30 11:25:20,371] A new study created in memory with name:
no-name-52850d65-7ce2-46a4-945b-0c2ea20f7e9a
[I 2024-12-30 11:25:20,378] Trial 0 finished with value:
3.141189248969905 and parameters: {'w_sarima': 0.041037127773097204,
'w_lstm': 0.5298788574882175}. Best is trial 0 with value:
3.141189248969905.
[I 2024-12-30 11:25:20,382] Trial 1 finished with value:
2.7032291443526613 and parameters: {'w_sarima': 0.07441747971040669,
'w_lstm': 0.28985007464815815}. Best is trial 1 with value:
2.7032291443526613.
[I 2024-12-30 11:25:20,386] Trial 2 finished with value:
2.7650540353496944 and parameters: {'w_sarima': 0.08837511809381327,
'w_lstm': 0.38785683581371533}. Best is trial 1 with value:
2.7032291443526613.
[I 2024-12-30 11:25:20,390] Trial 3 finished with value:
2.348001364770916 and parameters: {'w_sarima': 0.12468860125092629,
'w_lstm': 0.2748033077711354}. Best is trial 3 with value:
2.348001364770916.
[I 2024-12-30 11:25:20,395] Trial 4 finished with value:
3.2449899594568152 and parameters: {'w_sarima': 0.03358953733454051,
'w_lstm': 0.7946202296286197}. Best is trial 3 with value:
2.348001364770916.
[I 2024-12-30 11:25:20,401] Trial 5 finished with value:
1.2986944392663413 and parameters: {'w_sarima': 0.831416011665027,
'w_lstm': 0.4753830961617661}. Best is trial 5 with value:
1.2986944392663413.
[I 2024-12-30 11:25:20,406] Trial 6 finished with value:
2.248284700284406 and parameters: {'w_sarima': 0.2933479410710851,
'w_lstm': 0.5631876434119111}. Best is trial 5 with value:
1.2986944392663413.
[I 2024-12-30 11:25:20,409] Trial 7 finished with value:
0.44113625563758824 and parameters: {'w_sarima': 0.5224238121929237,
'w_lstm': 0.005931612862372759}. Best is trial 7 with value:
0.44113625563758824.
[I 2024-12-30 11:25:20,413] Trial 8 finished with value:
1.9007740665472548 and parameters: {'w_sarima': 0.7392713613928467,
'w_lstm': 0.908036501750902}. Best is trial 7 with value:
0.44113625563758824.
[I 2024-12-30 11:25:20,416] Trial 9 finished with value:

```

2.7587536090752804 and parameters: {'w_sarima': 0.20873993787156475, 'w_lstm': 0.904664583640158}. Best is trial 7 with value: 0.44113625563758824.

[I 2024-12-30 11:25:20,434] Trial 10 finished with value: 0.4789392505692475 and parameters: {'w_sarima': 0.553068730659078, 'w_lstm': 0.03259231295124325}. Best is trial 7 with value: 0.44113625563758824.

[I 2024-12-30 11:25:20,449] Trial 11 finished with value: 0.5016524736415187 and parameters: {'w_sarima': 0.551009647868948, 'w_lstm': 0.042105439385021315}. Best is trial 7 with value: 0.44113625563758824.

[I 2024-12-30 11:25:20,465] Trial 12 finished with value: 0.44023431900236665 and parameters: {'w_sarima': 0.49871048214591435, 'w_lstm': 0.004046205531897142}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,481] Trial 13 finished with value: 1.0140460052859677 and parameters: {'w_sarima': 0.40354810071550756, 'w_lstm': 0.15052552830802554}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,497] Trial 14 finished with value: 0.8019179971193666 and parameters: {'w_sarima': 0.6987274651232342, 'w_lstm': 0.17362770936681496}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,512] Trial 15 finished with value: 1.459709438482992 and parameters: {'w_sarima': 0.984342929228466, 'w_lstm': 0.6970146256610628}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,527] Trial 16 finished with value: 0.9189859267372048 and parameters: {'w_sarima': 0.4189557177274701, 'w_lstm': 0.13213109002839765}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,545] Trial 17 finished with value: 0.4716662043684957 and parameters: {'w_sarima': 0.6324411556269198, 'w_lstm': 0.03326368245227285}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,561] Trial 18 finished with value: 1.5232766545214544 and parameters: {'w_sarima': 0.3846262102065722, 'w_lstm': 0.29544892340314743}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,577] Trial 19 finished with value: 1.145089600405017 and parameters: {'w_sarima': 0.48900813896488005, 'w_lstm': 0.22441741518681682}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,592] Trial 20 finished with value: 1.9877133595373198 and parameters: {'w_sarima': 0.2919752600435544, 'w_lstm': 0.3997441868375031}. Best is trial 12 with value: 0.44023431900236665.

[I 2024-12-30 11:25:20,608] Trial 21 finished with value: 0.4845001062876119 and parameters: {'w_sarima': 0.6131669498716606,

'w_lstm': 0.0389249900224693}. Best is trial 12 with value:
0.44023431900236665.
[I 2024-12-30 11:25:20,625] Trial 22 finished with value:
0.440563140773841 and parameters: {'w_sarima': 0.6610127571257259,
'w_lstm': 0.006214871487324099}. Best is trial 12 with value:
0.44023431900236665.
[I 2024-12-30 11:25:20,640] Trial 23 finished with value:
0.6617252816795451 and parameters: {'w_sarima': 0.7704739630338927,
'w_lstm': 0.13218540454314223}. Best is trial 12 with value:
0.44023431900236665.
[I 2024-12-30 11:25:20,656] Trial 24 finished with value:
0.4391919610757121 and parameters: {'w_sarima': 0.879437301979181,
'w_lstm': 0.00142364485952919}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,671] Trial 25 finished with value:
0.5591903225992776 and parameters: {'w_sarima': 0.9105706547024728,
'w_lstm': 0.10339187578189968}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,687] Trial 26 finished with value:
0.5375835529159507 and parameters: {'w_sarima': 0.8373192838908778,
'w_lstm': 0.08400516334993618}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,703] Trial 27 finished with value:
0.9899650575978676 and parameters: {'w_sarima': 0.658202696862548,
'w_lstm': 0.23568543321932994}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,720] Trial 28 finished with value:
1.031495241290762 and parameters: {'w_sarima': 0.9828524292838834,
'w_lstm': 0.3773939037016157}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,736] Trial 29 finished with value:
1.5082481301157393 and parameters: {'w_sarima': 0.8460174160337246,
'w_lstm': 0.6375537624615695}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,751] Trial 30 finished with value:
0.8283586677474883 and parameters: {'w_sarima': 0.7676650214965758,
'w_lstm': 0.2021157252797154}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,767] Trial 31 finished with value:
0.4405780955846459 and parameters: {'w_sarima': 0.47645456206428777,
'w_lstm': 0.004505922091027644}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,782] Trial 32 finished with value:
0.4393892799561651 and parameters: {'w_sarima': 0.4679682363490342,
'w_lstm': 0.0016469079324184068}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,798] Trial 33 finished with value:
0.86386471846474 and parameters: {'w_sarima': 0.33304270607641806,
'w_lstm': 0.09438994728242335}. Best is trial 24 with value:

0.4391919610757121.
[I 2024-12-30 11:25:20,814] Trial 34 finished with value:
0.6108441639099412 and parameters: {'w_sarima': 0.5717291242750747,
'w_lstm': 0.08197325323169398}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,829] Trial 35 finished with value:
1.4701332364815378 and parameters: {'w_sarima': 0.4579482527774337,
'w_lstm': 0.3286616498462921}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,845] Trial 36 finished with value:
0.7238380083318245 and parameters: {'w_sarima': 0.9085727351019879,
'w_lstm': 0.1867104753643094}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,861] Trial 37 finished with value:
0.5633858564722967 and parameters: {'w_sarima': 0.6750524979282342,
'w_lstm': 0.07833845593941308}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,878] Trial 38 finished with value:
2.5067978243778146 and parameters: {'w_sarima': 0.17748108460642653,
'w_lstm': 0.49515675603423825}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,894] Trial 39 finished with value:
0.4393936040092066 and parameters: {'w_sarima': 0.6080843039351524,
'w_lstm': 0.0021605660683747677}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,910] Trial 40 finished with value:
1.773957379152655 and parameters: {'w_sarima': 0.24967212152722074,
'w_lstm': 0.262148069628542}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,926] Trial 41 finished with value:
2.1521751591892206 and parameters: {'w_sarima': 0.5902391498317301,
'w_lstm': 0.9972869631034037}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,942] Trial 42 finished with value:
0.43925609331652565 and parameters: {'w_sarima': 0.5216823715795063,
'w_lstm': 0.001220129378762036}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,958] Trial 43 finished with value:
0.6175341656391278 and parameters: {'w_sarima': 0.5183292291786866,
'w_lstm': 0.07626101258251611}. Best is trial 24 with value:
0.4391919610757121.
[I 2024-12-30 11:25:20,975] Trial 44 finished with value:
0.4390971975194503 and parameters: {'w_sarima': 0.4457276115358492,
'w_lstm': 1.9372018588426076e-05}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:20,994] Trial 45 finished with value:
0.9979273641009925 and parameters: {'w_sarima': 0.36160056277049557,
'w_lstm': 0.1312554008932403}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,011] Trial 46 finished with value: 0.5397960030624596 and parameters: {'w_sarima': 0.4484942277391589, 'w_lstm': 0.04561632722496659}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,027] Trial 47 finished with value: 0.7272542588334642 and parameters: {'w_sarima': 0.7262031514905726, 'w_lstm': 0.15058943868198418}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,042] Trial 48 finished with value: 0.590882654473302 and parameters: {'w_sarima': 0.42903853695353084, 'w_lstm': 0.05665951230130048}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,058] Trial 49 finished with value: 0.44017810995612566 and parameters: {'w_sarima': 0.5390431211612419, 'w_lstm': 0.0042455311037362135}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,074] Trial 50 finished with value: 0.9639830215811085 and parameters: {'w_sarima': 0.33821958223329374, 'w_lstm': 0.11574806609320316}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,090] Trial 51 finished with value: 0.43961880376646495 and parameters: {'w_sarima': 0.5215561120080685, 'w_lstm': 0.002650652063386733}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,106] Trial 52 finished with value: 0.5218844867247496 and parameters: {'w_sarima': 0.5939541767969141, 'w_lstm': 0.05360874119718349}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,122] Trial 53 finished with value: 0.43948055890436694 and parameters: {'w_sarima': 0.49944401898806756, 'w_lstm': 0.0020932591822610007}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,138] Trial 54 finished with value: 1.1326181918348341 and parameters: {'w_sarima': 0.3894355561015225, 'w_lstm': 0.17539215306528827}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,155] Trial 55 finished with value: 2.0801490166823626 and parameters: {'w_sarima': 0.4885152882449131, 'w_lstm': 0.7519850623470032}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,172] Trial 56 finished with value: 2.787330156823333 and parameters: {'w_sarima': 0.00926561631611833, 'w_lstm': 0.042547217078191715}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,189] Trial 57 finished with value: 1.024041720045307 and parameters: {'w_sarima': 0.2912544448061605, 'w_lstm': 0.11046547356591149}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,207] Trial 58 finished with value:

1.6097219355120058 and parameters: {'w_sarima': 0.6258574225350817, 'w_lstm': 0.5360495095971084}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,223] Trial 59 finished with value: 0.8394408954687951 and parameters: {'w_sarima': 0.5611531821086996, 'w_lstm': 0.15125044633378382}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,239] Trial 60 finished with value: 0.9975394384793869 and parameters: {'w_sarima': 0.09646194048292689, 'w_lstm': 0.03499105535652272}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,254] Trial 61 finished with value: 0.4510824065652495 and parameters: {'w_sarima': 0.4467137212036697, 'w_lstm': 0.013521196463072547}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,270] Trial 62 finished with value: 0.5817011887190231 and parameters: {'w_sarima': 0.5214146784766596, 'w_lstm': 0.06610438268846174}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,285] Trial 63 finished with value: 0.4470511578472862 and parameters: {'w_sarima': 0.4029442739112589, 'w_lstm': 0.009743044891668164}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,303] Trial 64 finished with value: 0.710736973409353 and parameters: {'w_sarima': 0.500633297744211, 'w_lstm': 0.09929804749043772}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,319] Trial 65 finished with value: 0.43947069199066424 and parameters: {'w_sarima': 0.5371860765620572, 'w_lstm': 0.0022144589519973324}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,335] Trial 66 finished with value: 0.5432214651635389 and parameters: {'w_sarima': 0.559904857807506, 'w_lstm': 0.05813901130899446}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,350] Trial 67 finished with value: 0.46482925163943717 and parameters: {'w_sarima': 0.7080753986273388, 'w_lstm': 0.03264939694163059}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,365] Trial 68 finished with value: 0.7880145598646933 and parameters: {'w_sarima': 0.4720036809608321, 'w_lstm': 0.11364390049012796}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,380] Trial 69 finished with value: 0.7672031495645844 and parameters: {'w_sarima': 0.6481756504306785, 'w_lstm': 0.1486092446829369}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:21,397] Trial 70 finished with value: 1.5235182118844546 and parameters: {'w_sarima': 0.803733503780959,

'w_lstm': 0.6175738298881708}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,414] Trial 71 finished with value:
0.4396422742041146 and parameters: {'w_sarima': 0.5266858599022807,
'w_lstm': 0.00275037581609425}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,430] Trial 72 finished with value:
0.4390994116973565 and parameters: {'w_sarima': 0.49859722583401545,
'w_lstm': 4.8663466191525276e-05}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,446] Trial 73 finished with value:
1.7160973891126226 and parameters: {'w_sarima': 0.43887838895797804,
'w_lstm': 0.4290173421846636}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,463] Trial 74 finished with value:
0.7191813085182434 and parameters: {'w_sarima': 0.3723053925746645,
'w_lstm': 0.07556126385992226}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,480] Trial 75 finished with value:
0.45206937008071024 and parameters: {'w_sarima': 0.8941198751886039,
'w_lstm': 0.028262851683266175}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,496] Trial 76 finished with value:
0.5060519422635552 and parameters: {'w_sarima': 0.40940824218029515,
'w_lstm': 0.0325604012767029}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,513] Trial 77 finished with value:
0.6030837117225798 and parameters: {'w_sarima': 0.5906712814059362,
'w_lstm': 0.08210481151872889}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,530] Trial 78 finished with value:
1.0961664600884307 and parameters: {'w_sarima': 0.5016568532359373,
'w_lstm': 0.2136357462666708}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,546] Trial 79 finished with value:
0.45616443920957467 and parameters: {'w_sarima': 0.9450803930561764,
'w_lstm': 0.03473013148902603}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,563] Trial 80 finished with value:
0.5380616347070024 and parameters: {'w_sarima': 0.6111128511701799,
'w_lstm': 0.06149382153352559}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,580] Trial 81 finished with value:
0.43992102818347806 and parameters: {'w_sarima': 0.46516320669664024,
'w_lstm': 0.003119910410185797}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,597] Trial 82 finished with value:
0.4401224144418041 and parameters: {'w_sarima': 0.5405194358841148,
'w_lstm': 0.004126910695583581}. Best is trial 44 with value:

0.4390971975194503.
[I 2024-12-30 11:25:21,613] Trial 83 finished with value:
0.6855386548581979 and parameters: {'w_sarima': 0.5066901098431728,
'w_lstm': 0.09353048060131172}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,629] Trial 84 finished with value:
0.49312185560204275 and parameters: {'w_sarima': 0.42015082193307407,
'w_lstm': 0.029477892871621163}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,646] Trial 85 finished with value:
0.5510471382763079 and parameters: {'w_sarima': 0.575651994978,
'w_lstm': 0.06253603418833671}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,662] Trial 86 finished with value:
0.8433780341364726 and parameters: {'w_sarima': 0.4773686447598708,
'w_lstm': 0.12973079153846392}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,678] Trial 87 finished with value:
0.5292968162789722 and parameters: {'w_sarima': 0.5476292164051193,
'w_lstm': 0.052063278853033815}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,695] Trial 88 finished with value:
0.48869995728058685 and parameters: {'w_sarima': 0.32517750906828946,
'w_lstm': 0.021717387324888367}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,711] Trial 89 finished with value:
0.6063138470781786 and parameters: {'w_sarima': 0.680372144459927,
'w_lstm': 0.09581480248455783}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,729] Trial 90 finished with value:
2.213560790324582 and parameters: {'w_sarima': 0.45395667229376213,
'w_lstm': 0.8317933429205718}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,747] Trial 91 finished with value:
0.4401731184571174 and parameters: {'w_sarima': 0.5293466140146086,
'w_lstm': 0.004157858483759576}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,763] Trial 92 finished with value:
0.519359116482239 and parameters: {'w_sarima': 0.5204328635293455,
'w_lstm': 0.04610527061577579}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,781] Trial 93 finished with value:
0.4398798797758023 and parameters: {'w_sarima': 0.49074040117487,
'w_lstm': 0.003192148413453266}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:21,798] Trial 94 finished with value:
0.5816625775503783 and parameters: {'w_sarima': 0.5848911288092964,
'w_lstm': 0.07413879214677553}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,815] Trial 95 finished with value:
0.45767322921020476 and parameters: {'w_sarima': 0.6169153632439712,
'w_lstm': 0.023752967351624986}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,832] Trial 96 finished with value:
0.5238519369708718 and parameters: {'w_sarima': 0.5526678718458455,
'w_lstm': 0.05059462345127597}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,850] Trial 97 finished with value:
0.4734920139539052 and parameters: {'w_sarima': 0.42957674174126326,
'w_lstm': 0.023297275444226793}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,869] Trial 98 finished with value:
0.7358266062069857 and parameters: {'w_sarima': 0.5121978613911496,
'w_lstm': 0.10861320913666357}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,886] Trial 99 finished with value:
0.4397053847712358 and parameters: {'w_sarima': 0.3505147756665042,
'w_lstm': 0.0019575395188820076}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,904] Trial 100 finished with value:
0.6887183912306818 and parameters: {'w_sarima': 0.38940472794753034,
'w_lstm': 0.0725567718903684}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,920] Trial 101 finished with value:
0.4949105551654987 and parameters: {'w_sarima': 0.36307768175592364,
'w_lstm': 0.025959246140857685}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,938] Trial 102 finished with value:
0.4391898159890015 and parameters: {'w_sarima': 0.4779806930999924,
'w_lstm': 0.0007608956856879089}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,955] Trial 103 finished with value:
0.5495296621347064 and parameters: {'w_sarima': 0.4802233419386751,
'w_lstm': 0.05172540614288491}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,972] Trial 104 finished with value:
0.43918737792753365 and parameters: {'w_sarima': 0.531235836994337,
'w_lstm': 0.0008292703096191485}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:21,990] Trial 105 finished with value:
0.7125581290875954 and parameters: {'w_sarima': 0.44639751996316174,
'w_lstm': 0.08898440817445048}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:22,006] Trial 106 finished with value:
0.4834402306042907 and parameters: {'w_sarima': 0.6401797742536112,
'w_lstm': 0.04009499664081078}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:22,024] Trial 107 finished with value:

0.7375158765903621 and parameters: {'w_sarima': 0.5654250949501163, 'w_lstm': 0.1204229228633188}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,041] Trial 108 finished with value: 0.47035323406676954 and parameters: {'w_sarima': 0.46181000165230923, 'w_lstm': 0.023735135791163934}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,058] Trial 109 finished with value: 1.4038907580630708 and parameters: {'w_sarima': 0.49718431708843736, 'w_lstm': 0.32736936652785426}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,077] Trial 110 finished with value: 0.8408960595675581 and parameters: {'w_sarima': 0.6080714961337029, 'w_lstm': 0.1643968560975615}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,094] Trial 111 finished with value: 0.4391767892716153 and parameters: {'w_sarima': 0.5357557792450675, 'w_lstm': 0.0007625009037837767}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,112] Trial 112 finished with value: 0.45669192481024323 and parameters: {'w_sarima': 0.540085030131709, 'w_lstm': 0.020182450543372078}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,131] Trial 113 finished with value: 0.43910026047101075 and parameters: {'w_sarima': 0.483946956430367, 'w_lstm': 5.705033959307686e-05}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,150] Trial 114 finished with value: 0.54947879215494 and parameters: {'w_sarima': 0.4815398970289381, 'w_lstm': 0.05185227405112575}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,169] Trial 115 finished with value: 0.5057044255868482 and parameters: {'w_sarima': 0.8705246438683973, 'w_lstm': 0.06902106602216707}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,186] Trial 116 finished with value: 0.5343557122214282 and parameters: {'w_sarima': 0.4077615452567149, 'w_lstm': 0.04008024070620344}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,203] Trial 117 finished with value: 0.4392310626935132 and parameters: {'w_sarima': 0.43306211301618247, 'w_lstm': 0.000898502965755695}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,221] Trial 118 finished with value: 0.46725137798623595 and parameters: {'w_sarima': 0.42776679505035636, 'w_lstm': 0.020737680279575097}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,238] Trial 119 finished with value: 0.5471940199346826 and parameters: {'w_sarima': 0.7831352885236501,

'w_lstm': 0.08323408251950844}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,257] Trial 120 finished with value:
0.43913641988828034 and parameters: {'w_sarima': 0.4641724971816258,
'w_lstm': 0.00038333512681051733}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,275] Trial 121 finished with value:
0.43934741418493606 and parameters: {'w_sarima': 0.45562957355962647,
'w_lstm': 0.0014487834374023573}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,292] Trial 122 finished with value:
0.5168883136662148 and parameters: {'w_sarima': 0.46122795219756174,
'w_lstm': 0.04010117478043789}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,310] Trial 123 finished with value:
0.47287923544802235 and parameters: {'w_sarima': 0.3898615228534249,
'w_lstm': 0.02093065714168211}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,328] Trial 124 finished with value:
0.6077208057406929 and parameters: {'w_sarima': 0.44616183458115954,
'w_lstm': 0.06318553332977198}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,346] Trial 125 finished with value:
0.4734580501393236 and parameters: {'w_sarima': 0.4238091704476994,
'w_lstm': 0.022971706278340543}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,363] Trial 126 finished with value:
0.5590312599789741 and parameters: {'w_sarima': 0.4801156341106186,
'w_lstm': 0.05446961445343277}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,381] Trial 127 finished with value:
0.43917780559571057 and parameters: {'w_sarima': 0.5120283390813363,
'w_lstm': 0.0007356442375708264}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,398] Trial 128 finished with value:
0.4952139725537247 and parameters: {'w_sarima': 0.5157909271582551,
'w_lstm': 0.036994175701521734}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,417] Trial 129 finished with value:
0.43913659407500105 and parameters: {'w_sarima': 0.4635721804122686,
'w_lstm': 0.0003841835634746568}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,435] Trial 130 finished with value:
0.43936042728398156 and parameters: {'w_sarima': 0.4383731486285514,
'w_lstm': 0.0014412823594802582}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,453] Trial 131 finished with value:
0.46873450292883545 and parameters: {'w_sarima': 0.4063541548630476,
'w_lstm': 0.02027254290561788}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:22,471] Trial 132 finished with value: 0.4392599319220801 and parameters: {'w_sarima': 0.2023019151075215, 'w_lstm': 0.0004810282182077725}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,489] Trial 133 finished with value: 0.8848470388455555 and parameters: {'w_sarima': 0.14165527654928078, 'w_lstm': 0.04185557658752856}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,507] Trial 134 finished with value: 0.8199253411516898 and parameters: {'w_sarima': 0.24630839142781935, 'w_lstm': 0.06368321269990411}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,525] Trial 135 finished with value: 0.5174579295833526 and parameters: {'w_sarima': 0.20516483972532712, 'w_lstm': 0.017916049793817213}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,544] Trial 136 finished with value: 0.43949197364624537 and parameters: {'w_sarima': 0.30983895401504136, 'w_lstm': 0.0013229584946619374}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,561] Trial 137 finished with value: 2.5948790892604574 and parameters: {'w_sarima': 0.027924342316892503, 'w_lstm': 0.08983397342429428}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,579] Trial 138 finished with value: 0.51339978415646 and parameters: {'w_sarima': 0.5071898973847793, 'w_lstm': 0.04290524401271125}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,597] Trial 139 finished with value: 1.6511858868888276 and parameters: {'w_sarima': 0.07560931829606105, 'w_lstm': 0.06819528960804241}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,616] Trial 140 finished with value: 0.43911228510647277 and parameters: {'w_sarima': 0.9609370370182136, 'w_lstm': 0.0003674744704600239}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,634] Trial 141 finished with value: 0.4391439958340557 and parameters: {'w_sarima': 0.9985398190029139, 'w_lstm': 0.0009474645291859369}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,651] Trial 142 finished with value: 0.4477848161784736 and parameters: {'w_sarima': 0.9111892825850536, 'w_lstm': 0.023123529592881588}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,669] Trial 143 finished with value: 0.4532788391627145 and parameters: {'w_sarima': 0.9669290996234243, 'w_lstm': 0.032095634524141436}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,686] Trial 144 finished with value:

0.4448115898382622 and parameters: {'w_sarima': 0.941559665684625, 'w_lstm': 0.018986883081500948}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,704] Trial 145 finished with value: 0.4712880472473126 and parameters: {'w_sarima': 0.9990351577142033, 'w_lstm': 0.05220170103299117}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,723] Trial 146 finished with value: 1.358231246662281 and parameters: {'w_sarima': 0.9680766096899647, 'w_lstm': 0.5999937689916601}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,741] Trial 147 finished with value: 1.1914974548108568 and parameters: {'w_sarima': 0.929771979406556, 'w_lstm': 0.45697847840610667}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,759] Trial 148 finished with value: 0.4391520401931548 and parameters: {'w_sarima': 0.8768102375601731, 'w_lstm': 0.0009409537151063784}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,776] Trial 149 finished with value: 0.46370221527552596 and parameters: {'w_sarima': 0.9684838517828155, 'w_lstm': 0.04355937567865355}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,793] Trial 150 finished with value: 0.44880377447210784 and parameters: {'w_sarima': 0.8877099017890369, 'w_lstm': 0.02393854002662099}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,812] Trial 151 finished with value: 0.4393491781250254 and parameters: {'w_sarima': 0.8223562986993642, 'w_lstm': 0.0026270416692383263}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,830] Trial 152 finished with value: 0.504612105648398 and parameters: {'w_sarima': 0.2703954288285283, 'w_lstm': 0.02123097540390186}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,847] Trial 153 finished with value: 0.43910207507440635 and parameters: {'w_sarima': 0.855522419170089, 'w_lstm': 0.0001372609965073891}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,865] Trial 154 finished with value: 0.4649538333946713 and parameters: {'w_sarima': 0.8702586542509028, 'w_lstm': 0.040235588603462435}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,884] Trial 155 finished with value: 1.560014576342583 and parameters: {'w_sarima': 0.8583105741888378, 'w_lstm': 0.6906811713529712}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:22,901] Trial 156 finished with value: 0.5203953396786271 and parameters: {'w_sarima': 0.7518709599661085,

'w_lstm': 0.06712410660875034}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,919] Trial 157 finished with value:
0.4392844019889107 and parameters: {'w_sarima': 0.8334974654701078,
'w_lstm': 0.002181695074397407}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,938] Trial 158 finished with value:
0.44520017409217044 and parameters: {'w_sarima': 0.9174459920065391,
'w_lstm': 0.01918218609457337}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,956] Trial 159 finished with value:
0.4731099879432636 and parameters: {'w_sarima': 0.9975503362029294,
'w_lstm': 0.05376132678657022}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,974] Trial 160 finished with value:
0.5227986792891008 and parameters: {'w_sarima': 0.8969451914431475,
'w_lstm': 0.0814940033973133}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:22,992] Trial 161 finished with value:
0.4430443347161788 and parameters: {'w_sarima': 0.9454553656300768,
'w_lstm': 0.015542507746705098}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,010] Trial 162 finished with value:
0.4392375252447575 and parameters: {'w_sarima': 0.7957401309113303,
'w_lstm': 0.0017066561647409123}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,029] Trial 163 finished with value:
0.45895298966647147 and parameters: {'w_sarima': 0.8650411649078411,
'w_lstm': 0.034552849624132395}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,047] Trial 164 finished with value:
0.46269676458972997 and parameters: {'w_sarima': 0.8168029877184819,
'w_lstm': 0.035896654762433394}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,066] Trial 165 finished with value:
0.43918832327957863 and parameters: {'w_sarima': 0.781067489146452,
'w_lstm': 0.0012286416836155185}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,085] Trial 166 finished with value:
0.4391726244658485 and parameters: {'w_sarima': 0.8072340888712305,
'w_lstm': 0.001103689981179748}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,102] Trial 167 finished with value:
0.44952756175295044 and parameters: {'w_sarima': 0.7702857530027182,
'w_lstm': 0.021606441607626373}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,120] Trial 168 finished with value:
0.4817969021739511 and parameters: {'w_sarima': 0.8823461894057498,
'w_lstm': 0.0540847053463834}. Best is trial 44 with value:

0.4390971975194503.
[I 2024-12-30 11:25:23,139] Trial 169 finished with value:
0.4621115776547246 and parameters: {'w_sarima': 0.8440860259872951,
'w_lstm': 0.03658304122816361}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,160] Trial 170 finished with value:
0.43919241599232506 and parameters: {'w_sarima': 0.8533055589661315,
'w_lstm': 0.0013861886856234495}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,179] Trial 171 finished with value:
0.44596570237995237 and parameters: {'w_sarima': 0.8106373004291867,
'w_lstm': 0.01808547387596374}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,199] Trial 172 finished with value:
0.4396367130561201 and parameters: {'w_sarima': 0.8486809620192677,
'w_lstm': 0.004403945354154391}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,217] Trial 173 finished with value:
0.4392675566911982 and parameters: {'w_sarima': 0.8350055044809717,
'w_lstm': 0.002049107180305094}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,235] Trial 174 finished with value:
0.43922355429159293 and parameters: {'w_sarima': 0.48463831365292154,
'w_lstm': 0.0009652758586814379}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,255] Trial 175 finished with value:
0.49517142090341265 and parameters: {'w_sarima': 0.4850841111137736,
'w_lstm': 0.03477646107453442}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,273] Trial 176 finished with value:
0.45047381720671353 and parameters: {'w_sarima': 0.7508045721804787,
'w_lstm': 0.022085847327561088}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,292] Trial 177 finished with value:
0.4800366786859777 and parameters: {'w_sarima': 0.9232636598087494,
'w_lstm': 0.05525364139610566}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,311] Trial 178 finished with value:
0.4525110631049802 and parameters: {'w_sarima': 0.7158520047982394,
'w_lstm': 0.02304708331702808}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,330] Trial 179 finished with value:
0.6207465325512843 and parameters: {'w_sarima': 0.47088421118553236,
'w_lstm': 0.0701256496115924}. Best is trial 44 with value:
0.4390971975194503.
[I 2024-12-30 11:25:23,348] Trial 180 finished with value:
0.5217908415744859 and parameters: {'w_sarima': 0.49541718327242285,
'w_lstm': 0.04468455456855198}. Best is trial 44 with value:
0.4390971975194503.

[I 2024-12-30 11:25:23,365] Trial 181 finished with value: 0.4550488208133231 and parameters: {'w_sarima': 0.4557509445337151, 'w_lstm': 0.01613704160678025}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:23,383] Trial 182 finished with value: 0.43954946938992406 and parameters: {'w_sarima': 0.5310167259844732, 'w_lstm': 0.0024697925393720585}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:23,400] Trial 183 finished with value: 0.9218986907018348 and parameters: {'w_sarima': 0.797224529661359, 'w_lstm': 0.25279840451005736}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:23,419] Trial 184 finished with value: 0.4984002693286623 and parameters: {'w_sarima': 0.436123647221044, 'w_lstm': 0.03230204675214865}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:23,437] Trial 185 finished with value: 0.43914915757224704 and parameters: {'w_sarima': 0.9534373398490522, 'w_lstm': 0.0009813730423090246}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:23,454] Trial 186 finished with value: 1.668744528132678 and parameters: {'w_sarima': 0.9819819256378766, 'w_lstm': 0.9052246962357297}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:23,473] Trial 187 finished with value: 0.4392336836437617 and parameters: {'w_sarima': 0.9555747574200099, 'w_lstm': 0.0020098659097435682}. Best is trial 44 with value: 0.4390971975194503.

[I 2024-12-30 11:25:23,490] Trial 188 finished with value: 0.43909658236748333 and parameters: {'w_sarima': 0.9068511919073923, 'w_lstm': 2.5472111923758797e-05}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,508] Trial 189 finished with value: 0.4575205877437399 and parameters: {'w_sarima': 0.8930470168858924, 'w_lstm': 0.03422884748275246}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,529] Trial 190 finished with value: 1.7648111420452792 and parameters: {'w_sarima': 0.9362275805530944, 'w_lstm': 0.9719713357422808}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,548] Trial 191 finished with value: 0.43921703696089304 and parameters: {'w_sarima': 0.9063665707908832, 'w_lstm': 0.0017384841719802985}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,566] Trial 192 finished with value: 0.446395017605245 and parameters: {'w_sarima': 0.9044202891651435, 'w_lstm': 0.020860266923558357}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,584] Trial 193 finished with value:

0.4391096204527333 and parameters: {'w_sarima': 0.8709087802287996, 'w_lstm': 0.00028480949112702833}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,602] Trial 194 finished with value: 0.44690299902202973 and parameters: {'w_sarima': 0.8819424414081931, 'w_lstm': 0.02110639104252762}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,620] Trial 195 finished with value: 0.4689700582471826 and parameters: {'w_sarima': 0.8444724075029914, 'w_lstm': 0.04231664319592891}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,639] Trial 196 finished with value: 0.445628195326696 and parameters: {'w_sarima': 0.8603329436069702, 'w_lstm': 0.01867053700966503}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,656] Trial 197 finished with value: 0.4709358415953416 and parameters: {'w_sarima': 0.9559083845207005, 'w_lstm': 0.04964097724401372}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,675] Trial 198 finished with value: 0.44339787637547967 and parameters: {'w_sarima': 0.9805628918622298, 'w_lstm': 0.016904027708440485}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,693] Trial 199 finished with value: 0.4391817943119423 and parameters: {'w_sarima': 0.9219023705607987, 'w_lstm': 0.0013728363283956198}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,713] Trial 200 finished with value: 0.4888788686111842 and parameters: {'w_sarima': 0.929174746073633, 'w_lstm': 0.062184793422047975}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,730] Trial 201 finished with value: 0.4554258951332622 and parameters: {'w_sarima': 0.8804684345753779, 'w_lstm': 0.03157815642172765}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,747] Trial 202 finished with value: 0.4446445754513935 and parameters: {'w_sarima': 0.9170533316425533, 'w_lstm': 0.01819328103720151}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,765] Trial 203 finished with value: 0.44400302534232244 and parameters: {'w_sarima': 0.8634769146024542, 'w_lstm': 0.01600861957677224}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,784] Trial 204 finished with value: 0.4392123666003757 and parameters: {'w_sarima': 0.9533784215074165, 'w_lstm': 0.0017774030382214788}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:23,802] Trial 205 finished with value: 0.4665973020613515 and parameters: {'w_sarima': 0.8285337915620383,

'w_lstm': 0.039643419218340165}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,821] Trial 206 finished with value:
0.4533430199154855 and parameters: {'w_sarima': 0.89469748739368,
'w_lstm': 0.02977169097834323}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,840] Trial 207 finished with value:
0.43918080667239656 and parameters: {'w_sarima': 0.9767522035690572,
'w_lstm': 0.0014419221422492996}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,859] Trial 208 finished with value:
0.439133793595561 and parameters: {'w_sarima': 0.937110725884271,
'w_lstm': 0.0007325312593463045}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,878] Trial 209 finished with value:
0.4391358198105377 and parameters: {'w_sarima': 0.9852243864419095,
'w_lstm': 0.0008037757306292813}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,897] Trial 210 finished with value:
0.43911930882719835 and parameters: {'w_sarima': 0.9901815857861416,
'w_lstm': 0.0005161806877446074}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,916] Trial 211 finished with value:
0.4391006636930814 and parameters: {'w_sarima': 0.9851567185375492,
'w_lstm': 0.0001255440532167795}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,934] Trial 212 finished with value:
0.44575813517201607 and parameters: {'w_sarima': 0.9921707560112707,
'w_lstm': 0.021765791903651036}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,953] Trial 213 finished with value:
0.46024824199020137 and parameters: {'w_sarima': 0.9663026268223844,
'w_lstm': 0.039968399551649}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,971] Trial 214 finished with value:
0.43910358125985594 and parameters: {'w_sarima': 0.9644861561029586,
'w_lstm': 0.00018804729126072238}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:23,989] Trial 215 finished with value:
1.0410552100665826 and parameters: {'w_sarima': 0.9794555775886704,
'w_lstm': 0.38203358735757487}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,007] Trial 216 finished with value:
0.4457677705010605 and parameters: {'w_sarima': 0.9990847521348578,
'w_lstm': 0.021934868039769562}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,027] Trial 217 finished with value:
0.4725981449928391 and parameters: {'w_sarima': 0.9417052566438563,
'w_lstm': 0.05032078925400248}. Best is trial 188 with value:

0.43909658236748333.
[I 2024-12-30 11:25:24,046] Trial 218 finished with value:
0.4462238436316037 and parameters: {'w_sarima': 0.9736719221459049,
'w_lstm': 0.022167049287895813}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,065] Trial 219 finished with value:
0.43911236210749977 and parameters: {'w_sarima': 0.9567995916664743,
'w_lstm': 0.0003674009847286592}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,085] Trial 220 finished with value:
0.43909860210293183 and parameters: {'w_sarima': 0.9624513103045216,
'w_lstm': 7.508601798139713e-05}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,105] Trial 221 finished with value:
0.4391831498532052 and parameters: {'w_sarima': 0.9547232710156179,
'w_lstm': 0.001438520732899259}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,126] Trial 222 finished with value:
0.44664340122894897 and parameters: {'w_sarima': 0.9809403439661792,
'w_lstm': 0.023044286624981338}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,147] Trial 223 finished with value:
0.43914592723989215 and parameters: {'w_sarima': 0.959080742737754,
'w_lstm': 0.0009391818557209405}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,166] Trial 224 finished with value:
0.4391096096946368 and parameters: {'w_sarima': 0.9578174190398889,
'w_lstm': 0.0003130134836160589}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,185] Trial 225 finished with value:
0.456258165906426 and parameters: {'w_sarima': 0.9473095826290316,
'w_lstm': 0.03491709389289177}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,206] Trial 226 finished with value:
0.4391005188501215 and parameters: {'w_sarima': 0.9610025204462052,
'w_lstm': 0.00011917526382802575}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,227] Trial 227 finished with value:
0.45018014497612086 and parameters: {'w_sarima': 0.9363015826186686,
'w_lstm': 0.027150740853230746}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,247] Trial 228 finished with value:
0.46744793151059744 and parameters: {'w_sarima': 0.9989291565467107,
'w_lstm': 0.0486153611198479}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,266] Trial 229 finished with value:
0.44578142303225204 and parameters: {'w_sarima': 0.9640336973049574,
'w_lstm': 0.021189094226435688}. Best is trial 188 with value:
0.43909658236748333.

[I 2024-12-30 11:25:24,284] Trial 230 finished with value: 0.443856733912531 and parameters: {'w_sarima': 0.9581633850529849, 'w_lstm': 0.017469754666752303}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,303] Trial 231 finished with value: 0.43917369581041377 and parameters: {'w_sarima': 0.9782495752923963, 'w_lstm': 0.001351696276835171}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,323] Trial 232 finished with value: 0.4456770509034241 and parameters: {'w_sarima': 0.9784859696693369, 'w_lstm': 0.021321716825036214}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,342] Trial 233 finished with value: 0.45844479140898514 and parameters: {'w_sarima': 0.9293372230238888, 'w_lstm': 0.03659388551590406}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,362] Trial 234 finished with value: 0.4391000023117511 and parameters: {'w_sarima': 0.9530429479697318, 'w_lstm': 0.00010649507283665937}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,381] Trial 235 finished with value: 0.439097059191662 and parameters: {'w_sarima': 0.9490595284164728, 'w_lstm': 3.7979179404815585e-05}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,401] Trial 236 finished with value: 0.4441324476419463 and parameters: {'w_sarima': 0.9444150084505347, 'w_lstm': 0.017762478362892804}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,421] Trial 237 finished with value: 0.4391486689724249 and parameters: {'w_sarima': 0.9574814651821907, 'w_lstm': 0.000978347472045873}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,440] Trial 238 finished with value: 0.45739611193567403 and parameters: {'w_sarima': 0.9617016343621094, 'w_lstm': 0.036722850322776765}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,462] Trial 239 finished with value: 0.43911203888514955 and parameters: {'w_sarima': 0.9417405825058699, 'w_lstm': 0.0003553768101562175}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,483] Trial 240 finished with value: 0.4391042677063329 and parameters: {'w_sarima': 0.998209775972587, 'w_lstm': 0.00021010609147269438}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,503] Trial 241 finished with value: 0.443925242213878 and parameters: {'w_sarima': 0.995568877066961, 'w_lstm': 0.018295505886515417}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,523] Trial 242 finished with value:

0.4440793598833119 and parameters: {'w_sarima': 0.9351718062085562, 'w_lstm': 0.01748612243178718}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,543] Trial 243 finished with value: 0.43917607187204355 and parameters: {'w_sarima': 0.9677875165133366, 'w_lstm': 0.0013681204518803686}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,564] Trial 244 finished with value: 1.6064262639481137 and parameters: {'w_sarima': 0.984654069243966, 'w_lstm': 0.839891936842027}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,585] Trial 245 finished with value: 0.4391040387547378 and parameters: {'w_sarima': 0.9483077583089252, 'w_lstm': 0.00019471097318783288}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,607] Trial 246 finished with value: 0.45934167805321935 and parameters: {'w_sarima': 0.9200010330027258, 'w_lstm': 0.0371434797622316}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,629] Trial 247 finished with value: 0.4463195179886441 and parameters: {'w_sarima': 0.9385082511512379, 'w_lstm': 0.021523376149246983}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,648] Trial 248 finished with value: 0.4390971957276756 and parameters: {'w_sarima': 0.9968008068110721, 'w_lstm': 4.32780959620274e-05}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,667] Trial 249 finished with value: 0.4714587999125573 and parameters: {'w_sarima': 0.9741094670803092, 'w_lstm': 0.051050593847325514}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,687] Trial 250 finished with value: 0.4390982807148294 and parameters: {'w_sarima': 0.9971235166529352, 'w_lstm': 6.99725848046562e-05}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,707] Trial 251 finished with value: 1.248715761718716 and parameters: {'w_sarima': 0.9945173183736155, 'w_lstm': 0.5304949029589572}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,727] Trial 252 finished with value: 0.4533262902361316 and parameters: {'w_sarima': 0.976951036527739, 'w_lstm': 0.03248778365284742}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,746] Trial 253 finished with value: 0.4465508085728374 and parameters: {'w_sarima': 0.9146978357573395, 'w_lstm': 0.021343135555586555}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:24,767] Trial 254 finished with value: 0.43910233311924973 and parameters: {'w_sarima': 0.9425982153367936,

'w_lstm': 0.00015685452482632552}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,786] Trial 255 finished with value:
0.9603992180300686 and parameters: {'w_sarima': 0.9400992008954312,
'w_lstm': 0.31969232051444485}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,809] Trial 256 finished with value:
0.47362530558608634 and parameters: {'w_sarima': 0.9520897875927611,
'w_lstm': 0.05174730602104499}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,829] Trial 257 finished with value:
0.4465292644078618 and parameters: {'w_sarima': 0.9263609992714753,
'w_lstm': 0.021580994602613174}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,850] Trial 258 finished with value:
0.4391061256667626 and parameters: {'w_sarima': 0.9991038105851218,
'w_lstm': 0.0002515680114412045}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,871] Trial 259 finished with value:
0.4454316464433454 and parameters: {'w_sarima': 0.9871200555146622,
'w_lstm': 0.02106547891593906}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,892] Trial 260 finished with value:
0.4576462810100562 and parameters: {'w_sarima': 0.996787021144203,
'w_lstm': 0.038348400560037604}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,912] Trial 261 finished with value:
0.4391288261180669 and parameters: {'w_sarima': 0.9636499350873962,
'w_lstm': 0.0006705075952257956}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,932] Trial 262 finished with value:
0.4950092472666379 and parameters: {'w_sarima': 0.9629840975532217,
'w_lstm': 0.06892187316386666}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,952] Trial 263 finished with value:
0.4461110394039722 and parameters: {'w_sarima': 0.9458969476966504,
'w_lstm': 0.021347025505667038}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,972] Trial 264 finished with value:
0.46625354513024464 and parameters: {'w_sarima': 0.9059682519579211,
'w_lstm': 0.04304570377458894}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:24,994] Trial 265 finished with value:
0.44460023963692763 and parameters: {'w_sarima': 0.9674240645500622,
'w_lstm': 0.019107985357626818}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,014] Trial 266 finished with value:
0.4391512565265457 and parameters: {'w_sarima': 0.9277825615202961,
'w_lstm': 0.0009846610441386365}. Best is trial 188 with value:
0.43909658236748333.

[I 2024-12-30 11:25:25,036] Trial 267 finished with value: 0.4555335714181393 and parameters: {'w_sarima': 0.9998040834922868, 'w_lstm': 0.03598794787681168}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,057] Trial 268 finished with value: 0.44477511796769 and parameters: {'w_sarima': 0.9684550218906919, 'w_lstm': 0.019460557375747714}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,078] Trial 269 finished with value: 0.43910911060611163 and parameters: {'w_sarima': 0.9500619412853086, 'w_lstm': 0.00030044751274622923}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,099] Trial 270 finished with value: 0.4785562113834177 and parameters: {'w_sarima': 0.959387830873526, 'w_lstm': 0.05622780099909467}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,120] Trial 271 finished with value: 0.444608643076468 and parameters: {'w_sarima': 0.9761552072069113, 'w_lstm': 0.019296640813247456}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,142] Trial 272 finished with value: 0.45894087326243077 and parameters: {'w_sarima': 0.9473403309711932, 'w_lstm': 0.0378274297293586}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,163] Trial 273 finished with value: 0.43910995158916116 and parameters: {'w_sarima': 0.9991640259841686, 'w_lstm': 0.0003337183325335302}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,185] Trial 274 finished with value: 1.0046313455142457 and parameters: {'w_sarima': 0.9783580837373542, 'w_lstm': 0.3591934319273715}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,206] Trial 275 finished with value: 0.44421302621499364 and parameters: {'w_sarima': 0.913283568224756, 'w_lstm': 0.01732797381220722}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,228] Trial 276 finished with value: 0.4769311718625096 and parameters: {'w_sarima': 0.9948729312191679, 'w_lstm': 0.05693539195469142}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,250] Trial 277 finished with value: 0.4391123272115591 and parameters: {'w_sarima': 0.999777649717779, 'w_lstm': 0.00038318983886556906}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,271] Trial 278 finished with value: 0.45552402671231124 and parameters: {'w_sarima': 0.9984413771904466, 'w_lstm': 0.03592742252340947}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,292] Trial 279 finished with value:

0.4459070514368313 and parameters: {'w_sarima': 0.9385629634203334, 'w_lstm': 0.020841194194694337}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,313] Trial 280 finished with value: 0.4576232813105783 and parameters: {'w_sarima': 0.9742408756795303, 'w_lstm': 0.03745539100488867}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,334] Trial 281 finished with value: 0.44377940605362093 and parameters: {'w_sarima': 0.958779337773543, 'w_lstm': 0.01732359314332206}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,355] Trial 282 finished with value: 0.4391580249364968 and parameters: {'w_sarima': 0.9997704264324858, 'w_lstm': 0.0011616783290035028}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,376] Trial 283 finished with value: 0.47953364616212346 and parameters: {'w_sarima': 0.9051522213879654, 'w_lstm': 0.05379071931421571}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,397] Trial 284 finished with value: 0.4440676653414552 and parameters: {'w_sarima': 0.952821244502795, 'w_lstm': 0.017793059031448732}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,420] Trial 285 finished with value: 1.4436933239790262 and parameters: {'w_sarima': 0.9769640284989906, 'w_lstm': 0.6775958573826553}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,440] Trial 286 finished with value: 1.3510819278144333 and parameters: {'w_sarima': 0.9248874134404133, 'w_lstm': 0.5677647492727775}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,461] Trial 287 finished with value: 0.4551750198569157 and parameters: {'w_sarima': 0.9415334937583144, 'w_lstm': 0.033482109908144035}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,483] Trial 288 finished with value: 0.5008176397784982 and parameters: {'w_sarima': 0.9707459239007074, 'w_lstm': 0.07359810523241622}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,503] Trial 289 finished with value: 0.43918132404963117 and parameters: {'w_sarima': 0.9550251323952008, 'w_lstm': 0.0014163043806662353}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,523] Trial 290 finished with value: 0.44474320707001364 and parameters: {'w_sarima': 0.9825944058618569, 'w_lstm': 0.01968354041542865}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:25,544] Trial 291 finished with value: 0.4598836363175654 and parameters: {'w_sarima': 0.9277811874573196,

'w_lstm': 0.03800810918243748}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,565] Trial 292 finished with value:
1.545465918448855 and parameters: {'w_sarima': 0.94730606739367,
'w_lstm': 0.7484219982631409}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,585] Trial 293 finished with value:
0.43912958246643397 and parameters: {'w_sarima': 0.9998304668102439,
'w_lstm': 0.0007089685517625195}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,606] Trial 294 finished with value:
0.43911813058358856 and parameters: {'w_sarima': 0.9092051630069834,
'w_lstm': 0.00045338410871548435}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,627] Trial 295 finished with value:
0.445052570260161 and parameters: {'w_sarima': 0.9773092278513015,
'w_lstm': 0.02016064307722808}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,647] Trial 296 finished with value:
0.4824746188222127 and parameters: {'w_sarima': 0.9614571196667644,
'w_lstm': 0.05946517183485206}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,667] Trial 297 finished with value:
0.4620192457269764 and parameters: {'w_sarima': 0.9328575314664933,
'w_lstm': 0.0403404984006513}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,688] Trial 298 finished with value:
0.43910416135254476 and parameters: {'w_sarima': 0.9999099615400443,
'w_lstm': 0.0002080699274712979}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,710] Trial 299 finished with value:
0.7106548305701738 and parameters: {'w_sarima': 0.9861727758507205,
'w_lstm': 0.1955580962670799}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,732] Trial 300 finished with value:
0.4453210734132344 and parameters: {'w_sarima': 0.9994043426745729,
'w_lstm': 0.021122273629515652}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,751] Trial 301 finished with value:
0.45318081496108975 and parameters: {'w_sarima': 0.9726721531152103,
'w_lstm': 0.032163637840041025}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,772] Trial 302 finished with value:
0.44334611281132114 and parameters: {'w_sarima': 0.9800447252885324,
'w_lstm': 0.016782260009682737}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,792] Trial 303 finished with value:
0.46349598786586665 and parameters: {'w_sarima': 0.999413439843404,
'w_lstm': 0.04474096996759233}. Best is trial 188 with value:

0.43909658236748333.
[I 2024-12-30 11:25:25,813] Trial 304 finished with value:
0.43912562847282377 and parameters: {'w_sarima': 0.9013499632556939,
'w_lstm': 0.0005757155876530214}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,834] Trial 305 finished with value:
0.4461999548015891 and parameters: {'w_sarima': 0.9484513863296703,
'w_lstm': 0.02155312849411728}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,855] Trial 306 finished with value:
0.48260879653751776 and parameters: {'w_sarima': 0.967159101709565,
'w_lstm': 0.059923271832983266}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,876] Trial 307 finished with value:
0.4391247537597009 and parameters: {'w_sarima': 0.9302848840955648,
'w_lstm': 0.0005794296271521345}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,898] Trial 308 finished with value:
0.4537574346342743 and parameters: {'w_sarima': 0.9793587481462396,
'w_lstm': 0.03310573644278371}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,919] Trial 309 finished with value:
1.208015087484763 and parameters: {'w_sarima': 0.9494201878200748,
'w_lstm': 0.4779291968971357}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,940] Trial 310 finished with value:
0.44406305675578417 and parameters: {'w_sarima': 0.9806153062464597,
'w_lstm': 0.018302720686293628}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,960] Trial 311 finished with value:
0.44481671187276217 and parameters: {'w_sarima': 0.9123072268831444,
'w_lstm': 0.01840606790699092}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:25,981] Trial 312 finished with value:
0.5095787411597923 and parameters: {'w_sarima': 0.9640968094455876,
'w_lstm': 0.07903777150097342}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:26,001] Trial 313 finished with value:
0.9271319559944783 and parameters: {'w_sarima': 0.8914201138969358,
'w_lstm': 0.28542266036280617}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:26,022] Trial 314 finished with value:
0.4661806318301245 and parameters: {'w_sarima': 0.9366796701667163,
'w_lstm': 0.044438306591872374}. Best is trial 188 with value:
0.43909658236748333.
[I 2024-12-30 11:25:26,042] Trial 315 finished with value:
0.43912758787290146 and parameters: {'w_sarima': 0.9983240198459582,
'w_lstm': 0.000672743524137553}. Best is trial 188 with value:
0.43909658236748333.

[I 2024-12-30 11:25:26,063] Trial 316 finished with value: 0.4551149471389674 and parameters: {'w_sarima': 0.9671348673189587, 'w_lstm': 0.034321847590640185}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,084] Trial 317 finished with value: 0.44353863653771813 and parameters: {'w_sarima': 0.9994244978902165, 'w_lstm': 0.017538832447322468}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,105] Trial 318 finished with value: 0.48260455265237867 and parameters: {'w_sarima': 0.950602288947357, 'w_lstm': 0.058894168449349985}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,126] Trial 319 finished with value: 0.43911613790436727 and parameters: {'w_sarima': 0.925312688767053, 'w_lstm': 0.0004254493786580155}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,147] Trial 320 finished with value: 0.4530996087225136 and parameters: {'w_sarima': 0.9795101665817355, 'w_lstm': 0.032287162874910465}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,169] Trial 321 finished with value: 0.4391245583670195 and parameters: {'w_sarima': 0.959254412113531, 'w_lstm': 0.0005940566387692639}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,191] Trial 322 finished with value: 0.4445327927175929 and parameters: {'w_sarima': 0.9801010668512541, 'w_lstm': 0.019227378011118363}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,212] Trial 323 finished with value: 0.47217100991968736 and parameters: {'w_sarima': 0.9443726094405304, 'w_lstm': 0.050100775166308564}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,232] Trial 324 finished with value: 0.4441970173786072 and parameters: {'w_sarima': 0.9221684911895414, 'w_lstm': 0.01746634549219668}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,253] Trial 325 finished with value: 0.4562265757830513 and parameters: {'w_sarima': 0.8931851944469896, 'w_lstm': 0.03288875579951803}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,274] Trial 326 finished with value: 0.4390971689233063 and parameters: {'w_sarima': 0.9618665747808856, 'w_lstm': 4.112001862210496e-05}. Best is trial 188 with value: 0.43909658236748333.

[I 2024-12-30 11:25:26,295] Trial 327 finished with value: 0.439096185108384 and parameters: {'w_sarima': 0.9419147856489246, 'w_lstm': 1.7029935327657125e-05}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,316] Trial 328 finished with value:

0.4447723601911648 and parameters: {'w_sarima': 0.9232958245364133, 'w_lstm': 0.018548149761840226}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,336] Trial 329 finished with value: 0.46030700765120636 and parameters: {'w_sarima': 0.9394300142269754, 'w_lstm': 0.038916523598147464}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,356] Trial 330 finished with value: 0.44559902229449466 and parameters: {'w_sarima': 0.9042044557327917, 'w_lstm': 0.019574432953375402}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,377] Trial 331 finished with value: 0.487083169172254 and parameters: {'w_sarima': 0.9585282333177044, 'w_lstm': 0.06280899423113626}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,398] Trial 332 finished with value: 0.4444279189774474 and parameters: {'w_sarima': 0.9402177491737492, 'w_lstm': 0.018248104193002972}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,420] Trial 333 finished with value: 0.4646949106908499 and parameters: {'w_sarima': 0.971652334434017, 'w_lstm': 0.04467275353190742}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,441] Trial 334 finished with value: 0.44545012139335416 and parameters: {'w_sarima': 0.8725571418937541, 'w_lstm': 0.018650482018264646}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,462] Trial 335 finished with value: 0.4391574900016592 and parameters: {'w_sarima': 0.9130267196321162, 'w_lstm': 0.0010537489457886576}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,485] Trial 336 finished with value: 0.5299514492750823 and parameters: {'w_sarima': 0.9501962460493374, 'w_lstm': 0.09073427886404224}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,506] Trial 337 finished with value: 1.0824094916818707 and parameters: {'w_sarima': 0.9721429652600877, 'w_lstm': 0.40517348151725}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,528] Trial 338 finished with value: 0.45629046136583656 and parameters: {'w_sarima': 0.9827452647648091, 'w_lstm': 0.03626071469476329}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,548] Trial 339 finished with value: 0.4391210995924362 and parameters: {'w_sarima': 0.9288829927671078, 'w_lstm': 0.0005157532137205551}. Best is trial 327 with value: 0.439096185108384.

[I 2024-12-30 11:25:26,570] Trial 340 finished with value: 0.45347379199032406 and parameters: {'w_sarima': 0.9562913643416112,

'w_lstm': 0.03198122472190332}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,595] Trial 341 finished with value:
0.4441693671332297 and parameters: {'w_sarima': 0.9999728431732738,
'w_lstm': 0.01888331659209036}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,618] Trial 342 finished with value:
0.4710537557389838 and parameters: {'w_sarima': 0.9790886788535424,
'w_lstm': 0.05095025843772669}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,640] Trial 343 finished with value:
0.4390980441644262 and parameters: {'w_sarima': 0.9402823582103457,
'w_lstm': 6.053424276510396e-05}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,661] Trial 344 finished with value:
0.4391160882292471 and parameters: {'w_sarima': 0.8860069598633257,
'w_lstm': 0.00040650988753465427}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,683] Trial 345 finished with value:
0.5020930757360617 and parameters: {'w_sarima': 0.9147576063519319,
'w_lstm': 0.0701895076635945}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,704] Trial 346 finished with value:
0.4543504980739045 and parameters: {'w_sarima': 0.9633279785930773,
'w_lstm': 0.03328059507475683}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,727] Trial 347 finished with value:
0.43911764668617326 and parameters: {'w_sarima': 0.6938513977854242,
'w_lstm': 0.00033949386713878266}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,748] Trial 348 finished with value:
0.4463157068838435 and parameters: {'w_sarima': 0.9358916264089638,
'w_lstm': 0.021457154318409683}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,771] Trial 349 finished with value:
0.4716933180011883 and parameters: {'w_sarima': 0.9785386780610758,
'w_lstm': 0.051490969296072685}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,793] Trial 350 finished with value:
0.4560688641908171 and parameters: {'w_sarima': 0.49951539443601223,
'w_lstm': 0.018299742304900495}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,815] Trial 351 finished with value:
0.45421765630540817 and parameters: {'w_sarima': 0.9628163239949311,
'w_lstm': 0.0331035317167491}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,836] Trial 352 finished with value:
0.4431813450997668 and parameters: {'w_sarima': 0.9508720601390417,
'w_lstm': 0.01592998899499844}. Best is trial 327 with value:

0.439096185108384.
[I 2024-12-30 11:25:26,858] Trial 353 finished with value:
0.43912648848479685 and parameters: {'w_sarima': 0.9837678745668484,
'w_lstm': 0.0006436021310910622}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,880] Trial 354 finished with value:
0.4591711996214642 and parameters: {'w_sarima': 0.9232756070180564,
'w_lstm': 0.03710207515123633}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,904] Trial 355 finished with value:
0.44655854742526924 and parameters: {'w_sarima': 0.8964100046975452,
'w_lstm': 0.020928321733856496}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,926] Trial 356 finished with value:
0.47107874051967563 and parameters: {'w_sarima': 0.9449208711484777,
'w_lstm': 0.049193776560356936}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,949] Trial 357 finished with value:
0.4391388214340774 and parameters: {'w_sarima': 0.9681565663073186,
'w_lstm': 0.0008379551688628936}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,970] Trial 358 finished with value:
0.4907582148180244 and parameters: {'w_sarima': 0.9998415015525696,
'w_lstm': 0.06835840793919304}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:26,993] Trial 359 finished with value:
0.44422750062126537 and parameters: {'w_sarima': 0.9823776774168154,
'w_lstm': 0.018667966540989456}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:27,014] Trial 360 finished with value:
0.4391117381940347 and parameters: {'w_sarima': 0.9301439448516324,
'w_lstm': 0.00034524647878433266}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:27,036] Trial 361 finished with value:
0.4987821200736202 and parameters: {'w_sarima': 0.4710946478135395,
'w_lstm': 0.03502315369958313}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:27,058] Trial 362 finished with value:
0.4452813333262142 and parameters: {'w_sarima': 0.9592500414499764,
'w_lstm': 0.020202381548499095}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:27,080] Trial 363 finished with value:
0.4391129731563166 and parameters: {'w_sarima': 0.9810715954087531,
'w_lstm': 0.0003889530621444909}. Best is trial 327 with value:
0.439096185108384.
[I 2024-12-30 11:25:27,102] Trial 364 finished with value:
0.46905028918677966 and parameters: {'w_sarima': 0.9391217515197647,
'w_lstm': 0.047130174699551476}. Best is trial 327 with value:
0.439096185108384.

[I 2024-12-30 11:25:27,125] Trial 365 finished with value:
0.44588089758400207 and parameters: {'w_sarima': 0.9156056421685779,
'w_lstm': 0.020288520536409747}. Best is trial 327 with value:
0.439096185108384.

[I 2024-12-30 11:25:27,147] Trial 366 finished with value:
0.43909553246232286 and parameters: {'w_sarima': 0.9611038800129934,
'w_lstm': 1.4382436341755803e-06}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,170] Trial 367 finished with value:
0.4566513896105302 and parameters: {'w_sarima': 0.8984864238635094,
'w_lstm': 0.0335329635749259}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,192] Trial 368 finished with value:
0.44423845141680357 and parameters: {'w_sarima': 0.9528881823396815,
'w_lstm': 0.018128877357914866}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,214] Trial 369 finished with value:
0.48384085790134224 and parameters: {'w_sarima': 0.877614957731231,
'w_lstm': 0.055248834855727284}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,234] Trial 370 finished with value:
0.4391202246237759 and parameters: {'w_sarima': 0.9334540463269292,
'w_lstm': 0.0005028756403498555}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,256] Trial 371 finished with value:
0.455048306482915 and parameters: {'w_sarima': 0.9596447047553123,
'w_lstm': 0.03397810229947622}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,276] Trial 372 finished with value:
1.7599711664457238 and parameters: {'w_sarima': 0.9119098126017304,
'w_lstm': 0.941083764007407}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,297] Trial 373 finished with value:
0.44406221475226765 and parameters: {'w_sarima': 0.9476179117566021,
'w_lstm': 0.017685185580351263}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,318] Trial 374 finished with value:
0.6136510669707553 and parameters: {'w_sarima': 0.511009585251793,
'w_lstm': 0.0740727210855433}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,339] Trial 375 finished with value:
0.4391297779204683 and parameters: {'w_sarima': 0.4549503671143506,
'w_lstm': 0.0003241567617123729}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,359] Trial 376 finished with value:
0.4579190421440621 and parameters: {'w_sarima': 0.974097355160466,
'w_lstm': 0.037778174086856554}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,380] Trial 377 finished with value:

0.4458366927076282 and parameters: {'w_sarima': 0.9241974511193072, 'w_lstm': 0.020405543711056174}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,402] Trial 378 finished with value: 0.4740597033384027 and parameters: {'w_sarima': 0.9570393724831631, 'w_lstm': 0.05238380328852044}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,423] Trial 379 finished with value: 0.4445213872530555 and parameters: {'w_sarima': 0.9791775921057624, 'w_lstm': 0.019187056110192186}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,443] Trial 380 finished with value: 0.4443526399590863 and parameters: {'w_sarima': 0.9423458287875032, 'w_lstm': 0.01814666503269493}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,464] Trial 381 finished with value: 0.5019637491278849 and parameters: {'w_sarima': 0.48573418135845364, 'w_lstm': 0.037225577417922644}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,486] Trial 382 finished with value: 0.4439750923644691 and parameters: {'w_sarima': 0.9670687899935959, 'w_lstm': 0.017872787073862834}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,507] Trial 383 finished with value: 0.4391639505592797 and parameters: {'w_sarima': 0.9146431009888483, 'w_lstm': 0.001140639120142993}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,527] Trial 384 finished with value: 0.47936931737779764 and parameters: {'w_sarima': 0.999998866130917, 'w_lstm': 0.05928998177476234}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,547] Trial 385 finished with value: 0.5075352368731518 and parameters: {'w_sarima': 0.4202758266555125, 'w_lstm': 0.033859914698897146}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,568] Trial 386 finished with value: 0.5505160458693914 and parameters: {'w_sarima': 0.9398668188823168, 'w_lstm': 0.10179893728823974}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,589] Trial 387 finished with value: 0.4466364155961211 and parameters: {'w_sarima': 0.8906784551238816, 'w_lstm': 0.020913227950600924}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,610] Trial 388 finished with value: 1.0125403972647509 and parameters: {'w_sarima': 0.12378457885542438, 'w_lstm': 0.04605585065700515}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,632] Trial 389 finished with value: 0.44396829485398315 and parameters: {'w_sarima': 0.9649990169973464,

'w_lstm': 0.017820816938699403}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,654] Trial 390 finished with value:
0.4391123154437861 and parameters: {'w_sarima': 0.984072385381467,
'w_lstm': 0.00037693324707414297}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,675] Trial 391 finished with value:
0.4391843568460612 and parameters: {'w_sarima': 0.9289581961429655,
'w_lstm': 0.0014141844105433096}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,698] Trial 392 finished with value:
0.4571618503346191 and parameters: {'w_sarima': 0.9552623504928534,
'w_lstm': 0.036219022831583805}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,721] Trial 393 finished with value:
0.439103600602155 and parameters: {'w_sarima': 0.861340217585497,
'w_lstm': 0.00016831485683398013}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,742] Trial 394 finished with value:
0.49067623032138047 and parameters: {'w_sarima': 0.977552188732786,
'w_lstm': 0.06677328411496698}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,764] Trial 395 finished with value:
0.4462832079756076 and parameters: {'w_sarima': 0.9511788861277372,
'w_lstm': 0.02175373263190386}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,786] Trial 396 finished with value:
0.4559792164717368 and parameters: {'w_sarima': 0.9830209142237514,
'w_lstm': 0.03590820622815736}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,809] Trial 397 finished with value:
0.4439439361730913 and parameters: {'w_sarima': 0.968192110455711,
'w_lstm': 0.017830390570847985}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,833] Trial 398 finished with value:
0.43916422731641946 and parameters: {'w_sarima': 0.9990413961159988,
'w_lstm': 0.0012498008113661265}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,855] Trial 399 finished with value:
0.46894644162214005 and parameters: {'w_sarima': 0.930204795446679,
'w_lstm': 0.04659209696141363}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,877] Trial 400 finished with value:
0.6856779415338555 and parameters: {'w_sarima': 0.4402600148301706,
'w_lstm': 0.08130156602745214}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:27,901] Trial 401 finished with value:
0.4391133745648756 and parameters: {'w_sarima': 0.9506002331088299,
'w_lstm': 0.00038461695465365496}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:27,922] Trial 402 finished with value: 0.44700850239971124 and parameters: {'w_sarima': 0.9057830103780677, 'w_lstm': 0.021837046691252592}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,945] Trial 403 finished with value: 0.4548399693555723 and parameters: {'w_sarima': 0.967729515086607, 'w_lstm': 0.0340177393691072}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:27,974] Trial 404 finished with value: 0.43912736906043565 and parameters: {'w_sarima': 0.9389908485284111, 'w_lstm': 0.0006291009596211001}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,004] Trial 405 finished with value: 1.6050317484197407 and parameters: {'w_sarima': 0.9860020020466289, 'w_lstm': 0.8395758845582741}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,030] Trial 406 finished with value: 0.43910355427405845 and parameters: {'w_sarima': 0.9614090846461917, 'w_lstm': 0.00018685834701611534}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,057] Trial 407 finished with value: 0.47639842110511427 and parameters: {'w_sarima': 0.9821583996127952, 'w_lstm': 0.05575889624264324}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,079] Trial 408 finished with value: 0.4438461769237406 and parameters: {'w_sarima': 0.9994190520234102, 'w_lstm': 0.01819962612898704}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,100] Trial 409 finished with value: 0.8871605998495915 and parameters: {'w_sarima': 0.8508003945917073, 'w_lstm': 0.25252808777422897}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,121] Trial 410 finished with value: 0.45401144464873655 and parameters: {'w_sarima': 0.9191011310199435, 'w_lstm': 0.031363168894072264}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,142] Trial 411 finished with value: 0.44444066545159194 and parameters: {'w_sarima': 0.9633723518660107, 'w_lstm': 0.018722111100554824}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,164] Trial 412 finished with value: 0.4674371001424147 and parameters: {'w_sarima': 0.9411736558348455, 'w_lstm': 0.045794780972501364}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,188] Trial 413 finished with value: 0.44387847471412795 and parameters: {'w_sarima': 0.9685862396602112, 'w_lstm': 0.017704274805909987}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,211] Trial 414 finished with value:

0.4391220603554773 and parameters: {'w_sarima': 0.4993645473815034, 'w_lstm': 0.0002862486970918363}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,234] Trial 415 finished with value: 1.985972048453358 and parameters: {'w_sarima': 0.5482715079195367, 'w_lstm': 0.7490000204287678}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,256] Trial 416 finished with value: 0.5160770791219566 and parameters: {'w_sarima': 0.3809190846223294, 'w_lstm': 0.03291166087569273}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,277] Trial 417 finished with value: 0.5814819763077084 and parameters: {'w_sarima': 0.4733158250530211, 'w_lstm': 0.059946429795914795}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,298] Trial 418 finished with value: 0.4442590249716395 and parameters: {'w_sarima': 0.9428019495300209, 'w_lstm': 0.017976512415482825}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,319] Trial 419 finished with value: 0.43910107564782447 and parameters: {'w_sarima': 0.9823330845537219, 'w_lstm': 0.00013471361784023742}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,339] Trial 420 finished with value: 0.766127585186058 and parameters: {'w_sarima': 0.9824026105000055, 'w_lstm': 0.22465661513619462}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,361] Trial 421 finished with value: 0.4544732750286468 and parameters: {'w_sarima': 0.9985733403468041, 'w_lstm': 0.03465045733721285}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,382] Trial 422 finished with value: 0.44351813582071015 and parameters: {'w_sarima': 0.9751673029348171, 'w_lstm': 0.017069424115942748}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,402] Trial 423 finished with value: 2.065094336719709 and parameters: {'w_sarima': 0.5244512775527679, 'w_lstm': 0.7919119712901855}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,423] Trial 424 finished with value: 0.5003512767411967 and parameters: {'w_sarima': 0.6571407671937692, 'w_lstm': 0.049601145738644374}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,445] Trial 425 finished with value: 1.28854592524088 and parameters: {'w_sarima': 0.9990487989850799, 'w_lstm': 0.5633124970982726}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:28,468] Trial 426 finished with value: 0.4391040329976011 and parameters: {'w_sarima': 0.9627653409110019,

'w_lstm': 0.0001975544152703852}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,490] Trial 427 finished with value:
0.4391381348852077 and parameters: {'w_sarima': 0.9256974205825883,
'w_lstm': 0.0007907698772352294}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,512] Trial 428 finished with value:
0.4533031122952204 and parameters: {'w_sarima': 0.9586866395875315,
'w_lstm': 0.031851911417873524}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,534] Trial 429 finished with value:
0.4450853143686067 and parameters: {'w_sarima': 0.9015588375587406,
'w_lstm': 0.018654161590610757}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,556] Trial 430 finished with value:
0.4931516928299042 and parameters: {'w_sarima': 0.9619278271634262,
'w_lstm': 0.06751069064311045}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,578] Trial 431 finished with value:
0.44563687077550734 and parameters: {'w_sarima': 0.9336969036242041,
'w_lstm': 0.02027742291758383}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,600] Trial 432 finished with value:
0.43910280179801 and parameters: {'w_sarima': 0.945298309711192,
'w_lstm': 0.000167495910621473}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,622] Trial 433 finished with value:
0.4391058717262219 and parameters: {'w_sarima': 0.9159206916860204,
'w_lstm': 0.00022550312904006205}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,643] Trial 434 finished with value:
0.46960330233874775 and parameters: {'w_sarima': 0.8850002161722152,
'w_lstm': 0.04487097984067461}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,665] Trial 435 finished with value:
0.4566985598733785 and parameters: {'w_sarima': 0.9421506326372937,
'w_lstm': 0.035214557089991015}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,685] Trial 436 finished with value:
0.4448476362507764 and parameters: {'w_sarima': 0.9106504937894191,
'w_lstm': 0.018427227695687845}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,707] Trial 437 finished with value:
0.4391187387223794 and parameters: {'w_sarima': 0.9296673098114098,
'w_lstm': 0.00047447985094540765}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,731] Trial 438 finished with value:
0.444670518790914 and parameters: {'w_sarima': 0.9552346769778131,
'w_lstm': 0.018999486902172107}. Best is trial 366 with value:

0.43909553246232286.
[I 2024-12-30 11:25:28,752] Trial 439 finished with value:
0.5568161142195878 and parameters: {'w_sarima': 0.446378133814063,
'w_lstm': 0.05004891692977504}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,774] Trial 440 finished with value:
0.43912068852610775 and parameters: {'w_sarima': 0.9453437798871919,
'w_lstm': 0.00051757365478579}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,795] Trial 441 finished with value:
0.45829340248518957 and parameters: {'w_sarima': 0.8663257021153469,
'w_lstm': 0.03396526905449626}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,817] Trial 442 finished with value:
0.44515622468504296 and parameters: {'w_sarima': 0.9662419337103487,
'w_lstm': 0.020122325695892417}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,838] Trial 443 finished with value:
0.5166373322128366 and parameters: {'w_sarima': 0.9031530015168713,
'w_lstm': 0.07837231003013664}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,860] Trial 444 finished with value:
0.5191901012085499 and parameters: {'w_sarima': 0.4060967237424894,
'w_lstm': 0.03593067714833389}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,882] Trial 445 finished with value:
1.0349843059186083 and parameters: {'w_sarima': 0.9276162861615562,
'w_lstm': 0.35823458243086154}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,904] Trial 446 finished with value:
0.44450479159128253 and parameters: {'w_sarima': 0.9691828976093189,
'w_lstm': 0.01895918968991022}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,925] Trial 447 finished with value:
0.4784382923254995 and parameters: {'w_sarima': 0.9457555535976296,
'w_lstm': 0.0553348805251792}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,947] Trial 448 finished with value:
0.45665055916856223 and parameters: {'w_sarima': 0.4834908618855091,
'w_lstm': 0.01804418943834109}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,969] Trial 449 finished with value:
1.6867888525956065 and parameters: {'w_sarima': 0.9236760632651648,
'w_lstm': 0.8707471151302201}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:28,992] Trial 450 finished with value:
0.4391300342427515 and parameters: {'w_sarima': 0.9737050220287912,
'w_lstm': 0.0006981359637827908}. Best is trial 366 with value:
0.43909553246232286.

[I 2024-12-30 11:25:29,015] Trial 451 finished with value: 0.7204880038529884 and parameters: {'w_sarima': 0.8251635900734797, 'w_lstm': 0.1680599953463716}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,036] Trial 452 finished with value: 0.4559829918523466 and parameters: {'w_sarima': 0.9599778373363537, 'w_lstm': 0.03507079167944492}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,059] Trial 453 finished with value: 0.4434372696926172 and parameters: {'w_sarima': 0.891661864570575, 'w_lstm': 0.015449190793662929}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,080] Trial 454 finished with value: 0.4728471357582787 and parameters: {'w_sarima': 0.9456164889263619, 'w_lstm': 0.050740574450030634}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,102] Trial 455 finished with value: 0.43913692408415855 and parameters: {'w_sarima': 0.9755261200381307, 'w_lstm': 0.0008138128043889804}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,124] Trial 456 finished with value: 0.4537790166102567 and parameters: {'w_sarima': 0.9162063100484878, 'w_lstm': 0.030995981071289667}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,145] Trial 457 finished with value: 0.4391077632637299 and parameters: {'w_sarima': 0.945013519642671, 'w_lstm': 0.00027162646811779053}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,167] Trial 458 finished with value: 0.5175202449837125 and parameters: {'w_sarima': 0.2260458883795181, 'w_lstm': 0.01974889547462781}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,188] Trial 459 finished with value: 0.4391129631390682 and parameters: {'w_sarima': 0.9813128632464362, 'w_lstm': 0.0003888487824602747}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,211] Trial 460 finished with value: 1.1652837519739447 and parameters: {'w_sarima': 0.9582227695820206, 'w_lstm': 0.4531882764327154}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,232] Trial 461 finished with value: 0.5289458148930352 and parameters: {'w_sarima': 0.9315881070086011, 'w_lstm': 0.08835639852422822}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,255] Trial 462 finished with value: 1.3764874519444816 and parameters: {'w_sarima': 0.9840288767610567, 'w_lstm': 0.6248963398924711}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,276] Trial 463 finished with value:

0.5033594874880573 and parameters: {'w_sarima': 0.4632998076611267, 'w_lstm': 0.0359668548178774}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,298] Trial 464 finished with value: 0.4550657562589168 and parameters: {'w_sarima': 0.5053339906739321, 'w_lstm': 0.017903093776464422}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,321] Trial 465 finished with value: 0.4860554223535432 and parameters: {'w_sarima': 0.9612749811219643, 'w_lstm': 0.06221163874318166}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,343] Trial 466 finished with value: 0.43911358378086773 and parameters: {'w_sarima': 0.8748926660682563, 'w_lstm': 0.00035768852693998047}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,364] Trial 467 finished with value: 0.4823530816418792 and parameters: {'w_sarima': 0.7393893524725303, 'w_lstm': 0.04565740840247762}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,386] Trial 468 finished with value: 0.44473848431028573 and parameters: {'w_sarima': 0.9348535875288604, 'w_lstm': 0.018718564134581835}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,408] Trial 469 finished with value: 0.9521502744663811 and parameters: {'w_sarima': 0.9036444221698786, 'w_lstm': 0.30280841817345266}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,429] Trial 470 finished with value: 0.4498522934435965 and parameters: {'w_sarima': 0.9780571867351064, 'w_lstm': 0.027898937702396185}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,450] Trial 471 finished with value: 3.175222639704076 and parameters: {'w_sarima': 0.04327191124187746, 'w_lstm': 0.6591093374420967}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,472] Trial 472 finished with value: 0.4391206623972442 and parameters: {'w_sarima': 0.9540244242243797, 'w_lstm': 0.0005218558293181234}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,494] Trial 473 finished with value: 0.4562856356067116 and parameters: {'w_sarima': 0.9263949659595524, 'w_lstm': 0.03417625801861215}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,517] Trial 474 finished with value: 0.46020815469720827 and parameters: {'w_sarima': 0.4270748481542346, 'w_lstm': 0.01764624250991832}. Best is trial 366 with value: 0.43909553246232286.

[I 2024-12-30 11:25:29,539] Trial 475 finished with value: 0.4912563278929017 and parameters: {'w_sarima': 0.9746991553103588,

'w_lstm': 0.06700959654605465}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,563] Trial 476 finished with value:
0.4390999278617158 and parameters: {'w_sarima': 0.9504285902415548,
'w_lstm': 0.00010451505286465506}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,585] Trial 477 finished with value:
0.4714135884227564 and parameters: {'w_sarima': 0.9087096333591663,
'w_lstm': 0.047585809314426984}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,609] Trial 478 finished with value:
0.44551800847672574 and parameters: {'w_sarima': 0.9388666421839535,
'w_lstm': 0.02018532612067571}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,632] Trial 479 finished with value:
0.4603008163394189 and parameters: {'w_sarima': 0.9214667713212867,
'w_lstm': 0.03816622457251104}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,653] Trial 480 finished with value:
0.44502706139587367 and parameters: {'w_sarima': 0.8431454278223032,
'w_lstm': 0.017352011393983364}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,675] Trial 481 finished with value:
0.43912735614594844 and parameters: {'w_sarima': 0.9491520885454372,
'w_lstm': 0.0006356901857506984}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,699] Trial 482 finished with value:
0.45518677653802436 and parameters: {'w_sarima': 0.9442492872720336,
'w_lstm': 0.03359217856540794}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,723] Trial 483 finished with value:
0.44528517588691857 and parameters: {'w_sarima': 0.9028158062500682,
'w_lstm': 0.019020334157276463}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,746] Trial 484 finished with value:
0.47689915687803053 and parameters: {'w_sarima': 0.9636636497647325,
'w_lstm': 0.05512292336509813}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,770] Trial 485 finished with value:
0.43910696720169656 and parameters: {'w_sarima': 0.8784954675715205,
'w_lstm': 0.00023736495917834027}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,793] Trial 486 finished with value:
0.4450269908648615 and parameters: {'w_sarima': 0.9249120906503054,
'w_lstm': 0.01903465268615287}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,815] Trial 487 finished with value:
0.45934159985560985 and parameters: {'w_sarima': 0.949130367267907,
'w_lstm': 0.03831944574502876}. Best is trial 366 with value:

0.43909553246232286.
[I 2024-12-30 11:25:29,838] Trial 488 finished with value:
0.44439184551833005 and parameters: {'w_sarima': 0.9605575295094617,
'w_lstm': 0.01857326384789629}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,862] Trial 489 finished with value:
0.508437424089206 and parameters: {'w_sarima': 0.9354029483758737,
'w_lstm': 0.07594755286423452}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,885] Trial 490 finished with value:
0.44454752332587566 and parameters: {'w_sarima': 0.9117223621724377,
'w_lstm': 0.017912615584179933}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,909] Trial 491 finished with value:
0.5313342595653656 and parameters: {'w_sarima': 0.5224766527029524,
'w_lstm': 0.050353164871043146}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,931] Trial 492 finished with value:
0.45550032655213385 and parameters: {'w_sarima': 0.9809181345696086,
'w_lstm': 0.03526886922645353}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,954] Trial 493 finished with value:
0.4579411556826039 and parameters: {'w_sarima': 0.48884838261412106,
'w_lstm': 0.018971158460345888}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,976] Trial 494 finished with value:
0.4437448030395659 and parameters: {'w_sarima': 0.9625451177070066,
'w_lstm': 0.017320531551668118}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:29,999] Trial 495 finished with value:
0.7279298018749951 and parameters: {'w_sarima': 0.5595803232196757,
'w_lstm': 0.11624423679836685}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:30,023] Trial 496 finished with value:
0.43926707455243863 and parameters: {'w_sarima': 0.8873706276647643,
'w_lstm': 0.0021733717282378176}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:30,047] Trial 497 finished with value:
0.4391576463323439 and parameters: {'w_sarima': 0.928644045801837,
'w_lstm': 0.0010738972031808505}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:30,070] Trial 498 finished with value:
2.0963778721399766 and parameters: {'w_sarima': 0.45583713491652356,
'w_lstm': 0.7164523811702416}. Best is trial 366 with value:
0.43909553246232286.
[I 2024-12-30 11:25:30,094] Trial 499 finished with value:
0.4391216722728952 and parameters: {'w_sarima': 0.9807997606825044,
'w_lstm': 0.0005551124353492261}. Best is trial 366 with value:
0.43909553246232286.

```

# Get the best weights for SARIMA and LSTM
best_weights = study_ensemble.best_params
print("Best Ensemble Weights:", best_weights)

Best Ensemble Weights: {'w_sarima': 0.9611038800129934, 'w_lstm':
1.4382436341755803e-06}

# Final ensemble predictions using best weights
w_sarima = best_weights['w_sarima']
w_lstm = best_weights['w_lstm']

# Normalize weights
total_weight = w_sarima + w_lstm
w_sarima /= total_weight
w_lstm /= total_weight

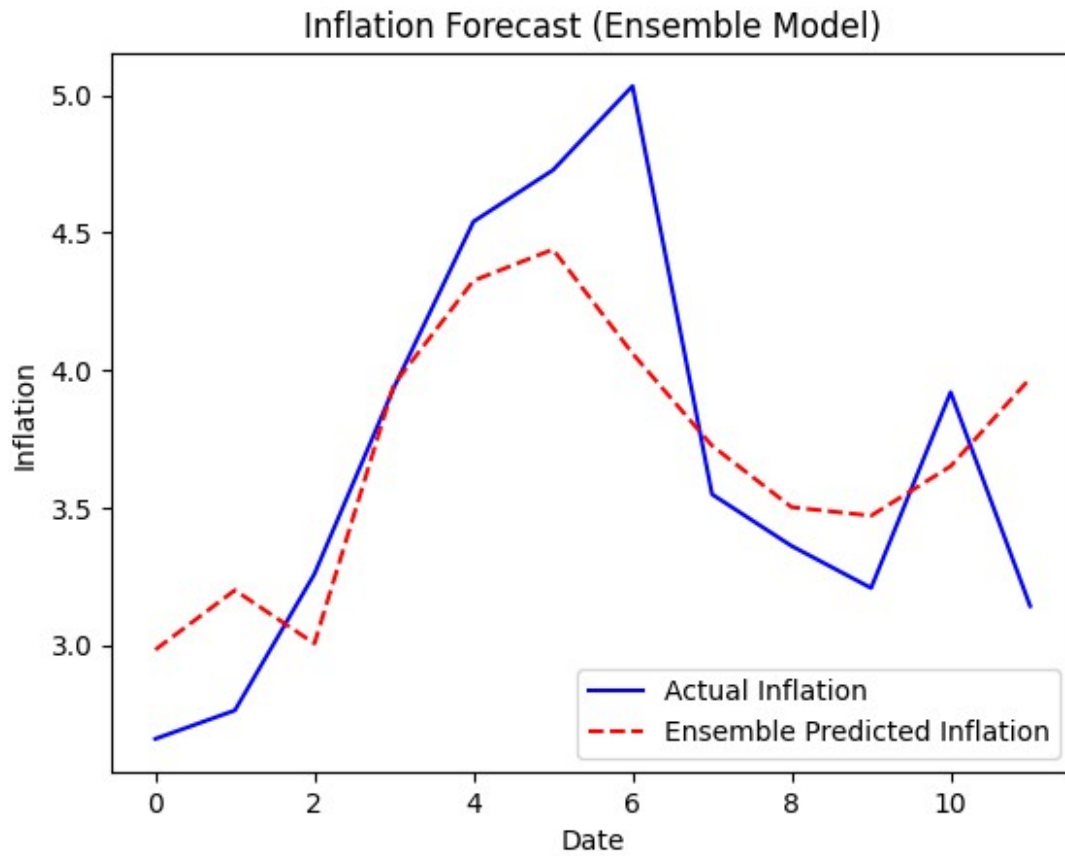
final_ensemble_pred = (
    w_sarima * sarima_pred +
    w_lstm * y_pred_lstm
)

# Evaluate the final ensemble model
final_rmse = mean_squared_error(y_test, final_ensemble_pred,
squared=False)
print(f"Final Ensemble RMSE: {final_rmse}")

Final Ensemble RMSE: 0.43909553246232286

# Plot actual vs predicted inflation for the ensemble model
plt.plot(y_test.index, y_test, label='Actual Inflation', color='blue')
plt.plot(y_test.index, final_ensemble_pred, label='Ensemble Predicted
Inflation', linestyle='--', color='red')
plt.legend()
plt.title("Inflation Forecast (Ensemble Model)")
plt.xlabel("Date")
plt.ylabel("Inflation")
plt.show()

```



```
# Flatten y_test and final_ensemble_pred to make them 1-dimensional
y_test_flat = y_test.values.ravel() # Convert y_test to a 1D array
y_pred_ensemble_flat = final_ensemble_pred.ravel() # Convert ensemble
predictions to a 1D array

# Create a DataFrame with Actual vs Predicted Inflation for the
ensemble model
inflation_comparison_ensemble = pd.DataFrame({
    'Actual Inflation': y_test_flat,
    'Ensemble Predicted Inflation': y_pred_ensemble_flat
})

# Display the table
print(inflation_comparison_ensemble)

# Optionally, save it to a CSV file
inflation_comparison_ensemble.to_csv('inflation_comparison_ensemble.csv', index=False)
```

	Actual Inflation	Ensemble Predicted Inflation
0	2.659581	2.983712
1	2.763105	3.200124
2	3.258886	3.006111

3	3.936922	3.947911
4	4.540525	4.325689
5	4.727825	4.439273
6	5.033436	4.060910
7	3.548792	3.725445
8	3.360973	3.502007
9	3.208128	3.470916
10	3.920039	3.650754
11	3.142613	3.970686