source_code_aerosols-img

June 24, 2024

[ ]: 1. Introdução

Este relatorio para a UC de Redes Neuronais e Aprendizagem Profunda tem como
↪objetivo construir um modelo capaz de estimar a AOT (Aerosol Optical
↪Thickness) a 550 nm para uma localização específica a partir da imagem
↪correspondente dos satelites Sentinel-2 em conjunto com os dados recolhidos
↪pelas estações AERONET.

Descrição dos Dados para construir o modelo:

Imagens Sentinel-2 de 19x19 pixels centradas na localização da estação AERONET.

Medidas de elevação, ozono e NO2 obtidas a partir da estação AERONET;

Ângulos solares (azimute e zenite);

Ângulos de incidência do satélite (azimute e zenite);

Nome de cada ficheiro de imagem coreespondente, com o qual podemos identificar
↪a data, a hora da imagem e as cordenadas da estação AERONET.

Feature a prever:

value_550: AOT de 550 nm para qualquer localização com base nos dados dos
↪satelites Sentinel-2.

No geral, o dataset é composto por 13.150 pontos de dados, com 10439
↪observaçoes para treino e 2711 para teste.

[1]:
```python
# Bibliotecas Gerais
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```python
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split, KFold
import matplotlib.pyplot as plt

# TensorFlow
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Dropout
from tensorflow.keras.layers import LeakyReLU
from tensorflow.keras.layers import Dense, Dropout, BatchNormalization
from tensorflow.keras.regularizers import l2, l1
from tensorflow.keras.callbacks import EarlyStopping
from tensorflow.keras.optimizers import Adam
```

[2]:
```python
# Ler dados
train_data = pd.read_csv('train.csv')
test_data = pd.read_csv('test.csv')
```

[ ]: 2. Pré-processamento dos Dados

As etapas de pré-processamento dos dados de treino e de teste são abrangentes,␣
↪de modo a extrair o maximo de features que revelem valor na predição do␣
↪valor AOT 550 nm:

Passando pelas seguintes etapas:

Extração de features a partir do nome do ficheiro de imagem, como a data, a␣
↪hora e **as** coordenadas da estação AERONET.

Remoção da coluna id que não tem valor preditivo, e da coluna file_name_l1␣
↪que foi usada para extrair **as** features mencionadas acima.

Ordenação dos valores de AOT 550 nm para testar a construção do modelo com␣
↪a variável target ordenada.

Divisão dos dados de treino em train_set e validation_set, de modo a poder␣
↪construir um modelo que seja capaz de generalizar para dados não vistos.

Standardização dos dados de treino e de teste, de modo a garantir que todas␣
↪**as** features tenham a mesma escala e não seja um fator que influencie a␣
↪predição do modelo.

[3]:
```python
# Função para dividir o nome do file e extrair informações
def extract_features_from_filename(filename):
    parts = filename.split('_')

    def clean_coordinate(coordinate):
```

```python
        clean_coord = coordinate.replace('-', '')
        try:
            return float(clean_coord)
        except ValueError:
            return clean_coord


    if len(parts) == 11:
        coordinates_id1 = clean_coordinate(parts[4])
        coordinates_id2 = clean_coordinate(parts[5])
        date_time_acquisition_start = parts[8].replace('T', '')
        date_time_acquisition_end = parts[9].replace('T', '')
        return pd.Series([coordinates_id1, coordinates_id2,
↪date_time_acquisition_start, date_time_acquisition_end],
                        index=['coordinates_id1', 'coordinates_id2',
↪'date_time_acquisition_start', 'date_time_acquisition_end'])

    if len(parts) == 10:
        coordinates_id1 = clean_coordinate(parts[3])
        coordinates_id2 = clean_coordinate(parts[4])
        date_time_acquisition_start = parts[7].replace('T', '')
        date_time_acquisition_end = parts[8].replace('T', '')
        return pd.Series([coordinates_id1, coordinates_id2,
↪date_time_acquisition_start, date_time_acquisition_end],
                        index=['coordinates_id1', 'coordinates_id2',
↪'date_time_acquisition_start', 'date_time_acquisition_end'])

    if len(parts) == 9:
        coordinates_id1 = clean_coordinate(parts[2])
        coordinates_id2 = clean_coordinate(parts[3])
        date_time_acquisition_start = parts[6].replace('T', '')
        date_time_acquisition_end = parts[7].replace('T', '')
        return pd.Series([coordinates_id1, coordinates_id2,
↪date_time_acquisition_start, date_time_acquisition_end],
                        index=['coordinates_id1', 'coordinates_id2',
↪'date_time_acquisition_start', 'date_time_acquisition_end'])

    if len(parts) == 8:
        coordinates_id1 = clean_coordinate(parts[1])
        coordinates_id2 = clean_coordinate(parts[2])
        date_time_acquisition_start = parts[5].replace('T', '')
        date_time_acquisition_end = parts[6].replace('T', '')
        return pd.Series([coordinates_id1, coordinates_id2,
↪date_time_acquisition_start, date_time_acquisition_end],
                        index=['coordinates_id1', 'coordinates_id2',
↪'date_time_acquisition_start', 'date_time_acquisition_end'])
```

```python
    return pd.Series([None]*4, index=['coordinates_id1', 'coordinates_id2',
 ↪'date_time_acquisition_start', 'date_time_acquisition_end'])

# Aplicar a função a cada nome de arquivo no dataset
file_features = train_data['file_name_l1'].apply(extract_features_from_filename)
file_features_test = test_data['file_name_l1'].
 ↪apply(extract_features_from_filename)

# Concatenar as novas features ao dataframe original
train_data = pd.concat([train_data, file_features], axis=1)
test_data = pd.concat([test_data, file_features_test], axis=1)
```

[4]:
```python
# Remover colunas 'id' e 'file_name_l1'

train_data = train_data.drop(columns=['id', 'file_name_l1'])
test_data = test_data.drop(columns=['file_name_l1'])
```

[5]:
```python
# Estatísticas descritivas dos dados de treino

print("Estatísticas Descritivas do Dataset de Treino:")
desc_stats = train_data.describe()
print(desc_stats.to_string())
print("\n")

# Verificar valores nulos
print("Verificar Missing Data:")
missing_data = train_data.isnull().sum()
print(missing_data.to_string())
```

```
Estatísticas Descritivas do Dataset de Treino:
          elevation          ozone            NO2        azimuth         zenith
incidence_azimuth  incidence_zenith      value_550  coordinates_id1
coordinates_id2
count  10438.000000   10438.000000   10438.000000   10438.000000   10438.000000
10438.000000       10438.000000   10438.000000    1.043800e+04    1.043800e+04
mean     417.992240     317.283388       0.226330     148.246685      43.553870
191.787363            6.088504       0.143846    2.359460e+07    3.621300e+07
std      671.904367      39.412705       0.101593      33.901711      15.653371
78.862966            2.490754       0.165720    2.582994e+07    4.428080e+07
min      -32.000000     237.000000       0.054000      18.700000       7.000000
96.700000            2.500000       0.010000    1.350000e+02    4.400000e+01
25%       51.000000     288.000000       0.171000     137.100000      30.200000
106.000000            3.600000       0.055000    4.871160e+05    7.813950e+05
50%      174.000000     313.000000       0.201000     153.200000      41.500000
180.700000            6.000000       0.093000    5.859417e+06    1.059290e+07
75%      423.000000     344.000000       0.263000     163.700000      56.700000
283.100000            8.200000       0.166000    4.196685e+07    7.126862e+07
```

```
max      5233.000000     450.000000        1.356000     248.500000      82.000000
349.800000            11.500000        1.985000     8.005361e+07    1.747681e+08
```

```
Verificar Missing Data:
elevation                      0
ozone                          0
NO2                            0
azimuth                        0
zenith                         0
incidence_azimuth              0
incidence_zenith               0
value_550                      0
coordinates_id1                0
coordinates_id2                0
date_time_acquisition_start    0
date_time_acquisition_end      0
```
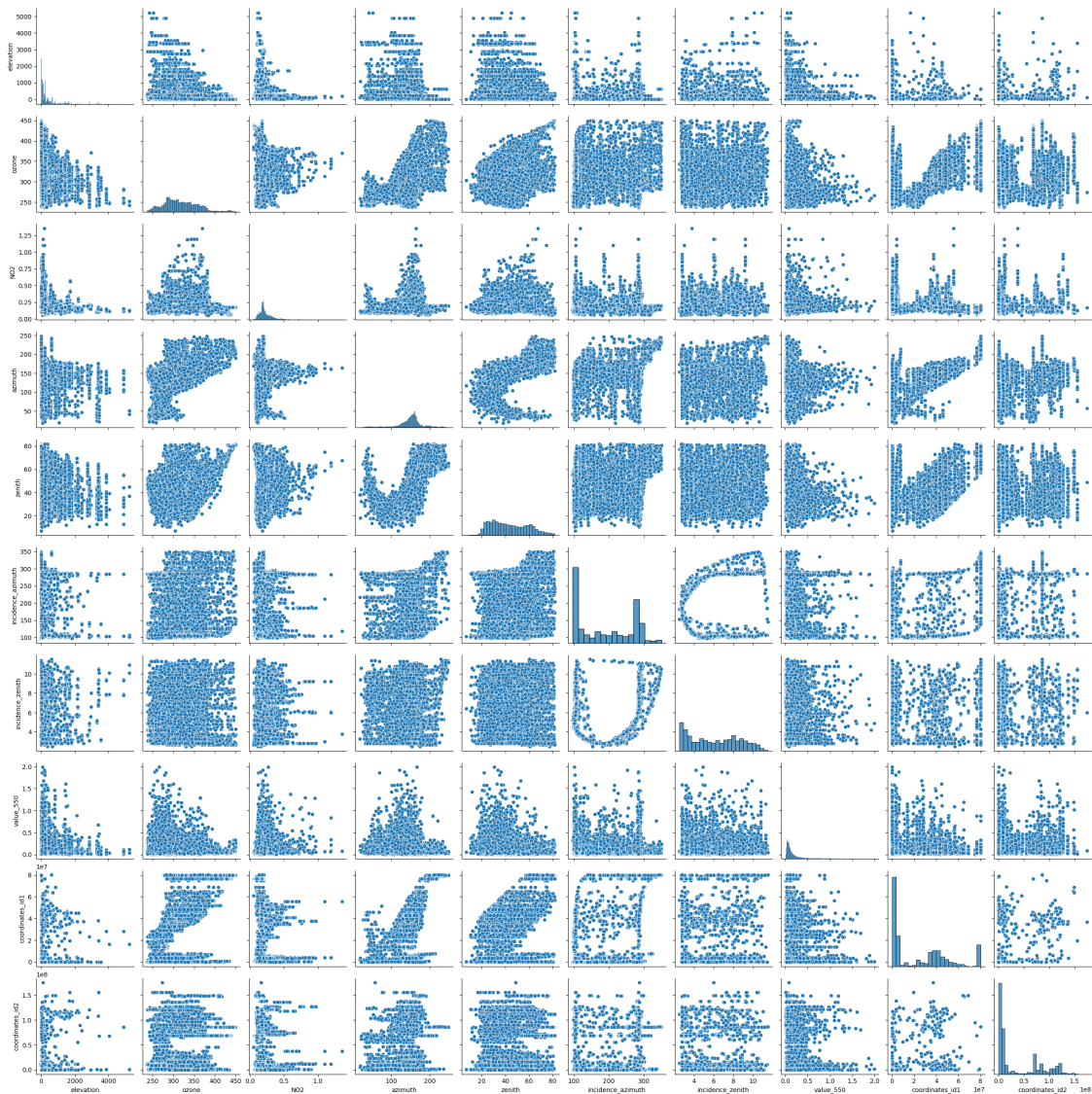
[6]:
```python
# Graficos e Visualizações dos dados de treino

numeric_columns = train_data.select_dtypes(include=['number']).columns
sns.pairplot(train_data[numeric_columns])
plt.show()
```

```
c:\ProgramData\anaconda3\Lib\site-packages\seaborn\axisgrid.py:118: UserWarning:
The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

```
[8]:  # Visualizar a distribuição normal das features
      df_analise_dist = train_data.melt()

      # Histograma para cada feature do DataSet
      g = sns.FacetGrid(df_analise_dist, col="variable", col_wrap=4, sharex=False,␣
       ↪sharey=False, height=4)
      g.map(sns.histplot, "value", kde=False, color='blue', bins=30)
      plt.show()
```

c:\ProgramData\anaconda3\Lib\site-packages\seaborn\axisgrid.py:118: UserWarning:
The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
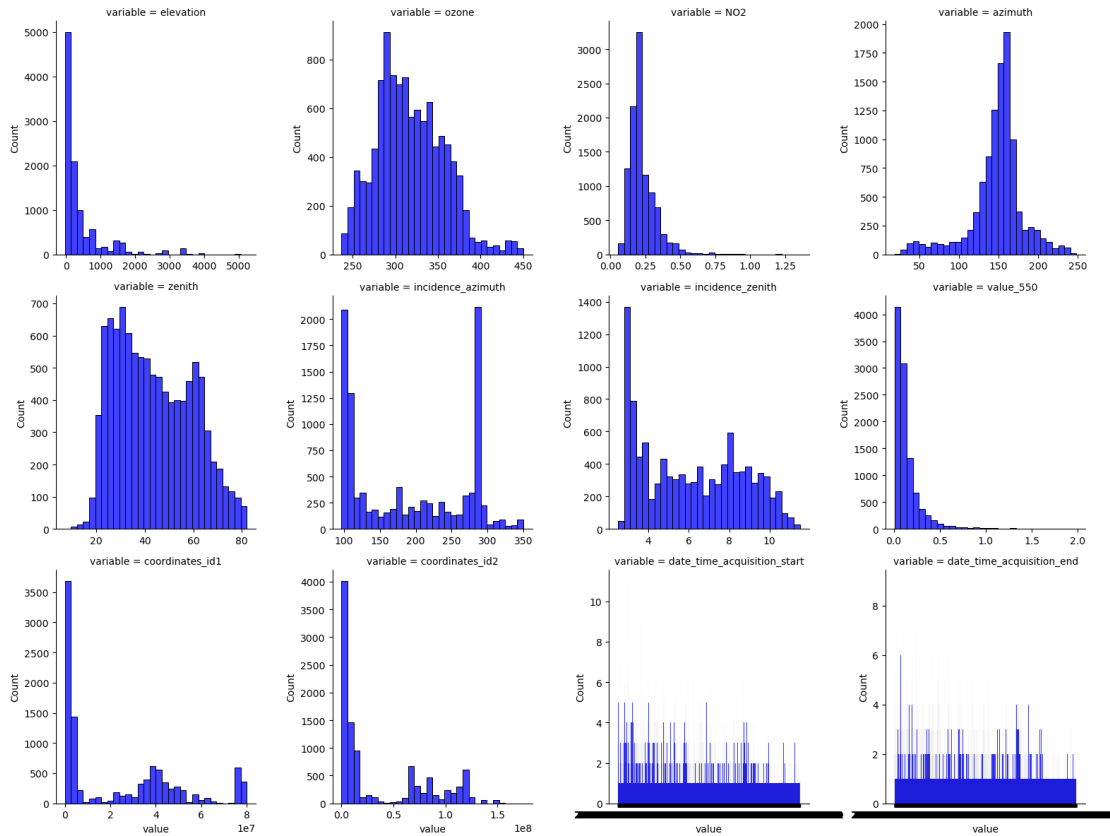
[ ]:
3. Análise do Dataset

Pela análise dos dados de treino, podemos observar que:

   Não existem valores nulos no dataset.

   Existem outliers em algumas features, como a elevação e o ozono, mas␣
   ↪conclui-se que são valores válidos e não são removidos.

   A distribuição das features é bastante variada, com algumas features a␣
   ↪terem uma distribuição normal e outras com uma distribuição mais␣
   ↪assimétrica, revelando que a incidencia_azimute e a incidencia_zenite são␣
   ↪features que podem não ser as mais relevantes para a predição do valor AOT␣
   ↪550 nm, mas todas as restantes têm alguma corelação com a variável target.

[9]:
```
# Valor_550 **COM** ordenação

#train_data_sorted = train_data.sort_values(by='value_550')
#X = train_data_sorted.drop(columns=['value_550'])
```

```
# Valor_550 **SEM** ordenação
#Opção1
X = train_data.drop(columns=['value_550'])

#Opção2
#X = train_data.drop(columns=['value_550','azimuth','zenith'])

#Opção3
#X = train_data_sorted.
 ↪drop(columns=['value_550','azimuth','zenith','date_time_acquisition_start','date_time_acqui


# Target
y = train_data['value_550']



# Dividir os dados de treino completos em treino e validação
X_train, X_val, y_train, y_val = train_test_split(X, y, test_size=0.20,␣
 ↪random_state=10)
```

[10]:
```
# Standardizar as features dos dados de treino e validação

scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_val_scaled = scaler.transform(X_val)

# Standardizar as features dos dados completos

scaler = StandardScaler()
X_scaled  = scaler.fit_transform(X)
```

[ ]:
```
4. Design do Setup Exprimental e Construção do Modelo

Os modelos construidos são assim divididos em 2 fases, a primeira com os dados␣
 ↪divididos em treino e validação, e a segunda com os dados de treino␣
 ↪completos aquando a descoberta de uma arqitetura estavel de modo a utilizar␣
 ↪a totalidade dos das de treino disponiveis.

   Fase 1: Construção de um modelo de regressão com recurso à bilioteca␣
 ↪Tesorflow, dividido em folds de validação cruzada para avaliar o MAE (mean␣
 ↪absolute error) do modelo criado, com o objectivo de obter a arquitetura␣
 ↪mais estavel e com o valor de MAE mais baixo possivel.
```

Fase 2: Construção do mesmo modelo utilizado na Fase 1, mas com os dados de
treino completos dada a quantidade escassa de dados disponiveis para treino.

```python
# Criação do modelo com K-Fold Cross Validation

def create_model():
    model = Sequential([
        Dense(200, activation=LeakyReLU(negative_slope=0.01),
    kernel_regularizer=l1(0.0001),
                kernel_initializer='glorot_uniform', input_shape=(X_train_scaled.
    shape[1],)),
        BatchNormalization(),
        Dropout(0.3),
        Dense(100, activation=LeakyReLU(negative_slope=0.01),
    kernel_regularizer=l2(0.001)),
        BatchNormalization(),
        Dropout(0.156),
        Dense(50, activation='relu'),
        BatchNormalization(),
        Dropout(0.025),
        Dense(1)
    ])

    optimizer = Adam(learning_rate=0.0003)
    model.compile(optimizer=optimizer, loss='mean_squared_error',
    metrics=['mae'])

    return model

# K-Fold Cross Validation
kf = KFold(n_splits=10, shuffle=True, random_state=10)

val_mae_scores = []

# Loop para cada fold
for train_index, val_index in kf.split(X_train_scaled):
    X_train_fold, X_val_fold = X_train_scaled[train_index],
    X_train_scaled[val_index]
    y_train_fold, y_val_fold = y_train.iloc[train_index], y_train.
    iloc[val_index]

    model = create_model()

    # Early stopping callback
    early_stopping = EarlyStopping(monitor='val_loss', patience=25,
    restore_best_weights=True)
```

```python
    # Treinar o modelo
    history = model.fit(X_train_fold, y_train_fold, epochs=550, batch_size=512,
                        validation_data=(X_val_fold, y_val_fold),␣
 ↪callbacks=[early_stopping], verbose=1)

    # Plotting do training and validation loss para cada fold
    plt.figure(figsize=(12, 6))
    plt.plot(history.history['loss'], label='Training Loss')
    plt.plot(history.history['val_loss'], label='Validation Loss')
    plt.xlabel('Epochs')
    plt.ylabel('Loss')
    plt.title(f'Training and Validation Loss - Fold {len(val_mae_scores) + 1}')
    plt.legend()
    plt.show()

    # Plotting do training and validation MAE para cada fold
    plt.figure(figsize=(12, 6))
    plt.plot(history.history['mae'], label='Training MAE')
    plt.plot(history.history['val_mae'], label='Validation MAE')
    plt.xlabel('Epochs')
    plt.ylabel('MAE')
    plt.title(f'Training and Validation MAE - Fold {len(val_mae_scores) + 1}')
    plt.legend()
    plt.show()

    # Avaliar o modelo no conjunto de validação
    val_loss, val_mae = model.evaluate(X_val_fold, y_val_fold, verbose=0)
    val_mae_scores.append(val_mae)
    print(f"Fold Validation MAE: {val_mae}")

# Calcular a média e desvio padrão dos scores de validação
mean_val_mae = np.mean(val_mae_scores)
std_val_mae = np.std(val_mae_scores)

print(f"\nMean Validation MAE: {mean_val_mae}")
print(f"Standard Deviation of Validation MAE: {std_val_mae}")
```

Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

15/15   2s 22ms/step -
loss: 1.7602 - mae: 0.9765 - val_loss: 0.1860 - val_mae: 0.1259
Epoch 2/550

```
15/15                0s 5ms/step - loss:
1.1124 - mae: 0.7608 - val_loss: 0.1861 - val_mae: 0.1269
Epoch 3/550
15/15                0s 5ms/step - loss:
0.8202 - mae: 0.6214 - val_loss: 0.1880 - val_mae: 0.1335
Epoch 4/550
15/15                0s 6ms/step - loss:
0.6753 - mae: 0.5530 - val_loss: 0.1903 - val_mae: 0.1395
Epoch 5/550
15/15                0s 5ms/step - loss:
0.5806 - mae: 0.5028 - val_loss: 0.1899 - val_mae: 0.1395
Epoch 6/550
15/15                0s 5ms/step - loss:
0.5138 - mae: 0.4610 - val_loss: 0.1911 - val_mae: 0.1444
Epoch 7/550
15/15                0s 5ms/step - loss:
0.4785 - mae: 0.4408 - val_loss: 0.1924 - val_mae: 0.1473
Epoch 8/550
15/15                0s 5ms/step - loss:
0.4576 - mae: 0.4235 - val_loss: 0.1934 - val_mae: 0.1507
Epoch 9/550
15/15                0s 5ms/step - loss:
0.4219 - mae: 0.3932 - val_loss: 0.1935 - val_mae: 0.1527
Epoch 10/550
15/15                0s 5ms/step - loss:
0.4078 - mae: 0.3818 - val_loss: 0.1912 - val_mae: 0.1501
Epoch 11/550
15/15                0s 5ms/step - loss:
0.3770 - mae: 0.3616 - val_loss: 0.1920 - val_mae: 0.1523
Epoch 12/550
15/15                0s 5ms/step - loss:
0.3586 - mae: 0.3477 - val_loss: 0.1908 - val_mae: 0.1506
Epoch 13/550
15/15                0s 6ms/step - loss:
0.3577 - mae: 0.3399 - val_loss: 0.1895 - val_mae: 0.1478
Epoch 14/550
15/15                0s 5ms/step - loss:
0.3377 - mae: 0.3281 - val_loss: 0.1882 - val_mae: 0.1470
Epoch 15/550
15/15                0s 5ms/step - loss:
0.3353 - mae: 0.3226 - val_loss: 0.1863 - val_mae: 0.1437
Epoch 16/550
15/15                0s 5ms/step - loss:
0.3261 - mae: 0.3172 - val_loss: 0.1848 - val_mae: 0.1410
Epoch 17/550
15/15                0s 5ms/step - loss:
0.3116 - mae: 0.3013 - val_loss: 0.1836 - val_mae: 0.1399
Epoch 18/550
```

```
15/15              0s 5ms/step - loss:
0.2987 - mae: 0.2912 - val_loss: 0.1828 - val_mae: 0.1391
Epoch 19/550
15/15              0s 5ms/step - loss:
0.3012 - mae: 0.2899 - val_loss: 0.1805 - val_mae: 0.1339
Epoch 20/550
15/15              0s 6ms/step - loss:
0.2870 - mae: 0.2779 - val_loss: 0.1789 - val_mae: 0.1312
Epoch 21/550
15/15              0s 6ms/step - loss:
0.2862 - mae: 0.2795 - val_loss: 0.1769 - val_mae: 0.1284
Epoch 22/550
15/15              0s 5ms/step - loss:
0.2815 - mae: 0.2719 - val_loss: 0.1760 - val_mae: 0.1268
Epoch 23/550
15/15              0s 5ms/step - loss:
0.2768 - mae: 0.2661 - val_loss: 0.1749 - val_mae: 0.1248
Epoch 24/550
15/15              0s 5ms/step - loss:
0.2635 - mae: 0.2531 - val_loss: 0.1743 - val_mae: 0.1240
Epoch 25/550
15/15              0s 6ms/step - loss:
0.2706 - mae: 0.2560 - val_loss: 0.1728 - val_mae: 0.1216
Epoch 26/550
15/15              0s 5ms/step - loss:
0.2558 - mae: 0.2489 - val_loss: 0.1726 - val_mae: 0.1223
Epoch 27/550
15/15              0s 5ms/step - loss:
0.2580 - mae: 0.2493 - val_loss: 0.1717 - val_mae: 0.1211
Epoch 28/550
15/15              0s 5ms/step - loss:
0.2482 - mae: 0.2363 - val_loss: 0.1715 - val_mae: 0.1215
Epoch 29/550
15/15              0s 5ms/step - loss:
0.2540 - mae: 0.2391 - val_loss: 0.1702 - val_mae: 0.1184
Epoch 30/550
15/15              0s 5ms/step - loss:
0.2446 - mae: 0.2343 - val_loss: 0.1692 - val_mae: 0.1173
Epoch 31/550
15/15              0s 5ms/step - loss:
0.2430 - mae: 0.2325 - val_loss: 0.1694 - val_mae: 0.1192
Epoch 32/550
15/15              0s 6ms/step - loss:
0.2405 - mae: 0.2257 - val_loss: 0.1677 - val_mae: 0.1149
Epoch 33/550
15/15              0s 5ms/step - loss:
0.2362 - mae: 0.2215 - val_loss: 0.1673 - val_mae: 0.1150
Epoch 34/550
```

```
15/15              0s 5ms/step - loss:
0.2355 - mae: 0.2215 - val_loss: 0.1660 - val_mae: 0.1119
Epoch 35/550
15/15              0s 5ms/step - loss:
0.2363 - mae: 0.2219 - val_loss: 0.1657 - val_mae: 0.1132
Epoch 36/550
15/15              0s 5ms/step - loss:
0.2293 - mae: 0.2161 - val_loss: 0.1655 - val_mae: 0.1135
Epoch 37/550
15/15              0s 5ms/step - loss:
0.2322 - mae: 0.2198 - val_loss: 0.1645 - val_mae: 0.1123
Epoch 38/550
15/15              0s 6ms/step - loss:
0.2262 - mae: 0.2120 - val_loss: 0.1640 - val_mae: 0.1127
Epoch 39/550
15/15              0s 5ms/step - loss:
0.2253 - mae: 0.2105 - val_loss: 0.1626 - val_mae: 0.1095
Epoch 40/550
15/15              0s 7ms/step - loss:
0.2228 - mae: 0.2089 - val_loss: 0.1616 - val_mae: 0.1083
Epoch 41/550
15/15              0s 5ms/step - loss:
0.2209 - mae: 0.2034 - val_loss: 0.1609 - val_mae: 0.1078
Epoch 42/550
15/15              0s 7ms/step - loss:
0.2189 - mae: 0.2027 - val_loss: 0.1605 - val_mae: 0.1087
Epoch 43/550
15/15              0s 5ms/step - loss:
0.2183 - mae: 0.2018 - val_loss: 0.1601 - val_mae: 0.1079
Epoch 44/550
15/15              0s 5ms/step - loss:
0.2158 - mae: 0.1999 - val_loss: 0.1597 - val_mae: 0.1076
Epoch 45/550
15/15              0s 6ms/step - loss:
0.2176 - mae: 0.2010 - val_loss: 0.1584 - val_mae: 0.1053
Epoch 46/550
15/15              0s 5ms/step - loss:
0.2144 - mae: 0.1984 - val_loss: 0.1572 - val_mae: 0.1037
Epoch 47/550
15/15              0s 5ms/step - loss:
0.2051 - mae: 0.1886 - val_loss: 0.1567 - val_mae: 0.1035
Epoch 48/550
15/15              0s 5ms/step - loss:
0.2086 - mae: 0.1944 - val_loss: 0.1564 - val_mae: 0.1037
Epoch 49/550
15/15              0s 5ms/step - loss:
0.2038 - mae: 0.1889 - val_loss: 0.1557 - val_mae: 0.1029
Epoch 50/550
```

```
15/15              0s 5ms/step - loss:
0.2054 - mae: 0.1879 - val_loss: 0.1558 - val_mae: 0.1046
Epoch 51/550
15/15              0s 5ms/step - loss:
0.2029 - mae: 0.1855 - val_loss: 0.1538 - val_mae: 0.1006
Epoch 52/550
15/15              0s 5ms/step - loss:
0.2022 - mae: 0.1850 - val_loss: 0.1532 - val_mae: 0.1000
Epoch 53/550
15/15              0s 5ms/step - loss:
0.1991 - mae: 0.1815 - val_loss: 0.1526 - val_mae: 0.1005
Epoch 54/550
15/15              0s 5ms/step - loss:
0.2034 - mae: 0.1859 - val_loss: 0.1523 - val_mae: 0.1010
Epoch 55/550
15/15              0s 6ms/step - loss:
0.1968 - mae: 0.1816 - val_loss: 0.1516 - val_mae: 0.1005
Epoch 56/550
15/15              0s 6ms/step - loss:
0.1937 - mae: 0.1793 - val_loss: 0.1509 - val_mae: 0.1000
Epoch 57/550
15/15              0s 5ms/step - loss:
0.1955 - mae: 0.1776 - val_loss: 0.1504 - val_mae: 0.0999
Epoch 58/550
15/15              0s 5ms/step - loss:
0.1923 - mae: 0.1778 - val_loss: 0.1493 - val_mae: 0.0990
Epoch 59/550
15/15              0s 6ms/step - loss:
0.1958 - mae: 0.1817 - val_loss: 0.1488 - val_mae: 0.0980
Epoch 60/550
15/15              0s 5ms/step - loss:
0.1883 - mae: 0.1711 - val_loss: 0.1483 - val_mae: 0.0984
Epoch 61/550
15/15              0s 5ms/step - loss:
0.1899 - mae: 0.1713 - val_loss: 0.1474 - val_mae: 0.0969
Epoch 62/550
15/15              0s 5ms/step - loss:
0.1883 - mae: 0.1708 - val_loss: 0.1468 - val_mae: 0.0971
Epoch 63/550
15/15              0s 6ms/step - loss:
0.1894 - mae: 0.1704 - val_loss: 0.1462 - val_mae: 0.0972
Epoch 64/550
15/15              0s 6ms/step - loss:
0.1848 - mae: 0.1691 - val_loss: 0.1454 - val_mae: 0.0969
Epoch 65/550
15/15              0s 6ms/step - loss:
0.1842 - mae: 0.1691 - val_loss: 0.1451 - val_mae: 0.0973
Epoch 66/550
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15/15              0s 6ms/step - loss:
0.1865 - mae: 0.1690 - val_loss: 0.1439 - val_mae: 0.0947
Epoch 67/550
15/15              0s 6ms/step - loss:
0.1832 - mae: 0.1682 - val_loss: 0.1435 - val_mae: 0.0959
Epoch 68/550
15/15              0s 5ms/step - loss:
0.1797 - mae: 0.1640 - val_loss: 0.1429 - val_mae: 0.0960
Epoch 69/550
15/15              0s 7ms/step - loss:
0.1828 - mae: 0.1683 - val_loss: 0.1419 - val_mae: 0.0944
Epoch 70/550
15/15              0s 5ms/step - loss:
0.1794 - mae: 0.1623 - val_loss: 0.1411 - val_mae: 0.0937
Epoch 71/550
15/15              0s 6ms/step - loss:
0.1779 - mae: 0.1609 - val_loss: 0.1404 - val_mae: 0.0928
Epoch 72/550
15/15              0s 5ms/step - loss:
0.1759 - mae: 0.1613 - val_loss: 0.1395 - val_mae: 0.0923
Epoch 73/550
15/15              0s 6ms/step - loss:
0.1737 - mae: 0.1580 - val_loss: 0.1389 - val_mae: 0.0921
Epoch 74/550
15/15              0s 6ms/step - loss:
0.1753 - mae: 0.1604 - val_loss: 0.1383 - val_mae: 0.0926
Epoch 75/550
15/15              0s 5ms/step - loss:
0.1723 - mae: 0.1558 - val_loss: 0.1376 - val_mae: 0.0924
Epoch 76/550
15/15              0s 5ms/step - loss:
0.1745 - mae: 0.1602 - val_loss: 0.1366 - val_mae: 0.0908
Epoch 77/550
15/15              0s 5ms/step - loss:
0.1674 - mae: 0.1538 - val_loss: 0.1360 - val_mae: 0.0907
Epoch 78/550
15/15              0s 5ms/step - loss:
0.1713 - mae: 0.1553 - val_loss: 0.1352 - val_mae: 0.0908
Epoch 79/550
15/15              0s 5ms/step - loss:
0.1683 - mae: 0.1547 - val_loss: 0.1346 - val_mae: 0.0902
Epoch 80/550
15/15              0s 5ms/step - loss:
0.1655 - mae: 0.1527 - val_loss: 0.1340 - val_mae: 0.0903
Epoch 81/550
15/15              0s 5ms/step - loss:
0.1681 - mae: 0.1553 - val_loss: 0.1332 - val_mae: 0.0897
Epoch 82/550
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15/15                0s 5ms/step - loss:
0.1644 - mae: 0.1508 - val_loss: 0.1324 - val_mae: 0.0883
Epoch 83/550
15/15                0s 5ms/step - loss:
0.1609 - mae: 0.1477 - val_loss: 0.1318 - val_mae: 0.0887
Epoch 84/550
15/15                0s 6ms/step - loss:
0.1664 - mae: 0.1526 - val_loss: 0.1310 - val_mae: 0.0883
Epoch 85/550
15/15                0s 6ms/step - loss:
0.1617 - mae: 0.1506 - val_loss: 0.1305 - val_mae: 0.0896
Epoch 86/550
15/15                0s 6ms/step - loss:
0.1642 - mae: 0.1520 - val_loss: 0.1299 - val_mae: 0.0887
Epoch 87/550
15/15                0s 6ms/step - loss:
0.1634 - mae: 0.1509 - val_loss: 0.1291 - val_mae: 0.0879
Epoch 88/550
15/15                0s 5ms/step - loss:
0.1611 - mae: 0.1509 - val_loss: 0.1284 - val_mae: 0.0885
Epoch 89/550
15/15                0s 6ms/step - loss:
0.1629 - mae: 0.1508 - val_loss: 0.1276 - val_mae: 0.0873
Epoch 90/550
15/15                0s 6ms/step - loss:
0.1542 - mae: 0.1433 - val_loss: 0.1271 - val_mae: 0.0876
Epoch 91/550
15/15                0s 6ms/step - loss:
0.1539 - mae: 0.1430 - val_loss: 0.1261 - val_mae: 0.0859
Epoch 92/550
15/15                0s 5ms/step - loss:
0.1578 - mae: 0.1492 - val_loss: 0.1254 - val_mae: 0.0854
Epoch 93/550
15/15                0s 6ms/step - loss:
0.1553 - mae: 0.1465 - val_loss: 0.1248 - val_mae: 0.0854
Epoch 94/550
15/15                0s 5ms/step - loss:
0.1557 - mae: 0.1462 - val_loss: 0.1240 - val_mae: 0.0858
Epoch 95/550
15/15                0s 5ms/step - loss:
0.1532 - mae: 0.1459 - val_loss: 0.1233 - val_mae: 0.0860
Epoch 96/550
15/15                0s 5ms/step - loss:
0.1482 - mae: 0.1395 - val_loss: 0.1226 - val_mae: 0.0855
Epoch 97/550
15/15                0s 6ms/step - loss:
0.1481 - mae: 0.1387 - val_loss: 0.1219 - val_mae: 0.0846
Epoch 98/550
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15/15              0s 7ms/step - loss:
0.1473 - mae: 0.1392 - val_loss: 0.1213 - val_mae: 0.0846
Epoch 99/550
15/15              0s 6ms/step - loss:
0.1481 - mae: 0.1418 - val_loss: 0.1206 - val_mae: 0.0849
Epoch 100/550
15/15              0s 6ms/step - loss:
0.1494 - mae: 0.1409 - val_loss: 0.1199 - val_mae: 0.0845
Epoch 101/550
15/15              0s 6ms/step - loss:
0.1479 - mae: 0.1397 - val_loss: 0.1191 - val_mae: 0.0843
Epoch 102/550
15/15              0s 5ms/step - loss:
0.1524 - mae: 0.1434 - val_loss: 0.1186 - val_mae: 0.0858
Epoch 103/550
15/15              0s 5ms/step - loss:
0.1441 - mae: 0.1375 - val_loss: 0.1179 - val_mae: 0.0854
Epoch 104/550
15/15              0s 5ms/step - loss:
0.1445 - mae: 0.1380 - val_loss: 0.1170 - val_mae: 0.0837
Epoch 105/550
15/15              0s 6ms/step - loss:
0.1437 - mae: 0.1386 - val_loss: 0.1164 - val_mae: 0.0841
Epoch 106/550
15/15              0s 6ms/step - loss:
0.1386 - mae: 0.1316 - val_loss: 0.1157 - val_mae: 0.0837
Epoch 107/550
15/15              0s 5ms/step - loss:
0.1411 - mae: 0.1362 - val_loss: 0.1150 - val_mae: 0.0833
Epoch 108/550
15/15              0s 5ms/step - loss:
0.1402 - mae: 0.1334 - val_loss: 0.1144 - val_mae: 0.0843
Epoch 109/550
15/15              0s 6ms/step - loss:
0.1390 - mae: 0.1360 - val_loss: 0.1135 - val_mae: 0.0834
Epoch 110/550
15/15              0s 6ms/step - loss:
0.1397 - mae: 0.1377 - val_loss: 0.1128 - val_mae: 0.0826
Epoch 111/550
15/15              0s 5ms/step - loss:
0.1361 - mae: 0.1338 - val_loss: 0.1122 - val_mae: 0.0829
Epoch 112/550
15/15              0s 7ms/step - loss:
0.1336 - mae: 0.1305 - val_loss: 0.1114 - val_mae: 0.0823
Epoch 113/550
15/15              0s 6ms/step - loss:
0.1367 - mae: 0.1350 - val_loss: 0.1107 - val_mae: 0.0821
Epoch 114/550
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15/15              0s 6ms/step - loss:
0.1347 - mae: 0.1334 - val_loss: 0.1101 - val_mae: 0.0824
Epoch 115/550
15/15              0s 5ms/step - loss:
0.1340 - mae: 0.1325 - val_loss: 0.1094 - val_mae: 0.0826
Epoch 116/550
15/15              0s 5ms/step - loss:
0.1322 - mae: 0.1310 - val_loss: 0.1087 - val_mae: 0.0832
Epoch 117/550
15/15              0s 5ms/step - loss:
0.1306 - mae: 0.1296 - val_loss: 0.1079 - val_mae: 0.0819
Epoch 118/550
15/15              0s 6ms/step - loss:
0.1329 - mae: 0.1329 - val_loss: 0.1073 - val_mae: 0.0828
Epoch 119/550
15/15              0s 6ms/step - loss:
0.1280 - mae: 0.1277 - val_loss: 0.1065 - val_mae: 0.0812
Epoch 120/550
15/15              0s 5ms/step - loss:
0.1263 - mae: 0.1263 - val_loss: 0.1060 - val_mae: 0.0814
Epoch 121/550
15/15              0s 5ms/step - loss:
0.1276 - mae: 0.1292 - val_loss: 0.1052 - val_mae: 0.0812
Epoch 122/550
15/15              0s 5ms/step - loss:
0.1248 - mae: 0.1271 - val_loss: 0.1044 - val_mae: 0.0811
Epoch 123/550
15/15              0s 5ms/step - loss:
0.1254 - mae: 0.1284 - val_loss: 0.1039 - val_mae: 0.0816
Epoch 124/550
15/15              0s 5ms/step - loss:
0.1231 - mae: 0.1252 - val_loss: 0.1032 - val_mae: 0.0823
Epoch 125/550
15/15              0s 5ms/step - loss:
0.1235 - mae: 0.1267 - val_loss: 0.1025 - val_mae: 0.0826
Epoch 126/550
15/15              0s 6ms/step - loss:
0.1242 - mae: 0.1284 - val_loss: 0.1017 - val_mae: 0.0813
Epoch 127/550
15/15              0s 7ms/step - loss:
0.1249 - mae: 0.1275 - val_loss: 0.1010 - val_mae: 0.0806
Epoch 128/550
15/15              0s 6ms/step - loss:
0.1204 - mae: 0.1238 - val_loss: 0.1003 - val_mae: 0.0802
Epoch 129/550
15/15              0s 6ms/step - loss:
0.1202 - mae: 0.1233 - val_loss: 0.0997 - val_mae: 0.0809
Epoch 130/550
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15/15              0s 6ms/step - loss:
0.1200 - mae: 0.1237 - val_loss: 0.0990 - val_mae: 0.0805
Epoch 131/550
15/15              0s 5ms/step - loss:
0.1209 - mae: 0.1256 - val_loss: 0.0984 - val_mae: 0.0810
Epoch 132/550
15/15              0s 5ms/step - loss:
0.1187 - mae: 0.1233 - val_loss: 0.0977 - val_mae: 0.0802
Epoch 133/550
15/15              0s 5ms/step - loss:
0.1185 - mae: 0.1243 - val_loss: 0.0971 - val_mae: 0.0810
Epoch 134/550
15/15              0s 5ms/step - loss:
0.1171 - mae: 0.1228 - val_loss: 0.0963 - val_mae: 0.0802
Epoch 135/550
15/15              0s 5ms/step - loss:
0.1158 - mae: 0.1216 - val_loss: 0.0956 - val_mae: 0.0808
Epoch 136/550
15/15              0s 5ms/step - loss:
0.1130 - mae: 0.1195 - val_loss: 0.0949 - val_mae: 0.0802
Epoch 137/550
15/15              0s 5ms/step - loss:
0.1155 - mae: 0.1226 - val_loss: 0.0943 - val_mae: 0.0806
Epoch 138/550
15/15              0s 5ms/step - loss:
0.1139 - mae: 0.1209 - val_loss: 0.0937 - val_mae: 0.0805
Epoch 139/550
15/15              0s 6ms/step - loss:
0.1113 - mae: 0.1204 - val_loss: 0.0930 - val_mae: 0.0805
Epoch 140/550
15/15              0s 7ms/step - loss:
0.1099 - mae: 0.1183 - val_loss: 0.0923 - val_mae: 0.0801
Epoch 141/550
15/15              0s 5ms/step - loss:
0.1112 - mae: 0.1205 - val_loss: 0.0919 - val_mae: 0.0817
Epoch 142/550
15/15              0s 6ms/step - loss:
0.1095 - mae: 0.1199 - val_loss: 0.0911 - val_mae: 0.0806
Epoch 143/550
15/15              0s 6ms/step - loss:
0.1093 - mae: 0.1187 - val_loss: 0.0904 - val_mae: 0.0808
Epoch 144/550
15/15              0s 5ms/step - loss:
0.1087 - mae: 0.1192 - val_loss: 0.0897 - val_mae: 0.0799
Epoch 145/550
15/15              0s 5ms/step - loss:
0.1092 - mae: 0.1205 - val_loss: 0.0891 - val_mae: 0.0803
Epoch 146/550
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15/15              0s 6ms/step - loss:
0.1080 - mae: 0.1204 - val_loss: 0.0885 - val_mae: 0.0805
Epoch 147/550
15/15              0s 6ms/step - loss:
0.1038 - mae: 0.1144 - val_loss: 0.0878 - val_mae: 0.0805
Epoch 148/550
15/15              0s 5ms/step - loss:
0.1049 - mae: 0.1163 - val_loss: 0.0871 - val_mae: 0.0794
Epoch 149/550
15/15              0s 5ms/step - loss:
0.1032 - mae: 0.1173 - val_loss: 0.0865 - val_mae: 0.0795
Epoch 150/550
15/15              0s 5ms/step - loss:
0.1013 - mae: 0.1140 - val_loss: 0.0858 - val_mae: 0.0794
Epoch 151/550
15/15              0s 5ms/step - loss:
0.1033 - mae: 0.1167 - val_loss: 0.0853 - val_mae: 0.0798
Epoch 152/550
15/15              0s 5ms/step - loss:
0.1011 - mae: 0.1163 - val_loss: 0.0847 - val_mae: 0.0805
Epoch 153/550
15/15              0s 5ms/step - loss:
0.1006 - mae: 0.1133 - val_loss: 0.0840 - val_mae: 0.0794
Epoch 154/550
15/15              0s 7ms/step - loss:
0.1001 - mae: 0.1150 - val_loss: 0.0834 - val_mae: 0.0798
Epoch 155/550
15/15              0s 5ms/step - loss:
0.0993 - mae: 0.1145 - val_loss: 0.0828 - val_mae: 0.0800
Epoch 156/550
15/15              0s 5ms/step - loss:
0.0991 - mae: 0.1147 - val_loss: 0.0821 - val_mae: 0.0790
Epoch 157/550
15/15              0s 6ms/step - loss:
0.0989 - mae: 0.1147 - val_loss: 0.0816 - val_mae: 0.0798
Epoch 158/550
15/15              0s 5ms/step - loss:
0.0960 - mae: 0.1125 - val_loss: 0.0810 - val_mae: 0.0799
Epoch 159/550
15/15              0s 5ms/step - loss:
0.0966 - mae: 0.1148 - val_loss: 0.0803 - val_mae: 0.0794
Epoch 160/550
15/15              0s 5ms/step - loss:
0.0951 - mae: 0.1137 - val_loss: 0.0799 - val_mae: 0.0804
Epoch 161/550
15/15              0s 5ms/step - loss:
0.0951 - mae: 0.1136 - val_loss: 0.0791 - val_mae: 0.0797
Epoch 162/550
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15/15              0s 5ms/step - loss:
0.0932 - mae: 0.1116 - val_loss: 0.0785 - val_mae: 0.0800
Epoch 163/550
15/15              0s 5ms/step - loss:
0.0932 - mae: 0.1119 - val_loss: 0.0779 - val_mae: 0.0791
Epoch 164/550
15/15              0s 5ms/step - loss:
0.0938 - mae: 0.1128 - val_loss: 0.0773 - val_mae: 0.0796
Epoch 165/550
15/15              0s 5ms/step - loss:
0.0915 - mae: 0.1103 - val_loss: 0.0767 - val_mae: 0.0791
Epoch 166/550
15/15              0s 5ms/step - loss:
0.0901 - mae: 0.1111 - val_loss: 0.0762 - val_mae: 0.0798
Epoch 167/550
15/15              0s 5ms/step - loss:
0.0890 - mae: 0.1101 - val_loss: 0.0755 - val_mae: 0.0796
Epoch 168/550
15/15              0s 7ms/step - loss:
0.0895 - mae: 0.1106 - val_loss: 0.0750 - val_mae: 0.0802
Epoch 169/550
15/15              0s 6ms/step - loss:
0.0886 - mae: 0.1079 - val_loss: 0.0744 - val_mae: 0.0791
Epoch 170/550
15/15              0s 6ms/step - loss:
0.0893 - mae: 0.1134 - val_loss: 0.0738 - val_mae: 0.0792
Epoch 171/550
15/15              0s 5ms/step - loss:
0.0906 - mae: 0.1117 - val_loss: 0.0732 - val_mae: 0.0788
Epoch 172/550
15/15              0s 6ms/step - loss:
0.0864 - mae: 0.1086 - val_loss: 0.0727 - val_mae: 0.0793
Epoch 173/550
15/15              0s 5ms/step - loss:
0.0835 - mae: 0.1066 - val_loss: 0.0721 - val_mae: 0.0785
Epoch 174/550
15/15              0s 5ms/step - loss:
0.0866 - mae: 0.1100 - val_loss: 0.0715 - val_mae: 0.0789
Epoch 175/550
15/15              0s 5ms/step - loss:
0.0857 - mae: 0.1091 - val_loss: 0.0710 - val_mae: 0.0795
Epoch 176/550
15/15              0s 5ms/step - loss:
0.0846 - mae: 0.1087 - val_loss: 0.0704 - val_mae: 0.0790
Epoch 177/550
15/15              0s 5ms/step - loss:
0.0839 - mae: 0.1086 - val_loss: 0.0699 - val_mae: 0.0798
Epoch 178/550
```

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15/15            0s 5ms/step - loss:
0.0821 - mae: 0.1061 - val_loss: 0.0693 - val_mae: 0.0791
Epoch 179/550
15/15            0s 5ms/step - loss:
0.0827 - mae: 0.1077 - val_loss: 0.0688 - val_mae: 0.0792
Epoch 180/550
15/15            0s 5ms/step - loss:
0.0797 - mae: 0.1044 - val_loss: 0.0682 - val_mae: 0.0791
Epoch 181/550
15/15            0s 7ms/step - loss:
0.0817 - mae: 0.1067 - val_loss: 0.0676 - val_mae: 0.0787
Epoch 182/550
15/15            0s 5ms/step - loss:
0.0797 - mae: 0.1059 - val_loss: 0.0671 - val_mae: 0.0791
Epoch 183/550
15/15            0s 6ms/step - loss:
0.0787 - mae: 0.1049 - val_loss: 0.0665 - val_mae: 0.0783
Epoch 184/550
15/15            0s 5ms/step - loss:
0.0798 - mae: 0.1087 - val_loss: 0.0661 - val_mae: 0.0788
Epoch 185/550
15/15            0s 5ms/step - loss:
0.0787 - mae: 0.1067 - val_loss: 0.0655 - val_mae: 0.0784
Epoch 186/550
15/15            0s 6ms/step - loss:
0.0777 - mae: 0.1061 - val_loss: 0.0650 - val_mae: 0.0786
Epoch 187/550
15/15            0s 6ms/step - loss:
0.0760 - mae: 0.1034 - val_loss: 0.0645 - val_mae: 0.0788
Epoch 188/550
15/15            0s 6ms/step - loss:
0.0764 - mae: 0.1051 - val_loss: 0.0640 - val_mae: 0.0784
Epoch 189/550
15/15            0s 6ms/step - loss:
0.0786 - mae: 0.1070 - val_loss: 0.0634 - val_mae: 0.0785
Epoch 190/550
15/15            0s 6ms/step - loss:
0.0760 - mae: 0.1065 - val_loss: 0.0629 - val_mae: 0.0779
Epoch 191/550
15/15            0s 5ms/step - loss:
0.0737 - mae: 0.1033 - val_loss: 0.0624 - val_mae: 0.0777
Epoch 192/550
15/15            0s 7ms/step - loss:
0.0751 - mae: 0.1043 - val_loss: 0.0619 - val_mae: 0.0781
Epoch 193/550
15/15            0s 5ms/step - loss:
0.0748 - mae: 0.1036 - val_loss: 0.0614 - val_mae: 0.0782
Epoch 194/550
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15/15              0s 5ms/step - loss:
0.0742 - mae: 0.1054 - val_loss: 0.0609 - val_mae: 0.0783
Epoch 195/550
15/15              0s 5ms/step - loss:
0.0728 - mae: 0.1041 - val_loss: 0.0605 - val_mae: 0.0778
Epoch 196/550
15/15              0s 6ms/step - loss:
0.0724 - mae: 0.1031 - val_loss: 0.0599 - val_mae: 0.0778
Epoch 197/550
15/15              0s 5ms/step - loss:
0.0703 - mae: 0.1034 - val_loss: 0.0594 - val_mae: 0.0783
Epoch 198/550
15/15              0s 6ms/step - loss:
0.0725 - mae: 0.1042 - val_loss: 0.0590 - val_mae: 0.0786
Epoch 199/550
15/15              0s 5ms/step - loss:
0.0700 - mae: 0.1025 - val_loss: 0.0585 - val_mae: 0.0779
Epoch 200/550
15/15              0s 5ms/step - loss:
0.0701 - mae: 0.1021 - val_loss: 0.0579 - val_mae: 0.0778
Epoch 201/550
15/15              0s 5ms/step - loss:
0.0677 - mae: 0.1000 - val_loss: 0.0575 - val_mae: 0.0775
Epoch 202/550
15/15              0s 5ms/step - loss:
0.0685 - mae: 0.1023 - val_loss: 0.0570 - val_mae: 0.0783
Epoch 203/550
15/15              0s 5ms/step - loss:
0.0678 - mae: 0.1015 - val_loss: 0.0566 - val_mae: 0.0779
Epoch 204/550
15/15              0s 5ms/step - loss:
0.0660 - mae: 0.1002 - val_loss: 0.0561 - val_mae: 0.0782
Epoch 205/550
15/15              0s 7ms/step - loss:
0.0679 - mae: 0.1027 - val_loss: 0.0558 - val_mae: 0.0782
Epoch 206/550
15/15              0s 6ms/step - loss:
0.0642 - mae: 0.0978 - val_loss: 0.0552 - val_mae: 0.0777
Epoch 207/550
15/15              0s 5ms/step - loss:
0.0666 - mae: 0.1018 - val_loss: 0.0548 - val_mae: 0.0773
Epoch 208/550
15/15              0s 5ms/step - loss:
0.0668 - mae: 0.1012 - val_loss: 0.0544 - val_mae: 0.0777
Epoch 209/550
15/15              0s 5ms/step - loss:
0.0645 - mae: 0.1000 - val_loss: 0.0540 - val_mae: 0.0776
Epoch 210/550
```

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15/15              0s 6ms/step - loss:
0.0635 - mae: 0.0990 - val_loss: 0.0535 - val_mae: 0.0774
Epoch 211/550
15/15              0s 6ms/step - loss:
0.0638 - mae: 0.1012 - val_loss: 0.0530 - val_mae: 0.0765
Epoch 212/550
15/15              0s 6ms/step - loss:
0.0618 - mae: 0.0986 - val_loss: 0.0527 - val_mae: 0.0774
Epoch 213/550
15/15              0s 5ms/step - loss:
0.0606 - mae: 0.0977 - val_loss: 0.0522 - val_mae: 0.0768
Epoch 214/550
15/15              0s 5ms/step - loss:
0.0644 - mae: 0.1009 - val_loss: 0.0518 - val_mae: 0.0777
Epoch 215/550
15/15              0s 5ms/step - loss:
0.0613 - mae: 0.0983 - val_loss: 0.0515 - val_mae: 0.0769
Epoch 216/550
15/15              0s 7ms/step - loss:
0.0617 - mae: 0.0992 - val_loss: 0.0509 - val_mae: 0.0765
Epoch 217/550
15/15              0s 5ms/step - loss:
0.0630 - mae: 0.1009 - val_loss: 0.0505 - val_mae: 0.0769
Epoch 218/550
15/15              0s 6ms/step - loss:
0.0609 - mae: 0.0991 - val_loss: 0.0501 - val_mae: 0.0768
Epoch 219/550
15/15              0s 5ms/step - loss:
0.0608 - mae: 0.0993 - val_loss: 0.0497 - val_mae: 0.0774
Epoch 220/550
15/15              0s 5ms/step - loss:
0.0585 - mae: 0.0964 - val_loss: 0.0493 - val_mae: 0.0769
Epoch 221/550
15/15              0s 5ms/step - loss:
0.0584 - mae: 0.0985 - val_loss: 0.0489 - val_mae: 0.0768
Epoch 222/550
15/15              0s 5ms/step - loss:
0.0584 - mae: 0.0973 - val_loss: 0.0485 - val_mae: 0.0771
Epoch 223/550
15/15              0s 5ms/step - loss:
0.0596 - mae: 0.0995 - val_loss: 0.0482 - val_mae: 0.0779
Epoch 224/550
15/15              0s 5ms/step - loss:
0.0582 - mae: 0.0986 - val_loss: 0.0478 - val_mae: 0.0774
Epoch 225/550
15/15              0s 6ms/step - loss:
0.0575 - mae: 0.0980 - val_loss: 0.0475 - val_mae: 0.0778
Epoch 226/550
```

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15/15              0s 6ms/step - loss:
0.0572 - mae: 0.0970 - val_loss: 0.0470 - val_mae: 0.0767
Epoch 227/550
15/15              0s 7ms/step - loss:
0.0561 - mae: 0.0974 - val_loss: 0.0467 - val_mae: 0.0765
Epoch 228/550
15/15              0s 5ms/step - loss:
0.0555 - mae: 0.0959 - val_loss: 0.0463 - val_mae: 0.0769
Epoch 229/550
15/15              0s 5ms/step - loss:
0.0556 - mae: 0.0959 - val_loss: 0.0459 - val_mae: 0.0771
Epoch 230/550
15/15              0s 5ms/step - loss:
0.0545 - mae: 0.0953 - val_loss: 0.0456 - val_mae: 0.0765
Epoch 231/550
15/15              0s 6ms/step - loss:
0.0547 - mae: 0.0970 - val_loss: 0.0452 - val_mae: 0.0769
Epoch 232/550
15/15              0s 5ms/step - loss:
0.0539 - mae: 0.0953 - val_loss: 0.0449 - val_mae: 0.0767
Epoch 233/550
15/15              0s 5ms/step - loss:
0.0531 - mae: 0.0941 - val_loss: 0.0446 - val_mae: 0.0767
Epoch 234/550
15/15              0s 5ms/step - loss:
0.0550 - mae: 0.0972 - val_loss: 0.0442 - val_mae: 0.0768
Epoch 235/550
15/15              0s 5ms/step - loss:
0.0528 - mae: 0.0953 - val_loss: 0.0439 - val_mae: 0.0768
Epoch 236/550
15/15              0s 6ms/step - loss:
0.0514 - mae: 0.0952 - val_loss: 0.0436 - val_mae: 0.0765
Epoch 237/550
15/15              0s 5ms/step - loss:
0.0518 - mae: 0.0941 - val_loss: 0.0433 - val_mae: 0.0768
Epoch 238/550
15/15              0s 5ms/step - loss:
0.0532 - mae: 0.0962 - val_loss: 0.0430 - val_mae: 0.0772
Epoch 239/550
15/15              0s 6ms/step - loss:
0.0510 - mae: 0.0937 - val_loss: 0.0427 - val_mae: 0.0764
Epoch 240/550
15/15              0s 6ms/step - loss:
0.0513 - mae: 0.0954 - val_loss: 0.0422 - val_mae: 0.0762
Epoch 241/550
15/15              0s 5ms/step - loss:
0.0489 - mae: 0.0926 - val_loss: 0.0420 - val_mae: 0.0765
Epoch 242/550
```

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15/15              0s 5ms/step - loss:
0.0508 - mae: 0.0958 - val_loss: 0.0417 - val_mae: 0.0763
Epoch 243/550
15/15              0s 6ms/step - loss:
0.0518 - mae: 0.0958 - val_loss: 0.0414 - val_mae: 0.0763
Epoch 244/550
15/15              0s 6ms/step - loss:
0.0504 - mae: 0.0950 - val_loss: 0.0411 - val_mae: 0.0759
Epoch 245/550
15/15              0s 5ms/step - loss:
0.0500 - mae: 0.0933 - val_loss: 0.0408 - val_mae: 0.0762
Epoch 246/550
15/15              0s 7ms/step - loss:
0.0483 - mae: 0.0923 - val_loss: 0.0405 - val_mae: 0.0758
Epoch 247/550
15/15              0s 6ms/step - loss:
0.0476 - mae: 0.0921 - val_loss: 0.0402 - val_mae: 0.0758
Epoch 248/550
15/15              0s 7ms/step - loss:
0.0479 - mae: 0.0923 - val_loss: 0.0399 - val_mae: 0.0755
Epoch 249/550
15/15              0s 5ms/step - loss:
0.0484 - mae: 0.0942 - val_loss: 0.0395 - val_mae: 0.0758
Epoch 250/550
15/15              0s 5ms/step - loss:
0.0489 - mae: 0.0945 - val_loss: 0.0393 - val_mae: 0.0757
Epoch 251/550
15/15              0s 6ms/step - loss:
0.0462 - mae: 0.0927 - val_loss: 0.0392 - val_mae: 0.0754
Epoch 252/550
15/15              0s 6ms/step - loss:
0.0461 - mae: 0.0917 - val_loss: 0.0389 - val_mae: 0.0753
Epoch 253/550
15/15              0s 5ms/step - loss:
0.0455 - mae: 0.0916 - val_loss: 0.0385 - val_mae: 0.0757
Epoch 254/550
15/15              0s 5ms/step - loss:
0.0488 - mae: 0.0941 - val_loss: 0.0382 - val_mae: 0.0761
Epoch 255/550
15/15              0s 5ms/step - loss:
0.0462 - mae: 0.0927 - val_loss: 0.0380 - val_mae: 0.0762
Epoch 256/550
15/15              0s 5ms/step - loss:
0.0443 - mae: 0.0907 - val_loss: 0.0377 - val_mae: 0.0754
Epoch 257/550
15/15              0s 5ms/step - loss:
0.0451 - mae: 0.0917 - val_loss: 0.0375 - val_mae: 0.0756
Epoch 258/550
```

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15/15            0s 5ms/step - loss:
0.0459 - mae: 0.0935 - val_loss: 0.0372 - val_mae: 0.0755
Epoch 259/550
15/15            0s 7ms/step - loss:
0.0452 - mae: 0.0927 - val_loss: 0.0370 - val_mae: 0.0752
Epoch 260/550
15/15            0s 5ms/step - loss:
0.0460 - mae: 0.0936 - val_loss: 0.0368 - val_mae: 0.0751
Epoch 261/550
15/15            0s 5ms/step - loss:
0.0440 - mae: 0.0911 - val_loss: 0.0365 - val_mae: 0.0744
Epoch 262/550
15/15            0s 5ms/step - loss:
0.0441 - mae: 0.0900 - val_loss: 0.0362 - val_mae: 0.0746
Epoch 263/550
15/15            0s 5ms/step - loss:
0.0431 - mae: 0.0895 - val_loss: 0.0359 - val_mae: 0.0744
Epoch 264/550
15/15            0s 5ms/step - loss:
0.0435 - mae: 0.0922 - val_loss: 0.0357 - val_mae: 0.0749
Epoch 265/550
15/15            0s 5ms/step - loss:
0.0439 - mae: 0.0919 - val_loss: 0.0355 - val_mae: 0.0747
Epoch 266/550
15/15            0s 6ms/step - loss:
0.0437 - mae: 0.0916 - val_loss: 0.0353 - val_mae: 0.0756
Epoch 267/550
15/15            0s 5ms/step - loss:
0.0414 - mae: 0.0895 - val_loss: 0.0350 - val_mae: 0.0754
Epoch 268/550
15/15            0s 5ms/step - loss:
0.0407 - mae: 0.0888 - val_loss: 0.0349 - val_mae: 0.0755
Epoch 269/550
15/15            0s 5ms/step - loss:
0.0448 - mae: 0.0937 - val_loss: 0.0347 - val_mae: 0.0753
Epoch 270/550
15/15            0s 7ms/step - loss:
0.0410 - mae: 0.0893 - val_loss: 0.0344 - val_mae: 0.0747
Epoch 271/550
15/15            0s 5ms/step - loss:
0.0410 - mae: 0.0889 - val_loss: 0.0342 - val_mae: 0.0751
Epoch 272/550
15/15            0s 6ms/step - loss:
0.0409 - mae: 0.0894 - val_loss: 0.0340 - val_mae: 0.0755
Epoch 273/550
15/15            0s 5ms/step - loss:
0.0396 - mae: 0.0886 - val_loss: 0.0338 - val_mae: 0.0748
Epoch 274/550
```

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15/15              0s 5ms/step - loss:
0.0398 - mae: 0.0902 - val_loss: 0.0337 - val_mae: 0.0746
Epoch 275/550
15/15              0s 5ms/step - loss:
0.0415 - mae: 0.0904 - val_loss: 0.0334 - val_mae: 0.0744
Epoch 276/550
15/15              0s 5ms/step - loss:
0.0397 - mae: 0.0897 - val_loss: 0.0331 - val_mae: 0.0750
Epoch 277/550
15/15              0s 5ms/step - loss:
0.0410 - mae: 0.0904 - val_loss: 0.0330 - val_mae: 0.0752
Epoch 278/550
15/15              0s 5ms/step - loss:
0.0391 - mae: 0.0887 - val_loss: 0.0328 - val_mae: 0.0751
Epoch 279/550
15/15              0s 5ms/step - loss:
0.0409 - mae: 0.0908 - val_loss: 0.0326 - val_mae: 0.0754
Epoch 280/550
15/15              0s 5ms/step - loss:
0.0391 - mae: 0.0897 - val_loss: 0.0324 - val_mae: 0.0750
Epoch 281/550
15/15              0s 6ms/step - loss:
0.0383 - mae: 0.0878 - val_loss: 0.0321 - val_mae: 0.0739
Epoch 282/550
15/15              0s 6ms/step - loss:
0.0399 - mae: 0.0896 - val_loss: 0.0319 - val_mae: 0.0739
Epoch 283/550
15/15              0s 5ms/step - loss:
0.0380 - mae: 0.0893 - val_loss: 0.0317 - val_mae: 0.0745
Epoch 284/550
15/15              0s 5ms/step - loss:
0.0391 - mae: 0.0899 - val_loss: 0.0316 - val_mae: 0.0748
Epoch 285/550
15/15              0s 5ms/step - loss:
0.0370 - mae: 0.0866 - val_loss: 0.0315 - val_mae: 0.0749
Epoch 286/550
15/15              0s 6ms/step - loss:
0.0374 - mae: 0.0878 - val_loss: 0.0312 - val_mae: 0.0744
Epoch 287/550
15/15              0s 5ms/step - loss:
0.0374 - mae: 0.0884 - val_loss: 0.0312 - val_mae: 0.0745
Epoch 288/550
15/15              0s 5ms/step - loss:
0.0382 - mae: 0.0888 - val_loss: 0.0310 - val_mae: 0.0750
Epoch 289/550
15/15              0s 6ms/step - loss:
0.0354 - mae: 0.0862 - val_loss: 0.0309 - val_mae: 0.0748
Epoch 290/550
```

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15/15              0s 7ms/step - loss:
0.0363 - mae: 0.0879 - val_loss: 0.0306 - val_mae: 0.0744
Epoch 291/550
15/15              0s 6ms/step - loss:
0.0363 - mae: 0.0870 - val_loss: 0.0305 - val_mae: 0.0743
Epoch 292/550
15/15              0s 6ms/step - loss:
0.0372 - mae: 0.0883 - val_loss: 0.0303 - val_mae: 0.0745
Epoch 293/550
15/15              0s 6ms/step - loss:
0.0372 - mae: 0.0884 - val_loss: 0.0301 - val_mae: 0.0741
Epoch 294/550
15/15              0s 5ms/step - loss:
0.0381 - mae: 0.0898 - val_loss: 0.0301 - val_mae: 0.0750
Epoch 295/550
15/15              0s 5ms/step - loss:
0.0361 - mae: 0.0861 - val_loss: 0.0299 - val_mae: 0.0747
Epoch 296/550
15/15              0s 6ms/step - loss:
0.0361 - mae: 0.0868 - val_loss: 0.0298 - val_mae: 0.0744
Epoch 297/550
15/15              0s 5ms/step - loss:
0.0364 - mae: 0.0889 - val_loss: 0.0296 - val_mae: 0.0740
Epoch 298/550
15/15              0s 5ms/step - loss:
0.0350 - mae: 0.0860 - val_loss: 0.0295 - val_mae: 0.0743
Epoch 299/550
15/15              0s 7ms/step - loss:
0.0339 - mae: 0.0855 - val_loss: 0.0294 - val_mae: 0.0749
Epoch 300/550
15/15              0s 5ms/step - loss:
0.0365 - mae: 0.0890 - val_loss: 0.0291 - val_mae: 0.0751
Epoch 301/550
15/15              0s 5ms/step - loss:
0.0354 - mae: 0.0871 - val_loss: 0.0291 - val_mae: 0.0747
Epoch 302/550
15/15              0s 5ms/step - loss:
0.0334 - mae: 0.0854 - val_loss: 0.0289 - val_mae: 0.0749
Epoch 303/550
15/15              0s 5ms/step - loss:
0.0353 - mae: 0.0870 - val_loss: 0.0287 - val_mae: 0.0741
Epoch 304/550
15/15              0s 5ms/step - loss:
0.0346 - mae: 0.0862 - val_loss: 0.0287 - val_mae: 0.0733
Epoch 305/550
15/15              0s 5ms/step - loss:
0.0362 - mae: 0.0876 - val_loss: 0.0285 - val_mae: 0.0737
Epoch 306/550
```

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15/15              0s 6ms/step - loss:
0.0361 - mae: 0.0877 - val_loss: 0.0283 - val_mae: 0.0739
Epoch 307/550
15/15              0s 5ms/step - loss:
0.0328 - mae: 0.0852 - val_loss: 0.0282 - val_mae: 0.0736
Epoch 308/550
15/15              0s 5ms/step - loss:
0.0346 - mae: 0.0868 - val_loss: 0.0280 - val_mae: 0.0742
Epoch 309/550
15/15              0s 6ms/step - loss:
0.0334 - mae: 0.0857 - val_loss: 0.0279 - val_mae: 0.0736
Epoch 310/550
15/15              0s 5ms/step - loss:
0.0325 - mae: 0.0857 - val_loss: 0.0278 - val_mae: 0.0736
Epoch 311/550
15/15              0s 5ms/step - loss:
0.0332 - mae: 0.0860 - val_loss: 0.0276 - val_mae: 0.0730
Epoch 312/550
15/15              0s 5ms/step - loss:
0.0313 - mae: 0.0846 - val_loss: 0.0276 - val_mae: 0.0742
Epoch 313/550
15/15              0s 5ms/step - loss:
0.0333 - mae: 0.0874 - val_loss: 0.0276 - val_mae: 0.0748
Epoch 314/550
15/15              0s 6ms/step - loss:
0.0329 - mae: 0.0864 - val_loss: 0.0274 - val_mae: 0.0747
Epoch 315/550
15/15              0s 5ms/step - loss:
0.0316 - mae: 0.0841 - val_loss: 0.0273 - val_mae: 0.0743
Epoch 316/550
15/15              0s 6ms/step - loss:
0.0321 - mae: 0.0842 - val_loss: 0.0271 - val_mae: 0.0747
Epoch 317/550
15/15              0s 6ms/step - loss:
0.0325 - mae: 0.0851 - val_loss: 0.0271 - val_mae: 0.0743
Epoch 318/550
15/15              0s 6ms/step - loss:
0.0319 - mae: 0.0850 - val_loss: 0.0270 - val_mae: 0.0737
Epoch 319/550
15/15              0s 7ms/step - loss:
0.0310 - mae: 0.0835 - val_loss: 0.0269 - val_mae: 0.0738
Epoch 320/550
15/15              0s 5ms/step - loss:
0.0311 - mae: 0.0845 - val_loss: 0.0268 - val_mae: 0.0739
Epoch 321/550
15/15              0s 5ms/step - loss:
0.0313 - mae: 0.0850 - val_loss: 0.0268 - val_mae: 0.0750
Epoch 322/550
```

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15/15             0s 6ms/step - loss:
0.0297 - mae: 0.0836 - val_loss: 0.0266 - val_mae: 0.0743
Epoch 323/550
15/15             0s 6ms/step - loss:
0.0324 - mae: 0.0847 - val_loss: 0.0263 - val_mae: 0.0744
Epoch 324/550
15/15             0s 5ms/step - loss:
0.0313 - mae: 0.0846 - val_loss: 0.0265 - val_mae: 0.0750
Epoch 325/550
15/15             0s 5ms/step - loss:
0.0299 - mae: 0.0835 - val_loss: 0.0266 - val_mae: 0.0755
Epoch 326/550
15/15             0s 5ms/step - loss:
0.0308 - mae: 0.0848 - val_loss: 0.0264 - val_mae: 0.0754
Epoch 327/550
15/15             0s 5ms/step - loss:
0.0306 - mae: 0.0833 - val_loss: 0.0262 - val_mae: 0.0744
Epoch 328/550
15/15             0s 7ms/step - loss:
0.0295 - mae: 0.0824 - val_loss: 0.0260 - val_mae: 0.0740
Epoch 329/550
15/15             0s 5ms/step - loss:
0.0306 - mae: 0.0839 - val_loss: 0.0261 - val_mae: 0.0754
Epoch 330/550
15/15             0s 5ms/step - loss:
0.0307 - mae: 0.0851 - val_loss: 0.0258 - val_mae: 0.0744
Epoch 331/550
15/15             0s 5ms/step - loss:
0.0296 - mae: 0.0829 - val_loss: 0.0257 - val_mae: 0.0737
Epoch 332/550
15/15             0s 5ms/step - loss:
0.0298 - mae: 0.0834 - val_loss: 0.0256 - val_mae: 0.0749
Epoch 333/550
15/15             0s 5ms/step - loss:
0.0305 - mae: 0.0835 - val_loss: 0.0254 - val_mae: 0.0743
Epoch 334/550
15/15             0s 5ms/step - loss:
0.0313 - mae: 0.0846 - val_loss: 0.0253 - val_mae: 0.0751
Epoch 335/550
15/15             0s 6ms/step - loss:
0.0313 - mae: 0.0848 - val_loss: 0.0253 - val_mae: 0.0749
Epoch 336/550
15/15             0s 6ms/step - loss:
0.0295 - mae: 0.0833 - val_loss: 0.0252 - val_mae: 0.0744
Epoch 337/550
15/15             0s 7ms/step - loss:
0.0300 - mae: 0.0822 - val_loss: 0.0249 - val_mae: 0.0738
Epoch 338/550
```

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15/15            0s 6ms/step - loss:
0.0287 - mae: 0.0831 - val_loss: 0.0249 - val_mae: 0.0731
Epoch 339/550
15/15            0s 5ms/step - loss:
0.0302 - mae: 0.0839 - val_loss: 0.0250 - val_mae: 0.0740
Epoch 340/550
15/15            0s 6ms/step - loss:
0.0293 - mae: 0.0825 - val_loss: 0.0248 - val_mae: 0.0738
Epoch 341/550
15/15            0s 5ms/step - loss:
0.0289 - mae: 0.0823 - val_loss: 0.0249 - val_mae: 0.0751
Epoch 342/550
15/15            0s 5ms/step - loss:
0.0294 - mae: 0.0836 - val_loss: 0.0250 - val_mae: 0.0758
Epoch 343/550
15/15            0s 5ms/step - loss:
0.0276 - mae: 0.0813 - val_loss: 0.0248 - val_mae: 0.0755
Epoch 344/550
15/15            0s 5ms/step - loss:
0.0310 - mae: 0.0851 - val_loss: 0.0247 - val_mae: 0.0755
Epoch 345/550
15/15            0s 6ms/step - loss:
0.0280 - mae: 0.0812 - val_loss: 0.0246 - val_mae: 0.0754
Epoch 346/550
15/15            0s 7ms/step - loss:
0.0304 - mae: 0.0844 - val_loss: 0.0247 - val_mae: 0.0751
Epoch 347/550
15/15            0s 6ms/step - loss:
0.0278 - mae: 0.0828 - val_loss: 0.0244 - val_mae: 0.0745
Epoch 348/550
15/15            0s 5ms/step - loss:
0.0288 - mae: 0.0832 - val_loss: 0.0245 - val_mae: 0.0748
Epoch 349/550
15/15            0s 5ms/step - loss:
0.0282 - mae: 0.0829 - val_loss: 0.0243 - val_mae: 0.0739
Epoch 350/550
15/15            0s 6ms/step - loss:
0.0284 - mae: 0.0836 - val_loss: 0.0241 - val_mae: 0.0746
Epoch 351/550
15/15            0s 5ms/step - loss:
0.0303 - mae: 0.0837 - val_loss: 0.0239 - val_mae: 0.0732
Epoch 352/550
15/15            0s 5ms/step - loss:
0.0283 - mae: 0.0829 - val_loss: 0.0239 - val_mae: 0.0740
Epoch 353/550
15/15            0s 5ms/step - loss:
0.0262 - mae: 0.0806 - val_loss: 0.0239 - val_mae: 0.0741
Epoch 354/550
```

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15/15              0s 5ms/step - loss:
0.0274 - mae: 0.0821 - val_loss: 0.0239 - val_mae: 0.0729
Epoch 355/550
15/15              0s 6ms/step - loss:
0.0279 - mae: 0.0822 - val_loss: 0.0239 - val_mae: 0.0729
Epoch 356/550
15/15              0s 7ms/step - loss:
0.0272 - mae: 0.0808 - val_loss: 0.0237 - val_mae: 0.0726
Epoch 357/550
15/15              0s 5ms/step - loss:
0.0260 - mae: 0.0801 - val_loss: 0.0236 - val_mae: 0.0737
Epoch 358/550
15/15              0s 5ms/step - loss:
0.0268 - mae: 0.0817 - val_loss: 0.0237 - val_mae: 0.0742
Epoch 359/550
15/15              0s 5ms/step - loss:
0.0270 - mae: 0.0816 - val_loss: 0.0232 - val_mae: 0.0732
Epoch 360/550
15/15              0s 5ms/step - loss:
0.0271 - mae: 0.0813 - val_loss: 0.0233 - val_mae: 0.0725
Epoch 361/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0823 - val_loss: 0.0232 - val_mae: 0.0738
Epoch 362/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0825 - val_loss: 0.0230 - val_mae: 0.0746
Epoch 363/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0823 - val_loss: 0.0228 - val_mae: 0.0753
Epoch 364/550
15/15              0s 5ms/step - loss:
0.0258 - mae: 0.0810 - val_loss: 0.0226 - val_mae: 0.0738
Epoch 365/550
15/15              0s 7ms/step - loss:
0.0264 - mae: 0.0821 - val_loss: 0.0225 - val_mae: 0.0722
Epoch 366/550
15/15              0s 5ms/step - loss:
0.0255 - mae: 0.0792 - val_loss: 0.0227 - val_mae: 0.0717
Epoch 367/550
15/15              0s 5ms/step - loss:
0.0263 - mae: 0.0821 - val_loss: 0.0227 - val_mae: 0.0725
Epoch 368/550
15/15              0s 5ms/step - loss:
0.0271 - mae: 0.0814 - val_loss: 0.0229 - val_mae: 0.0746
Epoch 369/550
15/15              0s 5ms/step - loss:
0.0255 - mae: 0.0800 - val_loss: 0.0226 - val_mae: 0.0736
Epoch 370/550
```

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15/15              0s 5ms/step - loss:
0.0253 - mae: 0.0798 - val_loss: 0.0223 - val_mae: 0.0732
Epoch 371/550
15/15              0s 5ms/step - loss:
0.0258 - mae: 0.0803 - val_loss: 0.0225 - val_mae: 0.0731
Epoch 372/550
15/15              0s 5ms/step - loss:
0.0249 - mae: 0.0795 - val_loss: 0.0226 - val_mae: 0.0739
Epoch 373/550
15/15              0s 5ms/step - loss:
0.0266 - mae: 0.0816 - val_loss: 0.0224 - val_mae: 0.0734
Epoch 374/550
15/15              0s 5ms/step - loss:
0.0258 - mae: 0.0812 - val_loss: 0.0221 - val_mae: 0.0719
Epoch 375/550
15/15              0s 6ms/step - loss:
0.0270 - mae: 0.0818 - val_loss: 0.0223 - val_mae: 0.0730
Epoch 376/550
15/15              0s 6ms/step - loss:
0.0263 - mae: 0.0817 - val_loss: 0.0222 - val_mae: 0.0731
Epoch 377/550
15/15              0s 5ms/step - loss:
0.0241 - mae: 0.0785 - val_loss: 0.0222 - val_mae: 0.0731
Epoch 378/550
15/15              0s 5ms/step - loss:
0.0259 - mae: 0.0803 - val_loss: 0.0223 - val_mae: 0.0748
Epoch 379/550
15/15              0s 6ms/step - loss:
0.0250 - mae: 0.0795 - val_loss: 0.0220 - val_mae: 0.0728
Epoch 380/550
15/15              0s 5ms/step - loss:
0.0245 - mae: 0.0796 - val_loss: 0.0220 - val_mae: 0.0742
Epoch 381/550
15/15              0s 5ms/step - loss:
0.0253 - mae: 0.0813 - val_loss: 0.0222 - val_mae: 0.0735
Epoch 382/550
15/15              0s 5ms/step - loss:
0.0259 - mae: 0.0809 - val_loss: 0.0221 - val_mae: 0.0741
Epoch 383/550
15/15              0s 5ms/step - loss:
0.0254 - mae: 0.0816 - val_loss: 0.0219 - val_mae: 0.0738
Epoch 384/550
15/15              0s 7ms/step - loss:
0.0249 - mae: 0.0798 - val_loss: 0.0218 - val_mae: 0.0736
Epoch 385/550
15/15              0s 5ms/step - loss:
0.0241 - mae: 0.0799 - val_loss: 0.0218 - val_mae: 0.0740
Epoch 386/550
```

```
15/15            0s 6ms/step - loss:
0.0248 - mae: 0.0797 - val_loss: 0.0217 - val_mae: 0.0725
Epoch 387/550
15/15            0s 5ms/step - loss:
0.0234 - mae: 0.0783 - val_loss: 0.0215 - val_mae: 0.0729
Epoch 388/550
15/15            0s 5ms/step - loss:
0.0235 - mae: 0.0785 - val_loss: 0.0216 - val_mae: 0.0742
Epoch 389/550
15/15            0s 6ms/step - loss:
0.0250 - mae: 0.0814 - val_loss: 0.0214 - val_mae: 0.0728
Epoch 390/550
15/15            0s 5ms/step - loss:
0.0252 - mae: 0.0803 - val_loss: 0.0214 - val_mae: 0.0740
Epoch 391/550
15/15            0s 5ms/step - loss:
0.0244 - mae: 0.0799 - val_loss: 0.0215 - val_mae: 0.0737
Epoch 392/550
15/15            0s 5ms/step - loss:
0.0236 - mae: 0.0791 - val_loss: 0.0220 - val_mae: 0.0746
Epoch 393/550
15/15            0s 6ms/step - loss:
0.0253 - mae: 0.0816 - val_loss: 0.0213 - val_mae: 0.0730
Epoch 394/550
15/15            0s 5ms/step - loss:
0.0236 - mae: 0.0796 - val_loss: 0.0214 - val_mae: 0.0732
Epoch 395/550
15/15            0s 5ms/step - loss:
0.0247 - mae: 0.0801 - val_loss: 0.0217 - val_mae: 0.0744
Epoch 396/550
15/15            0s 5ms/step - loss:
0.0246 - mae: 0.0803 - val_loss: 0.0211 - val_mae: 0.0733
Epoch 397/550
15/15            0s 6ms/step - loss:
0.0243 - mae: 0.0801 - val_loss: 0.0214 - val_mae: 0.0743
Epoch 398/550
15/15            0s 5ms/step - loss:
0.0229 - mae: 0.0768 - val_loss: 0.0212 - val_mae: 0.0738
Epoch 399/550
15/15            0s 6ms/step - loss:
0.0243 - mae: 0.0800 - val_loss: 0.0209 - val_mae: 0.0721
Epoch 400/550
15/15            0s 6ms/step - loss:
0.0236 - mae: 0.0795 - val_loss: 0.0211 - val_mae: 0.0732
Epoch 401/550
15/15            0s 5ms/step - loss:
0.0227 - mae: 0.0783 - val_loss: 0.0211 - val_mae: 0.0732
Epoch 402/550
```

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15/15              0s 5ms/step - loss:
0.0226 - mae: 0.0782 - val_loss: 0.0207 - val_mae: 0.0717
Epoch 403/550
15/15              0s 5ms/step - loss:
0.0242 - mae: 0.0800 - val_loss: 0.0209 - val_mae: 0.0741
Epoch 404/550
15/15              0s 5ms/step - loss:
0.0228 - mae: 0.0796 - val_loss: 0.0211 - val_mae: 0.0738
Epoch 405/550
15/15              0s 5ms/step - loss:
0.0228 - mae: 0.0784 - val_loss: 0.0212 - val_mae: 0.0749
Epoch 406/550
15/15              0s 5ms/step - loss:
0.0234 - mae: 0.0801 - val_loss: 0.0210 - val_mae: 0.0737
Epoch 407/550
15/15              0s 6ms/step - loss:
0.0212 - mae: 0.0767 - val_loss: 0.0208 - val_mae: 0.0737
Epoch 408/550
15/15              0s 5ms/step - loss:
0.0235 - mae: 0.0787 - val_loss: 0.0206 - val_mae: 0.0736
Epoch 409/550
15/15              0s 7ms/step - loss:
0.0212 - mae: 0.0773 - val_loss: 0.0209 - val_mae: 0.0739
Epoch 410/550
15/15              0s 5ms/step - loss:
0.0231 - mae: 0.0791 - val_loss: 0.0206 - val_mae: 0.0742
Epoch 411/550
15/15              0s 5ms/step - loss:
0.0219 - mae: 0.0784 - val_loss: 0.0207 - val_mae: 0.0732
Epoch 412/550
15/15              0s 5ms/step - loss:
0.0222 - mae: 0.0777 - val_loss: 0.0206 - val_mae: 0.0733
Epoch 413/550
15/15              0s 5ms/step - loss:
0.0217 - mae: 0.0772 - val_loss: 0.0209 - val_mae: 0.0732
Epoch 414/550
15/15              0s 6ms/step - loss:
0.0231 - mae: 0.0791 - val_loss: 0.0205 - val_mae: 0.0724
Epoch 415/550
15/15              0s 5ms/step - loss:
0.0222 - mae: 0.0783 - val_loss: 0.0207 - val_mae: 0.0739
Epoch 416/550
15/15              0s 5ms/step - loss:
0.0224 - mae: 0.0786 - val_loss: 0.0202 - val_mae: 0.0724
Epoch 417/550
15/15              0s 7ms/step - loss:
0.0225 - mae: 0.0780 - val_loss: 0.0206 - val_mae: 0.0730
Epoch 418/550
```

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15/15              0s 6ms/step - loss:
0.0221 - mae: 0.0779 - val_loss: 0.0202 - val_mae: 0.0714
Epoch 419/550
15/15              0s 5ms/step - loss:
0.0221 - mae: 0.0780 - val_loss: 0.0202 - val_mae: 0.0714
Epoch 420/550
15/15              0s 5ms/step - loss:
0.0213 - mae: 0.0780 - val_loss: 0.0208 - val_mae: 0.0732
Epoch 421/550
15/15              0s 6ms/step - loss:
0.0225 - mae: 0.0775 - val_loss: 0.0200 - val_mae: 0.0721
Epoch 422/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0756 - val_loss: 0.0203 - val_mae: 0.0727
Epoch 423/550
15/15              0s 5ms/step - loss:
0.0221 - mae: 0.0781 - val_loss: 0.0203 - val_mae: 0.0733
Epoch 424/550
15/15              0s 7ms/step - loss:
0.0211 - mae: 0.0767 - val_loss: 0.0199 - val_mae: 0.0720
Epoch 425/550
15/15              0s 5ms/step - loss:
0.0218 - mae: 0.0779 - val_loss: 0.0207 - val_mae: 0.0735
Epoch 426/550
15/15              0s 5ms/step - loss:
0.0212 - mae: 0.0772 - val_loss: 0.0203 - val_mae: 0.0727
Epoch 427/550
15/15              0s 5ms/step - loss:
0.0210 - mae: 0.0761 - val_loss: 0.0205 - val_mae: 0.0735
Epoch 428/550
15/15              0s 5ms/step - loss:
0.0211 - mae: 0.0771 - val_loss: 0.0197 - val_mae: 0.0716
Epoch 429/550
15/15              0s 5ms/step - loss:
0.0218 - mae: 0.0769 - val_loss: 0.0207 - val_mae: 0.0741
Epoch 430/550
15/15              0s 5ms/step - loss:
0.0222 - mae: 0.0784 - val_loss: 0.0201 - val_mae: 0.0734
Epoch 431/550
15/15              0s 5ms/step - loss:
0.0212 - mae: 0.0771 - val_loss: 0.0202 - val_mae: 0.0731
Epoch 432/550
15/15              0s 6ms/step - loss:
0.0213 - mae: 0.0778 - val_loss: 0.0198 - val_mae: 0.0712
Epoch 433/550
15/15              0s 5ms/step - loss:
0.0215 - mae: 0.0765 - val_loss: 0.0199 - val_mae: 0.0715
Epoch 434/550
```

```
15/15              0s 5ms/step - loss:
0.0205 - mae: 0.0778 - val_loss: 0.0198 - val_mae: 0.0706
Epoch 435/550
15/15              0s 5ms/step - loss:
0.0214 - mae: 0.0779 - val_loss: 0.0199 - val_mae: 0.0721
Epoch 436/550
15/15              0s 5ms/step - loss:
0.0216 - mae: 0.0774 - val_loss: 0.0196 - val_mae: 0.0716
Epoch 437/550
15/15              0s 5ms/step - loss:
0.0220 - mae: 0.0778 - val_loss: 0.0198 - val_mae: 0.0727
Epoch 438/550
15/15              0s 5ms/step - loss:
0.0208 - mae: 0.0763 - val_loss: 0.0197 - val_mae: 0.0716
Epoch 439/550
15/15              0s 7ms/step - loss:
0.0208 - mae: 0.0770 - val_loss: 0.0192 - val_mae: 0.0712
Epoch 440/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0752 - val_loss: 0.0197 - val_mae: 0.0728
Epoch 441/550
15/15              0s 5ms/step - loss:
0.0213 - mae: 0.0769 - val_loss: 0.0198 - val_mae: 0.0741
Epoch 442/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0753 - val_loss: 0.0190 - val_mae: 0.0726
Epoch 443/550
15/15              0s 5ms/step - loss:
0.0225 - mae: 0.0787 - val_loss: 0.0192 - val_mae: 0.0710
Epoch 444/550
15/15              0s 5ms/step - loss:
0.0208 - mae: 0.0769 - val_loss: 0.0193 - val_mae: 0.0711
Epoch 445/550
15/15              0s 5ms/step - loss:
0.0207 - mae: 0.0769 - val_loss: 0.0195 - val_mae: 0.0713
Epoch 446/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0741 - val_loss: 0.0194 - val_mae: 0.0714
Epoch 447/550
15/15              0s 6ms/step - loss:
0.0198 - mae: 0.0745 - val_loss: 0.0194 - val_mae: 0.0718
Epoch 448/550
15/15              0s 5ms/step - loss:
0.0207 - mae: 0.0770 - val_loss: 0.0188 - val_mae: 0.0711
Epoch 449/550
15/15              0s 7ms/step - loss:
0.0194 - mae: 0.0746 - val_loss: 0.0195 - val_mae: 0.0727
Epoch 450/550
```

```
15/15              0s 5ms/step - loss:
0.0207 - mae: 0.0768 - val_loss: 0.0193 - val_mae: 0.0718
Epoch 451/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0749 - val_loss: 0.0194 - val_mae: 0.0725
Epoch 452/550
15/15              0s 5ms/step - loss:
0.0206 - mae: 0.0770 - val_loss: 0.0192 - val_mae: 0.0722
Epoch 453/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0752 - val_loss: 0.0189 - val_mae: 0.0711
Epoch 454/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0742 - val_loss: 0.0191 - val_mae: 0.0700
Epoch 455/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0769 - val_loss: 0.0199 - val_mae: 0.0730
Epoch 456/550
15/15              0s 7ms/step - loss:
0.0201 - mae: 0.0770 - val_loss: 0.0195 - val_mae: 0.0731
Epoch 457/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0744 - val_loss: 0.0188 - val_mae: 0.0716
Epoch 458/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0748 - val_loss: 0.0197 - val_mae: 0.0733
Epoch 459/550
15/15              0s 5ms/step - loss:
0.0209 - mae: 0.0772 - val_loss: 0.0195 - val_mae: 0.0725
Epoch 460/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0763 - val_loss: 0.0195 - val_mae: 0.0724
Epoch 461/550
15/15              0s 6ms/step - loss:
0.0190 - mae: 0.0748 - val_loss: 0.0193 - val_mae: 0.0715
Epoch 462/550
15/15              0s 5ms/step - loss:
0.0205 - mae: 0.0766 - val_loss: 0.0190 - val_mae: 0.0714
Epoch 463/550
15/15              0s 6ms/step - loss:
0.0198 - mae: 0.0758 - val_loss: 0.0189 - val_mae: 0.0721
Epoch 464/550
15/15              0s 5ms/step - loss:
0.0205 - mae: 0.0762 - val_loss: 0.0190 - val_mae: 0.0721
Epoch 465/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0753 - val_loss: 0.0189 - val_mae: 0.0720
Epoch 466/550
```

```
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0734 - val_loss: 0.0187 - val_mae: 0.0708
Epoch 467/550
15/15              0s 5ms/step - loss:
0.0191 - mae: 0.0744 - val_loss: 0.0188 - val_mae: 0.0709
Epoch 468/550
15/15              0s 5ms/step - loss:
0.0191 - mae: 0.0745 - val_loss: 0.0194 - val_mae: 0.0728
Epoch 469/550
15/15              0s 5ms/step - loss:
0.0191 - mae: 0.0747 - val_loss: 0.0192 - val_mae: 0.0715
Epoch 470/550
15/15              0s 5ms/step - loss:
0.0195 - mae: 0.0755 - val_loss: 0.0185 - val_mae: 0.0709
Epoch 471/550
15/15              0s 6ms/step - loss:
0.0201 - mae: 0.0760 - val_loss: 0.0190 - val_mae: 0.0718
Epoch 472/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0755 - val_loss: 0.0188 - val_mae: 0.0701
Epoch 473/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0758 - val_loss: 0.0196 - val_mae: 0.0723
Epoch 474/550
15/15              0s 5ms/step - loss:
0.0187 - mae: 0.0735 - val_loss: 0.0187 - val_mae: 0.0711
Epoch 475/550
15/15              0s 5ms/step - loss:
0.0177 - mae: 0.0725 - val_loss: 0.0188 - val_mae: 0.0708
Epoch 476/550
15/15              0s 5ms/step - loss:
0.0188 - mae: 0.0740 - val_loss: 0.0193 - val_mae: 0.0721
Epoch 477/550
15/15              0s 5ms/step - loss:
0.0196 - mae: 0.0758 - val_loss: 0.0189 - val_mae: 0.0712
Epoch 478/550
15/15              0s 5ms/step - loss:
0.0187 - mae: 0.0733 - val_loss: 0.0188 - val_mae: 0.0708
Epoch 479/550
15/15              0s 7ms/step - loss:
0.0191 - mae: 0.0738 - val_loss: 0.0186 - val_mae: 0.0704
Epoch 480/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0743 - val_loss: 0.0185 - val_mae: 0.0701
Epoch 481/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0731 - val_loss: 0.0184 - val_mae: 0.0708
Epoch 482/550
```

```
15/15              0s 6ms/step - loss:
0.0196 - mae: 0.0752 - val_loss: 0.0189 - val_mae: 0.0714
Epoch 483/550
15/15              0s 6ms/step - loss:
0.0192 - mae: 0.0735 - val_loss: 0.0183 - val_mae: 0.0701
Epoch 484/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0755 - val_loss: 0.0185 - val_mae: 0.0696
Epoch 485/550
15/15              0s 7ms/step - loss:
0.0185 - mae: 0.0749 - val_loss: 0.0190 - val_mae: 0.0704
Epoch 486/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0719 - val_loss: 0.0188 - val_mae: 0.0716
Epoch 487/550
15/15              0s 6ms/step - loss:
0.0198 - mae: 0.0757 - val_loss: 0.0189 - val_mae: 0.0722
Epoch 488/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0735 - val_loss: 0.0188 - val_mae: 0.0715
Epoch 489/550
15/15              0s 5ms/step - loss:
0.0178 - mae: 0.0724 - val_loss: 0.0189 - val_mae: 0.0717
Epoch 490/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0735 - val_loss: 0.0193 - val_mae: 0.0721
Epoch 491/550
15/15              0s 5ms/step - loss:
0.0192 - mae: 0.0759 - val_loss: 0.0189 - val_mae: 0.0710
Epoch 492/550
15/15              0s 7ms/step - loss:
0.0192 - mae: 0.0749 - val_loss: 0.0198 - val_mae: 0.0723
Epoch 493/550
15/15              0s 5ms/step - loss:
0.0181 - mae: 0.0726 - val_loss: 0.0188 - val_mae: 0.0714
Epoch 494/550
15/15              0s 6ms/step - loss:
0.0179 - mae: 0.0728 - val_loss: 0.0193 - val_mae: 0.0734
Epoch 495/550
15/15              0s 5ms/step - loss:
0.0185 - mae: 0.0735 - val_loss: 0.0195 - val_mae: 0.0737
Epoch 496/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0724 - val_loss: 0.0190 - val_mae: 0.0724
Epoch 497/550
15/15              0s 5ms/step - loss:
0.0185 - mae: 0.0730 - val_loss: 0.0191 - val_mae: 0.0712
Epoch 498/550
```

```
15/15              0s 5ms/step - loss:
0.0192 - mae: 0.0739 - val_loss: 0.0192 - val_mae: 0.0721
Epoch 499/550
15/15              0s 6ms/step - loss:
0.0173 - mae: 0.0710 - val_loss: 0.0188 - val_mae: 0.0714
Epoch 500/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0729 - val_loss: 0.0188 - val_mae: 0.0726
Epoch 501/550
15/15              0s 5ms/step - loss:
0.0188 - mae: 0.0740 - val_loss: 0.0189 - val_mae: 0.0720
Epoch 502/550
15/15              0s 5ms/step - loss:
0.0188 - mae: 0.0748 - val_loss: 0.0185 - val_mae: 0.0703
Epoch 503/550
15/15              0s 6ms/step - loss:
0.0184 - mae: 0.0736 - val_loss: 0.0187 - val_mae: 0.0692
Epoch 504/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0725 - val_loss: 0.0191 - val_mae: 0.0715
Epoch 505/550
15/15              0s 7ms/step - loss:
0.0197 - mae: 0.0745 - val_loss: 0.0186 - val_mae: 0.0710
Epoch 506/550
15/15              0s 5ms/step - loss:
0.0185 - mae: 0.0728 - val_loss: 0.0187 - val_mae: 0.0706
Epoch 507/550
15/15              0s 5ms/step - loss:
0.0185 - mae: 0.0726 - val_loss: 0.0187 - val_mae: 0.0720
Epoch 508/550
15/15              0s 6ms/step - loss:
0.0184 - mae: 0.0727 - val_loss: 0.0192 - val_mae: 0.0715
```

Training and Validation Loss - Fold 1

Training and Validation MAE - Fold 1
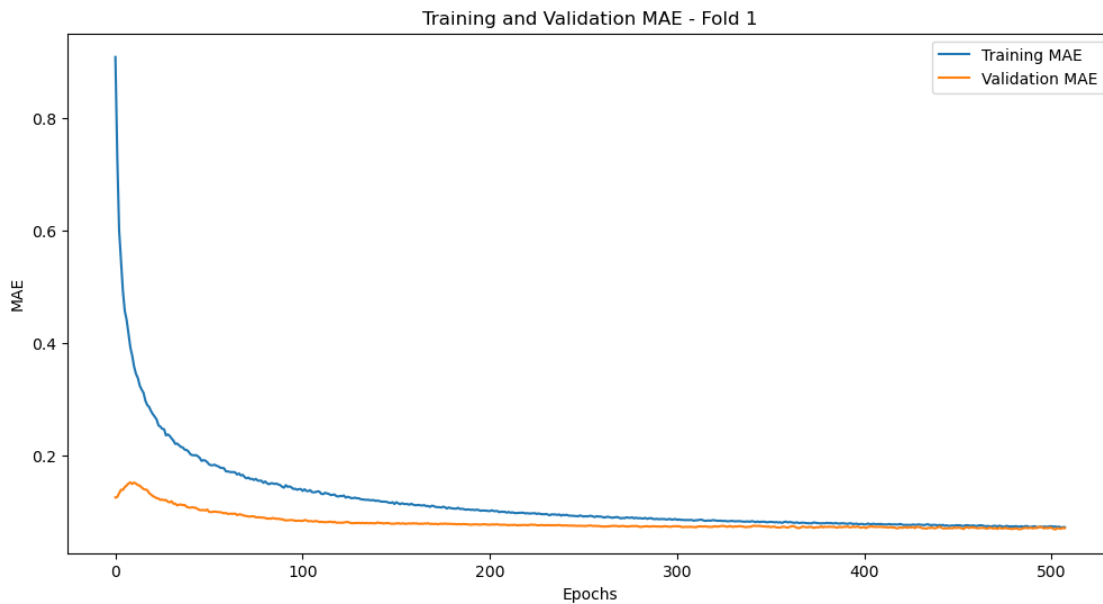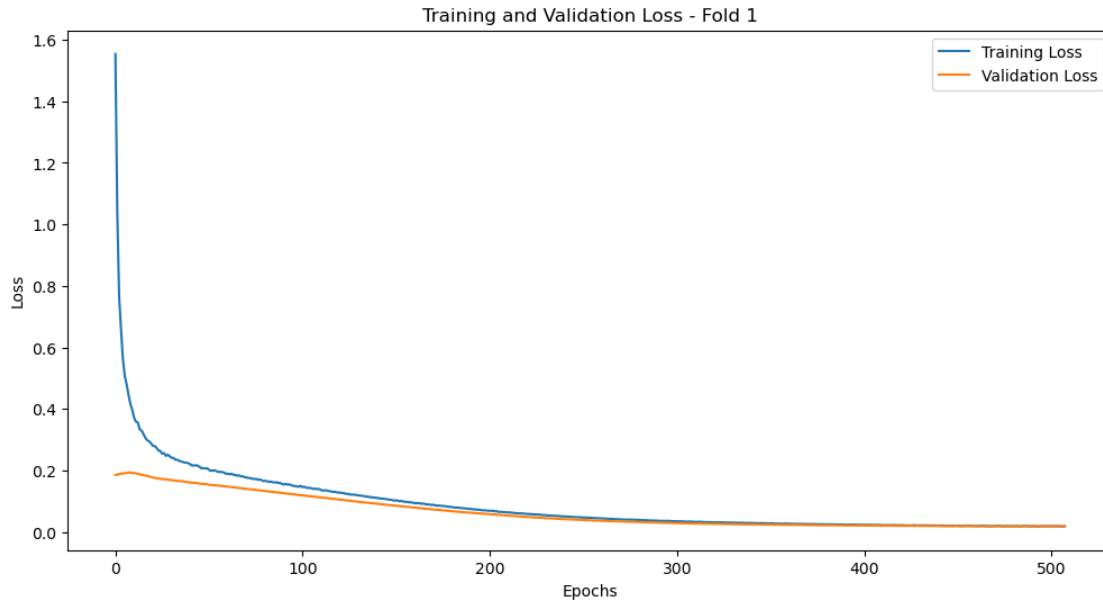
Fold Validation MAE: 0.07010382413864136
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

```
15/15              2s 16ms/step -
loss: 1.6756 - mae: 0.9483 - val_loss: 0.2164 - val_mae: 0.1781
Epoch 2/550
15/15              0s 5ms/step - loss:
0.9092 - mae: 0.6690 - val_loss: 0.2020 - val_mae: 0.1440
Epoch 3/550
15/15              0s 5ms/step - loss:
0.6940 - mae: 0.5713 - val_loss: 0.1986 - val_mae: 0.1358
Epoch 4/550
15/15              0s 5ms/step - loss:
0.5632 - mae: 0.4902 - val_loss: 0.1975 - val_mae: 0.1324
Epoch 5/550
15/15              0s 5ms/step - loss:
0.5038 - mae: 0.4579 - val_loss: 0.1965 - val_mae: 0.1308
Epoch 6/550
15/15              0s 5ms/step - loss:
0.4520 - mae: 0.4176 - val_loss: 0.1960 - val_mae: 0.1314
Epoch 7/550
15/15              0s 5ms/step - loss:
0.4218 - mae: 0.3925 - val_loss: 0.1958 - val_mae: 0.1299
Epoch 8/550
15/15              0s 5ms/step - loss:
0.3738 - mae: 0.3617 - val_loss: 0.1959 - val_mae: 0.1304
Epoch 9/550
15/15              0s 5ms/step - loss:
0.3588 - mae: 0.3480 - val_loss: 0.1950 - val_mae: 0.1306
Epoch 10/550
15/15              0s 5ms/step - loss:
0.3424 - mae: 0.3370 - val_loss: 0.1953 - val_mae: 0.1322
Epoch 11/550
15/15              0s 5ms/step - loss:
0.3306 - mae: 0.3240 - val_loss: 0.1958 - val_mae: 0.1339
Epoch 12/550
15/15              0s 5ms/step - loss:
0.3307 - mae: 0.3192 - val_loss: 0.1953 - val_mae: 0.1340
Epoch 13/550
15/15              0s 5ms/step - loss:
0.3096 - mae: 0.3025 - val_loss: 0.1951 - val_mae: 0.1335
Epoch 14/550
15/15              0s 6ms/step - loss:
0.3148 - mae: 0.3002 - val_loss: 0.1923 - val_mae: 0.1288
Epoch 15/550
15/15              0s 5ms/step - loss:
0.3008 - mae: 0.2907 - val_loss: 0.1922 - val_mae: 0.1300
Epoch 16/550
15/15              0s 5ms/step - loss:
0.2929 - mae: 0.2794 - val_loss: 0.1901 - val_mae: 0.1262
Epoch 17/550
```

```
15/15                0s 5ms/step - loss:
0.2755 - mae: 0.2660 - val_loss: 0.1901 - val_mae: 0.1269
Epoch 18/550
15/15                0s 5ms/step - loss:
0.2781 - mae: 0.2693 - val_loss: 0.1885 - val_mae: 0.1242
Epoch 19/550
15/15                0s 5ms/step - loss:
0.2757 - mae: 0.2629 - val_loss: 0.1870 - val_mae: 0.1242
Epoch 20/550
15/15                0s 5ms/step - loss:
0.2699 - mae: 0.2565 - val_loss: 0.1857 - val_mae: 0.1214
Epoch 21/550
15/15                0s 6ms/step - loss:
0.2555 - mae: 0.2462 - val_loss: 0.1842 - val_mae: 0.1189
Epoch 22/550
15/15                0s 5ms/step - loss:
0.2556 - mae: 0.2437 - val_loss: 0.1834 - val_mae: 0.1179
Epoch 23/550
15/15                0s 5ms/step - loss:
0.2589 - mae: 0.2417 - val_loss: 0.1828 - val_mae: 0.1171
Epoch 24/550
15/15                0s 5ms/step - loss:
0.2492 - mae: 0.2353 - val_loss: 0.1815 - val_mae: 0.1147
Epoch 25/550
15/15                0s 5ms/step - loss:
0.2462 - mae: 0.2303 - val_loss: 0.1810 - val_mae: 0.1153
Epoch 26/550
15/15                0s 5ms/step - loss:
0.2423 - mae: 0.2247 - val_loss: 0.1800 - val_mae: 0.1146
Epoch 27/550
15/15                0s 5ms/step - loss:
0.2395 - mae: 0.2231 - val_loss: 0.1787 - val_mae: 0.1125
Epoch 28/550
15/15                0s 5ms/step - loss:
0.2399 - mae: 0.2269 - val_loss: 0.1776 - val_mae: 0.1118
Epoch 29/550
15/15                0s 5ms/step - loss:
0.2316 - mae: 0.2148 - val_loss: 0.1764 - val_mae: 0.1100
Epoch 30/550
15/15                0s 5ms/step - loss:
0.2284 - mae: 0.2127 - val_loss: 0.1763 - val_mae: 0.1106
Epoch 31/550
15/15                0s 5ms/step - loss:
0.2305 - mae: 0.2162 - val_loss: 0.1755 - val_mae: 0.1106
Epoch 32/550
15/15                0s 5ms/step - loss:
0.2247 - mae: 0.2081 - val_loss: 0.1748 - val_mae: 0.1089
Epoch 33/550
```

```
15/15              0s 5ms/step - loss:
0.2252 - mae: 0.2076 - val_loss: 0.1747 - val_mae: 0.1117
Epoch 34/550
15/15              0s 5ms/step - loss:
0.2205 - mae: 0.1990 - val_loss: 0.1729 - val_mae: 0.1083
Epoch 35/550
15/15              0s 6ms/step - loss:
0.2178 - mae: 0.2002 - val_loss: 0.1724 - val_mae: 0.1089
Epoch 36/550
15/15              0s 6ms/step - loss:
0.2200 - mae: 0.1989 - val_loss: 0.1719 - val_mae: 0.1074
Epoch 37/550
15/15              0s 5ms/step - loss:
0.2166 - mae: 0.1952 - val_loss: 0.1713 - val_mae: 0.1075
Epoch 38/550
15/15              0s 6ms/step - loss:
0.2114 - mae: 0.1920 - val_loss: 0.1698 - val_mae: 0.1055
Epoch 39/550
15/15              0s 6ms/step - loss:
0.2143 - mae: 0.1923 - val_loss: 0.1692 - val_mae: 0.1057
Epoch 40/550
15/15              0s 5ms/step - loss:
0.2074 - mae: 0.1881 - val_loss: 0.1702 - val_mae: 0.1107
Epoch 41/550
15/15              0s 6ms/step - loss:
0.2104 - mae: 0.1891 - val_loss: 0.1687 - val_mae: 0.1070
Epoch 42/550
15/15              0s 6ms/step - loss:
0.2096 - mae: 0.1893 - val_loss: 0.1672 - val_mae: 0.1060
Epoch 43/550
15/15              0s 6ms/step - loss:
0.2058 - mae: 0.1863 - val_loss: 0.1663 - val_mae: 0.1037
Epoch 44/550
15/15              0s 6ms/step - loss:
0.2095 - mae: 0.1907 - val_loss: 0.1657 - val_mae: 0.1028
Epoch 45/550
15/15              0s 6ms/step - loss:
0.2002 - mae: 0.1803 - val_loss: 0.1659 - val_mae: 0.1058
Epoch 46/550
15/15              0s 6ms/step - loss:
0.2081 - mae: 0.1819 - val_loss: 0.1641 - val_mae: 0.1018
Epoch 47/550
15/15              0s 6ms/step - loss:
0.2018 - mae: 0.1792 - val_loss: 0.1634 - val_mae: 0.1019
Epoch 48/550
15/15              0s 5ms/step - loss:
0.2011 - mae: 0.1794 - val_loss: 0.1627 - val_mae: 0.1024
Epoch 49/550
```

```
15/15              0s 5ms/step - loss:
0.1943 - mae: 0.1744 - val_loss: 0.1622 - val_mae: 0.1016
Epoch 50/550
15/15              0s 5ms/step - loss:
0.1956 - mae: 0.1726 - val_loss: 0.1616 - val_mae: 0.1013
Epoch 51/550
15/15              0s 5ms/step - loss:
0.1926 - mae: 0.1718 - val_loss: 0.1613 - val_mae: 0.1021
Epoch 52/550
15/15              0s 5ms/step - loss:
0.1929 - mae: 0.1727 - val_loss: 0.1601 - val_mae: 0.1009
Epoch 53/550
15/15              0s 5ms/step - loss:
0.1910 - mae: 0.1710 - val_loss: 0.1593 - val_mae: 0.1007
Epoch 54/550
15/15              0s 5ms/step - loss:
0.1870 - mae: 0.1692 - val_loss: 0.1581 - val_mae: 0.0979
Epoch 55/550
15/15              0s 6ms/step - loss:
0.1897 - mae: 0.1705 - val_loss: 0.1579 - val_mae: 0.0997
Epoch 56/550
15/15              0s 7ms/step - loss:
0.1857 - mae: 0.1662 - val_loss: 0.1568 - val_mae: 0.0986
Epoch 57/550
15/15              0s 6ms/step - loss:
0.1880 - mae: 0.1674 - val_loss: 0.1564 - val_mae: 0.0990
Epoch 58/550
15/15              0s 6ms/step - loss:
0.1836 - mae: 0.1635 - val_loss: 0.1558 - val_mae: 0.0991
Epoch 59/550
15/15              0s 5ms/step - loss:
0.1807 - mae: 0.1628 - val_loss: 0.1544 - val_mae: 0.0965
Epoch 60/550
15/15              0s 5ms/step - loss:
0.1798 - mae: 0.1578 - val_loss: 0.1537 - val_mae: 0.0961
Epoch 61/550
15/15              0s 5ms/step - loss:
0.1764 - mae: 0.1572 - val_loss: 0.1533 - val_mae: 0.0969
Epoch 62/550
15/15              0s 6ms/step - loss:
0.1787 - mae: 0.1585 - val_loss: 0.1522 - val_mae: 0.0952
Epoch 63/550
15/15              0s 5ms/step - loss:
0.1748 - mae: 0.1562 - val_loss: 0.1520 - val_mae: 0.0962
Epoch 64/550
15/15              0s 5ms/step - loss:
0.1757 - mae: 0.1558 - val_loss: 0.1515 - val_mae: 0.0971
Epoch 65/550
```

```
15/15              0s 5ms/step - loss:
0.1748 - mae: 0.1554 - val_loss: 0.1503 - val_mae: 0.0949
Epoch 66/550
15/15              0s 5ms/step - loss:
0.1757 - mae: 0.1579 - val_loss: 0.1497 - val_mae: 0.0948
Epoch 67/550
15/15              0s 6ms/step - loss:
0.1695 - mae: 0.1506 - val_loss: 0.1488 - val_mae: 0.0937
Epoch 68/550
15/15              0s 5ms/step - loss:
0.1673 - mae: 0.1499 - val_loss: 0.1483 - val_mae: 0.0953
Epoch 69/550
15/15              0s 5ms/step - loss:
0.1728 - mae: 0.1531 - val_loss: 0.1473 - val_mae: 0.0945
Epoch 70/550
15/15              0s 5ms/step - loss:
0.1702 - mae: 0.1544 - val_loss: 0.1469 - val_mae: 0.0951
Epoch 71/550
15/15              0s 5ms/step - loss:
0.1705 - mae: 0.1493 - val_loss: 0.1458 - val_mae: 0.0935
Epoch 72/550
15/15              0s 5ms/step - loss:
0.1657 - mae: 0.1478 - val_loss: 0.1456 - val_mae: 0.0954
Epoch 73/550
15/15              0s 6ms/step - loss:
0.1661 - mae: 0.1495 - val_loss: 0.1448 - val_mae: 0.0949
Epoch 74/550
15/15              0s 5ms/step - loss:
0.1649 - mae: 0.1458 - val_loss: 0.1437 - val_mae: 0.0930
Epoch 75/550
15/15              0s 5ms/step - loss:
0.1669 - mae: 0.1485 - val_loss: 0.1428 - val_mae: 0.0915
Epoch 76/550
15/15              0s 5ms/step - loss:
0.1615 - mae: 0.1473 - val_loss: 0.1426 - val_mae: 0.0931
Epoch 77/550
15/15              0s 6ms/step - loss:
0.1635 - mae: 0.1452 - val_loss: 0.1415 - val_mae: 0.0918
Epoch 78/550
15/15              0s 6ms/step - loss:
0.1567 - mae: 0.1407 - val_loss: 0.1409 - val_mae: 0.0925
Epoch 79/550
15/15              0s 5ms/step - loss:
0.1638 - mae: 0.1459 - val_loss: 0.1399 - val_mae: 0.0919
Epoch 80/550
15/15              0s 5ms/step - loss:
0.1571 - mae: 0.1404 - val_loss: 0.1392 - val_mae: 0.0912
Epoch 81/550
```

```
15/15              0s 6ms/step - loss:
0.1586 - mae: 0.1446 - val_loss: 0.1384 - val_mae: 0.0907
Epoch 82/550
15/15              0s 6ms/step - loss:
0.1555 - mae: 0.1403 - val_loss: 0.1380 - val_mae: 0.0919
Epoch 83/550
15/15              0s 5ms/step - loss:
0.1553 - mae: 0.1402 - val_loss: 0.1370 - val_mae: 0.0909
Epoch 84/550
15/15              0s 5ms/step - loss:
0.1576 - mae: 0.1429 - val_loss: 0.1365 - val_mae: 0.0917
Epoch 85/550
15/15              0s 5ms/step - loss:
0.1511 - mae: 0.1380 - val_loss: 0.1354 - val_mae: 0.0901
Epoch 86/550
15/15              0s 5ms/step - loss:
0.1523 - mae: 0.1364 - val_loss: 0.1346 - val_mae: 0.0894
Epoch 87/550
15/15              0s 5ms/step - loss:
0.1568 - mae: 0.1449 - val_loss: 0.1340 - val_mae: 0.0900
Epoch 88/550
15/15              0s 5ms/step - loss:
0.1508 - mae: 0.1377 - val_loss: 0.1335 - val_mae: 0.0910
Epoch 89/550
15/15              0s 7ms/step - loss:
0.1493 - mae: 0.1372 - val_loss: 0.1324 - val_mae: 0.0894
Epoch 90/550
15/15              0s 5ms/step - loss:
0.1467 - mae: 0.1340 - val_loss: 0.1318 - val_mae: 0.0899
Epoch 91/550
15/15              0s 5ms/step - loss:
0.1471 - mae: 0.1352 - val_loss: 0.1310 - val_mae: 0.0894
Epoch 92/550
15/15              0s 5ms/step - loss:
0.1452 - mae: 0.1325 - val_loss: 0.1301 - val_mae: 0.0887
Epoch 93/550
15/15              0s 6ms/step - loss:
0.1459 - mae: 0.1347 - val_loss: 0.1294 - val_mae: 0.0884
Epoch 94/550
15/15              0s 5ms/step - loss:
0.1464 - mae: 0.1373 - val_loss: 0.1285 - val_mae: 0.0877
Epoch 95/550
15/15              0s 6ms/step - loss:
0.1409 - mae: 0.1316 - val_loss: 0.1282 - val_mae: 0.0899
Epoch 96/550
15/15              0s 6ms/step - loss:
0.1427 - mae: 0.1338 - val_loss: 0.1269 - val_mae: 0.0883
Epoch 97/550
```

```
15/15                0s 6ms/step - loss:
0.1398 - mae: 0.1305 - val_loss: 0.1264 - val_mae: 0.0888
Epoch 98/550
15/15                0s 6ms/step - loss:
0.1401 - mae: 0.1315 - val_loss: 0.1256 - val_mae: 0.0878
Epoch 99/550
15/15                0s 6ms/step - loss:
0.1395 - mae: 0.1308 - val_loss: 0.1247 - val_mae: 0.0872
Epoch 100/550
15/15                0s 6ms/step - loss:
0.1395 - mae: 0.1335 - val_loss: 0.1242 - val_mae: 0.0882
Epoch 101/550
15/15                0s 6ms/step - loss:
0.1395 - mae: 0.1293 - val_loss: 0.1233 - val_mae: 0.0874
Epoch 102/550
15/15                0s 5ms/step - loss:
0.1381 - mae: 0.1326 - val_loss: 0.1225 - val_mae: 0.0861
Epoch 103/550
15/15                0s 6ms/step - loss:
0.1365 - mae: 0.1288 - val_loss: 0.1219 - val_mae: 0.0868
Epoch 104/550
15/15                0s 5ms/step - loss:
0.1344 - mae: 0.1279 - val_loss: 0.1210 - val_mae: 0.0860
Epoch 105/550
15/15                0s 5ms/step - loss:
0.1326 - mae: 0.1267 - val_loss: 0.1204 - val_mae: 0.0862
Epoch 106/550
15/15                0s 5ms/step - loss:
0.1333 - mae: 0.1269 - val_loss: 0.1197 - val_mae: 0.0861
Epoch 107/550
15/15                0s 5ms/step - loss:
0.1290 - mae: 0.1257 - val_loss: 0.1189 - val_mae: 0.0863
Epoch 108/550
15/15                0s 6ms/step - loss:
0.1299 - mae: 0.1267 - val_loss: 0.1183 - val_mae: 0.0861
Epoch 109/550
15/15                0s 5ms/step - loss:
0.1306 - mae: 0.1240 - val_loss: 0.1177 - val_mae: 0.0859
Epoch 110/550
15/15                0s 5ms/step - loss:
0.1283 - mae: 0.1261 - val_loss: 0.1169 - val_mae: 0.0854
Epoch 111/550
15/15                0s 6ms/step - loss:
0.1283 - mae: 0.1245 - val_loss: 0.1162 - val_mae: 0.0857
Epoch 112/550
15/15                0s 5ms/step - loss:
0.1294 - mae: 0.1260 - val_loss: 0.1153 - val_mae: 0.0847
Epoch 113/550
```

```
15/15            0s 5ms/step - loss:
0.1265 - mae: 0.1253 - val_loss: 0.1146 - val_mae: 0.0851
Epoch 114/550
15/15            0s 5ms/step - loss:
0.1265 - mae: 0.1240 - val_loss: 0.1138 - val_mae: 0.0848
Epoch 115/550
15/15            0s 5ms/step - loss:
0.1198 - mae: 0.1189 - val_loss: 0.1130 - val_mae: 0.0846
Epoch 116/550
15/15            0s 5ms/step - loss:
0.1242 - mae: 0.1244 - val_loss: 0.1124 - val_mae: 0.0846
Epoch 117/550
15/15            0s 7ms/step - loss:
0.1259 - mae: 0.1255 - val_loss: 0.1116 - val_mae: 0.0842
Epoch 118/550
15/15            0s 6ms/step - loss:
0.1213 - mae: 0.1222 - val_loss: 0.1111 - val_mae: 0.0847
Epoch 119/550
15/15            0s 6ms/step - loss:
0.1211 - mae: 0.1224 - val_loss: 0.1103 - val_mae: 0.0846
Epoch 120/550
15/15            0s 6ms/step - loss:
0.1186 - mae: 0.1183 - val_loss: 0.1096 - val_mae: 0.0846
Epoch 121/550
15/15            0s 5ms/step - loss:
0.1200 - mae: 0.1214 - val_loss: 0.1089 - val_mae: 0.0846
Epoch 122/550
15/15            0s 5ms/step - loss:
0.1188 - mae: 0.1220 - val_loss: 0.1081 - val_mae: 0.0845
Epoch 123/550
15/15            0s 5ms/step - loss:
0.1174 - mae: 0.1198 - val_loss: 0.1074 - val_mae: 0.0838
Epoch 124/550
15/15            0s 5ms/step - loss:
0.1166 - mae: 0.1209 - val_loss: 0.1069 - val_mae: 0.0843
Epoch 125/550
15/15            0s 5ms/step - loss:
0.1187 - mae: 0.1221 - val_loss: 0.1062 - val_mae: 0.0849
Epoch 126/550
15/15            0s 5ms/step - loss:
0.1149 - mae: 0.1199 - val_loss: 0.1053 - val_mae: 0.0843
Epoch 127/550
15/15            0s 5ms/step - loss:
0.1152 - mae: 0.1196 - val_loss: 0.1047 - val_mae: 0.0841
Epoch 128/550
15/15            0s 5ms/step - loss:
0.1143 - mae: 0.1177 - val_loss: 0.1040 - val_mae: 0.0835
Epoch 129/550
```

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15/15              0s 5ms/step - loss:
0.1160 - mae: 0.1209 - val_loss: 0.1033 - val_mae: 0.0835
Epoch 130/550
15/15              0s 5ms/step - loss:
0.1099 - mae: 0.1161 - val_loss: 0.1026 - val_mae: 0.0836
Epoch 131/550
15/15              0s 5ms/step - loss:
0.1087 - mae: 0.1161 - val_loss: 0.1019 - val_mae: 0.0835
Epoch 132/550
15/15              0s 7ms/step - loss:
0.1090 - mae: 0.1163 - val_loss: 0.1014 - val_mae: 0.0837
Epoch 133/550
15/15              0s 5ms/step - loss:
0.1090 - mae: 0.1168 - val_loss: 0.1008 - val_mae: 0.0839
Epoch 134/550
15/15              0s 5ms/step - loss:
0.1073 - mae: 0.1153 - val_loss: 0.0998 - val_mae: 0.0833
Epoch 135/550
15/15              0s 5ms/step - loss:
0.1108 - mae: 0.1173 - val_loss: 0.0993 - val_mae: 0.0838
Epoch 136/550
15/15              0s 5ms/step - loss:
0.1072 - mae: 0.1169 - val_loss: 0.0985 - val_mae: 0.0834
Epoch 137/550
15/15              0s 5ms/step - loss:
0.1033 - mae: 0.1123 - val_loss: 0.0978 - val_mae: 0.0825
Epoch 138/550
15/15              0s 5ms/step - loss:
0.1058 - mae: 0.1165 - val_loss: 0.0971 - val_mae: 0.0831
Epoch 139/550
15/15              0s 6ms/step - loss:
0.1032 - mae: 0.1131 - val_loss: 0.0965 - val_mae: 0.0830
Epoch 140/550
15/15              0s 5ms/step - loss:
0.1046 - mae: 0.1153 - val_loss: 0.0960 - val_mae: 0.0840
Epoch 141/550
15/15              0s 6ms/step - loss:
0.1020 - mae: 0.1127 - val_loss: 0.0951 - val_mae: 0.0828
Epoch 142/550
15/15              0s 5ms/step - loss:
0.1000 - mae: 0.1109 - val_loss: 0.0945 - val_mae: 0.0829
Epoch 143/550
15/15              0s 5ms/step - loss:
0.1002 - mae: 0.1125 - val_loss: 0.0939 - val_mae: 0.0839
Epoch 144/550
15/15              0s 5ms/step - loss:
0.1010 - mae: 0.1159 - val_loss: 0.0931 - val_mae: 0.0833
Epoch 145/550
```

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15/15              0s 5ms/step - loss:
0.1004 - mae: 0.1125 - val_loss: 0.0925 - val_mae: 0.0830
Epoch 146/550
15/15              0s 5ms/step - loss:
0.0990 - mae: 0.1128 - val_loss: 0.0919 - val_mae: 0.0834
Epoch 147/550
15/15              0s 7ms/step - loss:
0.0980 - mae: 0.1123 - val_loss: 0.0913 - val_mae: 0.0829
Epoch 148/550
15/15              0s 5ms/step - loss:
0.0981 - mae: 0.1135 - val_loss: 0.0906 - val_mae: 0.0827
Epoch 149/550
15/15              0s 5ms/step - loss:
0.0944 - mae: 0.1096 - val_loss: 0.0901 - val_mae: 0.0832
Epoch 150/550
15/15              0s 5ms/step - loss:
0.0943 - mae: 0.1097 - val_loss: 0.0893 - val_mae: 0.0824
Epoch 151/550
15/15              0s 5ms/step - loss:
0.0961 - mae: 0.1115 - val_loss: 0.0887 - val_mae: 0.0831
Epoch 152/550
15/15              0s 5ms/step - loss:
0.0967 - mae: 0.1125 - val_loss: 0.0881 - val_mae: 0.0824
Epoch 153/550
15/15              0s 5ms/step - loss:
0.0931 - mae: 0.1114 - val_loss: 0.0876 - val_mae: 0.0833
Epoch 154/550
15/15              0s 5ms/step - loss:
0.0917 - mae: 0.1086 - val_loss: 0.0869 - val_mae: 0.0823
Epoch 155/550
15/15              0s 5ms/step - loss:
0.0912 - mae: 0.1091 - val_loss: 0.0863 - val_mae: 0.0822
Epoch 156/550
15/15              0s 6ms/step - loss:
0.0901 - mae: 0.1072 - val_loss: 0.0855 - val_mae: 0.0819
Epoch 157/550
15/15              0s 5ms/step - loss:
0.0889 - mae: 0.1075 - val_loss: 0.0851 - val_mae: 0.0824
Epoch 158/550
15/15              0s 5ms/step - loss:
0.0884 - mae: 0.1077 - val_loss: 0.0844 - val_mae: 0.0826
Epoch 159/550
15/15              0s 5ms/step - loss:
0.0893 - mae: 0.1086 - val_loss: 0.0838 - val_mae: 0.0820
Epoch 160/550
15/15              0s 6ms/step - loss:
0.0890 - mae: 0.1075 - val_loss: 0.0832 - val_mae: 0.0821
Epoch 161/550
```

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15/15              0s 5ms/step - loss:
0.0869 - mae: 0.1060 - val_loss: 0.0827 - val_mae: 0.0827
Epoch 162/550
15/15              0s 6ms/step - loss:
0.0836 - mae: 0.1044 - val_loss: 0.0821 - val_mae: 0.0829
Epoch 163/550
15/15              0s 5ms/step - loss:
0.0858 - mae: 0.1071 - val_loss: 0.0815 - val_mae: 0.0826
Epoch 164/550
15/15              0s 5ms/step - loss:
0.0850 - mae: 0.1076 - val_loss: 0.0808 - val_mae: 0.0821
Epoch 165/550
15/15              0s 5ms/step - loss:
0.0857 - mae: 0.1074 - val_loss: 0.0804 - val_mae: 0.0824
Epoch 166/550
15/15              0s 5ms/step - loss:
0.0837 - mae: 0.1067 - val_loss: 0.0798 - val_mae: 0.0817
Epoch 167/550
15/15              0s 5ms/step - loss:
0.0816 - mae: 0.1040 - val_loss: 0.0792 - val_mae: 0.0819
Epoch 168/550
15/15              0s 5ms/step - loss:
0.0814 - mae: 0.1053 - val_loss: 0.0786 - val_mae: 0.0824
Epoch 169/550
15/15              0s 5ms/step - loss:
0.0810 - mae: 0.1045 - val_loss: 0.0781 - val_mae: 0.0828
Epoch 170/550
15/15              0s 5ms/step - loss:
0.0819 - mae: 0.1061 - val_loss: 0.0775 - val_mae: 0.0821
Epoch 171/550
15/15              0s 6ms/step - loss:
0.0798 - mae: 0.1034 - val_loss: 0.0770 - val_mae: 0.0817
Epoch 172/550
15/15              0s 5ms/step - loss:
0.0818 - mae: 0.1058 - val_loss: 0.0765 - val_mae: 0.0827
Epoch 173/550
15/15              0s 6ms/step - loss:
0.0820 - mae: 0.1057 - val_loss: 0.0761 - val_mae: 0.0828
Epoch 174/550
15/15              0s 6ms/step - loss:
0.0768 - mae: 0.1018 - val_loss: 0.0754 - val_mae: 0.0822
Epoch 175/550
15/15              0s 5ms/step - loss:
0.0770 - mae: 0.1025 - val_loss: 0.0749 - val_mae: 0.0828
Epoch 176/550
15/15              0s 5ms/step - loss:
0.0768 - mae: 0.1030 - val_loss: 0.0742 - val_mae: 0.0821
Epoch 177/550
```

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15/15              0s 5ms/step - loss:
0.0754 - mae: 0.1009 - val_loss: 0.0737 - val_mae: 0.0818
Epoch 178/550
15/15              0s 5ms/step - loss:
0.0763 - mae: 0.1029 - val_loss: 0.0734 - val_mae: 0.0822
Epoch 179/550
15/15              0s 5ms/step - loss:
0.0745 - mae: 0.1018 - val_loss: 0.0727 - val_mae: 0.0817
Epoch 180/550
15/15              0s 5ms/step - loss:
0.0734 - mae: 0.1028 - val_loss: 0.0724 - val_mae: 0.0820
Epoch 181/550
15/15              0s 5ms/step - loss:
0.0745 - mae: 0.1036 - val_loss: 0.0717 - val_mae: 0.0809
Epoch 182/550
15/15              0s 5ms/step - loss:
0.0747 - mae: 0.1030 - val_loss: 0.0711 - val_mae: 0.0812
Epoch 183/550
15/15              0s 6ms/step - loss:
0.0726 - mae: 0.1005 - val_loss: 0.0707 - val_mae: 0.0815
Epoch 184/550
15/15              0s 5ms/step - loss:
0.0748 - mae: 0.1057 - val_loss: 0.0701 - val_mae: 0.0811
Epoch 185/550
15/15              0s 5ms/step - loss:
0.0732 - mae: 0.1027 - val_loss: 0.0696 - val_mae: 0.0813
Epoch 186/550
15/15              0s 5ms/step - loss:
0.0724 - mae: 0.1029 - val_loss: 0.0691 - val_mae: 0.0813
Epoch 187/550
15/15              0s 7ms/step - loss:
0.0700 - mae: 0.1017 - val_loss: 0.0687 - val_mae: 0.0811
Epoch 188/550
15/15              0s 6ms/step - loss:
0.0683 - mae: 0.0995 - val_loss: 0.0682 - val_mae: 0.0811
Epoch 189/550
15/15              0s 6ms/step - loss:
0.0684 - mae: 0.1003 - val_loss: 0.0677 - val_mae: 0.0814
Epoch 190/550
15/15              0s 6ms/step - loss:
0.0693 - mae: 0.1003 - val_loss: 0.0672 - val_mae: 0.0808
Epoch 191/550
15/15              0s 5ms/step - loss:
0.0681 - mae: 0.0997 - val_loss: 0.0668 - val_mae: 0.0807
Epoch 192/550
15/15              0s 6ms/step - loss:
0.0666 - mae: 0.0988 - val_loss: 0.0663 - val_mae: 0.0809
Epoch 193/550
```

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15/15              0s 5ms/step - loss:
0.0660 - mae: 0.0982 - val_loss: 0.0658 - val_mae: 0.0807
Epoch 194/550
15/15              0s 6ms/step - loss:
0.0668 - mae: 0.0996 - val_loss: 0.0654 - val_mae: 0.0809
Epoch 195/550
15/15              0s 5ms/step - loss:
0.0657 - mae: 0.0983 - val_loss: 0.0648 - val_mae: 0.0806
Epoch 196/550
15/15              0s 5ms/step - loss:
0.0646 - mae: 0.0970 - val_loss: 0.0644 - val_mae: 0.0807
Epoch 197/550
15/15              0s 6ms/step - loss:
0.0664 - mae: 0.1000 - val_loss: 0.0640 - val_mae: 0.0807
Epoch 198/550
15/15              0s 7ms/step - loss:
0.0640 - mae: 0.0976 - val_loss: 0.0635 - val_mae: 0.0811
Epoch 199/550
15/15              0s 5ms/step - loss:
0.0626 - mae: 0.0974 - val_loss: 0.0631 - val_mae: 0.0813
Epoch 200/550
15/15              0s 5ms/step - loss:
0.0634 - mae: 0.0983 - val_loss: 0.0626 - val_mae: 0.0813
Epoch 201/550
15/15              0s 6ms/step - loss:
0.0627 - mae: 0.0978 - val_loss: 0.0624 - val_mae: 0.0809
Epoch 202/550
15/15              0s 6ms/step - loss:
0.0617 - mae: 0.0976 - val_loss: 0.0619 - val_mae: 0.0807
Epoch 203/550
15/15              0s 5ms/step - loss:
0.0609 - mae: 0.0978 - val_loss: 0.0615 - val_mae: 0.0805
Epoch 204/550
15/15              0s 6ms/step - loss:
0.0613 - mae: 0.0964 - val_loss: 0.0611 - val_mae: 0.0808
Epoch 205/550
15/15              0s 6ms/step - loss:
0.0618 - mae: 0.0980 - val_loss: 0.0606 - val_mae: 0.0805
Epoch 206/550
15/15              0s 5ms/step - loss:
0.0611 - mae: 0.0965 - val_loss: 0.0602 - val_mae: 0.0799
Epoch 207/550
15/15              0s 5ms/step - loss:
0.0605 - mae: 0.0964 - val_loss: 0.0599 - val_mae: 0.0807
Epoch 208/550
15/15              0s 5ms/step - loss:
0.0590 - mae: 0.0970 - val_loss: 0.0593 - val_mae: 0.0800
Epoch 209/550
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15/15              0s 5ms/step - loss:
0.0579 - mae: 0.0950 - val_loss: 0.0590 - val_mae: 0.0805
Epoch 210/550
15/15              0s 7ms/step - loss:
0.0583 - mae: 0.0950 - val_loss: 0.0586 - val_mae: 0.0810
Epoch 211/550
15/15              0s 5ms/step - loss:
0.0585 - mae: 0.0971 - val_loss: 0.0582 - val_mae: 0.0803
Epoch 212/550
15/15              0s 6ms/step - loss:
0.0576 - mae: 0.0955 - val_loss: 0.0580 - val_mae: 0.0811
Epoch 213/550
15/15              0s 5ms/step - loss:
0.0589 - mae: 0.0970 - val_loss: 0.0575 - val_mae: 0.0802
Epoch 214/550
15/15              0s 5ms/step - loss:
0.0564 - mae: 0.0950 - val_loss: 0.0572 - val_mae: 0.0803
Epoch 215/550
15/15              0s 5ms/step - loss:
0.0575 - mae: 0.0959 - val_loss: 0.0568 - val_mae: 0.0804
Epoch 216/550
15/15              0s 5ms/step - loss:
0.0568 - mae: 0.0967 - val_loss: 0.0564 - val_mae: 0.0803
Epoch 217/550
15/15              0s 5ms/step - loss:
0.0560 - mae: 0.0957 - val_loss: 0.0562 - val_mae: 0.0800
Epoch 218/550
15/15              0s 5ms/step - loss:
0.0548 - mae: 0.0946 - val_loss: 0.0557 - val_mae: 0.0797
Epoch 219/550
15/15              0s 5ms/step - loss:
0.0565 - mae: 0.0961 - val_loss: 0.0554 - val_mae: 0.0804
Epoch 220/550
15/15              0s 5ms/step - loss:
0.0525 - mae: 0.0926 - val_loss: 0.0550 - val_mae: 0.0802
Epoch 221/550
15/15              0s 6ms/step - loss:
0.0545 - mae: 0.0942 - val_loss: 0.0546 - val_mae: 0.0798
Epoch 222/550
15/15              0s 6ms/step - loss:
0.0529 - mae: 0.0944 - val_loss: 0.0543 - val_mae: 0.0800
Epoch 223/550
15/15              0s 5ms/step - loss:
0.0532 - mae: 0.0947 - val_loss: 0.0539 - val_mae: 0.0802
Epoch 224/550
15/15              0s 5ms/step - loss:
0.0531 - mae: 0.0948 - val_loss: 0.0536 - val_mae: 0.0797
Epoch 225/550
```

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15/15              0s 6ms/step - loss:
0.0541 - mae: 0.0961 - val_loss: 0.0532 - val_mae: 0.0799
Epoch 226/550
15/15              0s 6ms/step - loss:
0.0528 - mae: 0.0966 - val_loss: 0.0529 - val_mae: 0.0802
Epoch 227/550
15/15              0s 5ms/step - loss:
0.0511 - mae: 0.0937 - val_loss: 0.0526 - val_mae: 0.0795
Epoch 228/550
15/15              0s 5ms/step - loss:
0.0518 - mae: 0.0936 - val_loss: 0.0523 - val_mae: 0.0799
Epoch 229/550
15/15              0s 5ms/step - loss:
0.0526 - mae: 0.0945 - val_loss: 0.0518 - val_mae: 0.0804
Epoch 230/550
15/15              0s 5ms/step - loss:
0.0494 - mae: 0.0926 - val_loss: 0.0516 - val_mae: 0.0802
Epoch 231/550
15/15              0s 5ms/step - loss:
0.0502 - mae: 0.0932 - val_loss: 0.0512 - val_mae: 0.0801
Epoch 232/550
15/15              0s 5ms/step - loss:
0.0485 - mae: 0.0917 - val_loss: 0.0510 - val_mae: 0.0798
Epoch 233/550
15/15              0s 5ms/step - loss:
0.0485 - mae: 0.0916 - val_loss: 0.0506 - val_mae: 0.0801
Epoch 234/550
15/15              0s 7ms/step - loss:
0.0501 - mae: 0.0945 - val_loss: 0.0504 - val_mae: 0.0808
Epoch 235/550
15/15              0s 5ms/step - loss:
0.0484 - mae: 0.0917 - val_loss: 0.0499 - val_mae: 0.0795
Epoch 236/550
15/15              0s 6ms/step - loss:
0.0484 - mae: 0.0907 - val_loss: 0.0496 - val_mae: 0.0794
Epoch 237/550
15/15              0s 5ms/step - loss:
0.0475 - mae: 0.0910 - val_loss: 0.0494 - val_mae: 0.0797
Epoch 238/550
15/15              0s 5ms/step - loss:
0.0469 - mae: 0.0917 - val_loss: 0.0491 - val_mae: 0.0792
Epoch 239/550
15/15              0s 5ms/step - loss:
0.0488 - mae: 0.0935 - val_loss: 0.0488 - val_mae: 0.0797
Epoch 240/550
15/15              0s 5ms/step - loss:
0.0463 - mae: 0.0914 - val_loss: 0.0484 - val_mae: 0.0791
Epoch 241/550
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15/15            0s 6ms/step - loss:
0.0456 - mae: 0.0905 - val_loss: 0.0482 - val_mae: 0.0792
Epoch 242/550
15/15            0s 6ms/step - loss:
0.0452 - mae: 0.0905 - val_loss: 0.0478 - val_mae: 0.0791
Epoch 243/550
15/15            0s 5ms/step - loss:
0.0457 - mae: 0.0912 - val_loss: 0.0476 - val_mae: 0.0793
Epoch 244/550
15/15            0s 5ms/step - loss:
0.0463 - mae: 0.0921 - val_loss: 0.0474 - val_mae: 0.0790
Epoch 245/550
15/15            0s 5ms/step - loss:
0.0469 - mae: 0.0927 - val_loss: 0.0471 - val_mae: 0.0785
Epoch 246/550
15/15            0s 7ms/step - loss:
0.0456 - mae: 0.0916 - val_loss: 0.0469 - val_mae: 0.0779
Epoch 247/550
15/15            0s 6ms/step - loss:
0.0444 - mae: 0.0901 - val_loss: 0.0466 - val_mae: 0.0777
Epoch 248/550
15/15            0s 5ms/step - loss:
0.0439 - mae: 0.0887 - val_loss: 0.0463 - val_mae: 0.0781
Epoch 249/550
15/15            0s 5ms/step - loss:
0.0454 - mae: 0.0921 - val_loss: 0.0461 - val_mae: 0.0788
Epoch 250/550
15/15            0s 5ms/step - loss:
0.0432 - mae: 0.0896 - val_loss: 0.0458 - val_mae: 0.0790
Epoch 251/550
15/15            0s 6ms/step - loss:
0.0447 - mae: 0.0905 - val_loss: 0.0455 - val_mae: 0.0794
Epoch 252/550
15/15            0s 5ms/step - loss:
0.0433 - mae: 0.0914 - val_loss: 0.0452 - val_mae: 0.0786
Epoch 253/550
15/15            0s 5ms/step - loss:
0.0429 - mae: 0.0891 - val_loss: 0.0451 - val_mae: 0.0779
Epoch 254/550
15/15            0s 6ms/step - loss:
0.0427 - mae: 0.0893 - val_loss: 0.0449 - val_mae: 0.0784
Epoch 255/550
15/15            0s 6ms/step - loss:
0.0435 - mae: 0.0913 - val_loss: 0.0447 - val_mae: 0.0789
Epoch 256/550
15/15            0s 6ms/step - loss:
0.0411 - mae: 0.0882 - val_loss: 0.0444 - val_mae: 0.0785
Epoch 257/550
```

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15/15              0s 6ms/step - loss:
0.0414 - mae: 0.0878 - val_loss: 0.0441 - val_mae: 0.0784
Epoch 258/550
15/15              0s 5ms/step - loss:
0.0425 - mae: 0.0903 - val_loss: 0.0437 - val_mae: 0.0786
Epoch 259/550
15/15              0s 5ms/step - loss:
0.0413 - mae: 0.0897 - val_loss: 0.0437 - val_mae: 0.0781
Epoch 260/550
15/15              0s 6ms/step - loss:
0.0425 - mae: 0.0913 - val_loss: 0.0433 - val_mae: 0.0782
Epoch 261/550
15/15              0s 6ms/step - loss:
0.0411 - mae: 0.0898 - val_loss: 0.0431 - val_mae: 0.0779
Epoch 262/550
15/15              0s 6ms/step - loss:
0.0419 - mae: 0.0885 - val_loss: 0.0429 - val_mae: 0.0779
Epoch 263/550
15/15              0s 7ms/step - loss:
0.0403 - mae: 0.0894 - val_loss: 0.0427 - val_mae: 0.0781
Epoch 264/550
15/15              0s 5ms/step - loss:
0.0400 - mae: 0.0897 - val_loss: 0.0424 - val_mae: 0.0784
Epoch 265/550
15/15              0s 5ms/step - loss:
0.0405 - mae: 0.0899 - val_loss: 0.0422 - val_mae: 0.0785
Epoch 266/550
15/15              0s 6ms/step - loss:
0.0399 - mae: 0.0892 - val_loss: 0.0420 - val_mae: 0.0782
Epoch 267/550
15/15              0s 5ms/step - loss:
0.0395 - mae: 0.0890 - val_loss: 0.0422 - val_mae: 0.0782
Epoch 268/550
15/15              0s 6ms/step - loss:
0.0395 - mae: 0.0883 - val_loss: 0.0419 - val_mae: 0.0778
Epoch 269/550
15/15              0s 6ms/step - loss:
0.0369 - mae: 0.0851 - val_loss: 0.0415 - val_mae: 0.0783
Epoch 270/550
15/15              0s 6ms/step - loss:
0.0375 - mae: 0.0868 - val_loss: 0.0413 - val_mae: 0.0783
Epoch 271/550
15/15              0s 7ms/step - loss:
0.0388 - mae: 0.0878 - val_loss: 0.0413 - val_mae: 0.0780
Epoch 272/550
15/15              0s 6ms/step - loss:
0.0383 - mae: 0.0885 - val_loss: 0.0409 - val_mae: 0.0777
Epoch 273/550
```

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15/15              0s 5ms/step - loss:
0.0382 - mae: 0.0878 - val_loss: 0.0408 - val_mae: 0.0772
Epoch 274/550
15/15              0s 5ms/step - loss:
0.0378 - mae: 0.0868 - val_loss: 0.0406 - val_mae: 0.0772
Epoch 275/550
15/15              0s 5ms/step - loss:
0.0365 - mae: 0.0867 - val_loss: 0.0404 - val_mae: 0.0776
Epoch 276/550
15/15              0s 5ms/step - loss:
0.0385 - mae: 0.0890 - val_loss: 0.0403 - val_mae: 0.0773
Epoch 277/550
15/15              0s 5ms/step - loss:
0.0372 - mae: 0.0870 - val_loss: 0.0400 - val_mae: 0.0774
Epoch 278/550
15/15              0s 5ms/step - loss:
0.0387 - mae: 0.0895 - val_loss: 0.0398 - val_mae: 0.0775
Epoch 279/550
15/15              0s 6ms/step - loss:
0.0367 - mae: 0.0868 - val_loss: 0.0394 - val_mae: 0.0774
Epoch 280/550
15/15              0s 5ms/step - loss:
0.0357 - mae: 0.0854 - val_loss: 0.0391 - val_mae: 0.0770
Epoch 281/550
15/15              0s 7ms/step - loss:
0.0364 - mae: 0.0870 - val_loss: 0.0389 - val_mae: 0.0772
Epoch 282/550
15/15              0s 5ms/step - loss:
0.0345 - mae: 0.0844 - val_loss: 0.0388 - val_mae: 0.0777
Epoch 283/550
15/15              0s 5ms/step - loss:
0.0389 - mae: 0.0898 - val_loss: 0.0390 - val_mae: 0.0777
Epoch 284/550
15/15              0s 5ms/step - loss:
0.0367 - mae: 0.0867 - val_loss: 0.0387 - val_mae: 0.0774
Epoch 285/550
15/15              0s 6ms/step - loss:
0.0349 - mae: 0.0858 - val_loss: 0.0387 - val_mae: 0.0782
Epoch 286/550
15/15              0s 5ms/step - loss:
0.0351 - mae: 0.0855 - val_loss: 0.0385 - val_mae: 0.0773
Epoch 287/550
15/15              0s 5ms/step - loss:
0.0347 - mae: 0.0851 - val_loss: 0.0383 - val_mae: 0.0783
Epoch 288/550
15/15              0s 6ms/step - loss:
0.0367 - mae: 0.0892 - val_loss: 0.0381 - val_mae: 0.0787
Epoch 289/550
```

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15/15            0s 6ms/step - loss:
0.0345 - mae: 0.0856 - val_loss: 0.0378 - val_mae: 0.0779
Epoch 290/550
15/15            0s 5ms/step - loss:
0.0349 - mae: 0.0869 - val_loss: 0.0376 - val_mae: 0.0770
Epoch 291/550
15/15            0s 7ms/step - loss:
0.0349 - mae: 0.0860 - val_loss: 0.0373 - val_mae: 0.0767
Epoch 292/550
15/15            0s 5ms/step - loss:
0.0337 - mae: 0.0847 - val_loss: 0.0372 - val_mae: 0.0762
Epoch 293/550
15/15            0s 5ms/step - loss:
0.0337 - mae: 0.0854 - val_loss: 0.0372 - val_mae: 0.0763
Epoch 294/550
15/15            0s 5ms/step - loss:
0.0334 - mae: 0.0847 - val_loss: 0.0371 - val_mae: 0.0768
Epoch 295/550
15/15            0s 5ms/step - loss:
0.0330 - mae: 0.0857 - val_loss: 0.0369 - val_mae: 0.0767
Epoch 296/550
15/15            0s 6ms/step - loss:
0.0321 - mae: 0.0837 - val_loss: 0.0368 - val_mae: 0.0769
Epoch 297/550
15/15            0s 5ms/step - loss:
0.0354 - mae: 0.0872 - val_loss: 0.0367 - val_mae: 0.0779
Epoch 298/550
15/15            0s 6ms/step - loss:
0.0326 - mae: 0.0848 - val_loss: 0.0366 - val_mae: 0.0773
Epoch 299/550
15/15            0s 5ms/step - loss:
0.0339 - mae: 0.0864 - val_loss: 0.0361 - val_mae: 0.0773
Epoch 300/550
15/15            0s 5ms/step - loss:
0.0328 - mae: 0.0852 - val_loss: 0.0360 - val_mae: 0.0764
Epoch 301/550
15/15            0s 7ms/step - loss:
0.0324 - mae: 0.0839 - val_loss: 0.0362 - val_mae: 0.0765
Epoch 302/550
15/15            0s 5ms/step - loss:
0.0341 - mae: 0.0866 - val_loss: 0.0359 - val_mae: 0.0765
Epoch 303/550
15/15            0s 5ms/step - loss:
0.0331 - mae: 0.0852 - val_loss: 0.0357 - val_mae: 0.0765
Epoch 304/550
15/15            0s 5ms/step - loss:
0.0333 - mae: 0.0846 - val_loss: 0.0355 - val_mae: 0.0767
Epoch 305/550
```

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15/15              0s 5ms/step - loss:
0.0326 - mae: 0.0856 - val_loss: 0.0356 - val_mae: 0.0767
Epoch 306/550
15/15              0s 5ms/step - loss:
0.0321 - mae: 0.0842 - val_loss: 0.0355 - val_mae: 0.0761
Epoch 307/550
15/15              0s 6ms/step - loss:
0.0322 - mae: 0.0835 - val_loss: 0.0352 - val_mae: 0.0760
Epoch 308/550
15/15              0s 5ms/step - loss:
0.0309 - mae: 0.0828 - val_loss: 0.0351 - val_mae: 0.0760
Epoch 309/550
15/15              0s 5ms/step - loss:
0.0310 - mae: 0.0831 - val_loss: 0.0350 - val_mae: 0.0769
Epoch 310/550
15/15              0s 6ms/step - loss:
0.0308 - mae: 0.0845 - val_loss: 0.0348 - val_mae: 0.0765
Epoch 311/550
15/15              0s 7ms/step - loss:
0.0314 - mae: 0.0856 - val_loss: 0.0350 - val_mae: 0.0764
Epoch 312/550
15/15              0s 5ms/step - loss:
0.0298 - mae: 0.0830 - val_loss: 0.0346 - val_mae: 0.0763
Epoch 313/550
15/15              0s 5ms/step - loss:
0.0295 - mae: 0.0826 - val_loss: 0.0347 - val_mae: 0.0768
Epoch 314/550
15/15              0s 5ms/step - loss:
0.0305 - mae: 0.0843 - val_loss: 0.0346 - val_mae: 0.0775
Epoch 315/550
15/15              0s 5ms/step - loss:
0.0309 - mae: 0.0845 - val_loss: 0.0344 - val_mae: 0.0772
Epoch 316/550
15/15              0s 5ms/step - loss:
0.0299 - mae: 0.0833 - val_loss: 0.0344 - val_mae: 0.0768
Epoch 317/550
15/15              0s 5ms/step - loss:
0.0301 - mae: 0.0837 - val_loss: 0.0338 - val_mae: 0.0766
Epoch 318/550
15/15              0s 5ms/step - loss:
0.0312 - mae: 0.0841 - val_loss: 0.0339 - val_mae: 0.0769
Epoch 319/550
15/15              0s 5ms/step - loss:
0.0306 - mae: 0.0855 - val_loss: 0.0339 - val_mae: 0.0769
Epoch 320/550
15/15              0s 5ms/step - loss:
0.0313 - mae: 0.0847 - val_loss: 0.0341 - val_mae: 0.0767
Epoch 321/550
```

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15/15              0s 5ms/step - loss:
0.0293 - mae: 0.0826 - val_loss: 0.0337 - val_mae: 0.0763
Epoch 322/550
15/15              0s 7ms/step - loss:
0.0298 - mae: 0.0834 - val_loss: 0.0337 - val_mae: 0.0769
Epoch 323/550
15/15              0s 5ms/step - loss:
0.0300 - mae: 0.0846 - val_loss: 0.0337 - val_mae: 0.0770
Epoch 324/550
15/15              0s 5ms/step - loss:
0.0291 - mae: 0.0822 - val_loss: 0.0336 - val_mae: 0.0770
Epoch 325/550
15/15              0s 5ms/step - loss:
0.0284 - mae: 0.0815 - val_loss: 0.0337 - val_mae: 0.0765
Epoch 326/550
15/15              0s 5ms/step - loss:
0.0283 - mae: 0.0818 - val_loss: 0.0331 - val_mae: 0.0766
Epoch 327/550
15/15              0s 5ms/step - loss:
0.0288 - mae: 0.0825 - val_loss: 0.0332 - val_mae: 0.0775
Epoch 328/550
15/15              0s 5ms/step - loss:
0.0281 - mae: 0.0822 - val_loss: 0.0330 - val_mae: 0.0771
Epoch 329/550
15/15              0s 5ms/step - loss:
0.0285 - mae: 0.0830 - val_loss: 0.0332 - val_mae: 0.0767
Epoch 330/550
15/15              0s 5ms/step - loss:
0.0290 - mae: 0.0831 - val_loss: 0.0332 - val_mae: 0.0762
Epoch 331/550
15/15              0s 6ms/step - loss:
0.0293 - mae: 0.0842 - val_loss: 0.0327 - val_mae: 0.0760
Epoch 332/550
15/15              0s 7ms/step - loss:
0.0296 - mae: 0.0840 - val_loss: 0.0328 - val_mae: 0.0764
Epoch 333/550
15/15              0s 5ms/step - loss:
0.0284 - mae: 0.0820 - val_loss: 0.0325 - val_mae: 0.0761
Epoch 334/550
15/15              0s 5ms/step - loss:
0.0288 - mae: 0.0834 - val_loss: 0.0325 - val_mae: 0.0758
Epoch 335/550
15/15              0s 5ms/step - loss:
0.0276 - mae: 0.0814 - val_loss: 0.0323 - val_mae: 0.0759
Epoch 336/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0820 - val_loss: 0.0326 - val_mae: 0.0763
Epoch 337/550
```

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15/15              0s 5ms/step - loss:
0.0276 - mae: 0.0816 - val_loss: 0.0324 - val_mae: 0.0766
Epoch 338/550
15/15              0s 5ms/step - loss:
0.0278 - mae: 0.0825 - val_loss: 0.0322 - val_mae: 0.0758
Epoch 339/550
15/15              0s 5ms/step - loss:
0.0278 - mae: 0.0812 - val_loss: 0.0323 - val_mae: 0.0760
Epoch 340/550
15/15              0s 5ms/step - loss:
0.0283 - mae: 0.0845 - val_loss: 0.0323 - val_mae: 0.0757
Epoch 341/550
15/15              0s 5ms/step - loss:
0.0269 - mae: 0.0811 - val_loss: 0.0319 - val_mae: 0.0752
Epoch 342/550
15/15              0s 7ms/step - loss:
0.0282 - mae: 0.0830 - val_loss: 0.0319 - val_mae: 0.0746
Epoch 343/550
15/15              0s 6ms/step - loss:
0.0274 - mae: 0.0822 - val_loss: 0.0317 - val_mae: 0.0756
Epoch 344/550
15/15              0s 5ms/step - loss:
0.0266 - mae: 0.0814 - val_loss: 0.0317 - val_mae: 0.0769
Epoch 345/550
15/15              0s 5ms/step - loss:
0.0254 - mae: 0.0797 - val_loss: 0.0319 - val_mae: 0.0763
Epoch 346/550
15/15              0s 5ms/step - loss:
0.0270 - mae: 0.0814 - val_loss: 0.0314 - val_mae: 0.0767
Epoch 347/550
15/15              0s 5ms/step - loss:
0.0276 - mae: 0.0831 - val_loss: 0.0318 - val_mae: 0.0769
Epoch 348/550
15/15              0s 5ms/step - loss:
0.0274 - mae: 0.0821 - val_loss: 0.0313 - val_mae: 0.0765
Epoch 349/550
15/15              0s 5ms/step - loss:
0.0266 - mae: 0.0812 - val_loss: 0.0312 - val_mae: 0.0771
Epoch 350/550
15/15              0s 5ms/step - loss:
0.0266 - mae: 0.0829 - val_loss: 0.0309 - val_mae: 0.0768
Epoch 351/550
15/15              0s 5ms/step - loss:
0.0266 - mae: 0.0818 - val_loss: 0.0311 - val_mae: 0.0767
Epoch 352/550
15/15              0s 7ms/step - loss:
0.0257 - mae: 0.0807 - val_loss: 0.0308 - val_mae: 0.0764
Epoch 353/550
```

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15/15              0s 6ms/step - loss:
0.0268 - mae: 0.0820 - val_loss: 0.0308 - val_mae: 0.0758
Epoch 354/550
15/15              0s 5ms/step - loss:
0.0256 - mae: 0.0803 - val_loss: 0.0307 - val_mae: 0.0761
Epoch 355/550
15/15              0s 5ms/step - loss:
0.0253 - mae: 0.0806 - val_loss: 0.0306 - val_mae: 0.0758
Epoch 356/550
15/15              0s 5ms/step - loss:
0.0264 - mae: 0.0816 - val_loss: 0.0308 - val_mae: 0.0760
Epoch 357/550
15/15              0s 5ms/step - loss:
0.0258 - mae: 0.0807 - val_loss: 0.0306 - val_mae: 0.0759
Epoch 358/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0803 - val_loss: 0.0307 - val_mae: 0.0757
Epoch 359/550
15/15              0s 5ms/step - loss:
0.0266 - mae: 0.0818 - val_loss: 0.0308 - val_mae: 0.0759
Epoch 360/550
15/15              0s 5ms/step - loss:
0.0259 - mae: 0.0800 - val_loss: 0.0301 - val_mae: 0.0764
Epoch 361/550
15/15              0s 6ms/step - loss:
0.0253 - mae: 0.0790 - val_loss: 0.0301 - val_mae: 0.0759
Epoch 362/550
15/15              0s 6ms/step - loss:
0.0261 - mae: 0.0819 - val_loss: 0.0301 - val_mae: 0.0759
Epoch 363/550
15/15              0s 6ms/step - loss:
0.0245 - mae: 0.0798 - val_loss: 0.0300 - val_mae: 0.0749
Epoch 364/550
15/15              0s 5ms/step - loss:
0.0261 - mae: 0.0809 - val_loss: 0.0303 - val_mae: 0.0756
Epoch 365/550
15/15              0s 6ms/step - loss:
0.0261 - mae: 0.0808 - val_loss: 0.0296 - val_mae: 0.0760
Epoch 366/550
15/15              0s 5ms/step - loss:
0.0259 - mae: 0.0800 - val_loss: 0.0299 - val_mae: 0.0768
Epoch 367/550
15/15              0s 5ms/step - loss:
0.0244 - mae: 0.0792 - val_loss: 0.0300 - val_mae: 0.0756
Epoch 368/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0798 - val_loss: 0.0296 - val_mae: 0.0756
Epoch 369/550
```

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15/15              0s 6ms/step - loss:
0.0248 - mae: 0.0799 - val_loss: 0.0295 - val_mae: 0.0766
Epoch 370/550
15/15              0s 7ms/step - loss:
0.0238 - mae: 0.0793 - val_loss: 0.0296 - val_mae: 0.0746
Epoch 371/550
15/15              0s 5ms/step - loss:
0.0247 - mae: 0.0801 - val_loss: 0.0294 - val_mae: 0.0753
Epoch 372/550
15/15              0s 5ms/step - loss:
0.0247 - mae: 0.0788 - val_loss: 0.0296 - val_mae: 0.0751
Epoch 373/550
15/15              0s 5ms/step - loss:
0.0235 - mae: 0.0793 - val_loss: 0.0298 - val_mae: 0.0751
Epoch 374/550
15/15              0s 6ms/step - loss:
0.0254 - mae: 0.0820 - val_loss: 0.0295 - val_mae: 0.0754
Epoch 375/550
15/15              0s 5ms/step - loss:
0.0248 - mae: 0.0797 - val_loss: 0.0295 - val_mae: 0.0764
Epoch 376/550
15/15              0s 5ms/step - loss:
0.0235 - mae: 0.0791 - val_loss: 0.0292 - val_mae: 0.0759
Epoch 377/550
15/15              0s 5ms/step - loss:
0.0237 - mae: 0.0800 - val_loss: 0.0298 - val_mae: 0.0761
Epoch 378/550
15/15              0s 5ms/step - loss:
0.0244 - mae: 0.0795 - val_loss: 0.0293 - val_mae: 0.0760
Epoch 379/550
15/15              0s 7ms/step - loss:
0.0246 - mae: 0.0809 - val_loss: 0.0293 - val_mae: 0.0768
Epoch 380/550
15/15              0s 6ms/step - loss:
0.0224 - mae: 0.0781 - val_loss: 0.0289 - val_mae: 0.0765
Epoch 381/550
15/15              0s 5ms/step - loss:
0.0230 - mae: 0.0787 - val_loss: 0.0289 - val_mae: 0.0766
Epoch 382/550
15/15              0s 5ms/step - loss:
0.0236 - mae: 0.0797 - val_loss: 0.0294 - val_mae: 0.0763
Epoch 383/550
15/15              0s 5ms/step - loss:
0.0239 - mae: 0.0802 - val_loss: 0.0289 - val_mae: 0.0771
Epoch 384/550
15/15              0s 6ms/step - loss:
0.0233 - mae: 0.0790 - val_loss: 0.0285 - val_mae: 0.0763
Epoch 385/550
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15/15              0s 5ms/step - loss:
0.0231 - mae: 0.0775 - val_loss: 0.0283 - val_mae: 0.0753
Epoch 386/550
15/15              0s 5ms/step - loss:
0.0224 - mae: 0.0784 - val_loss: 0.0287 - val_mae: 0.0753
Epoch 387/550
15/15              0s 5ms/step - loss:
0.0230 - mae: 0.0782 - val_loss: 0.0286 - val_mae: 0.0764
Epoch 388/550
15/15              0s 6ms/step - loss:
0.0237 - mae: 0.0798 - val_loss: 0.0284 - val_mae: 0.0754
Epoch 389/550
15/15              0s 5ms/step - loss:
0.0216 - mae: 0.0770 - val_loss: 0.0287 - val_mae: 0.0745
Epoch 390/550
15/15              0s 5ms/step - loss:
0.0229 - mae: 0.0794 - val_loss: 0.0286 - val_mae: 0.0753
Epoch 391/550
15/15              0s 5ms/step - loss:
0.0235 - mae: 0.0799 - val_loss: 0.0289 - val_mae: 0.0746
Epoch 392/550
15/15              0s 5ms/step - loss:
0.0219 - mae: 0.0774 - val_loss: 0.0286 - val_mae: 0.0748
Epoch 393/550
15/15              0s 5ms/step - loss:
0.0231 - mae: 0.0783 - val_loss: 0.0288 - val_mae: 0.0753
Epoch 394/550
15/15              0s 5ms/step - loss:
0.0220 - mae: 0.0771 - val_loss: 0.0292 - val_mae: 0.0758
Epoch 395/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0808 - val_loss: 0.0283 - val_mae: 0.0751
Epoch 396/550
15/15              0s 6ms/step - loss:
0.0227 - mae: 0.0784 - val_loss: 0.0282 - val_mae: 0.0752
Epoch 397/550
15/15              0s 5ms/step - loss:
0.0225 - mae: 0.0782 - val_loss: 0.0280 - val_mae: 0.0754
Epoch 398/550
15/15              0s 5ms/step - loss:
0.0221 - mae: 0.0775 - val_loss: 0.0284 - val_mae: 0.0755
Epoch 399/550
15/15              0s 5ms/step - loss:
0.0217 - mae: 0.0787 - val_loss: 0.0279 - val_mae: 0.0753
Epoch 400/550
15/15              0s 5ms/step - loss:
0.0230 - mae: 0.0784 - val_loss: 0.0288 - val_mae: 0.0760
Epoch 401/550
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15/15              0s 5ms/step - loss:
0.0224 - mae: 0.0770 - val_loss: 0.0281 - val_mae: 0.0761
Epoch 402/550
15/15              0s 5ms/step - loss:
0.0215 - mae: 0.0778 - val_loss: 0.0282 - val_mae: 0.0752
Epoch 403/550
15/15              0s 5ms/step - loss:
0.0226 - mae: 0.0787 - val_loss: 0.0281 - val_mae: 0.0749
Epoch 404/550
15/15              0s 7ms/step - loss:
0.0229 - mae: 0.0793 - val_loss: 0.0277 - val_mae: 0.0739
Epoch 405/550
15/15              0s 5ms/step - loss:
0.0218 - mae: 0.0788 - val_loss: 0.0276 - val_mae: 0.0747
Epoch 406/550
15/15              0s 5ms/step - loss:
0.0225 - mae: 0.0785 - val_loss: 0.0277 - val_mae: 0.0759
Epoch 407/550
15/15              0s 5ms/step - loss:
0.0208 - mae: 0.0760 - val_loss: 0.0276 - val_mae: 0.0746
Epoch 408/550
15/15              0s 6ms/step - loss:
0.0216 - mae: 0.0769 - val_loss: 0.0271 - val_mae: 0.0749
Epoch 409/550
15/15              0s 5ms/step - loss:
0.0222 - mae: 0.0789 - val_loss: 0.0270 - val_mae: 0.0754
Epoch 410/550
15/15              0s 6ms/step - loss:
0.0211 - mae: 0.0777 - val_loss: 0.0267 - val_mae: 0.0755
Epoch 411/550
15/15              0s 5ms/step - loss:
0.0211 - mae: 0.0766 - val_loss: 0.0268 - val_mae: 0.0758
Epoch 412/550
15/15              0s 6ms/step - loss:
0.0209 - mae: 0.0777 - val_loss: 0.0270 - val_mae: 0.0753
Epoch 413/550
15/15              0s 5ms/step - loss:
0.0211 - mae: 0.0772 - val_loss: 0.0269 - val_mae: 0.0747
Epoch 414/550
15/15              0s 5ms/step - loss:
0.0214 - mae: 0.0766 - val_loss: 0.0268 - val_mae: 0.0745
Epoch 415/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0756 - val_loss: 0.0269 - val_mae: 0.0743
Epoch 416/550
15/15              0s 6ms/step - loss:
0.0214 - mae: 0.0769 - val_loss: 0.0269 - val_mae: 0.0741
Epoch 417/550
```

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15/15              0s 5ms/step - loss:
0.0218 - mae: 0.0785 - val_loss: 0.0275 - val_mae: 0.0754
Epoch 418/550
15/15              0s 6ms/step - loss:
0.0211 - mae: 0.0766 - val_loss: 0.0266 - val_mae: 0.0740
Epoch 419/550
15/15              0s 5ms/step - loss:
0.0210 - mae: 0.0775 - val_loss: 0.0273 - val_mae: 0.0746
Epoch 420/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0761 - val_loss: 0.0270 - val_mae: 0.0737
Epoch 421/550
15/15              0s 6ms/step - loss:
0.0206 - mae: 0.0767 - val_loss: 0.0269 - val_mae: 0.0755
Epoch 422/550
15/15              0s 5ms/step - loss:
0.0217 - mae: 0.0773 - val_loss: 0.0270 - val_mae: 0.0754
Epoch 423/550
15/15              0s 5ms/step - loss:
0.0216 - mae: 0.0774 - val_loss: 0.0269 - val_mae: 0.0754
Epoch 424/550
15/15              0s 5ms/step - loss:
0.0216 - mae: 0.0781 - val_loss: 0.0270 - val_mae: 0.0755
Epoch 425/550
15/15              0s 5ms/step - loss:
0.0190 - mae: 0.0750 - val_loss: 0.0267 - val_mae: 0.0745
Epoch 426/550
15/15              0s 5ms/step - loss:
0.0201 - mae: 0.0768 - val_loss: 0.0270 - val_mae: 0.0742
Epoch 427/550
15/15              0s 5ms/step - loss:
0.0215 - mae: 0.0784 - val_loss: 0.0266 - val_mae: 0.0733
Epoch 428/550
15/15              0s 6ms/step - loss:
0.0197 - mae: 0.0765 - val_loss: 0.0260 - val_mae: 0.0744
Epoch 429/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0769 - val_loss: 0.0265 - val_mae: 0.0740
Epoch 430/550
15/15              0s 7ms/step - loss:
0.0197 - mae: 0.0775 - val_loss: 0.0263 - val_mae: 0.0755
Epoch 431/550
15/15              0s 5ms/step - loss:
0.0211 - mae: 0.0772 - val_loss: 0.0275 - val_mae: 0.0763
Epoch 432/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0779 - val_loss: 0.0261 - val_mae: 0.0743
Epoch 433/550
```

```
15/15              0s 5ms/step - loss:
0.0208 - mae: 0.0774 - val_loss: 0.0264 - val_mae: 0.0749
Epoch 434/550
15/15              0s 5ms/step - loss:
0.0195 - mae: 0.0755 - val_loss: 0.0264 - val_mae: 0.0746
Epoch 435/550
15/15              0s 5ms/step - loss:
0.0201 - mae: 0.0753 - val_loss: 0.0261 - val_mae: 0.0755
Epoch 436/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0755 - val_loss: 0.0261 - val_mae: 0.0739
Epoch 437/550
15/15              0s 5ms/step - loss:
0.0195 - mae: 0.0754 - val_loss: 0.0265 - val_mae: 0.0743
Epoch 438/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0766 - val_loss: 0.0274 - val_mae: 0.0759
Epoch 439/550
15/15              0s 7ms/step - loss:
0.0197 - mae: 0.0747 - val_loss: 0.0259 - val_mae: 0.0759
Epoch 440/550
15/15              0s 5ms/step - loss:
0.0207 - mae: 0.0773 - val_loss: 0.0260 - val_mae: 0.0747
Epoch 441/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0761 - val_loss: 0.0263 - val_mae: 0.0746
Epoch 442/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0762 - val_loss: 0.0261 - val_mae: 0.0738
Epoch 443/550
15/15              0s 5ms/step - loss:
0.0197 - mae: 0.0764 - val_loss: 0.0256 - val_mae: 0.0740
Epoch 444/550
15/15              0s 5ms/step - loss:
0.0195 - mae: 0.0762 - val_loss: 0.0264 - val_mae: 0.0739
Epoch 445/550
15/15              0s 5ms/step - loss:
0.0219 - mae: 0.0776 - val_loss: 0.0259 - val_mae: 0.0743
Epoch 446/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0760 - val_loss: 0.0259 - val_mae: 0.0754
Epoch 447/550
15/15              0s 6ms/step - loss:
0.0190 - mae: 0.0740 - val_loss: 0.0260 - val_mae: 0.0753
Epoch 448/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0727 - val_loss: 0.0257 - val_mae: 0.0742
Epoch 449/550
```

```
15/15                0s 6ms/step - loss:
0.0199 - mae: 0.0758 - val_loss: 0.0264 - val_mae: 0.0741
Epoch 450/550
15/15                0s 5ms/step - loss:
0.0203 - mae: 0.0767 - val_loss: 0.0258 - val_mae: 0.0744
Epoch 451/550
15/15                0s 5ms/step - loss:
0.0196 - mae: 0.0752 - val_loss: 0.0258 - val_mae: 0.0738
Epoch 452/550
15/15                0s 6ms/step - loss:
0.0192 - mae: 0.0751 - val_loss: 0.0261 - val_mae: 0.0739
Epoch 453/550
15/15                0s 5ms/step - loss:
0.0196 - mae: 0.0768 - val_loss: 0.0258 - val_mae: 0.0746
Epoch 454/550
15/15                0s 5ms/step - loss:
0.0211 - mae: 0.0785 - val_loss: 0.0264 - val_mae: 0.0754
Epoch 455/550
15/15                0s 7ms/step - loss:
0.0195 - mae: 0.0757 - val_loss: 0.0253 - val_mae: 0.0746
Epoch 456/550
15/15                0s 5ms/step - loss:
0.0189 - mae: 0.0742 - val_loss: 0.0256 - val_mae: 0.0761
Epoch 457/550
15/15                0s 5ms/step - loss:
0.0190 - mae: 0.0749 - val_loss: 0.0257 - val_mae: 0.0759
Epoch 458/550
15/15                0s 5ms/step - loss:
0.0196 - mae: 0.0756 - val_loss: 0.0258 - val_mae: 0.0745
Epoch 459/550
15/15                0s 6ms/step - loss:
0.0187 - mae: 0.0744 - val_loss: 0.0256 - val_mae: 0.0747
Epoch 460/550
15/15                0s 5ms/step - loss:
0.0184 - mae: 0.0742 - val_loss: 0.0256 - val_mae: 0.0739
Epoch 461/550
15/15                0s 5ms/step - loss:
0.0189 - mae: 0.0754 - val_loss: 0.0252 - val_mae: 0.0739
Epoch 462/550
15/15                0s 7ms/step - loss:
0.0189 - mae: 0.0754 - val_loss: 0.0257 - val_mae: 0.0737
Epoch 463/550
15/15                0s 5ms/step - loss:
0.0203 - mae: 0.0773 - val_loss: 0.0252 - val_mae: 0.0736
Epoch 464/550
15/15                0s 5ms/step - loss:
0.0183 - mae: 0.0738 - val_loss: 0.0258 - val_mae: 0.0747
Epoch 465/550
```

```
15/15              0s 5ms/step - loss:
0.0191 - mae: 0.0749 - val_loss: 0.0258 - val_mae: 0.0735
Epoch 466/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0757 - val_loss: 0.0267 - val_mae: 0.0757
Epoch 467/550
15/15              0s 5ms/step - loss:
0.0188 - mae: 0.0747 - val_loss: 0.0258 - val_mae: 0.0737
Epoch 468/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0739 - val_loss: 0.0260 - val_mae: 0.0739
Epoch 469/550
15/15              0s 5ms/step - loss:
0.0191 - mae: 0.0747 - val_loss: 0.0255 - val_mae: 0.0735
Epoch 470/550
15/15              0s 7ms/step - loss:
0.0198 - mae: 0.0755 - val_loss: 0.0252 - val_mae: 0.0737
Epoch 471/550
15/15              0s 5ms/step - loss:
0.0186 - mae: 0.0749 - val_loss: 0.0254 - val_mae: 0.0745
Epoch 472/550
15/15              0s 5ms/step - loss:
0.0197 - mae: 0.0757 - val_loss: 0.0253 - val_mae: 0.0744
Epoch 473/550
15/15              0s 5ms/step - loss:
0.0190 - mae: 0.0741 - val_loss: 0.0255 - val_mae: 0.0751
Epoch 474/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0740 - val_loss: 0.0252 - val_mae: 0.0734
Epoch 475/550
15/15              0s 5ms/step - loss:
0.0191 - mae: 0.0747 - val_loss: 0.0261 - val_mae: 0.0757
Epoch 476/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0738 - val_loss: 0.0259 - val_mae: 0.0750
Epoch 477/550
15/15              0s 7ms/step - loss:
0.0197 - mae: 0.0751 - val_loss: 0.0264 - val_mae: 0.0740
Epoch 478/550
15/15              0s 5ms/step - loss:
0.0190 - mae: 0.0748 - val_loss: 0.0259 - val_mae: 0.0747
Epoch 479/550
15/15              0s 5ms/step - loss:
0.0178 - mae: 0.0726 - val_loss: 0.0268 - val_mae: 0.0751
Epoch 480/550
15/15              0s 6ms/step - loss:
0.0200 - mae: 0.0748 - val_loss: 0.0251 - val_mae: 0.0734
Epoch 481/550
```

```
15/15              0s 6ms/step - loss:
0.0185 - mae: 0.0735 - val_loss: 0.0251 - val_mae: 0.0730
Epoch 482/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0740 - val_loss: 0.0262 - val_mae: 0.0744
Epoch 483/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0734 - val_loss: 0.0258 - val_mae: 0.0746
Epoch 484/550
15/15              0s 7ms/step - loss:
0.0178 - mae: 0.0733 - val_loss: 0.0251 - val_mae: 0.0756
Epoch 485/550
15/15              0s 5ms/step - loss:
0.0181 - mae: 0.0732 - val_loss: 0.0272 - val_mae: 0.0770
Epoch 486/550
15/15              0s 6ms/step - loss:
0.0180 - mae: 0.0742 - val_loss: 0.0264 - val_mae: 0.0751
Epoch 487/550
15/15              0s 5ms/step - loss:
0.0181 - mae: 0.0739 - val_loss: 0.0264 - val_mae: 0.0756
Epoch 488/550
15/15              0s 6ms/step - loss:
0.0188 - mae: 0.0752 - val_loss: 0.0257 - val_mae: 0.0740
Epoch 489/550
15/15              0s 6ms/step - loss:
0.0183 - mae: 0.0739 - val_loss: 0.0261 - val_mae: 0.0744
Epoch 490/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0739 - val_loss: 0.0270 - val_mae: 0.0746
Epoch 491/550
15/15              0s 7ms/step - loss:
0.0176 - mae: 0.0730 - val_loss: 0.0261 - val_mae: 0.0744
Epoch 492/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0738 - val_loss: 0.0261 - val_mae: 0.0750
Epoch 493/550
15/15              0s 5ms/step - loss:
0.0182 - mae: 0.0724 - val_loss: 0.0256 - val_mae: 0.0738
Epoch 494/550
15/15              0s 5ms/step - loss:
0.0185 - mae: 0.0742 - val_loss: 0.0254 - val_mae: 0.0747
Epoch 495/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0765 - val_loss: 0.0258 - val_mae: 0.0756
Epoch 496/550
15/15              0s 5ms/step - loss:
0.0166 - mae: 0.0716 - val_loss: 0.0254 - val_mae: 0.0748
Epoch 497/550
```

```
15/15              0s 6ms/step - loss:
0.0176 - mae: 0.0719 - val_loss: 0.0257 - val_mae: 0.0735
Epoch 498/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0721 - val_loss: 0.0252 - val_mae: 0.0728
Epoch 499/550
15/15              0s 7ms/step - loss:
0.0178 - mae: 0.0726 - val_loss: 0.0257 - val_mae: 0.0739
Epoch 500/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0744 - val_loss: 0.0254 - val_mae: 0.0735
Epoch 501/550
15/15              0s 6ms/step - loss:
0.0176 - mae: 0.0727 - val_loss: 0.0251 - val_mae: 0.0733
Epoch 502/550
15/15              0s 6ms/step - loss:
0.0176 - mae: 0.0723 - val_loss: 0.0257 - val_mae: 0.0739
Epoch 503/550
15/15              0s 6ms/step - loss:
0.0188 - mae: 0.0734 - val_loss: 0.0246 - val_mae: 0.0739
Epoch 504/550
15/15              0s 5ms/step - loss:
0.0190 - mae: 0.0748 - val_loss: 0.0248 - val_mae: 0.0745
Epoch 505/550
15/15              0s 7ms/step - loss:
0.0181 - mae: 0.0739 - val_loss: 0.0257 - val_mae: 0.0750
Epoch 506/550
15/15              0s 6ms/step - loss:
0.0178 - mae: 0.0730 - val_loss: 0.0253 - val_mae: 0.0734
Epoch 507/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0739 - val_loss: 0.0249 - val_mae: 0.0738
Epoch 508/550
15/15              0s 5ms/step - loss:
0.0190 - mae: 0.0748 - val_loss: 0.0244 - val_mae: 0.0735
Epoch 509/550
15/15              0s 5ms/step - loss:
0.0181 - mae: 0.0733 - val_loss: 0.0248 - val_mae: 0.0735
Epoch 510/550
15/15              0s 5ms/step - loss:
0.0176 - mae: 0.0732 - val_loss: 0.0260 - val_mae: 0.0743
Epoch 511/550
15/15              0s 5ms/step - loss:
0.0181 - mae: 0.0737 - val_loss: 0.0252 - val_mae: 0.0745
Epoch 512/550
15/15              0s 7ms/step - loss:
0.0172 - mae: 0.0719 - val_loss: 0.0253 - val_mae: 0.0757
Epoch 513/550
```

```
15/15              0s 5ms/step - loss:
0.0173 - mae: 0.0722 - val_loss: 0.0248 - val_mae: 0.0745
Epoch 514/550
15/15              0s 5ms/step - loss:
0.0177 - mae: 0.0720 - val_loss: 0.0249 - val_mae: 0.0736
Epoch 515/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0728 - val_loss: 0.0240 - val_mae: 0.0730
Epoch 516/550
15/15              0s 5ms/step - loss:
0.0171 - mae: 0.0712 - val_loss: 0.0249 - val_mae: 0.0755
Epoch 517/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0729 - val_loss: 0.0255 - val_mae: 0.0745
Epoch 518/550
15/15              0s 5ms/step - loss:
0.0165 - mae: 0.0709 - val_loss: 0.0249 - val_mae: 0.0742
Epoch 519/550
15/15              0s 6ms/step - loss:
0.0179 - mae: 0.0730 - val_loss: 0.0250 - val_mae: 0.0726
Epoch 520/550
15/15              0s 5ms/step - loss:
0.0170 - mae: 0.0710 - val_loss: 0.0259 - val_mae: 0.0739
Epoch 521/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0730 - val_loss: 0.0265 - val_mae: 0.0756
Epoch 522/550
15/15              0s 5ms/step - loss:
0.0176 - mae: 0.0729 - val_loss: 0.0258 - val_mae: 0.0739
Epoch 523/550
15/15              0s 5ms/step - loss:
0.0173 - mae: 0.0713 - val_loss: 0.0260 - val_mae: 0.0750
Epoch 524/550
15/15              0s 6ms/step - loss:
0.0180 - mae: 0.0721 - val_loss: 0.0259 - val_mae: 0.0744
Epoch 525/550
15/15              0s 6ms/step - loss:
0.0176 - mae: 0.0721 - val_loss: 0.0250 - val_mae: 0.0736
Epoch 526/550
15/15              0s 5ms/step - loss:
0.0174 - mae: 0.0718 - val_loss: 0.0260 - val_mae: 0.0744
Epoch 527/550
15/15              0s 6ms/step - loss:
0.0174 - mae: 0.0721 - val_loss: 0.0249 - val_mae: 0.0736
Epoch 528/550
15/15              0s 5ms/step - loss:
0.0174 - mae: 0.0721 - val_loss: 0.0245 - val_mae: 0.0742
Epoch 529/550
```

```
15/15              0s 5ms/step - loss:
0.0168 - mae: 0.0720 - val_loss: 0.0252 - val_mae: 0.0750
Epoch 530/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0728 - val_loss: 0.0250 - val_mae: 0.0744
Epoch 531/550
15/15              0s 5ms/step - loss:
0.0163 - mae: 0.0707 - val_loss: 0.0243 - val_mae: 0.0736
Epoch 532/550
15/15              0s 5ms/step - loss:
0.0176 - mae: 0.0726 - val_loss: 0.0254 - val_mae: 0.0747
Epoch 533/550
15/15              0s 5ms/step - loss:
0.0174 - mae: 0.0720 - val_loss: 0.0241 - val_mae: 0.0729
Epoch 534/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0733 - val_loss: 0.0245 - val_mae: 0.0741
Epoch 535/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0714 - val_loss: 0.0245 - val_mae: 0.0742
Epoch 536/550
15/15              0s 5ms/step - loss:
0.0172 - mae: 0.0708 - val_loss: 0.0247 - val_mae: 0.0742
Epoch 537/550
15/15              0s 6ms/step - loss:
0.0170 - mae: 0.0709 - val_loss: 0.0239 - val_mae: 0.0731
Epoch 538/550
15/15              0s 6ms/step - loss:
0.0176 - mae: 0.0722 - val_loss: 0.0256 - val_mae: 0.0740
Epoch 539/550
15/15              0s 5ms/step - loss:
0.0168 - mae: 0.0710 - val_loss: 0.0241 - val_mae: 0.0738
Epoch 540/550
15/15              0s 5ms/step - loss:
0.0171 - mae: 0.0713 - val_loss: 0.0244 - val_mae: 0.0732
Epoch 541/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0729 - val_loss: 0.0251 - val_mae: 0.0734
Epoch 542/550
15/15              0s 5ms/step - loss:
0.0168 - mae: 0.0707 - val_loss: 0.0253 - val_mae: 0.0738
Epoch 543/550
15/15              0s 5ms/step - loss:
0.0172 - mae: 0.0712 - val_loss: 0.0253 - val_mae: 0.0744
Epoch 544/550
15/15              0s 5ms/step - loss:
0.0172 - mae: 0.0722 - val_loss: 0.0241 - val_mae: 0.0730
Epoch 545/550
```

```
15/15                0s 6ms/step - loss:
0.0163 - mae: 0.0703 - val_loss: 0.0236 - val_mae: 0.0731
Epoch 546/550
15/15                0s 7ms/step - loss:
0.0171 - mae: 0.0705 - val_loss: 0.0254 - val_mae: 0.0756
Epoch 547/550
15/15                0s 5ms/step - loss:
0.0171 - mae: 0.0712 - val_loss: 0.0247 - val_mae: 0.0753
Epoch 548/550
15/15                0s 5ms/step - loss:
0.0166 - mae: 0.0710 - val_loss: 0.0244 - val_mae: 0.0751
Epoch 549/550
15/15                0s 6ms/step - loss:
0.0177 - mae: 0.0725 - val_loss: 0.0253 - val_mae: 0.0753
Epoch 550/550
15/15                0s 5ms/step - loss:
0.0168 - mae: 0.0712 - val_loss: 0.0245 - val_mae: 0.0748
```


Training and Validation Loss - Fold 2

Training and Validation MAE - Fold 2
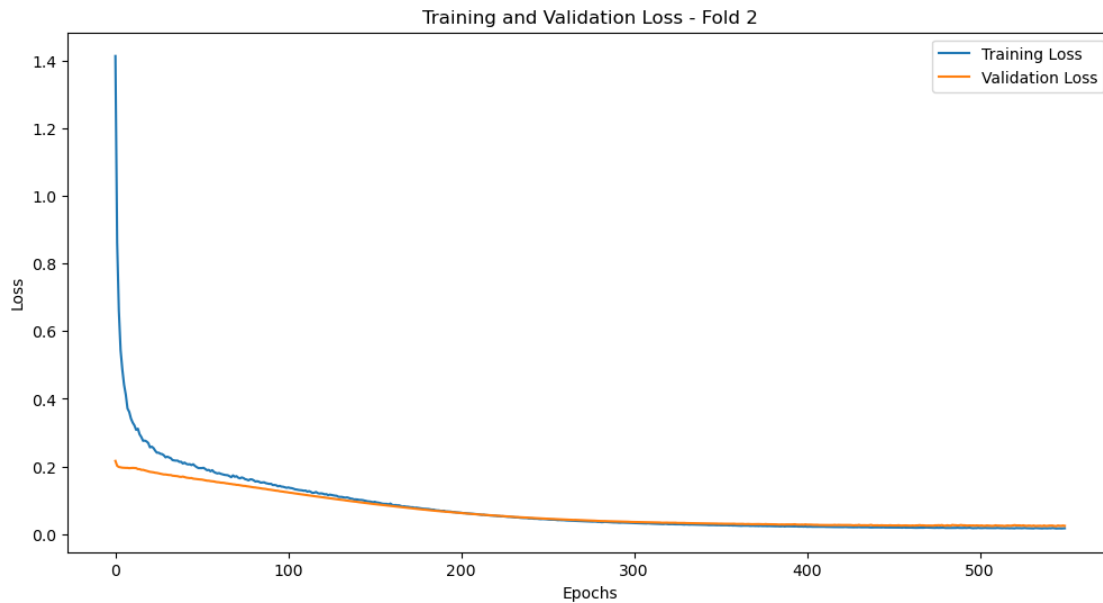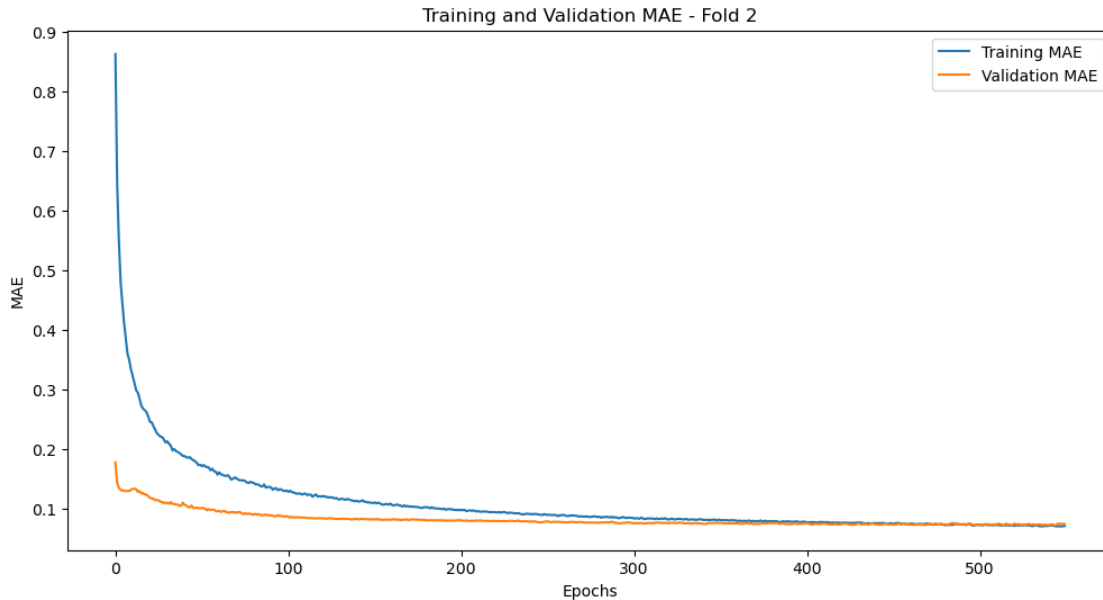
Fold Validation MAE: 0.07313141226768494
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

15/15   2s 17ms/step -
loss: 1.4982 - mae: 0.8968 - val_loss: 0.1901 - val_mae: 0.1162
Epoch 2/550
15/15   0s 5ms/step - loss:
0.8798 - mae: 0.6669 - val_loss: 0.1866 - val_mae: 0.1198
Epoch 3/550
15/15   0s 6ms/step - loss:
0.6533 - mae: 0.5518 - val_loss: 0.1940 - val_mae: 0.1546
Epoch 4/550
15/15   0s 5ms/step - loss:
0.5659 - mae: 0.4989 - val_loss: 0.2076 - val_mae: 0.1959
Epoch 5/550
15/15   0s 5ms/step - loss:
0.4929 - mae: 0.4489 - val_loss: 0.2266 - val_mae: 0.2373
Epoch 6/550
15/15   0s 5ms/step - loss:
0.4514 - mae: 0.4216 - val_loss: 0.2424 - val_mae: 0.2657
Epoch 7/550
15/15   0s 5ms/step - loss:

0.4108 - mae: 0.3898 - val_loss: 0.2523 - val_mae: 0.2815
Epoch 8/550
15/15 0s 5ms/step - loss:
0.3888 - mae: 0.3725 - val_loss: 0.2639 - val_mae: 0.2998
Epoch 9/550
15/15 0s 5ms/step - loss:
0.3629 - mae: 0.3563 - val_loss: 0.2665 - val_mae: 0.3028
Epoch 10/550
15/15 0s 5ms/step - loss:
0.3513 - mae: 0.3426 - val_loss: 0.2597 - val_mae: 0.2926
Epoch 11/550
15/15 0s 5ms/step - loss:
0.3375 - mae: 0.3315 - val_loss: 0.2506 - val_mae: 0.2790
Epoch 12/550
15/15 0s 5ms/step - loss:
0.3150 - mae: 0.3121 - val_loss: 0.2426 - val_mae: 0.2658
Epoch 13/550
15/15 0s 5ms/step - loss:
0.3082 - mae: 0.3065 - val_loss: 0.2385 - val_mae: 0.2610
Epoch 14/550
15/15 0s 5ms/step - loss:
0.3022 - mae: 0.2958 - val_loss: 0.2271 - val_mae: 0.2410
Epoch 15/550
15/15 0s 5ms/step - loss:
0.2926 - mae: 0.2872 - val_loss: 0.2180 - val_mae: 0.2242
Epoch 16/550
15/15 0s 5ms/step - loss:
0.2806 - mae: 0.2762 - val_loss: 0.2162 - val_mae: 0.2211
Epoch 17/550
15/15 0s 5ms/step - loss:
0.2771 - mae: 0.2695 - val_loss: 0.2084 - val_mae: 0.2058
Epoch 18/550
15/15 0s 7ms/step - loss:
0.2731 - mae: 0.2682 - val_loss: 0.2023 - val_mae: 0.1934
Epoch 19/550
15/15 0s 6ms/step - loss:
0.2734 - mae: 0.2659 - val_loss: 0.1967 - val_mae: 0.1812
Epoch 20/550
15/15 0s 5ms/step - loss:
0.2609 - mae: 0.2524 - val_loss: 0.1923 - val_mae: 0.1711
Epoch 21/550
15/15 0s 5ms/step - loss:
0.2572 - mae: 0.2492 - val_loss: 0.1906 - val_mae: 0.1682
Epoch 22/550
15/15 0s 5ms/step - loss:
0.2490 - mae: 0.2419 - val_loss: 0.1880 - val_mae: 0.1621
Epoch 23/550
15/15 0s 5ms/step - loss:

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0.2474 - mae: 0.2391 - val_loss: 0.1843 - val_mae: 0.1526
Epoch 24/550
15/15          0s 5ms/step - loss:
0.2442 - mae: 0.2338 - val_loss: 0.1825 - val_mae: 0.1486
Epoch 25/550
15/15          0s 6ms/step - loss:
0.2398 - mae: 0.2275 - val_loss: 0.1802 - val_mae: 0.1444
Epoch 26/550
15/15          0s 5ms/step - loss:
0.2385 - mae: 0.2295 - val_loss: 0.1778 - val_mae: 0.1374
Epoch 27/550
15/15          0s 5ms/step - loss:
0.2373 - mae: 0.2237 - val_loss: 0.1773 - val_mae: 0.1369
Epoch 28/550
15/15          0s 5ms/step - loss:
0.2360 - mae: 0.2236 - val_loss: 0.1748 - val_mae: 0.1317
Epoch 29/550
15/15          0s 5ms/step - loss:
0.2328 - mae: 0.2210 - val_loss: 0.1750 - val_mae: 0.1336
Epoch 30/550
15/15          0s 5ms/step - loss:
0.2248 - mae: 0.2101 - val_loss: 0.1729 - val_mae: 0.1286
Epoch 31/550
15/15          0s 5ms/step - loss:
0.2245 - mae: 0.2098 - val_loss: 0.1718 - val_mae: 0.1266
Epoch 32/550
15/15          0s 5ms/step - loss:
0.2251 - mae: 0.2127 - val_loss: 0.1717 - val_mae: 0.1287
Epoch 33/550
15/15          0s 5ms/step - loss:
0.2238 - mae: 0.2081 - val_loss: 0.1701 - val_mae: 0.1228
Epoch 34/550
15/15          0s 5ms/step - loss:
0.2172 - mae: 0.2023 - val_loss: 0.1686 - val_mae: 0.1219
Epoch 35/550
15/15          0s 6ms/step - loss:
0.2187 - mae: 0.2036 - val_loss: 0.1672 - val_mae: 0.1183
Epoch 36/550
15/15          0s 5ms/step - loss:
0.2164 - mae: 0.2001 - val_loss: 0.1664 - val_mae: 0.1172
Epoch 37/550
15/15          0s 6ms/step - loss:
0.2134 - mae: 0.1987 - val_loss: 0.1657 - val_mae: 0.1165
Epoch 38/550
15/15          0s 5ms/step - loss:
0.2104 - mae: 0.1906 - val_loss: 0.1653 - val_mae: 0.1175
Epoch 39/550
15/15          0s 5ms/step - loss:
```

0.2068 - mae: 0.1888 - val_loss: 0.1643 - val_mae: 0.1168
Epoch 40/550
15/15   0s 5ms/step - loss:
0.2055 - mae: 0.1890 - val_loss: 0.1639 - val_mae: 0.1163
Epoch 41/550
15/15   0s 5ms/step - loss:
0.2028 - mae: 0.1864 - val_loss: 0.1626 - val_mae: 0.1147
Epoch 42/550
15/15   0s 5ms/step - loss:
0.2045 - mae: 0.1892 - val_loss: 0.1622 - val_mae: 0.1149
Epoch 43/550
15/15   0s 5ms/step - loss:
0.2009 - mae: 0.1864 - val_loss: 0.1610 - val_mae: 0.1132
Epoch 44/550
15/15   0s 5ms/step - loss:
0.1968 - mae: 0.1803 - val_loss: 0.1600 - val_mae: 0.1114
Epoch 45/550
15/15   0s 5ms/step - loss:
0.1962 - mae: 0.1792 - val_loss: 0.1591 - val_mae: 0.1100
Epoch 46/550
15/15   0s 5ms/step - loss:
0.1990 - mae: 0.1815 - val_loss: 0.1585 - val_mae: 0.1112
Epoch 47/550
15/15   0s 5ms/step - loss:
0.1975 - mae: 0.1818 - val_loss: 0.1577 - val_mae: 0.1104
Epoch 48/550
15/15   0s 6ms/step - loss:
0.1920 - mae: 0.1772 - val_loss: 0.1573 - val_mae: 0.1112
Epoch 49/550
15/15   0s 5ms/step - loss:
0.1935 - mae: 0.1766 - val_loss: 0.1564 - val_mae: 0.1107
Epoch 50/550
15/15   0s 6ms/step - loss:
0.1875 - mae: 0.1720 - val_loss: 0.1554 - val_mae: 0.1091
Epoch 51/550
15/15   0s 5ms/step - loss:
0.1902 - mae: 0.1761 - val_loss: 0.1546 - val_mae: 0.1084
Epoch 52/550
15/15   0s 7ms/step - loss:
0.1878 - mae: 0.1698 - val_loss: 0.1537 - val_mae: 0.1066
Epoch 53/550
15/15   0s 6ms/step - loss:
0.1838 - mae: 0.1684 - val_loss: 0.1528 - val_mae: 0.1062
Epoch 54/550
15/15   0s 6ms/step - loss:
0.1863 - mae: 0.1726 - val_loss: 0.1522 - val_mae: 0.1063
Epoch 55/550
15/15   0s 5ms/step - loss:

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0.1818 - mae: 0.1658 - val_loss: 0.1514 - val_mae: 0.1069
Epoch 56/550
15/15          0s 6ms/step - loss:
0.1799 - mae: 0.1651 - val_loss: 0.1505 - val_mae: 0.1059
Epoch 57/550
15/15          0s 5ms/step - loss:
0.1816 - mae: 0.1668 - val_loss: 0.1499 - val_mae: 0.1060
Epoch 58/550
15/15          0s 6ms/step - loss:
0.1795 - mae: 0.1661 - val_loss: 0.1494 - val_mae: 0.1068
Epoch 59/550
15/15          0s 6ms/step - loss:
0.1762 - mae: 0.1617 - val_loss: 0.1480 - val_mae: 0.1046
Epoch 60/550
15/15          0s 6ms/step - loss:
0.1773 - mae: 0.1615 - val_loss: 0.1476 - val_mae: 0.1042
Epoch 61/550
15/15          0s 5ms/step - loss:
0.1781 - mae: 0.1632 - val_loss: 0.1467 - val_mae: 0.1045
Epoch 62/550
15/15          0s 6ms/step - loss:
0.1740 - mae: 0.1611 - val_loss: 0.1458 - val_mae: 0.1044
Epoch 63/550
15/15          0s 6ms/step - loss:
0.1740 - mae: 0.1591 - val_loss: 0.1453 - val_mae: 0.1041
Epoch 64/550
15/15          0s 6ms/step - loss:
0.1729 - mae: 0.1578 - val_loss: 0.1442 - val_mae: 0.1035
Epoch 65/550
15/15          0s 6ms/step - loss:
0.1697 - mae: 0.1543 - val_loss: 0.1434 - val_mae: 0.1031
Epoch 66/550
15/15          0s 7ms/step - loss:
0.1682 - mae: 0.1557 - val_loss: 0.1424 - val_mae: 0.1026
Epoch 67/550
15/15          0s 5ms/step - loss:
0.1652 - mae: 0.1534 - val_loss: 0.1416 - val_mae: 0.1016
Epoch 68/550
15/15          0s 5ms/step - loss:
0.1663 - mae: 0.1542 - val_loss: 0.1410 - val_mae: 0.1020
Epoch 69/550
15/15          0s 5ms/step - loss:
0.1664 - mae: 0.1537 - val_loss: 0.1402 - val_mae: 0.1022
Epoch 70/550
15/15          0s 5ms/step - loss:
0.1661 - mae: 0.1539 - val_loss: 0.1393 - val_mae: 0.1018
Epoch 71/550
15/15          0s 5ms/step - loss:
```

0.1631 - mae: 0.1503 - val_loss: 0.1386 - val_mae: 0.1017
Epoch 72/550
15/15   0s 5ms/step - loss:
0.1610 - mae: 0.1492 - val_loss: 0.1377 - val_mae: 0.1010
Epoch 73/550
15/15   0s 5ms/step - loss:
0.1598 - mae: 0.1477 - val_loss: 0.1368 - val_mae: 0.1003
Epoch 74/550
15/15   0s 6ms/step - loss:
0.1590 - mae: 0.1471 - val_loss: 0.1361 - val_mae: 0.1011
Epoch 75/550
15/15   0s 6ms/step - loss:
0.1589 - mae: 0.1485 - val_loss: 0.1351 - val_mae: 0.0995
Epoch 76/550
15/15   0s 6ms/step - loss:
0.1566 - mae: 0.1458 - val_loss: 0.1345 - val_mae: 0.0998
Epoch 77/550
15/15   0s 6ms/step - loss:
0.1584 - mae: 0.1463 - val_loss: 0.1336 - val_mae: 0.0985
Epoch 78/550
15/15   0s 5ms/step - loss:
0.1562 - mae: 0.1474 - val_loss: 0.1330 - val_mae: 0.0988
Epoch 79/550
15/15   0s 5ms/step - loss:
0.1580 - mae: 0.1496 - val_loss: 0.1320 - val_mae: 0.0985
Epoch 80/550
15/15   0s 5ms/step - loss:
0.1531 - mae: 0.1456 - val_loss: 0.1313 - val_mae: 0.0977
Epoch 81/550
15/15   0s 5ms/step - loss:
0.1513 - mae: 0.1439 - val_loss: 0.1304 - val_mae: 0.0974
Epoch 82/550
15/15   0s 7ms/step - loss:
0.1522 - mae: 0.1442 - val_loss: 0.1301 - val_mae: 0.1001
Epoch 83/550
15/15   0s 6ms/step - loss:
0.1515 - mae: 0.1425 - val_loss: 0.1288 - val_mae: 0.0980
Epoch 84/550
15/15   0s 5ms/step - loss:
0.1488 - mae: 0.1407 - val_loss: 0.1282 - val_mae: 0.0979
Epoch 85/550
15/15   0s 5ms/step - loss:
0.1465 - mae: 0.1395 - val_loss: 0.1275 - val_mae: 0.0983
Epoch 86/550
15/15   0s 5ms/step - loss:
0.1461 - mae: 0.1390 - val_loss: 0.1267 - val_mae: 0.0979
Epoch 87/550
15/15   0s 5ms/step - loss:

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0.1460 - mae: 0.1388 - val_loss: 0.1257 - val_mae: 0.0969
Epoch 88/550
15/15          0s 6ms/step - loss:
0.1424 - mae: 0.1367 - val_loss: 0.1253 - val_mae: 0.0981
Epoch 89/550
15/15          0s 6ms/step - loss:
0.1399 - mae: 0.1345 - val_loss: 0.1242 - val_mae: 0.0971
Epoch 90/550
15/15          0s 5ms/step - loss:
0.1432 - mae: 0.1373 - val_loss: 0.1235 - val_mae: 0.0972
Epoch 91/550
15/15          0s 5ms/step - loss:
0.1405 - mae: 0.1351 - val_loss: 0.1226 - val_mae: 0.0967
Epoch 92/550
15/15          0s 5ms/step - loss:
0.1392 - mae: 0.1337 - val_loss: 0.1218 - val_mae: 0.0967
Epoch 93/550
15/15          0s 6ms/step - loss:
0.1382 - mae: 0.1328 - val_loss: 0.1210 - val_mae: 0.0964
Epoch 94/550
15/15          0s 6ms/step - loss:
0.1403 - mae: 0.1357 - val_loss: 0.1202 - val_mae: 0.0960
Epoch 95/550
15/15          0s 5ms/step - loss:
0.1375 - mae: 0.1349 - val_loss: 0.1193 - val_mae: 0.0947
Epoch 96/550
15/15          0s 6ms/step - loss:
0.1372 - mae: 0.1347 - val_loss: 0.1186 - val_mae: 0.0949
Epoch 97/550
15/15          0s 6ms/step - loss:
0.1359 - mae: 0.1328 - val_loss: 0.1179 - val_mae: 0.0955
Epoch 98/550
15/15          0s 6ms/step - loss:
0.1323 - mae: 0.1325 - val_loss: 0.1170 - val_mae: 0.0951
Epoch 99/550
15/15          0s 6ms/step - loss:
0.1338 - mae: 0.1338 - val_loss: 0.1168 - val_mae: 0.0980
Epoch 100/550
15/15          0s 5ms/step - loss:
0.1358 - mae: 0.1352 - val_loss: 0.1153 - val_mae: 0.0941
Epoch 101/550
15/15          0s 5ms/step - loss:
0.1293 - mae: 0.1291 - val_loss: 0.1150 - val_mae: 0.0947
Epoch 102/550
15/15          0s 5ms/step - loss:
0.1282 - mae: 0.1274 - val_loss: 0.1138 - val_mae: 0.0937
Epoch 103/550
15/15          0s 6ms/step - loss:
```

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0.1303 - mae: 0.1306 - val_loss: 0.1135 - val_mae: 0.0956
Epoch 104/550
15/15            0s 6ms/step - loss:
0.1273 - mae: 0.1280 - val_loss: 0.1123 - val_mae: 0.0930
Epoch 105/550
15/15            0s 5ms/step - loss:
0.1264 - mae: 0.1264 - val_loss: 0.1116 - val_mae: 0.0932
Epoch 106/550
15/15            0s 6ms/step - loss:
0.1286 - mae: 0.1308 - val_loss: 0.1108 - val_mae: 0.0935
Epoch 107/550
15/15            0s 5ms/step - loss:
0.1245 - mae: 0.1284 - val_loss: 0.1102 - val_mae: 0.0942
Epoch 108/550
15/15            0s 5ms/step - loss:
0.1254 - mae: 0.1288 - val_loss: 0.1093 - val_mae: 0.0935
Epoch 109/550
15/15            0s 6ms/step - loss:
0.1218 - mae: 0.1255 - val_loss: 0.1087 - val_mae: 0.0936
Epoch 110/550
15/15            0s 5ms/step - loss:
0.1246 - mae: 0.1279 - val_loss: 0.1077 - val_mae: 0.0927
Epoch 111/550
15/15            0s 5ms/step - loss:
0.1240 - mae: 0.1275 - val_loss: 0.1072 - val_mae: 0.0937
Epoch 112/550
15/15            0s 5ms/step - loss:
0.1219 - mae: 0.1263 - val_loss: 0.1063 - val_mae: 0.0932
Epoch 113/550
15/15            0s 7ms/step - loss:
0.1217 - mae: 0.1278 - val_loss: 0.1056 - val_mae: 0.0929
Epoch 114/550
15/15            0s 5ms/step - loss:
0.1207 - mae: 0.1264 - val_loss: 0.1047 - val_mae: 0.0918
Epoch 115/550
15/15            0s 6ms/step - loss:
0.1192 - mae: 0.1258 - val_loss: 0.1040 - val_mae: 0.0920
Epoch 116/550
15/15            0s 6ms/step - loss:
0.1192 - mae: 0.1231 - val_loss: 0.1033 - val_mae: 0.0932
Epoch 117/550
15/15            0s 5ms/step - loss:
0.1149 - mae: 0.1201 - val_loss: 0.1026 - val_mae: 0.0927
Epoch 118/550
15/15            0s 6ms/step - loss:
0.1176 - mae: 0.1249 - val_loss: 0.1020 - val_mae: 0.0933
Epoch 119/550
15/15            0s 6ms/step - loss:
```

```
0.1153 - mae: 0.1226 - val_loss: 0.1011 - val_mae: 0.0921
Epoch 120/550
15/15          0s 5ms/step - loss:
0.1122 - mae: 0.1211 - val_loss: 0.1007 - val_mae: 0.0929
Epoch 121/550
15/15          0s 5ms/step - loss:
0.1116 - mae: 0.1200 - val_loss: 0.0997 - val_mae: 0.0930
Epoch 122/550
15/15          0s 5ms/step - loss:
0.1141 - mae: 0.1223 - val_loss: 0.0990 - val_mae: 0.0930
Epoch 123/550
15/15          0s 6ms/step - loss:
0.1092 - mae: 0.1188 - val_loss: 0.0983 - val_mae: 0.0926
Epoch 124/550
15/15          0s 6ms/step - loss:
0.1118 - mae: 0.1211 - val_loss: 0.0974 - val_mae: 0.0921
Epoch 125/550
15/15          0s 5ms/step - loss:
0.1088 - mae: 0.1206 - val_loss: 0.0968 - val_mae: 0.0921
Epoch 126/550
15/15          0s 7ms/step - loss:
0.1069 - mae: 0.1193 - val_loss: 0.0961 - val_mae: 0.0919
Epoch 127/550
15/15          0s 5ms/step - loss:
0.1079 - mae: 0.1197 - val_loss: 0.0954 - val_mae: 0.0920
Epoch 128/550
15/15          0s 5ms/step - loss:
0.1087 - mae: 0.1230 - val_loss: 0.0946 - val_mae: 0.0910
Epoch 129/550
15/15          0s 5ms/step - loss:
0.1048 - mae: 0.1187 - val_loss: 0.0938 - val_mae: 0.0904
Epoch 130/550
15/15          0s 6ms/step - loss:
0.1050 - mae: 0.1191 - val_loss: 0.0931 - val_mae: 0.0908
Epoch 131/550
15/15          0s 5ms/step - loss:
0.1055 - mae: 0.1189 - val_loss: 0.0925 - val_mae: 0.0915
Epoch 132/550
15/15          0s 5ms/step - loss:
0.1025 - mae: 0.1158 - val_loss: 0.0917 - val_mae: 0.0912
Epoch 133/550
15/15          0s 6ms/step - loss:
0.1033 - mae: 0.1182 - val_loss: 0.0909 - val_mae: 0.0903
Epoch 134/550
15/15          0s 5ms/step - loss:
0.1012 - mae: 0.1156 - val_loss: 0.0903 - val_mae: 0.0901
Epoch 135/550
15/15          0s 5ms/step - loss:
```

0.1013 - mae: 0.1180 - val_loss: 0.0897 - val_mae: 0.0909
Epoch 136/550
15/15   0s 5ms/step - loss:
0.0995 - mae: 0.1157 - val_loss: 0.0889 - val_mae: 0.0901
Epoch 137/550
15/15   0s 6ms/step - loss:
0.1000 - mae: 0.1155 - val_loss: 0.0883 - val_mae: 0.0905
Epoch 138/550
15/15   0s 5ms/step - loss:
0.0980 - mae: 0.1158 - val_loss: 0.0877 - val_mae: 0.0896
Epoch 139/550
15/15   0s 6ms/step - loss:
0.0961 - mae: 0.1134 - val_loss: 0.0869 - val_mae: 0.0896
Epoch 140/550
15/15   0s 7ms/step - loss:
0.0959 - mae: 0.1135 - val_loss: 0.0863 - val_mae: 0.0898
Epoch 141/550
15/15   0s 5ms/step - loss:
0.0977 - mae: 0.1157 - val_loss: 0.0856 - val_mae: 0.0896
Epoch 142/550
15/15   0s 6ms/step - loss:
0.0940 - mae: 0.1128 - val_loss: 0.0849 - val_mae: 0.0891
Epoch 143/550
15/15   0s 6ms/step - loss:
0.0956 - mae: 0.1139 - val_loss: 0.0842 - val_mae: 0.0884
Epoch 144/550
15/15   0s 6ms/step - loss:
0.0902 - mae: 0.1100 - val_loss: 0.0836 - val_mae: 0.0880
Epoch 145/550
15/15   0s 5ms/step - loss:
0.0932 - mae: 0.1140 - val_loss: 0.0830 - val_mae: 0.0887
Epoch 146/550
15/15   0s 5ms/step - loss:
0.0913 - mae: 0.1118 - val_loss: 0.0823 - val_mae: 0.0886
Epoch 147/550
15/15   0s 5ms/step - loss:
0.0925 - mae: 0.1140 - val_loss: 0.0817 - val_mae: 0.0889
Epoch 148/550
15/15   0s 5ms/step - loss:
0.0910 - mae: 0.1130 - val_loss: 0.0811 - val_mae: 0.0887
Epoch 149/550
15/15   0s 5ms/step - loss:
0.0884 - mae: 0.1110 - val_loss: 0.0805 - val_mae: 0.0883
Epoch 150/550
15/15   0s 5ms/step - loss:
0.0879 - mae: 0.1094 - val_loss: 0.0799 - val_mae: 0.0887
Epoch 151/550
15/15   0s 5ms/step - loss:

0.0884 - mae: 0.1118 - val_loss: 0.0793 - val_mae: 0.0891
Epoch 152/550
15/15   0s 5ms/step - loss:
0.0878 - mae: 0.1116 - val_loss: 0.0787 - val_mae: 0.0885
Epoch 153/550
15/15   0s 5ms/step - loss:
0.0866 - mae: 0.1109 - val_loss: 0.0780 - val_mae: 0.0882
Epoch 154/550
15/15   0s 7ms/step - loss:
0.0860 - mae: 0.1094 - val_loss: 0.0774 - val_mae: 0.0885
Epoch 155/550
15/15   0s 5ms/step - loss:
0.0860 - mae: 0.1111 - val_loss: 0.0768 - val_mae: 0.0886
Epoch 156/550
15/15   0s 5ms/step - loss:
0.0837 - mae: 0.1097 - val_loss: 0.0762 - val_mae: 0.0877
Epoch 157/550
15/15   0s 6ms/step - loss:
0.0818 - mae: 0.1073 - val_loss: 0.0755 - val_mae: 0.0880
Epoch 158/550
15/15   0s 5ms/step - loss:
0.0823 - mae: 0.1082 - val_loss: 0.0749 - val_mae: 0.0878
Epoch 159/550
15/15   0s 6ms/step - loss:
0.0812 - mae: 0.1063 - val_loss: 0.0745 - val_mae: 0.0883
Epoch 160/550
15/15   0s 5ms/step - loss:
0.0819 - mae: 0.1078 - val_loss: 0.0738 - val_mae: 0.0877
Epoch 161/550
15/15   0s 6ms/step - loss:
0.0797 - mae: 0.1064 - val_loss: 0.0732 - val_mae: 0.0875
Epoch 162/550
15/15   0s 6ms/step - loss:
0.0830 - mae: 0.1088 - val_loss: 0.0726 - val_mae: 0.0879
Epoch 163/550
15/15   0s 5ms/step - loss:
0.0824 - mae: 0.1092 - val_loss: 0.0721 - val_mae: 0.0873
Epoch 164/550
15/15   0s 5ms/step - loss:
0.0787 - mae: 0.1066 - val_loss: 0.0715 - val_mae: 0.0872
Epoch 165/550
15/15   0s 5ms/step - loss:
0.0781 - mae: 0.1065 - val_loss: 0.0711 - val_mae: 0.0882
Epoch 166/550
15/15   0s 5ms/step - loss:
0.0779 - mae: 0.1073 - val_loss: 0.0704 - val_mae: 0.0879
Epoch 167/550
15/15   0s 7ms/step - loss:

0.0792 - mae: 0.1080 - val_loss: 0.0699 - val_mae: 0.0881
Epoch 168/550
15/15   0s 5ms/step - loss:
0.0778 - mae: 0.1068 - val_loss: 0.0694 - val_mae: 0.0884
Epoch 169/550
15/15   0s 5ms/step - loss:
0.0744 - mae: 0.1066 - val_loss: 0.0688 - val_mae: 0.0877
Epoch 170/550
15/15   0s 5ms/step - loss:
0.0732 - mae: 0.1030 - val_loss: 0.0683 - val_mae: 0.0873
Epoch 171/550
15/15   0s 5ms/step - loss:
0.0755 - mae: 0.1059 - val_loss: 0.0677 - val_mae: 0.0870
Epoch 172/550
15/15   0s 5ms/step - loss:
0.0756 - mae: 0.1069 - val_loss: 0.0673 - val_mae: 0.0877
Epoch 173/550
15/15   0s 5ms/step - loss:
0.0724 - mae: 0.1041 - val_loss: 0.0667 - val_mae: 0.0872
Epoch 174/550
15/15   0s 6ms/step - loss:
0.0723 - mae: 0.1051 - val_loss: 0.0662 - val_mae: 0.0868
Epoch 175/550
15/15   0s 5ms/step - loss:
0.0740 - mae: 0.1044 - val_loss: 0.0658 - val_mae: 0.0870
Epoch 176/550
15/15   0s 5ms/step - loss:
0.0708 - mae: 0.1042 - val_loss: 0.0651 - val_mae: 0.0869
Epoch 177/550
15/15   0s 6ms/step - loss:
0.0719 - mae: 0.1055 - val_loss: 0.0647 - val_mae: 0.0876
Epoch 178/550
15/15   0s 6ms/step - loss:
0.0696 - mae: 0.1038 - val_loss: 0.0641 - val_mae: 0.0861
Epoch 179/550
15/15   0s 6ms/step - loss:
0.0703 - mae: 0.1055 - val_loss: 0.0637 - val_mae: 0.0866
Epoch 180/550
15/15   0s 5ms/step - loss:
0.0694 - mae: 0.1024 - val_loss: 0.0631 - val_mae: 0.0863
Epoch 181/550
15/15   0s 5ms/step - loss:
0.0672 - mae: 0.1006 - val_loss: 0.0626 - val_mae: 0.0858
Epoch 182/550
15/15   0s 6ms/step - loss:
0.0666 - mae: 0.1014 - val_loss: 0.0621 - val_mae: 0.0864
Epoch 183/550
15/15   0s 5ms/step - loss:

0.0675 - mae: 0.1021 - val_loss: 0.0617 - val_mae: 0.0862
Epoch 184/550
15/15   0s 6ms/step - loss:
0.0664 - mae: 0.1018 - val_loss: 0.0611 - val_mae: 0.0863
Epoch 185/550
15/15   0s 5ms/step - loss:
0.0646 - mae: 0.1002 - val_loss: 0.0607 - val_mae: 0.0867
Epoch 186/550
15/15   0s 5ms/step - loss:
0.0658 - mae: 0.1018 - val_loss: 0.0603 - val_mae: 0.0873
Epoch 187/550
15/15   0s 5ms/step - loss:
0.0652 - mae: 0.1008 - val_loss: 0.0598 - val_mae: 0.0866
Epoch 188/550
15/15   0s 5ms/step - loss:
0.0658 - mae: 0.1012 - val_loss: 0.0596 - val_mae: 0.0874
Epoch 189/550
15/15   0s 6ms/step - loss:
0.0638 - mae: 0.1008 - val_loss: 0.0588 - val_mae: 0.0861
Epoch 190/550
15/15   0s 5ms/step - loss:
0.0639 - mae: 0.1001 - val_loss: 0.0586 - val_mae: 0.0871
Epoch 191/550
15/15   0s 7ms/step - loss:
0.0634 - mae: 0.1010 - val_loss: 0.0580 - val_mae: 0.0861
Epoch 192/550
15/15   0s 6ms/step - loss:
0.0620 - mae: 0.1000 - val_loss: 0.0576 - val_mae: 0.0858
Epoch 193/550
15/15   0s 5ms/step - loss:
0.0626 - mae: 0.1003 - val_loss: 0.0572 - val_mae: 0.0859
Epoch 194/550
15/15   0s 5ms/step - loss:
0.0612 - mae: 0.0995 - val_loss: 0.0567 - val_mae: 0.0860
Epoch 195/550
15/15   0s 5ms/step - loss:
0.0607 - mae: 0.0990 - val_loss: 0.0564 - val_mae: 0.0866
Epoch 196/550
15/15   0s 5ms/step - loss:
0.0608 - mae: 0.0996 - val_loss: 0.0559 - val_mae: 0.0873
Epoch 197/550
15/15   0s 6ms/step - loss:
0.0623 - mae: 0.1024 - val_loss: 0.0555 - val_mae: 0.0869
Epoch 198/550
15/15   0s 6ms/step - loss:
0.0571 - mae: 0.0973 - val_loss: 0.0550 - val_mae: 0.0857
Epoch 199/550
15/15   0s 6ms/step - loss:

0.0597 - mae: 0.1001 - val_loss: 0.0547 - val_mae: 0.0863
Epoch 200/550
15/15   0s 5ms/step - loss:
0.0585 - mae: 0.0987 - val_loss: 0.0542 - val_mae: 0.0859
Epoch 201/550
15/15   0s 6ms/step - loss:
0.0560 - mae: 0.0964 - val_loss: 0.0539 - val_mae: 0.0863
Epoch 202/550
15/15   0s 5ms/step - loss:
0.0566 - mae: 0.0976 - val_loss: 0.0534 - val_mae: 0.0860
Epoch 203/550
15/15   0s 7ms/step - loss:
0.0567 - mae: 0.0979 - val_loss: 0.0530 - val_mae: 0.0858
Epoch 204/550
15/15   0s 6ms/step - loss:
0.0563 - mae: 0.0971 - val_loss: 0.0527 - val_mae: 0.0858
Epoch 205/550
15/15   0s 5ms/step - loss:
0.0582 - mae: 0.0976 - val_loss: 0.0522 - val_mae: 0.0848
Epoch 206/550
15/15   0s 5ms/step - loss:
0.0567 - mae: 0.0986 - val_loss: 0.0519 - val_mae: 0.0854
Epoch 207/550
15/15   0s 5ms/step - loss:
0.0563 - mae: 0.0977 - val_loss: 0.0516 - val_mae: 0.0860
Epoch 208/550
15/15   0s 5ms/step - loss:
0.0558 - mae: 0.0982 - val_loss: 0.0513 - val_mae: 0.0861
Epoch 209/550
15/15   0s 6ms/step - loss:
0.0549 - mae: 0.0966 - val_loss: 0.0508 - val_mae: 0.0857
Epoch 210/550
15/15   0s 5ms/step - loss:
0.0537 - mae: 0.0950 - val_loss: 0.0505 - val_mae: 0.0854
Epoch 211/550
15/15   0s 5ms/step - loss:
0.0543 - mae: 0.0967 - val_loss: 0.0501 - val_mae: 0.0855
Epoch 212/550
15/15   0s 5ms/step - loss:
0.0538 - mae: 0.0954 - val_loss: 0.0498 - val_mae: 0.0853
Epoch 213/550
15/15   0s 5ms/step - loss:
0.0518 - mae: 0.0941 - val_loss: 0.0495 - val_mae: 0.0856
Epoch 214/550
15/15   0s 7ms/step - loss:
0.0523 - mae: 0.0948 - val_loss: 0.0490 - val_mae: 0.0852
Epoch 215/550
15/15   0s 6ms/step - loss:

0.0520 - mae: 0.0957 - val_loss: 0.0488 - val_mae: 0.0857
Epoch 216/550
15/15   0s 5ms/step - loss:
0.0512 - mae: 0.0941 - val_loss: 0.0484 - val_mae: 0.0852
Epoch 217/550
15/15   0s 6ms/step - loss:
0.0518 - mae: 0.0962 - val_loss: 0.0481 - val_mae: 0.0848
Epoch 218/550
15/15   0s 6ms/step - loss:
0.0523 - mae: 0.0967 - val_loss: 0.0478 - val_mae: 0.0859
Epoch 219/550
15/15   0s 5ms/step - loss:
0.0513 - mae: 0.0953 - val_loss: 0.0476 - val_mae: 0.0858
Epoch 220/550
15/15   0s 6ms/step - loss:
0.0534 - mae: 0.0979 - val_loss: 0.0471 - val_mae: 0.0853
Epoch 221/550
15/15   0s 6ms/step - loss:
0.0505 - mae: 0.0937 - val_loss: 0.0468 - val_mae: 0.0853
Epoch 222/550
15/15   0s 5ms/step - loss:
0.0491 - mae: 0.0933 - val_loss: 0.0466 - val_mae: 0.0848
Epoch 223/550
15/15   0s 5ms/step - loss:
0.0479 - mae: 0.0926 - val_loss: 0.0462 - val_mae: 0.0845
Epoch 224/550
15/15   0s 10ms/step -
loss: 0.0492 - mae: 0.0951 - val_loss: 0.0459 - val_mae: 0.0843
Epoch 225/550
15/15   0s 6ms/step - loss:
0.0472 - mae: 0.0934 - val_loss: 0.0456 - val_mae: 0.0839
Epoch 226/550
15/15   0s 6ms/step - loss:
0.0484 - mae: 0.0939 - val_loss: 0.0454 - val_mae: 0.0845
Epoch 227/550
15/15   0s 5ms/step - loss:
0.0482 - mae: 0.0932 - val_loss: 0.0450 - val_mae: 0.0845
Epoch 228/550
15/15   0s 5ms/step - loss:
0.0471 - mae: 0.0924 - val_loss: 0.0449 - val_mae: 0.0850
Epoch 229/550
15/15   0s 6ms/step - loss:
0.0474 - mae: 0.0937 - val_loss: 0.0444 - val_mae: 0.0841
Epoch 230/550
15/15   0s 5ms/step - loss:
0.0465 - mae: 0.0925 - val_loss: 0.0442 - val_mae: 0.0850
Epoch 231/550
15/15   0s 5ms/step - loss:

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0.0466 - mae: 0.0920 - val_loss: 0.0437 - val_mae: 0.0841
Epoch 232/550
15/15          0s 5ms/step - loss:
0.0471 - mae: 0.0939 - val_loss: 0.0434 - val_mae: 0.0838
Epoch 233/550
15/15          0s 5ms/step - loss:
0.0473 - mae: 0.0935 - val_loss: 0.0433 - val_mae: 0.0841
Epoch 234/550
15/15          0s 7ms/step - loss:
0.0451 - mae: 0.0910 - val_loss: 0.0429 - val_mae: 0.0838
Epoch 235/550
15/15          0s 5ms/step - loss:
0.0446 - mae: 0.0929 - val_loss: 0.0428 - val_mae: 0.0843
Epoch 236/550
15/15          0s 5ms/step - loss:
0.0437 - mae: 0.0907 - val_loss: 0.0424 - val_mae: 0.0832
Epoch 237/550
15/15          0s 5ms/step - loss:
0.0453 - mae: 0.0929 - val_loss: 0.0423 - val_mae: 0.0838
Epoch 238/550
15/15          0s 6ms/step - loss:
0.0444 - mae: 0.0923 - val_loss: 0.0419 - val_mae: 0.0836
Epoch 239/550
15/15          0s 5ms/step - loss:
0.0448 - mae: 0.0928 - val_loss: 0.0418 - val_mae: 0.0840
Epoch 240/550
15/15          0s 5ms/step - loss:
0.0420 - mae: 0.0909 - val_loss: 0.0414 - val_mae: 0.0837
Epoch 241/550
15/15          0s 6ms/step - loss:
0.0433 - mae: 0.0904 - val_loss: 0.0412 - val_mae: 0.0833
Epoch 242/550
15/15          0s 5ms/step - loss:
0.0435 - mae: 0.0915 - val_loss: 0.0410 - val_mae: 0.0829
Epoch 243/550
15/15          0s 5ms/step - loss:
0.0421 - mae: 0.0904 - val_loss: 0.0407 - val_mae: 0.0830
Epoch 244/550
15/15          0s 7ms/step - loss:
0.0423 - mae: 0.0900 - val_loss: 0.0404 - val_mae: 0.0830
Epoch 245/550
15/15          0s 6ms/step - loss:
0.0430 - mae: 0.0912 - val_loss: 0.0402 - val_mae: 0.0836
Epoch 246/550
15/15          0s 5ms/step - loss:
0.0432 - mae: 0.0918 - val_loss: 0.0402 - val_mae: 0.0839
Epoch 247/550
15/15          0s 6ms/step - loss:
```

0.0429 - mae: 0.0914 - val_loss: 0.0397 - val_mae: 0.0833
Epoch 248/550
15/15   0s 5ms/step - loss:
0.0405 - mae: 0.0895 - val_loss: 0.0395 - val_mae: 0.0830
Epoch 249/550
15/15   0s 5ms/step - loss:
0.0421 - mae: 0.0916 - val_loss: 0.0391 - val_mae: 0.0827
Epoch 250/550
15/15   0s 5ms/step - loss:
0.0393 - mae: 0.0877 - val_loss: 0.0391 - val_mae: 0.0827
Epoch 251/550
15/15   0s 5ms/step - loss:
0.0398 - mae: 0.0881 - val_loss: 0.0387 - val_mae: 0.0831
Epoch 252/550
15/15   0s 5ms/step - loss:
0.0408 - mae: 0.0907 - val_loss: 0.0386 - val_mae: 0.0833
Epoch 253/550
15/15   0s 5ms/step - loss:
0.0399 - mae: 0.0886 - val_loss: 0.0383 - val_mae: 0.0826
Epoch 254/550
15/15   0s 6ms/step - loss:
0.0397 - mae: 0.0890 - val_loss: 0.0383 - val_mae: 0.0834
Epoch 255/550
15/15   0s 6ms/step - loss:
0.0403 - mae: 0.0896 - val_loss: 0.0381 - val_mae: 0.0836
Epoch 256/550
15/15   0s 6ms/step - loss:
0.0402 - mae: 0.0890 - val_loss: 0.0378 - val_mae: 0.0843
Epoch 257/550
15/15   0s 5ms/step - loss:
0.0401 - mae: 0.0895 - val_loss: 0.0375 - val_mae: 0.0826
Epoch 258/550
15/15   0s 6ms/step - loss:
0.0396 - mae: 0.0897 - val_loss: 0.0375 - val_mae: 0.0826
Epoch 259/550
15/15   0s 6ms/step - loss:
0.0400 - mae: 0.0887 - val_loss: 0.0371 - val_mae: 0.0828
Epoch 260/550
15/15   0s 5ms/step - loss:
0.0384 - mae: 0.0887 - val_loss: 0.0370 - val_mae: 0.0813
Epoch 261/550
15/15   0s 5ms/step - loss:
0.0363 - mae: 0.0859 - val_loss: 0.0369 - val_mae: 0.0820
Epoch 262/550
15/15   0s 5ms/step - loss:
0.0374 - mae: 0.0886 - val_loss: 0.0364 - val_mae: 0.0823
Epoch 263/550
15/15   0s 5ms/step - loss:

0.0387 - mae: 0.0892 - val_loss: 0.0364 - val_mae: 0.0830
Epoch 264/550
15/15   0s 7ms/step - loss:
0.0368 - mae: 0.0877 - val_loss: 0.0363 - val_mae: 0.0829
Epoch 265/550
15/15   0s 5ms/step - loss:
0.0384 - mae: 0.0889 - val_loss: 0.0360 - val_mae: 0.0817
Epoch 266/550
15/15   0s 6ms/step - loss:
0.0363 - mae: 0.0878 - val_loss: 0.0359 - val_mae: 0.0816
Epoch 267/550
15/15   0s 6ms/step - loss:
0.0359 - mae: 0.0861 - val_loss: 0.0357 - val_mae: 0.0807
Epoch 268/550
15/15   0s 5ms/step - loss:
0.0366 - mae: 0.0874 - val_loss: 0.0356 - val_mae: 0.0818
Epoch 269/550
15/15   0s 6ms/step - loss:
0.0388 - mae: 0.0898 - val_loss: 0.0353 - val_mae: 0.0814
Epoch 270/550
15/15   0s 6ms/step - loss:
0.0348 - mae: 0.0855 - val_loss: 0.0354 - val_mae: 0.0826
Epoch 271/550
15/15   0s 5ms/step - loss:
0.0356 - mae: 0.0869 - val_loss: 0.0351 - val_mae: 0.0822
Epoch 272/550
15/15   0s 6ms/step - loss:
0.0353 - mae: 0.0868 - val_loss: 0.0349 - val_mae: 0.0817
Epoch 273/550
15/15   0s 7ms/step - loss:
0.0364 - mae: 0.0884 - val_loss: 0.0349 - val_mae: 0.0824
Epoch 274/550
15/15   0s 5ms/step - loss:
0.0340 - mae: 0.0849 - val_loss: 0.0348 - val_mae: 0.0825
Epoch 275/550
15/15   0s 5ms/step - loss:
0.0361 - mae: 0.0875 - val_loss: 0.0344 - val_mae: 0.0815
Epoch 276/550
15/15   0s 5ms/step - loss:
0.0335 - mae: 0.0847 - val_loss: 0.0342 - val_mae: 0.0825
Epoch 277/550
15/15   0s 5ms/step - loss:
0.0363 - mae: 0.0877 - val_loss: 0.0342 - val_mae: 0.0818
Epoch 278/550
15/15   0s 6ms/step - loss:
0.0366 - mae: 0.0887 - val_loss: 0.0339 - val_mae: 0.0817
Epoch 279/550
15/15   0s 5ms/step - loss:

0.0342 - mae: 0.0866 - val_loss: 0.0338 - val_mae: 0.0816
Epoch 280/550
15/15   0s 6ms/step - loss:
0.0340 - mae: 0.0851 - val_loss: 0.0336 - val_mae: 0.0814
Epoch 281/550
15/15   0s 5ms/step - loss:
0.0337 - mae: 0.0852 - val_loss: 0.0337 - val_mae: 0.0818
Epoch 282/550
15/15   0s 5ms/step - loss:
0.0337 - mae: 0.0850 - val_loss: 0.0335 - val_mae: 0.0827
Epoch 283/550
15/15   0s 5ms/step - loss:
0.0333 - mae: 0.0848 - val_loss: 0.0331 - val_mae: 0.0814
Epoch 284/550
15/15   0s 6ms/step - loss:
0.0333 - mae: 0.0859 - val_loss: 0.0330 - val_mae: 0.0812
Epoch 285/550
15/15   0s 5ms/step - loss:
0.0339 - mae: 0.0859 - val_loss: 0.0330 - val_mae: 0.0813
Epoch 286/550
15/15   0s 5ms/step - loss:
0.0341 - mae: 0.0870 - val_loss: 0.0327 - val_mae: 0.0807
Epoch 287/550
15/15   0s 6ms/step - loss:
0.0349 - mae: 0.0879 - val_loss: 0.0326 - val_mae: 0.0809
Epoch 288/550
15/15   0s 6ms/step - loss:
0.0337 - mae: 0.0858 - val_loss: 0.0325 - val_mae: 0.0806
Epoch 289/550
15/15   0s 6ms/step - loss:
0.0343 - mae: 0.0873 - val_loss: 0.0323 - val_mae: 0.0807
Epoch 290/550
15/15   0s 6ms/step - loss:
0.0332 - mae: 0.0852 - val_loss: 0.0321 - val_mae: 0.0804
Epoch 291/550
15/15   0s 6ms/step - loss:
0.0322 - mae: 0.0839 - val_loss: 0.0320 - val_mae: 0.0807
Epoch 292/550
15/15   0s 5ms/step - loss:
0.0315 - mae: 0.0838 - val_loss: 0.0319 - val_mae: 0.0815
Epoch 293/550
15/15   0s 6ms/step - loss:
0.0316 - mae: 0.0835 - val_loss: 0.0318 - val_mae: 0.0819
Epoch 294/550
15/15   0s 5ms/step - loss:
0.0333 - mae: 0.0867 - val_loss: 0.0315 - val_mae: 0.0813
Epoch 295/550
15/15   0s 5ms/step - loss:

0.0309 - mae: 0.0841 - val_loss: 0.0316 - val_mae: 0.0817
Epoch 296/550
15/15   0s 6ms/step - loss:
0.0311 - mae: 0.0833 - val_loss: 0.0313 - val_mae: 0.0811
Epoch 297/550
15/15   0s 6ms/step - loss:
0.0315 - mae: 0.0848 - val_loss: 0.0312 - val_mae: 0.0814
Epoch 298/550
15/15   0s 6ms/step - loss:
0.0330 - mae: 0.0852 - val_loss: 0.0311 - val_mae: 0.0802
Epoch 299/550
15/15   0s 5ms/step - loss:
0.0301 - mae: 0.0825 - val_loss: 0.0310 - val_mae: 0.0806
Epoch 300/550
15/15   0s 6ms/step - loss:
0.0314 - mae: 0.0835 - val_loss: 0.0307 - val_mae: 0.0804
Epoch 301/550
15/15   0s 7ms/step - loss:
0.0317 - mae: 0.0848 - val_loss: 0.0307 - val_mae: 0.0815
Epoch 302/550
15/15   0s 5ms/step - loss:
0.0313 - mae: 0.0847 - val_loss: 0.0307 - val_mae: 0.0810
Epoch 303/550
15/15   0s 5ms/step - loss:
0.0311 - mae: 0.0850 - val_loss: 0.0303 - val_mae: 0.0817
Epoch 304/550
15/15   0s 5ms/step - loss:
0.0296 - mae: 0.0829 - val_loss: 0.0303 - val_mae: 0.0804
Epoch 305/550
15/15   0s 6ms/step - loss:
0.0308 - mae: 0.0849 - val_loss: 0.0301 - val_mae: 0.0800
Epoch 306/550
15/15   0s 5ms/step - loss:
0.0304 - mae: 0.0845 - val_loss: 0.0302 - val_mae: 0.0803
Epoch 307/550
15/15   0s 5ms/step - loss:
0.0309 - mae: 0.0848 - val_loss: 0.0301 - val_mae: 0.0801
Epoch 308/550
15/15   0s 6ms/step - loss:
0.0303 - mae: 0.0840 - val_loss: 0.0302 - val_mae: 0.0800
Epoch 309/550
15/15   0s 6ms/step - loss:
0.0315 - mae: 0.0855 - val_loss: 0.0298 - val_mae: 0.0806
Epoch 310/550
15/15   0s 7ms/step - loss:
0.0285 - mae: 0.0823 - val_loss: 0.0299 - val_mae: 0.0813
Epoch 311/550
15/15   0s 6ms/step - loss:

0.0287 - mae: 0.0816 - val_loss: 0.0295 - val_mae: 0.0807
Epoch 312/550
15/15   0s 6ms/step - loss:
0.0289 - mae: 0.0825 - val_loss: 0.0296 - val_mae: 0.0821
Epoch 313/550
15/15   0s 6ms/step - loss:
0.0291 - mae: 0.0834 - val_loss: 0.0291 - val_mae: 0.0790
Epoch 314/550
15/15   0s 5ms/step - loss:
0.0290 - mae: 0.0824 - val_loss: 0.0292 - val_mae: 0.0813
Epoch 315/550
15/15   0s 6ms/step - loss:
0.0311 - mae: 0.0846 - val_loss: 0.0288 - val_mae: 0.0793
Epoch 316/550
15/15   0s 6ms/step - loss:
0.0284 - mae: 0.0821 - val_loss: 0.0287 - val_mae: 0.0792
Epoch 317/550
15/15   0s 6ms/step - loss:
0.0286 - mae: 0.0813 - val_loss: 0.0290 - val_mae: 0.0790
Epoch 318/550
15/15   0s 6ms/step - loss:
0.0284 - mae: 0.0817 - val_loss: 0.0288 - val_mae: 0.0808
Epoch 319/550
15/15   0s 5ms/step - loss:
0.0280 - mae: 0.0824 - val_loss: 0.0287 - val_mae: 0.0801
Epoch 320/550
15/15   0s 6ms/step - loss:
0.0280 - mae: 0.0828 - val_loss: 0.0287 - val_mae: 0.0793
Epoch 321/550
15/15   0s 6ms/step - loss:
0.0298 - mae: 0.0828 - val_loss: 0.0281 - val_mae: 0.0795
Epoch 322/550
15/15   0s 5ms/step - loss:
0.0274 - mae: 0.0810 - val_loss: 0.0282 - val_mae: 0.0790
Epoch 323/550
15/15   0s 5ms/step - loss:
0.0279 - mae: 0.0818 - val_loss: 0.0282 - val_mae: 0.0791
Epoch 324/550
15/15   0s 5ms/step - loss:
0.0278 - mae: 0.0823 - val_loss: 0.0282 - val_mae: 0.0793
Epoch 325/550
15/15   0s 5ms/step - loss:
0.0284 - mae: 0.0824 - val_loss: 0.0280 - val_mae: 0.0799
Epoch 326/550
15/15   0s 5ms/step - loss:
0.0268 - mae: 0.0820 - val_loss: 0.0276 - val_mae: 0.0796
Epoch 327/550
15/15   0s 6ms/step - loss:

0.0273 - mae: 0.0809 - val_loss: 0.0277 - val_mae: 0.0782
Epoch 328/550
15/15   0s 5ms/step - loss:
0.0276 - mae: 0.0825 - val_loss: 0.0275 - val_mae: 0.0789
Epoch 329/550
15/15   0s 6ms/step - loss:
0.0289 - mae: 0.0830 - val_loss: 0.0275 - val_mae: 0.0787
Epoch 330/550
15/15   0s 6ms/step - loss:
0.0278 - mae: 0.0816 - val_loss: 0.0274 - val_mae: 0.0802
Epoch 331/550
15/15   0s 5ms/step - loss:
0.0271 - mae: 0.0819 - val_loss: 0.0275 - val_mae: 0.0801
Epoch 332/550
15/15   0s 5ms/step - loss:
0.0271 - mae: 0.0823 - val_loss: 0.0277 - val_mae: 0.0799
Epoch 333/550
15/15   0s 5ms/step - loss:
0.0263 - mae: 0.0806 - val_loss: 0.0273 - val_mae: 0.0775
Epoch 334/550
15/15   0s 5ms/step - loss:
0.0264 - mae: 0.0810 - val_loss: 0.0275 - val_mae: 0.0793
Epoch 335/550
15/15   0s 7ms/step - loss:
0.0261 - mae: 0.0813 - val_loss: 0.0273 - val_mae: 0.0785
Epoch 336/550
15/15   0s 5ms/step - loss:
0.0277 - mae: 0.0833 - val_loss: 0.0270 - val_mae: 0.0795
Epoch 337/550
15/15   0s 5ms/step - loss:
0.0263 - mae: 0.0809 - val_loss: 0.0268 - val_mae: 0.0788
Epoch 338/550
15/15   0s 6ms/step - loss:
0.0266 - mae: 0.0814 - val_loss: 0.0266 - val_mae: 0.0789
Epoch 339/550
15/15   0s 5ms/step - loss:
0.0254 - mae: 0.0804 - val_loss: 0.0265 - val_mae: 0.0787
Epoch 340/550
15/15   0s 5ms/step - loss:
0.0254 - mae: 0.0801 - val_loss: 0.0268 - val_mae: 0.0786
Epoch 341/550
15/15   0s 5ms/step - loss:
0.0267 - mae: 0.0806 - val_loss: 0.0265 - val_mae: 0.0777
Epoch 342/550
15/15   0s 5ms/step - loss:
0.0254 - mae: 0.0801 - val_loss: 0.0266 - val_mae: 0.0771
Epoch 343/550
15/15   0s 6ms/step - loss:

0.0256 - mae: 0.0794 - val_loss: 0.0268 - val_mae: 0.0784
Epoch 344/550
15/15   0s 5ms/step - loss:
0.0258 - mae: 0.0811 - val_loss: 0.0266 - val_mae: 0.0799
Epoch 345/550
15/15   0s 6ms/step - loss:
0.0254 - mae: 0.0799 - val_loss: 0.0260 - val_mae: 0.0776
Epoch 346/550
15/15   0s 5ms/step - loss:
0.0249 - mae: 0.0797 - val_loss: 0.0259 - val_mae: 0.0786
Epoch 347/550
15/15   0s 5ms/step - loss:
0.0249 - mae: 0.0791 - val_loss: 0.0259 - val_mae: 0.0791
Epoch 348/550
15/15   0s 5ms/step - loss:
0.0264 - mae: 0.0814 - val_loss: 0.0263 - val_mae: 0.0809
Epoch 349/550
15/15   0s 5ms/step - loss:
0.0237 - mae: 0.0794 - val_loss: 0.0263 - val_mae: 0.0788
Epoch 350/550
15/15   0s 6ms/step - loss:
0.0246 - mae: 0.0802 - val_loss: 0.0259 - val_mae: 0.0794
Epoch 351/550
15/15   0s 6ms/step - loss:
0.0253 - mae: 0.0804 - val_loss: 0.0257 - val_mae: 0.0790
Epoch 352/550
15/15   0s 6ms/step - loss:
0.0248 - mae: 0.0799 - val_loss: 0.0260 - val_mae: 0.0803
Epoch 353/550
15/15   0s 5ms/step - loss:
0.0257 - mae: 0.0798 - val_loss: 0.0259 - val_mae: 0.0790
Epoch 354/550
15/15   0s 5ms/step - loss:
0.0250 - mae: 0.0792 - val_loss: 0.0252 - val_mae: 0.0774
Epoch 355/550
15/15   0s 5ms/step - loss:
0.0255 - mae: 0.0807 - val_loss: 0.0259 - val_mae: 0.0781
Epoch 356/550
15/15   0s 5ms/step - loss:
0.0258 - mae: 0.0812 - val_loss: 0.0259 - val_mae: 0.0776
Epoch 357/550
15/15   0s 5ms/step - loss:
0.0246 - mae: 0.0799 - val_loss: 0.0253 - val_mae: 0.0773
Epoch 358/550
15/15   0s 5ms/step - loss:
0.0241 - mae: 0.0791 - val_loss: 0.0256 - val_mae: 0.0773
Epoch 359/550
15/15   0s 6ms/step - loss:

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0.0227 - mae: 0.0787 - val_loss: 0.0255 - val_mae: 0.0765
Epoch 360/550
15/15          0s 5ms/step - loss:
0.0243 - mae: 0.0784 - val_loss: 0.0249 - val_mae: 0.0779
Epoch 361/550
15/15          0s 7ms/step - loss:
0.0234 - mae: 0.0785 - val_loss: 0.0246 - val_mae: 0.0766
Epoch 362/550
15/15          0s 5ms/step - loss:
0.0246 - mae: 0.0796 - val_loss: 0.0248 - val_mae: 0.0775
Epoch 363/550
15/15          0s 5ms/step - loss:
0.0233 - mae: 0.0792 - val_loss: 0.0251 - val_mae: 0.0783
Epoch 364/550
15/15          0s 5ms/step - loss:
0.0237 - mae: 0.0794 - val_loss: 0.0250 - val_mae: 0.0774
Epoch 365/550
15/15          0s 6ms/step - loss:
0.0235 - mae: 0.0800 - val_loss: 0.0244 - val_mae: 0.0766
Epoch 366/550
15/15          0s 6ms/step - loss:
0.0234 - mae: 0.0796 - val_loss: 0.0244 - val_mae: 0.0774
Epoch 367/550
15/15          0s 6ms/step - loss:
0.0250 - mae: 0.0800 - val_loss: 0.0243 - val_mae: 0.0773
Epoch 368/550
15/15          0s 7ms/step - loss:
0.0230 - mae: 0.0778 - val_loss: 0.0244 - val_mae: 0.0784
Epoch 369/550
15/15          0s 6ms/step - loss:
0.0221 - mae: 0.0778 - val_loss: 0.0247 - val_mae: 0.0784
Epoch 370/550
15/15          0s 6ms/step - loss:
0.0238 - mae: 0.0787 - val_loss: 0.0242 - val_mae: 0.0778
Epoch 371/550
15/15          0s 6ms/step - loss:
0.0246 - mae: 0.0795 - val_loss: 0.0244 - val_mae: 0.0778
Epoch 372/550
15/15          0s 6ms/step - loss:
0.0249 - mae: 0.0806 - val_loss: 0.0246 - val_mae: 0.0796
Epoch 373/550
15/15          0s 5ms/step - loss:
0.0226 - mae: 0.0781 - val_loss: 0.0244 - val_mae: 0.0770
Epoch 374/550
15/15          0s 5ms/step - loss:
0.0230 - mae: 0.0779 - val_loss: 0.0242 - val_mae: 0.0775
Epoch 375/550
15/15          0s 5ms/step - loss:
```

0.0220 - mae: 0.0776 - val_loss: 0.0242 - val_mae: 0.0786
Epoch 376/550
15/15   0s 7ms/step - loss:
0.0215 - mae: 0.0769 - val_loss: 0.0240 - val_mae: 0.0774
Epoch 377/550
15/15   0s 6ms/step - loss:
0.0223 - mae: 0.0775 - val_loss: 0.0239 - val_mae: 0.0775
Epoch 378/550
15/15   0s 5ms/step - loss:
0.0238 - mae: 0.0792 - val_loss: 0.0240 - val_mae: 0.0772
Epoch 379/550
15/15   0s 6ms/step - loss:
0.0223 - mae: 0.0786 - val_loss: 0.0237 - val_mae: 0.0764
Epoch 380/550
15/15   0s 5ms/step - loss:
0.0234 - mae: 0.0786 - val_loss: 0.0242 - val_mae: 0.0768
Epoch 381/550
15/15   0s 5ms/step - loss:
0.0223 - mae: 0.0780 - val_loss: 0.0240 - val_mae: 0.0778
Epoch 382/550
15/15   0s 5ms/step - loss:
0.0232 - mae: 0.0787 - val_loss: 0.0242 - val_mae: 0.0763
Epoch 383/550
15/15   0s 5ms/step - loss:
0.0232 - mae: 0.0790 - val_loss: 0.0237 - val_mae: 0.0757
Epoch 384/550
15/15   0s 7ms/step - loss:
0.0230 - mae: 0.0786 - val_loss: 0.0235 - val_mae: 0.0751
Epoch 385/550
15/15   0s 5ms/step - loss:
0.0234 - mae: 0.0791 - val_loss: 0.0234 - val_mae: 0.0766
Epoch 386/550
15/15   0s 6ms/step - loss:
0.0219 - mae: 0.0779 - val_loss: 0.0233 - val_mae: 0.0762
Epoch 387/550
15/15   0s 5ms/step - loss:
0.0210 - mae: 0.0770 - val_loss: 0.0237 - val_mae: 0.0783
Epoch 388/550
15/15   0s 5ms/step - loss:
0.0218 - mae: 0.0777 - val_loss: 0.0233 - val_mae: 0.0770
Epoch 389/550
15/15   0s 5ms/step - loss:
0.0237 - mae: 0.0801 - val_loss: 0.0235 - val_mae: 0.0766
Epoch 390/550
15/15   0s 5ms/step - loss:
0.0227 - mae: 0.0790 - val_loss: 0.0240 - val_mae: 0.0778
Epoch 391/550
15/15   0s 5ms/step - loss:

0.0208 - mae: 0.0760 - val_loss: 0.0242 - val_mae: 0.0776
Epoch 392/550
15/15   0s 7ms/step - loss:
0.0223 - mae: 0.0783 - val_loss: 0.0241 - val_mae: 0.0782
Epoch 393/550
15/15   0s 6ms/step - loss:
0.0212 - mae: 0.0768 - val_loss: 0.0235 - val_mae: 0.0782
Epoch 394/550
15/15   0s 5ms/step - loss:
0.0215 - mae: 0.0776 - val_loss: 0.0234 - val_mae: 0.0777
Epoch 395/550
15/15   0s 5ms/step - loss:
0.0213 - mae: 0.0771 - val_loss: 0.0233 - val_mae: 0.0770
Epoch 396/550
15/15   0s 5ms/step - loss:
0.0218 - mae: 0.0772 - val_loss: 0.0235 - val_mae: 0.0768
Epoch 397/550
15/15   0s 5ms/step - loss:
0.0210 - mae: 0.0771 - val_loss: 0.0232 - val_mae: 0.0756
Epoch 398/550
15/15   0s 6ms/step - loss:
0.0235 - mae: 0.0780 - val_loss: 0.0238 - val_mae: 0.0779
Epoch 399/550
15/15   0s 6ms/step - loss:
0.0215 - mae: 0.0782 - val_loss: 0.0231 - val_mae: 0.0769
Epoch 400/550
15/15   0s 6ms/step - loss:
0.0207 - mae: 0.0763 - val_loss: 0.0226 - val_mae: 0.0773
Epoch 401/550
15/15   0s 5ms/step - loss:
0.0205 - mae: 0.0765 - val_loss: 0.0241 - val_mae: 0.0800
Epoch 402/550
15/15   0s 5ms/step - loss:
0.0206 - mae: 0.0759 - val_loss: 0.0234 - val_mae: 0.0784
Epoch 403/550
15/15   0s 5ms/step - loss:
0.0221 - mae: 0.0784 - val_loss: 0.0228 - val_mae: 0.0766
Epoch 404/550
15/15   0s 5ms/step - loss:
0.0205 - mae: 0.0773 - val_loss: 0.0228 - val_mae: 0.0777
Epoch 405/550
15/15   0s 5ms/step - loss:
0.0210 - mae: 0.0768 - val_loss: 0.0231 - val_mae: 0.0778
Epoch 406/550
15/15   0s 5ms/step - loss:
0.0205 - mae: 0.0761 - val_loss: 0.0229 - val_mae: 0.0781
Epoch 407/550
15/15   0s 5ms/step - loss:

0.0212 - mae: 0.0783 - val_loss: 0.0229 - val_mae: 0.0766
Epoch 408/550
15/15   0s 7ms/step - loss:
0.0200 - mae: 0.0752 - val_loss: 0.0224 - val_mae: 0.0761
Epoch 409/550
15/15   0s 5ms/step - loss:
0.0206 - mae: 0.0764 - val_loss: 0.0229 - val_mae: 0.0776
Epoch 410/550
15/15   0s 5ms/step - loss:
0.0195 - mae: 0.0745 - val_loss: 0.0230 - val_mae: 0.0778
Epoch 411/550
15/15   0s 5ms/step - loss:
0.0213 - mae: 0.0766 - val_loss: 0.0227 - val_mae: 0.0762
Epoch 412/550
15/15   0s 5ms/step - loss:
0.0192 - mae: 0.0746 - val_loss: 0.0226 - val_mae: 0.0764
Epoch 413/550
15/15   0s 6ms/step - loss:
0.0203 - mae: 0.0755 - val_loss: 0.0226 - val_mae: 0.0754
Epoch 414/550
15/15   0s 6ms/step - loss:
0.0219 - mae: 0.0770 - val_loss: 0.0234 - val_mae: 0.0780
Epoch 415/550
15/15   0s 5ms/step - loss:
0.0197 - mae: 0.0746 - val_loss: 0.0232 - val_mae: 0.0782
Epoch 416/550
15/15   0s 7ms/step - loss:
0.0201 - mae: 0.0760 - val_loss: 0.0226 - val_mae: 0.0761
Epoch 417/550
15/15   0s 5ms/step - loss:
0.0209 - mae: 0.0767 - val_loss: 0.0223 - val_mae: 0.0750
Epoch 418/550
15/15   0s 5ms/step - loss:
0.0195 - mae: 0.0758 - val_loss: 0.0231 - val_mae: 0.0757
Epoch 419/550
15/15   0s 5ms/step - loss:
0.0204 - mae: 0.0762 - val_loss: 0.0222 - val_mae: 0.0772
Epoch 420/550
15/15   0s 5ms/step - loss:
0.0192 - mae: 0.0740 - val_loss: 0.0228 - val_mae: 0.0768
Epoch 421/550
15/15   0s 5ms/step - loss:
0.0190 - mae: 0.0748 - val_loss: 0.0234 - val_mae: 0.0782
Epoch 422/550
15/15   0s 5ms/step - loss:
0.0206 - mae: 0.0762 - val_loss: 0.0230 - val_mae: 0.0782
Epoch 423/550
15/15   0s 5ms/step - loss:

0.0200 - mae: 0.0752 - val_loss: 0.0227 - val_mae: 0.0761
Epoch 424/550
15/15   0s 6ms/step - loss:
0.0193 - mae: 0.0751 - val_loss: 0.0222 - val_mae: 0.0757
Epoch 425/550
15/15   0s 6ms/step - loss:
0.0205 - mae: 0.0764 - val_loss: 0.0227 - val_mae: 0.0757
Epoch 426/550
15/15   0s 5ms/step - loss:
0.0208 - mae: 0.0767 - val_loss: 0.0225 - val_mae: 0.0761
Epoch 427/550
15/15   0s 5ms/step - loss:
0.0193 - mae: 0.0742 - val_loss: 0.0224 - val_mae: 0.0765
Epoch 428/550
15/15   0s 5ms/step - loss:
0.0200 - mae: 0.0761 - val_loss: 0.0218 - val_mae: 0.0752
Epoch 429/550
15/15   0s 5ms/step - loss:
0.0193 - mae: 0.0756 - val_loss: 0.0220 - val_mae: 0.0763
Epoch 430/550
15/15   0s 5ms/step - loss:
0.0183 - mae: 0.0734 - val_loss: 0.0221 - val_mae: 0.0755
Epoch 431/550
15/15   0s 5ms/step - loss:
0.0203 - mae: 0.0764 - val_loss: 0.0225 - val_mae: 0.0762
Epoch 432/550
15/15   0s 5ms/step - loss:
0.0199 - mae: 0.0750 - val_loss: 0.0231 - val_mae: 0.0772
Epoch 433/550
15/15   0s 5ms/step - loss:
0.0200 - mae: 0.0758 - val_loss: 0.0230 - val_mae: 0.0769
Epoch 434/550
15/15   0s 5ms/step - loss:
0.0206 - mae: 0.0769 - val_loss: 0.0225 - val_mae: 0.0772
Epoch 435/550
15/15   0s 6ms/step - loss:
0.0193 - mae: 0.0755 - val_loss: 0.0218 - val_mae: 0.0771
Epoch 436/550
15/15   0s 5ms/step - loss:
0.0185 - mae: 0.0737 - val_loss: 0.0221 - val_mae: 0.0766
Epoch 437/550
15/15   0s 6ms/step - loss:
0.0187 - mae: 0.0748 - val_loss: 0.0217 - val_mae: 0.0762
Epoch 438/550
15/15   0s 7ms/step - loss:
0.0189 - mae: 0.0741 - val_loss: 0.0221 - val_mae: 0.0763
Epoch 439/550
15/15   0s 6ms/step - loss:

0.0185 - mae: 0.0734 - val_loss: 0.0229 - val_mae: 0.0773
Epoch 440/550
15/15   0s 6ms/step - loss:
0.0187 - mae: 0.0750 - val_loss: 0.0223 - val_mae: 0.0770
Epoch 441/550
15/15   0s 5ms/step - loss:
0.0180 - mae: 0.0731 - val_loss: 0.0223 - val_mae: 0.0764
Epoch 442/550
15/15   0s 5ms/step - loss:
0.0206 - mae: 0.0761 - val_loss: 0.0225 - val_mae: 0.0753
Epoch 443/550
15/15   0s 6ms/step - loss:
0.0197 - mae: 0.0756 - val_loss: 0.0217 - val_mae: 0.0759
Epoch 444/550
15/15   0s 5ms/step - loss:
0.0192 - mae: 0.0748 - val_loss: 0.0224 - val_mae: 0.0769
Epoch 445/550
15/15   0s 7ms/step - loss:
0.0185 - mae: 0.0734 - val_loss: 0.0229 - val_mae: 0.0760
Epoch 446/550
15/15   0s 5ms/step - loss:
0.0189 - mae: 0.0744 - val_loss: 0.0223 - val_mae: 0.0750
Epoch 447/550
15/15   0s 5ms/step - loss:
0.0200 - mae: 0.0755 - val_loss: 0.0228 - val_mae: 0.0769
Epoch 448/550
15/15   0s 5ms/step - loss:
0.0187 - mae: 0.0742 - val_loss: 0.0219 - val_mae: 0.0758
Epoch 449/550
15/15   0s 5ms/step - loss:
0.0195 - mae: 0.0743 - val_loss: 0.0223 - val_mae: 0.0760
Epoch 450/550
15/15   0s 5ms/step - loss:
0.0194 - mae: 0.0740 - val_loss: 0.0224 - val_mae: 0.0757
Epoch 451/550
15/15   0s 6ms/step - loss:
0.0188 - mae: 0.0742 - val_loss: 0.0228 - val_mae: 0.0766
Epoch 452/550
15/15   0s 7ms/step - loss:
0.0193 - mae: 0.0761 - val_loss: 0.0224 - val_mae: 0.0750
Epoch 453/550
15/15   0s 5ms/step - loss:
0.0184 - mae: 0.0741 - val_loss: 0.0218 - val_mae: 0.0742
Epoch 454/550
15/15   0s 5ms/step - loss:
0.0177 - mae: 0.0729 - val_loss: 0.0227 - val_mae: 0.0753
Epoch 455/550
15/15   0s 5ms/step - loss:

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0.0186 - mae: 0.0740 - val_loss: 0.0224 - val_mae: 0.0751
Epoch 456/550
15/15          0s 6ms/step - loss:
0.0198 - mae: 0.0748 - val_loss: 0.0218 - val_mae: 0.0732
Epoch 457/550
15/15          0s 5ms/step - loss:
0.0182 - mae: 0.0723 - val_loss: 0.0227 - val_mae: 0.0749
Epoch 458/550
15/15          0s 6ms/step - loss:
0.0182 - mae: 0.0730 - val_loss: 0.0227 - val_mae: 0.0760
Epoch 459/550
15/15          0s 6ms/step - loss:
0.0185 - mae: 0.0737 - val_loss: 0.0247 - val_mae: 0.0788
Epoch 460/550
15/15          0s 6ms/step - loss:
0.0188 - mae: 0.0734 - val_loss: 0.0223 - val_mae: 0.0763
Epoch 461/550
15/15          0s 5ms/step - loss:
0.0178 - mae: 0.0723 - val_loss: 0.0226 - val_mae: 0.0757
Epoch 462/550
15/15          0s 5ms/step - loss:
0.0206 - mae: 0.0755 - val_loss: 0.0218 - val_mae: 0.0747
Epoch 463/550
15/15          0s 5ms/step - loss:
0.0178 - mae: 0.0726 - val_loss: 0.0230 - val_mae: 0.0771
Epoch 464/550
15/15          0s 5ms/step - loss:
0.0183 - mae: 0.0733 - val_loss: 0.0218 - val_mae: 0.0756
Epoch 465/550
15/15          0s 6ms/step - loss:
0.0184 - mae: 0.0722 - val_loss: 0.0233 - val_mae: 0.0787
Epoch 466/550
15/15          0s 5ms/step - loss:
0.0178 - mae: 0.0729 - val_loss: 0.0230 - val_mae: 0.0768
Epoch 467/550
15/15          0s 5ms/step - loss:
0.0175 - mae: 0.0723 - val_loss: 0.0226 - val_mae: 0.0757
Epoch 468/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0746 - val_loss: 0.0233 - val_mae: 0.0760
```

Training and Validation Loss - Fold 3

Training and Validation MAE - Fold 3
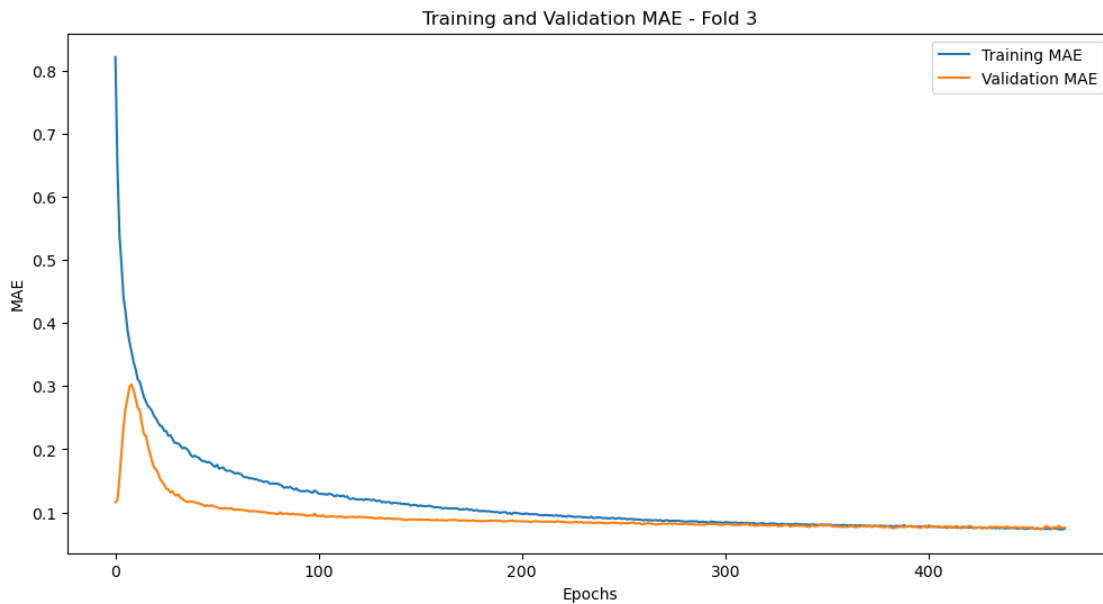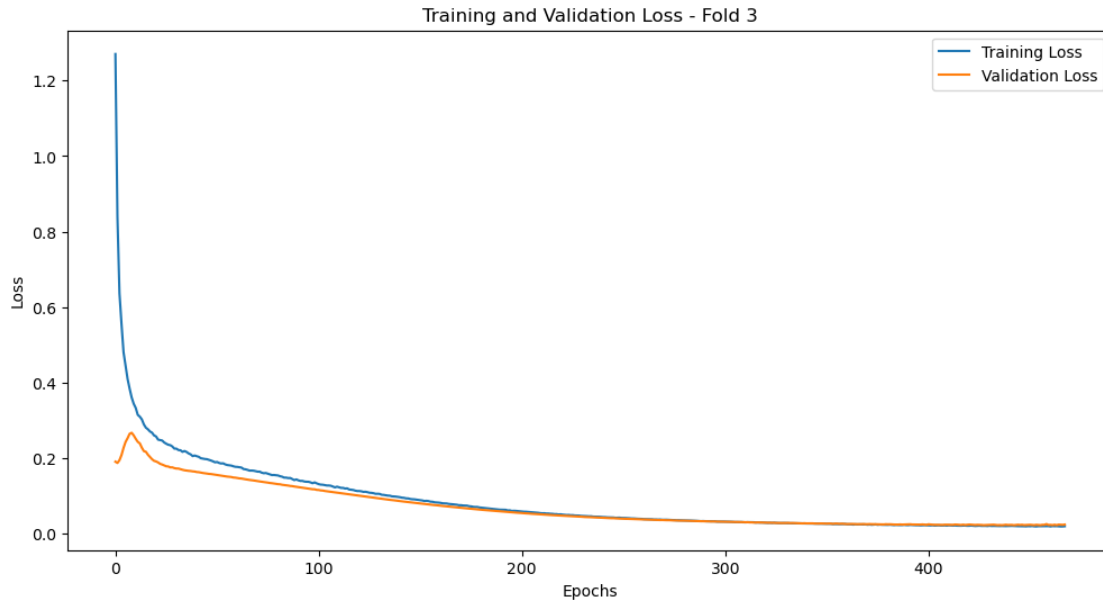
Fold Validation MAE: 0.07588523626327515
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

```
15/15              2s 17ms/step -
loss: 1.4448 - mae: 0.8727 - val_loss: 0.2060 - val_mae: 0.1375
Epoch 2/550
15/15              0s 6ms/step - loss:
0.8935 - mae: 0.6661 - val_loss: 0.1951 - val_mae: 0.1248
Epoch 3/550
15/15              0s 5ms/step - loss:
0.6701 - mae: 0.5563 - val_loss: 0.1972 - val_mae: 0.1476
Epoch 4/550
15/15              0s 5ms/step - loss:
0.5827 - mae: 0.5077 - val_loss: 0.2044 - val_mae: 0.1716
Epoch 5/550
15/15              0s 5ms/step - loss:
0.4961 - mae: 0.4552 - val_loss: 0.2115 - val_mae: 0.1904
Epoch 6/550
15/15              0s 6ms/step - loss:
0.4508 - mae: 0.4231 - val_loss: 0.2137 - val_mae: 0.1951
Epoch 7/550
15/15              0s 5ms/step - loss:
0.4223 - mae: 0.4045 - val_loss: 0.2141 - val_mae: 0.1956
Epoch 8/550
15/15              0s 5ms/step - loss:
0.3922 - mae: 0.3793 - val_loss: 0.2127 - val_mae: 0.1929
Epoch 9/550
15/15              0s 5ms/step - loss:
0.3714 - mae: 0.3615 - val_loss: 0.2106 - val_mae: 0.1877
Epoch 10/550
15/15              0s 5ms/step - loss:
0.3505 - mae: 0.3450 - val_loss: 0.2094 - val_mae: 0.1850
Epoch 11/550
15/15              0s 5ms/step - loss:
0.3344 - mae: 0.3323 - val_loss: 0.2090 - val_mae: 0.1848
Epoch 12/550
15/15              0s 5ms/step - loss:
0.3206 - mae: 0.3142 - val_loss: 0.2067 - val_mae: 0.1798
Epoch 13/550
15/15              0s 5ms/step - loss:
0.3132 - mae: 0.3087 - val_loss: 0.2043 - val_mae: 0.1758
Epoch 14/550
15/15              0s 5ms/step - loss:
0.3011 - mae: 0.2969 - val_loss: 0.2030 - val_mae: 0.1734
Epoch 15/550
15/15              0s 5ms/step - loss:
0.2928 - mae: 0.2899 - val_loss: 0.2020 - val_mae: 0.1713
Epoch 16/550
15/15              0s 5ms/step - loss:
0.2880 - mae: 0.2823 - val_loss: 0.1990 - val_mae: 0.1655
Epoch 17/550
```

```
15/15                0s 5ms/step - loss:
0.2798 - mae: 0.2771 - val_loss: 0.1983 - val_mae: 0.1650
Epoch 18/550
15/15                0s 5ms/step - loss:
0.2695 - mae: 0.2654 - val_loss: 0.1964 - val_mae: 0.1602
Epoch 19/550
15/15                0s 6ms/step - loss:
0.2633 - mae: 0.2584 - val_loss: 0.1953 - val_mae: 0.1577
Epoch 20/550
15/15                0s 5ms/step - loss:
0.2683 - mae: 0.2617 - val_loss: 0.1945 - val_mae: 0.1563
Epoch 21/550
15/15                0s 5ms/step - loss:
0.2539 - mae: 0.2498 - val_loss: 0.1927 - val_mae: 0.1509
Epoch 22/550
15/15                0s 5ms/step - loss:
0.2604 - mae: 0.2502 - val_loss: 0.1915 - val_mae: 0.1503
Epoch 23/550
15/15                0s 5ms/step - loss:
0.2485 - mae: 0.2434 - val_loss: 0.1905 - val_mae: 0.1496
Epoch 24/550
15/15                0s 5ms/step - loss:
0.2469 - mae: 0.2422 - val_loss: 0.1894 - val_mae: 0.1464
Epoch 25/550
15/15                0s 5ms/step - loss:
0.2398 - mae: 0.2330 - val_loss: 0.1886 - val_mae: 0.1447
Epoch 26/550
15/15                0s 5ms/step - loss:
0.2434 - mae: 0.2345 - val_loss: 0.1873 - val_mae: 0.1422
Epoch 27/550
15/15                0s 5ms/step - loss:
0.2379 - mae: 0.2291 - val_loss: 0.1864 - val_mae: 0.1412
Epoch 28/550
15/15                0s 5ms/step - loss:
0.2346 - mae: 0.2273 - val_loss: 0.1856 - val_mae: 0.1402
Epoch 29/550
15/15                0s 6ms/step - loss:
0.2356 - mae: 0.2262 - val_loss: 0.1850 - val_mae: 0.1385
Epoch 30/550
15/15                0s 5ms/step - loss:
0.2307 - mae: 0.2178 - val_loss: 0.1837 - val_mae: 0.1365
Epoch 31/550
15/15                0s 5ms/step - loss:
0.2242 - mae: 0.2142 - val_loss: 0.1828 - val_mae: 0.1363
Epoch 32/550
15/15                0s 5ms/step - loss:
0.2216 - mae: 0.2108 - val_loss: 0.1815 - val_mae: 0.1330
Epoch 33/550
```

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15/15              0s 5ms/step - loss:
0.2229 - mae: 0.2132 - val_loss: 0.1808 - val_mae: 0.1320
Epoch 34/550
15/15              0s 5ms/step - loss:
0.2195 - mae: 0.2078 - val_loss: 0.1797 - val_mae: 0.1323
Epoch 35/550
15/15              0s 5ms/step - loss:
0.2151 - mae: 0.2017 - val_loss: 0.1790 - val_mae: 0.1329
Epoch 36/550
15/15              0s 5ms/step - loss:
0.2116 - mae: 0.1995 - val_loss: 0.1782 - val_mae: 0.1306
Epoch 37/550
15/15              0s 5ms/step - loss:
0.2058 - mae: 0.1933 - val_loss: 0.1769 - val_mae: 0.1301
Epoch 38/550
15/15              0s 5ms/step - loss:
0.2129 - mae: 0.1990 - val_loss: 0.1761 - val_mae: 0.1294
Epoch 39/550
15/15              0s 6ms/step - loss:
0.2100 - mae: 0.1962 - val_loss: 0.1754 - val_mae: 0.1291
Epoch 40/550
15/15              0s 5ms/step - loss:
0.2089 - mae: 0.1945 - val_loss: 0.1749 - val_mae: 0.1288
Epoch 41/550
15/15              0s 5ms/step - loss:
0.2039 - mae: 0.1900 - val_loss: 0.1740 - val_mae: 0.1275
Epoch 42/550
15/15              0s 5ms/step - loss:
0.1995 - mae: 0.1847 - val_loss: 0.1730 - val_mae: 0.1258
Epoch 43/550
15/15              0s 5ms/step - loss:
0.1991 - mae: 0.1850 - val_loss: 0.1721 - val_mae: 0.1240
Epoch 44/550
15/15              0s 5ms/step - loss:
0.2013 - mae: 0.1886 - val_loss: 0.1710 - val_mae: 0.1231
Epoch 45/550
15/15              0s 5ms/step - loss:
0.1979 - mae: 0.1853 - val_loss: 0.1704 - val_mae: 0.1228
Epoch 46/550
15/15              0s 5ms/step - loss:
0.1994 - mae: 0.1841 - val_loss: 0.1696 - val_mae: 0.1233
Epoch 47/550
15/15              0s 5ms/step - loss:
0.1958 - mae: 0.1819 - val_loss: 0.1685 - val_mae: 0.1215
Epoch 48/550
15/15              0s 5ms/step - loss:
0.1955 - mae: 0.1784 - val_loss: 0.1677 - val_mae: 0.1214
Epoch 49/550
```

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15/15                0s 5ms/step - loss:
0.1932 - mae: 0.1807 - val_loss: 0.1668 - val_mae: 0.1202
Epoch 50/550
15/15                0s 6ms/step - loss:
0.1947 - mae: 0.1811 - val_loss: 0.1661 - val_mae: 0.1203
Epoch 51/550
15/15                0s 6ms/step - loss:
0.1879 - mae: 0.1726 - val_loss: 0.1653 - val_mae: 0.1190
Epoch 52/550
15/15                0s 5ms/step - loss:
0.1853 - mae: 0.1711 - val_loss: 0.1645 - val_mae: 0.1186
Epoch 53/550
15/15                0s 5ms/step - loss:
0.1849 - mae: 0.1710 - val_loss: 0.1635 - val_mae: 0.1178
Epoch 54/550
15/15                0s 5ms/step - loss:
0.1813 - mae: 0.1685 - val_loss: 0.1627 - val_mae: 0.1166
Epoch 55/550
15/15                0s 5ms/step - loss:
0.1826 - mae: 0.1700 - val_loss: 0.1618 - val_mae: 0.1157
Epoch 56/550
15/15                0s 6ms/step - loss:
0.1812 - mae: 0.1662 - val_loss: 0.1608 - val_mae: 0.1149
Epoch 57/550
15/15                0s 6ms/step - loss:
0.1789 - mae: 0.1633 - val_loss: 0.1601 - val_mae: 0.1142
Epoch 58/550
15/15                0s 7ms/step - loss:
0.1761 - mae: 0.1622 - val_loss: 0.1594 - val_mae: 0.1138
Epoch 59/550
15/15                0s 6ms/step - loss:
0.1787 - mae: 0.1632 - val_loss: 0.1584 - val_mae: 0.1132
Epoch 60/550
15/15                0s 6ms/step - loss:
0.1748 - mae: 0.1590 - val_loss: 0.1576 - val_mae: 0.1142
Epoch 61/550
15/15                0s 6ms/step - loss:
0.1755 - mae: 0.1636 - val_loss: 0.1566 - val_mae: 0.1131
Epoch 62/550
15/15                0s 5ms/step - loss:
0.1721 - mae: 0.1593 - val_loss: 0.1559 - val_mae: 0.1123
Epoch 63/550
15/15                0s 5ms/step - loss:
0.1730 - mae: 0.1598 - val_loss: 0.1553 - val_mae: 0.1114
Epoch 64/550
15/15                0s 5ms/step - loss:
0.1731 - mae: 0.1594 - val_loss: 0.1543 - val_mae: 0.1105
Epoch 65/550
```

```
15/15            0s 5ms/step - loss:
0.1691 - mae: 0.1572 - val_loss: 0.1535 - val_mae: 0.1103
Epoch 66/550
15/15            0s 5ms/step - loss:
0.1650 - mae: 0.1522 - val_loss: 0.1526 - val_mae: 0.1097
Epoch 67/550
15/15            0s 5ms/step - loss:
0.1646 - mae: 0.1528 - val_loss: 0.1520 - val_mae: 0.1104
Epoch 68/550
15/15            0s 5ms/step - loss:
0.1661 - mae: 0.1519 - val_loss: 0.1511 - val_mae: 0.1094
Epoch 69/550
15/15            0s 5ms/step - loss:
0.1620 - mae: 0.1493 - val_loss: 0.1504 - val_mae: 0.1088
Epoch 70/550
15/15            0s 5ms/step - loss:
0.1592 - mae: 0.1471 - val_loss: 0.1495 - val_mae: 0.1078
Epoch 71/550
15/15            0s 5ms/step - loss:
0.1622 - mae: 0.1504 - val_loss: 0.1487 - val_mae: 0.1079
Epoch 72/550
15/15            0s 6ms/step - loss:
0.1597 - mae: 0.1504 - val_loss: 0.1480 - val_mae: 0.1081
Epoch 73/550
15/15            0s 5ms/step - loss:
0.1590 - mae: 0.1478 - val_loss: 0.1474 - val_mae: 0.1088
Epoch 74/550
15/15            0s 7ms/step - loss:
0.1593 - mae: 0.1474 - val_loss: 0.1464 - val_mae: 0.1081
Epoch 75/550
15/15            0s 7ms/step - loss:
0.1560 - mae: 0.1443 - val_loss: 0.1459 - val_mae: 0.1089
Epoch 76/550
15/15            0s 5ms/step - loss:
0.1577 - mae: 0.1480 - val_loss: 0.1451 - val_mae: 0.1075
Epoch 77/550
15/15            0s 5ms/step - loss:
0.1549 - mae: 0.1438 - val_loss: 0.1441 - val_mae: 0.1071
Epoch 78/550
15/15            0s 5ms/step - loss:
0.1548 - mae: 0.1454 - val_loss: 0.1432 - val_mae: 0.1070
Epoch 79/550
15/15            0s 5ms/step - loss:
0.1524 - mae: 0.1450 - val_loss: 0.1423 - val_mae: 0.1060
Epoch 80/550
15/15            0s 5ms/step - loss:
0.1517 - mae: 0.1433 - val_loss: 0.1413 - val_mae: 0.1053
Epoch 81/550
```

```
15/15              0s 5ms/step - loss:
0.1515 - mae: 0.1429 - val_loss: 0.1405 - val_mae: 0.1048
Epoch 82/550
15/15              0s 5ms/step - loss:
0.1489 - mae: 0.1406 - val_loss: 0.1397 - val_mae: 0.1042
Epoch 83/550
15/15              0s 5ms/step - loss:
0.1497 - mae: 0.1437 - val_loss: 0.1390 - val_mae: 0.1032
Epoch 84/550
15/15              0s 5ms/step - loss:
0.1496 - mae: 0.1431 - val_loss: 0.1381 - val_mae: 0.1029
Epoch 85/550
15/15              0s 5ms/step - loss:
0.1452 - mae: 0.1373 - val_loss: 0.1373 - val_mae: 0.1031
Epoch 86/550
15/15              0s 6ms/step - loss:
0.1426 - mae: 0.1359 - val_loss: 0.1366 - val_mae: 0.1030
Epoch 87/550
15/15              0s 5ms/step - loss:
0.1463 - mae: 0.1394 - val_loss: 0.1357 - val_mae: 0.1033
Epoch 88/550
15/15              0s 5ms/step - loss:
0.1452 - mae: 0.1393 - val_loss: 0.1350 - val_mae: 0.1025
Epoch 89/550
15/15              0s 5ms/step - loss:
0.1398 - mae: 0.1352 - val_loss: 0.1344 - val_mae: 0.1026
Epoch 90/550
15/15              0s 5ms/step - loss:
0.1400 - mae: 0.1326 - val_loss: 0.1334 - val_mae: 0.1016
Epoch 91/550
15/15              0s 5ms/step - loss:
0.1397 - mae: 0.1335 - val_loss: 0.1327 - val_mae: 0.1024
Epoch 92/550
15/15              0s 6ms/step - loss:
0.1385 - mae: 0.1346 - val_loss: 0.1319 - val_mae: 0.1025
Epoch 93/550
15/15              0s 6ms/step - loss:
0.1343 - mae: 0.1292 - val_loss: 0.1310 - val_mae: 0.1009
Epoch 94/550
15/15              0s 5ms/step - loss:
0.1350 - mae: 0.1309 - val_loss: 0.1303 - val_mae: 0.1009
Epoch 95/550
15/15              0s 5ms/step - loss:
0.1353 - mae: 0.1327 - val_loss: 0.1298 - val_mae: 0.1018
Epoch 96/550
15/15              0s 6ms/step - loss:
0.1341 - mae: 0.1298 - val_loss: 0.1288 - val_mae: 0.1011
Epoch 97/550
```

```
15/15              0s 5ms/step - loss:
0.1344 - mae: 0.1310 - val_loss: 0.1279 - val_mae: 0.1005
Epoch 98/550
15/15              0s 5ms/step - loss:
0.1308 - mae: 0.1292 - val_loss: 0.1272 - val_mae: 0.1005
Epoch 99/550
15/15              0s 5ms/step - loss:
0.1297 - mae: 0.1268 - val_loss: 0.1266 - val_mae: 0.1010
Epoch 100/550
15/15              0s 5ms/step - loss:
0.1298 - mae: 0.1275 - val_loss: 0.1257 - val_mae: 0.1011
Epoch 101/550
15/15              0s 6ms/step - loss:
0.1293 - mae: 0.1298 - val_loss: 0.1249 - val_mae: 0.0996
Epoch 102/550
15/15              0s 5ms/step - loss:
0.1306 - mae: 0.1300 - val_loss: 0.1241 - val_mae: 0.0996
Epoch 103/550
15/15              0s 5ms/step - loss:
0.1281 - mae: 0.1278 - val_loss: 0.1235 - val_mae: 0.1002
Epoch 104/550
15/15              0s 5ms/step - loss:
0.1274 - mae: 0.1275 - val_loss: 0.1226 - val_mae: 0.0994
Epoch 105/550
15/15              0s 7ms/step - loss:
0.1267 - mae: 0.1272 - val_loss: 0.1218 - val_mae: 0.0992
Epoch 106/550
15/15              0s 6ms/step - loss:
0.1230 - mae: 0.1221 - val_loss: 0.1211 - val_mae: 0.0998
Epoch 107/550
15/15              0s 5ms/step - loss:
0.1263 - mae: 0.1293 - val_loss: 0.1203 - val_mae: 0.0996
Epoch 108/550
15/15              0s 5ms/step - loss:
0.1215 - mae: 0.1241 - val_loss: 0.1197 - val_mae: 0.0997
Epoch 109/550
15/15              0s 5ms/step - loss:
0.1212 - mae: 0.1234 - val_loss: 0.1188 - val_mae: 0.0990
Epoch 110/550
15/15              0s 5ms/step - loss:
0.1214 - mae: 0.1238 - val_loss: 0.1180 - val_mae: 0.0989
Epoch 111/550
15/15              0s 5ms/step - loss:
0.1181 - mae: 0.1187 - val_loss: 0.1173 - val_mae: 0.0982
Epoch 112/550
15/15              0s 5ms/step - loss:
0.1191 - mae: 0.1230 - val_loss: 0.1165 - val_mae: 0.0984
Epoch 113/550
```

```
15/15              0s 5ms/step - loss:
0.1184 - mae: 0.1213 - val_loss: 0.1160 - val_mae: 0.0990
Epoch 114/550
15/15              0s 5ms/step - loss:
0.1172 - mae: 0.1212 - val_loss: 0.1150 - val_mae: 0.0982
Epoch 115/550
15/15              0s 6ms/step - loss:
0.1163 - mae: 0.1208 - val_loss: 0.1145 - val_mae: 0.0988
Epoch 116/550
15/15              0s 5ms/step - loss:
0.1164 - mae: 0.1207 - val_loss: 0.1136 - val_mae: 0.0980
Epoch 117/550
15/15              0s 5ms/step - loss:
0.1156 - mae: 0.1207 - val_loss: 0.1129 - val_mae: 0.0975
Epoch 118/550
15/15              0s 5ms/step - loss:
0.1106 - mae: 0.1164 - val_loss: 0.1122 - val_mae: 0.0970
Epoch 119/550
15/15              0s 5ms/step - loss:
0.1123 - mae: 0.1181 - val_loss: 0.1114 - val_mae: 0.0974
Epoch 120/550
15/15              0s 6ms/step - loss:
0.1135 - mae: 0.1205 - val_loss: 0.1106 - val_mae: 0.0973
Epoch 121/550
15/15              0s 7ms/step - loss:
0.1096 - mae: 0.1177 - val_loss: 0.1099 - val_mae: 0.0968
Epoch 122/550
15/15              0s 5ms/step - loss:
0.1099 - mae: 0.1171 - val_loss: 0.1092 - val_mae: 0.0970
Epoch 123/550
15/15              0s 6ms/step - loss:
0.1065 - mae: 0.1145 - val_loss: 0.1086 - val_mae: 0.0966
Epoch 124/550
15/15              0s 5ms/step - loss:
0.1064 - mae: 0.1151 - val_loss: 0.1079 - val_mae: 0.0975
Epoch 125/550
15/15              0s 5ms/step - loss:
0.1059 - mae: 0.1144 - val_loss: 0.1071 - val_mae: 0.0968
Epoch 126/550
15/15              0s 6ms/step - loss:
0.1058 - mae: 0.1148 - val_loss: 0.1065 - val_mae: 0.0968
Epoch 127/550
15/15              0s 5ms/step - loss:
0.1034 - mae: 0.1127 - val_loss: 0.1058 - val_mae: 0.0966
Epoch 128/550
15/15              0s 5ms/step - loss:
0.1040 - mae: 0.1138 - val_loss: 0.1051 - val_mae: 0.0971
Epoch 129/550
```

```
15/15              0s 5ms/step - loss:
0.1010 - mae: 0.1121 - val_loss: 0.1043 - val_mae: 0.0963
Epoch 130/550
15/15              0s 5ms/step - loss:
0.1026 - mae: 0.1149 - val_loss: 0.1036 - val_mae: 0.0964
Epoch 131/550
15/15              0s 5ms/step - loss:
0.1010 - mae: 0.1120 - val_loss: 0.1029 - val_mae: 0.0961
Epoch 132/550
15/15              0s 5ms/step - loss:
0.1020 - mae: 0.1138 - val_loss: 0.1022 - val_mae: 0.0963
Epoch 133/550
15/15              0s 5ms/step - loss:
0.1007 - mae: 0.1136 - val_loss: 0.1015 - val_mae: 0.0962
Epoch 134/550
15/15              0s 7ms/step - loss:
0.0995 - mae: 0.1122 - val_loss: 0.1007 - val_mae: 0.0960
Epoch 135/550
15/15              0s 5ms/step - loss:
0.0985 - mae: 0.1120 - val_loss: 0.1001 - val_mae: 0.0961
Epoch 136/550
15/15              0s 6ms/step - loss:
0.0974 - mae: 0.1128 - val_loss: 0.0993 - val_mae: 0.0961
Epoch 137/550
15/15              0s 6ms/step - loss:
0.0962 - mae: 0.1105 - val_loss: 0.0986 - val_mae: 0.0951
Epoch 138/550
15/15              0s 5ms/step - loss:
0.0969 - mae: 0.1109 - val_loss: 0.0982 - val_mae: 0.0951
Epoch 139/550
15/15              0s 5ms/step - loss:
0.0945 - mae: 0.1089 - val_loss: 0.0973 - val_mae: 0.0950
Epoch 140/550
15/15              0s 5ms/step - loss:
0.0960 - mae: 0.1125 - val_loss: 0.0967 - val_mae: 0.0952
Epoch 141/550
15/15              0s 5ms/step - loss:
0.0926 - mae: 0.1089 - val_loss: 0.0960 - val_mae: 0.0950
Epoch 142/550
15/15              0s 5ms/step - loss:
0.0921 - mae: 0.1087 - val_loss: 0.0955 - val_mae: 0.0947
Epoch 143/550
15/15              0s 5ms/step - loss:
0.0904 - mae: 0.1072 - val_loss: 0.0947 - val_mae: 0.0946
Epoch 144/550
15/15              0s 5ms/step - loss:
0.0902 - mae: 0.1069 - val_loss: 0.0940 - val_mae: 0.0946
Epoch 145/550
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15/15              0s 5ms/step - loss:
0.0883 - mae: 0.1046 - val_loss: 0.0934 - val_mae: 0.0948
Epoch 146/550
15/15              0s 5ms/step - loss:
0.0890 - mae: 0.1066 - val_loss: 0.0926 - val_mae: 0.0943
Epoch 147/550
15/15              0s 6ms/step - loss:
0.0879 - mae: 0.1076 - val_loss: 0.0921 - val_mae: 0.0939
Epoch 148/550
15/15              0s 7ms/step - loss:
0.0872 - mae: 0.1056 - val_loss: 0.0916 - val_mae: 0.0939
Epoch 149/550
15/15              0s 5ms/step - loss:
0.0884 - mae: 0.1072 - val_loss: 0.0908 - val_mae: 0.0940
Epoch 150/550
15/15              0s 5ms/step - loss:
0.0887 - mae: 0.1089 - val_loss: 0.0901 - val_mae: 0.0937
Epoch 151/550
15/15              0s 5ms/step - loss:
0.0853 - mae: 0.1060 - val_loss: 0.0896 - val_mae: 0.0942
Epoch 152/550
15/15              0s 5ms/step - loss:
0.0851 - mae: 0.1064 - val_loss: 0.0890 - val_mae: 0.0938
Epoch 153/550
15/15              0s 5ms/step - loss:
0.0867 - mae: 0.1083 - val_loss: 0.0884 - val_mae: 0.0942
Epoch 154/550
15/15              0s 5ms/step - loss:
0.0827 - mae: 0.1034 - val_loss: 0.0878 - val_mae: 0.0941
Epoch 155/550
15/15              0s 5ms/step - loss:
0.0824 - mae: 0.1032 - val_loss: 0.0872 - val_mae: 0.0941
Epoch 156/550
15/15              0s 5ms/step - loss:
0.0819 - mae: 0.1036 - val_loss: 0.0867 - val_mae: 0.0940
Epoch 157/550
15/15              0s 6ms/step - loss:
0.0826 - mae: 0.1052 - val_loss: 0.0859 - val_mae: 0.0937
Epoch 158/550
15/15              0s 6ms/step - loss:
0.0816 - mae: 0.1043 - val_loss: 0.0852 - val_mae: 0.0941
Epoch 159/550
15/15              0s 5ms/step - loss:
0.0798 - mae: 0.1039 - val_loss: 0.0847 - val_mae: 0.0939
Epoch 160/550
15/15              0s 5ms/step - loss:
0.0793 - mae: 0.1034 - val_loss: 0.0840 - val_mae: 0.0934
Epoch 161/550
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15/15              0s 6ms/step - loss:
0.0792 - mae: 0.1022 - val_loss: 0.0835 - val_mae: 0.0937
Epoch 162/550
15/15              0s 5ms/step - loss:
0.0769 - mae: 0.1021 - val_loss: 0.0830 - val_mae: 0.0935
Epoch 163/550
15/15              0s 5ms/step - loss:
0.0797 - mae: 0.1052 - val_loss: 0.0825 - val_mae: 0.0935
Epoch 164/550
15/15              0s 6ms/step - loss:
0.0779 - mae: 0.1031 - val_loss: 0.0818 - val_mae: 0.0939
Epoch 165/550
15/15              0s 5ms/step - loss:
0.0765 - mae: 0.1016 - val_loss: 0.0812 - val_mae: 0.0931
Epoch 166/550
15/15              0s 5ms/step - loss:
0.0751 - mae: 0.1011 - val_loss: 0.0808 - val_mae: 0.0932
Epoch 167/550
15/15              0s 5ms/step - loss:
0.0738 - mae: 0.1003 - val_loss: 0.0801 - val_mae: 0.0930
Epoch 168/550
15/15              0s 5ms/step - loss:
0.0732 - mae: 0.0992 - val_loss: 0.0796 - val_mae: 0.0928
Epoch 169/550
15/15              0s 5ms/step - loss:
0.0756 - mae: 0.1022 - val_loss: 0.0790 - val_mae: 0.0934
Epoch 170/550
15/15              0s 5ms/step - loss:
0.0739 - mae: 0.1017 - val_loss: 0.0785 - val_mae: 0.0936
Epoch 171/550
15/15              0s 5ms/step - loss:
0.0733 - mae: 0.1021 - val_loss: 0.0779 - val_mae: 0.0932
Epoch 172/550
15/15              0s 5ms/step - loss:
0.0724 - mae: 0.1012 - val_loss: 0.0773 - val_mae: 0.0930
Epoch 173/550
15/15              0s 5ms/step - loss:
0.0721 - mae: 0.1001 - val_loss: 0.0769 - val_mae: 0.0930
Epoch 174/550
15/15              0s 5ms/step - loss:
0.0703 - mae: 0.0986 - val_loss: 0.0763 - val_mae: 0.0924
Epoch 175/550
15/15              0s 5ms/step - loss:
0.0710 - mae: 0.1000 - val_loss: 0.0758 - val_mae: 0.0928
Epoch 176/550
15/15              0s 6ms/step - loss:
0.0690 - mae: 0.0982 - val_loss: 0.0753 - val_mae: 0.0929
Epoch 177/550
```

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15/15              0s 5ms/step - loss:
0.0678 - mae: 0.0974 - val_loss: 0.0748 - val_mae: 0.0926
Epoch 178/550
15/15              0s 5ms/step - loss:
0.0660 - mae: 0.0960 - val_loss: 0.0743 - val_mae: 0.0921
Epoch 179/550
15/15              0s 6ms/step - loss:
0.0678 - mae: 0.0980 - val_loss: 0.0737 - val_mae: 0.0922
Epoch 180/550
15/15              0s 6ms/step - loss:
0.0675 - mae: 0.0998 - val_loss: 0.0732 - val_mae: 0.0922
Epoch 181/550
15/15              0s 5ms/step - loss:
0.0658 - mae: 0.0980 - val_loss: 0.0727 - val_mae: 0.0922
Epoch 182/550
15/15              0s 5ms/step - loss:
0.0649 - mae: 0.0967 - val_loss: 0.0723 - val_mae: 0.0921
Epoch 183/550
15/15              0s 5ms/step - loss:
0.0643 - mae: 0.0964 - val_loss: 0.0717 - val_mae: 0.0915
Epoch 184/550
15/15              0s 5ms/step - loss:
0.0640 - mae: 0.0954 - val_loss: 0.0713 - val_mae: 0.0916
Epoch 185/550
15/15              0s 5ms/step - loss:
0.0641 - mae: 0.0959 - val_loss: 0.0707 - val_mae: 0.0919
Epoch 186/550
15/15              0s 5ms/step - loss:
0.0627 - mae: 0.0960 - val_loss: 0.0702 - val_mae: 0.0918
Epoch 187/550
15/15              0s 5ms/step - loss:
0.0632 - mae: 0.0962 - val_loss: 0.0697 - val_mae: 0.0917
Epoch 188/550
15/15              0s 5ms/step - loss:
0.0638 - mae: 0.0977 - val_loss: 0.0694 - val_mae: 0.0915
Epoch 189/550
15/15              0s 6ms/step - loss:
0.0623 - mae: 0.0970 - val_loss: 0.0689 - val_mae: 0.0913
Epoch 190/550
15/15              0s 5ms/step - loss:
0.0611 - mae: 0.0944 - val_loss: 0.0684 - val_mae: 0.0911
Epoch 191/550
15/15              0s 5ms/step - loss:
0.0600 - mae: 0.0935 - val_loss: 0.0680 - val_mae: 0.0910
Epoch 192/550
15/15              0s 5ms/step - loss:
0.0617 - mae: 0.0958 - val_loss: 0.0675 - val_mae: 0.0914
Epoch 193/550
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15/15            0s 5ms/step - loss:
0.0592 - mae: 0.0932 - val_loss: 0.0671 - val_mae: 0.0915
Epoch 194/550
15/15            0s 5ms/step - loss:
0.0591 - mae: 0.0936 - val_loss: 0.0666 - val_mae: 0.0915
Epoch 195/550
15/15            0s 5ms/step - loss:
0.0588 - mae: 0.0944 - val_loss: 0.0661 - val_mae: 0.0912
Epoch 196/550
15/15            0s 6ms/step - loss:
0.0585 - mae: 0.0949 - val_loss: 0.0657 - val_mae: 0.0914
Epoch 197/550
15/15            0s 6ms/step - loss:
0.0576 - mae: 0.0940 - val_loss: 0.0654 - val_mae: 0.0908
Epoch 198/550
15/15            0s 5ms/step - loss:
0.0600 - mae: 0.0959 - val_loss: 0.0648 - val_mae: 0.0907
Epoch 199/550
15/15            0s 5ms/step - loss:
0.0582 - mae: 0.0941 - val_loss: 0.0645 - val_mae: 0.0906
Epoch 200/550
15/15            0s 5ms/step - loss:
0.0571 - mae: 0.0921 - val_loss: 0.0640 - val_mae: 0.0904
Epoch 201/550
15/15            0s 7ms/step - loss:
0.0566 - mae: 0.0941 - val_loss: 0.0636 - val_mae: 0.0905
Epoch 202/550
15/15            0s 6ms/step - loss:
0.0553 - mae: 0.0923 - val_loss: 0.0633 - val_mae: 0.0905
Epoch 203/550
15/15            0s 5ms/step - loss:
0.0551 - mae: 0.0926 - val_loss: 0.0628 - val_mae: 0.0911
Epoch 204/550
15/15            0s 5ms/step - loss:
0.0547 - mae: 0.0924 - val_loss: 0.0625 - val_mae: 0.0910
Epoch 205/550
15/15            0s 5ms/step - loss:
0.0549 - mae: 0.0933 - val_loss: 0.0621 - val_mae: 0.0913
Epoch 206/550
15/15            0s 5ms/step - loss:
0.0539 - mae: 0.0918 - val_loss: 0.0616 - val_mae: 0.0906
Epoch 207/550
15/15            0s 5ms/step - loss:
0.0535 - mae: 0.0929 - val_loss: 0.0614 - val_mae: 0.0904
Epoch 208/550
15/15            0s 5ms/step - loss:
0.0530 - mae: 0.0910 - val_loss: 0.0609 - val_mae: 0.0903
Epoch 209/550
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15/15            0s 5ms/step - loss:
0.0529 - mae: 0.0928 - val_loss: 0.0605 - val_mae: 0.0903
Epoch 210/550
15/15            0s 5ms/step - loss:
0.0524 - mae: 0.0913 - val_loss: 0.0602 - val_mae: 0.0901
Epoch 211/550
15/15            0s 5ms/step - loss:
0.0525 - mae: 0.0921 - val_loss: 0.0598 - val_mae: 0.0900
Epoch 212/550
15/15            0s 6ms/step - loss:
0.0503 - mae: 0.0914 - val_loss: 0.0594 - val_mae: 0.0898
Epoch 213/550
15/15            0s 7ms/step - loss:
0.0515 - mae: 0.0913 - val_loss: 0.0590 - val_mae: 0.0902
Epoch 214/550
15/15            0s 5ms/step - loss:
0.0519 - mae: 0.0929 - val_loss: 0.0588 - val_mae: 0.0899
Epoch 215/550
15/15            0s 5ms/step - loss:
0.0521 - mae: 0.0934 - val_loss: 0.0585 - val_mae: 0.0901
Epoch 216/550
15/15            0s 5ms/step - loss:
0.0505 - mae: 0.0922 - val_loss: 0.0581 - val_mae: 0.0899
Epoch 217/550
15/15            0s 5ms/step - loss:
0.0496 - mae: 0.0912 - val_loss: 0.0578 - val_mae: 0.0895
Epoch 218/550
15/15            0s 5ms/step - loss:
0.0489 - mae: 0.0890 - val_loss: 0.0575 - val_mae: 0.0896
Epoch 219/550
15/15            0s 5ms/step - loss:
0.0507 - mae: 0.0924 - val_loss: 0.0571 - val_mae: 0.0902
Epoch 220/550
15/15            0s 5ms/step - loss:
0.0499 - mae: 0.0909 - val_loss: 0.0567 - val_mae: 0.0900
Epoch 221/550
15/15            0s 5ms/step - loss:
0.0472 - mae: 0.0893 - val_loss: 0.0565 - val_mae: 0.0893
Epoch 222/550
15/15            0s 5ms/step - loss:
0.0472 - mae: 0.0885 - val_loss: 0.0561 - val_mae: 0.0895
Epoch 223/550
15/15            0s 6ms/step - loss:
0.0478 - mae: 0.0893 - val_loss: 0.0558 - val_mae: 0.0893
Epoch 224/550
15/15            0s 6ms/step - loss:
0.0483 - mae: 0.0920 - val_loss: 0.0555 - val_mae: 0.0895
Epoch 225/550
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15/15              0s 5ms/step - loss:
0.0462 - mae: 0.0881 - val_loss: 0.0551 - val_mae: 0.0892
Epoch 226/550
15/15              0s 6ms/step - loss:
0.0482 - mae: 0.0910 - val_loss: 0.0549 - val_mae: 0.0890
Epoch 227/550
15/15              0s 6ms/step - loss:
0.0460 - mae: 0.0880 - val_loss: 0.0545 - val_mae: 0.0885
Epoch 228/550
15/15              0s 5ms/step - loss:
0.0481 - mae: 0.0917 - val_loss: 0.0542 - val_mae: 0.0883
Epoch 229/550
15/15              0s 5ms/step - loss:
0.0440 - mae: 0.0869 - val_loss: 0.0540 - val_mae: 0.0884
Epoch 230/550
15/15              0s 5ms/step - loss:
0.0433 - mae: 0.0870 - val_loss: 0.0537 - val_mae: 0.0887
Epoch 231/550
15/15              0s 5ms/step - loss:
0.0453 - mae: 0.0897 - val_loss: 0.0533 - val_mae: 0.0883
Epoch 232/550
15/15              0s 5ms/step - loss:
0.0463 - mae: 0.0906 - val_loss: 0.0530 - val_mae: 0.0888
Epoch 233/550
15/15              0s 5ms/step - loss:
0.0447 - mae: 0.0893 - val_loss: 0.0528 - val_mae: 0.0888
Epoch 234/550
15/15              0s 5ms/step - loss:
0.0447 - mae: 0.0894 - val_loss: 0.0524 - val_mae: 0.0888
Epoch 235/550
15/15              0s 5ms/step - loss:
0.0451 - mae: 0.0907 - val_loss: 0.0521 - val_mae: 0.0888
Epoch 236/550
15/15              0s 5ms/step - loss:
0.0433 - mae: 0.0872 - val_loss: 0.0518 - val_mae: 0.0882
Epoch 237/550
15/15              0s 5ms/step - loss:
0.0439 - mae: 0.0883 - val_loss: 0.0516 - val_mae: 0.0880
Epoch 238/550
15/15              0s 6ms/step - loss:
0.0422 - mae: 0.0873 - val_loss: 0.0513 - val_mae: 0.0885
Epoch 239/550
15/15              0s 5ms/step - loss:
0.0430 - mae: 0.0883 - val_loss: 0.0511 - val_mae: 0.0888
Epoch 240/550
15/15              0s 5ms/step - loss:
0.0414 - mae: 0.0870 - val_loss: 0.0509 - val_mae: 0.0881
Epoch 241/550
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15/15              0s 5ms/step - loss:
0.0401 - mae: 0.0852 - val_loss: 0.0507 - val_mae: 0.0885
Epoch 242/550
15/15              0s 5ms/step - loss:
0.0412 - mae: 0.0873 - val_loss: 0.0504 - val_mae: 0.0887
Epoch 243/550
15/15              0s 5ms/step - loss:
0.0404 - mae: 0.0875 - val_loss: 0.0500 - val_mae: 0.0884
Epoch 244/550
15/15              0s 6ms/step - loss:
0.0398 - mae: 0.0862 - val_loss: 0.0498 - val_mae: 0.0887
Epoch 245/550
15/15              0s 5ms/step - loss:
0.0398 - mae: 0.0856 - val_loss: 0.0497 - val_mae: 0.0883
Epoch 246/550
15/15              0s 5ms/step - loss:
0.0403 - mae: 0.0865 - val_loss: 0.0496 - val_mae: 0.0882
Epoch 247/550
15/15              0s 5ms/step - loss:
0.0399 - mae: 0.0850 - val_loss: 0.0492 - val_mae: 0.0885
Epoch 248/550
15/15              0s 5ms/step - loss:
0.0398 - mae: 0.0865 - val_loss: 0.0490 - val_mae: 0.0885
Epoch 249/550
15/15              0s 5ms/step - loss:
0.0390 - mae: 0.0854 - val_loss: 0.0489 - val_mae: 0.0878
Epoch 250/550
15/15              0s 5ms/step - loss:
0.0384 - mae: 0.0846 - val_loss: 0.0484 - val_mae: 0.0881
Epoch 251/550
15/15              0s 7ms/step - loss:
0.0395 - mae: 0.0867 - val_loss: 0.0483 - val_mae: 0.0879
Epoch 252/550
15/15              0s 5ms/step - loss:
0.0393 - mae: 0.0867 - val_loss: 0.0479 - val_mae: 0.0872
Epoch 253/550
15/15              0s 5ms/step - loss:
0.0371 - mae: 0.0843 - val_loss: 0.0478 - val_mae: 0.0865
Epoch 254/550
15/15              0s 5ms/step - loss:
0.0378 - mae: 0.0845 - val_loss: 0.0475 - val_mae: 0.0868
Epoch 255/550
15/15              0s 5ms/step - loss:
0.0392 - mae: 0.0863 - val_loss: 0.0473 - val_mae: 0.0867
Epoch 256/550
15/15              0s 5ms/step - loss:
0.0372 - mae: 0.0844 - val_loss: 0.0472 - val_mae: 0.0869
Epoch 257/550
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15/15              0s 5ms/step - loss:
0.0381 - mae: 0.0855 - val_loss: 0.0471 - val_mae: 0.0868
Epoch 258/550
15/15              0s 5ms/step - loss:
0.0377 - mae: 0.0857 - val_loss: 0.0468 - val_mae: 0.0871
Epoch 259/550
15/15              0s 6ms/step - loss:
0.0389 - mae: 0.0877 - val_loss: 0.0466 - val_mae: 0.0871
Epoch 260/550
15/15              0s 5ms/step - loss:
0.0358 - mae: 0.0846 - val_loss: 0.0465 - val_mae: 0.0874
Epoch 261/550
15/15              0s 5ms/step - loss:
0.0361 - mae: 0.0838 - val_loss: 0.0463 - val_mae: 0.0875
Epoch 262/550
15/15              0s 5ms/step - loss:
0.0384 - mae: 0.0864 - val_loss: 0.0459 - val_mae: 0.0871
Epoch 263/550
15/15              0s 6ms/step - loss:
0.0365 - mae: 0.0845 - val_loss: 0.0458 - val_mae: 0.0868
Epoch 264/550
15/15              0s 5ms/step - loss:
0.0357 - mae: 0.0840 - val_loss: 0.0456 - val_mae: 0.0863
Epoch 265/550
15/15              0s 6ms/step - loss:
0.0361 - mae: 0.0851 - val_loss: 0.0455 - val_mae: 0.0863
Epoch 266/550
15/15              0s 5ms/step - loss:
0.0379 - mae: 0.0869 - val_loss: 0.0453 - val_mae: 0.0862
Epoch 267/550
15/15              0s 5ms/step - loss:
0.0351 - mae: 0.0831 - val_loss: 0.0450 - val_mae: 0.0868
Epoch 268/550
15/15              0s 5ms/step - loss:
0.0357 - mae: 0.0840 - val_loss: 0.0450 - val_mae: 0.0869
Epoch 269/550
15/15              0s 6ms/step - loss:
0.0350 - mae: 0.0844 - val_loss: 0.0447 - val_mae: 0.0874
Epoch 270/550
15/15              0s 5ms/step - loss:
0.0349 - mae: 0.0844 - val_loss: 0.0448 - val_mae: 0.0862
Epoch 271/550
15/15              0s 5ms/step - loss:
0.0350 - mae: 0.0838 - val_loss: 0.0444 - val_mae: 0.0864
Epoch 272/550
15/15              0s 5ms/step - loss:
0.0347 - mae: 0.0847 - val_loss: 0.0441 - val_mae: 0.0864
Epoch 273/550
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15/15              0s 5ms/step - loss:
0.0342 - mae: 0.0831 - val_loss: 0.0440 - val_mae: 0.0864
Epoch 274/550
15/15              0s 7ms/step - loss:
0.0345 - mae: 0.0845 - val_loss: 0.0438 - val_mae: 0.0865
Epoch 275/550
15/15              0s 5ms/step - loss:
0.0342 - mae: 0.0839 - val_loss: 0.0435 - val_mae: 0.0860
Epoch 276/550
15/15              0s 5ms/step - loss:
0.0338 - mae: 0.0833 - val_loss: 0.0436 - val_mae: 0.0860
Epoch 277/550
15/15              0s 5ms/step - loss:
0.0345 - mae: 0.0838 - val_loss: 0.0433 - val_mae: 0.0856
Epoch 278/550
15/15              0s 5ms/step - loss:
0.0348 - mae: 0.0845 - val_loss: 0.0433 - val_mae: 0.0857
Epoch 279/550
15/15              0s 5ms/step - loss:
0.0328 - mae: 0.0835 - val_loss: 0.0431 - val_mae: 0.0859
Epoch 280/550
15/15              0s 5ms/step - loss:
0.0333 - mae: 0.0832 - val_loss: 0.0430 - val_mae: 0.0860
Epoch 281/550
15/15              0s 5ms/step - loss:
0.0332 - mae: 0.0833 - val_loss: 0.0427 - val_mae: 0.0854
Epoch 282/550
15/15              0s 5ms/step - loss:
0.0331 - mae: 0.0830 - val_loss: 0.0426 - val_mae: 0.0856
Epoch 283/550
15/15              0s 5ms/step - loss:
0.0332 - mae: 0.0846 - val_loss: 0.0424 - val_mae: 0.0859
Epoch 284/550
15/15              0s 5ms/step - loss:
0.0331 - mae: 0.0833 - val_loss: 0.0422 - val_mae: 0.0858
Epoch 285/550
15/15              0s 7ms/step - loss:
0.0332 - mae: 0.0836 - val_loss: 0.0423 - val_mae: 0.0863
Epoch 286/550
15/15              0s 5ms/step - loss:
0.0313 - mae: 0.0822 - val_loss: 0.0421 - val_mae: 0.0858
Epoch 287/550
15/15              0s 6ms/step - loss:
0.0321 - mae: 0.0826 - val_loss: 0.0414 - val_mae: 0.0862
Epoch 288/550
15/15              0s 5ms/step - loss:
0.0320 - mae: 0.0829 - val_loss: 0.0415 - val_mae: 0.0866
Epoch 289/550
```

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15/15              0s 5ms/step - loss:
0.0321 - mae: 0.0828 - val_loss: 0.0413 - val_mae: 0.0857
Epoch 290/550
15/15              0s 5ms/step - loss:
0.0305 - mae: 0.0820 - val_loss: 0.0415 - val_mae: 0.0853
Epoch 291/550
15/15              0s 5ms/step - loss:
0.0309 - mae: 0.0821 - val_loss: 0.0414 - val_mae: 0.0850
Epoch 292/550
15/15              0s 5ms/step - loss:
0.0295 - mae: 0.0804 - val_loss: 0.0411 - val_mae: 0.0852
Epoch 293/550
15/15              0s 5ms/step - loss:
0.0318 - mae: 0.0845 - val_loss: 0.0416 - val_mae: 0.0862
Epoch 294/550
15/15              0s 5ms/step - loss:
0.0321 - mae: 0.0835 - val_loss: 0.0409 - val_mae: 0.0845
Epoch 295/550
15/15              0s 5ms/step - loss:
0.0318 - mae: 0.0832 - val_loss: 0.0408 - val_mae: 0.0853
Epoch 296/550
15/15              0s 7ms/step - loss:
0.0302 - mae: 0.0816 - val_loss: 0.0406 - val_mae: 0.0853
Epoch 297/550
15/15              0s 5ms/step - loss:
0.0325 - mae: 0.0837 - val_loss: 0.0405 - val_mae: 0.0846
Epoch 298/550
15/15              0s 6ms/step - loss:
0.0295 - mae: 0.0813 - val_loss: 0.0403 - val_mae: 0.0850
Epoch 299/550
15/15              0s 5ms/step - loss:
0.0286 - mae: 0.0794 - val_loss: 0.0402 - val_mae: 0.0859
Epoch 300/550
15/15              0s 5ms/step - loss:
0.0301 - mae: 0.0820 - val_loss: 0.0401 - val_mae: 0.0858
Epoch 301/550
15/15              0s 5ms/step - loss:
0.0319 - mae: 0.0844 - val_loss: 0.0400 - val_mae: 0.0853
Epoch 302/550
15/15              0s 5ms/step - loss:
0.0317 - mae: 0.0843 - val_loss: 0.0396 - val_mae: 0.0858
Epoch 303/550
15/15              0s 5ms/step - loss:
0.0289 - mae: 0.0823 - val_loss: 0.0395 - val_mae: 0.0845
Epoch 304/550
15/15              0s 5ms/step - loss:
0.0301 - mae: 0.0816 - val_loss: 0.0394 - val_mae: 0.0850
Epoch 305/550
```

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15/15              0s 5ms/step - loss:
0.0292 - mae: 0.0800 - val_loss: 0.0393 - val_mae: 0.0843
Epoch 306/550
15/15              0s 5ms/step - loss:
0.0305 - mae: 0.0821 - val_loss: 0.0393 - val_mae: 0.0851
Epoch 307/550
15/15              0s 5ms/step - loss:
0.0291 - mae: 0.0818 - val_loss: 0.0395 - val_mae: 0.0850
Epoch 308/550
15/15              0s 6ms/step - loss:
0.0296 - mae: 0.0824 - val_loss: 0.0393 - val_mae: 0.0851
Epoch 309/550
15/15              0s 6ms/step - loss:
0.0289 - mae: 0.0807 - val_loss: 0.0390 - val_mae: 0.0843
Epoch 310/550
15/15              0s 6ms/step - loss:
0.0289 - mae: 0.0803 - val_loss: 0.0389 - val_mae: 0.0840
Epoch 311/550
15/15              0s 5ms/step - loss:
0.0287 - mae: 0.0808 - val_loss: 0.0388 - val_mae: 0.0844
Epoch 312/550
15/15              0s 5ms/step - loss:
0.0273 - mae: 0.0796 - val_loss: 0.0386 - val_mae: 0.0850
Epoch 313/550
15/15              0s 5ms/step - loss:
0.0281 - mae: 0.0803 - val_loss: 0.0384 - val_mae: 0.0857
Epoch 314/550
15/15              0s 5ms/step - loss:
0.0293 - mae: 0.0821 - val_loss: 0.0382 - val_mae: 0.0857
Epoch 315/550
15/15              0s 5ms/step - loss:
0.0262 - mae: 0.0773 - val_loss: 0.0379 - val_mae: 0.0846
Epoch 316/550
15/15              0s 5ms/step - loss:
0.0277 - mae: 0.0805 - val_loss: 0.0382 - val_mae: 0.0846
Epoch 317/550
15/15              0s 7ms/step - loss:
0.0292 - mae: 0.0818 - val_loss: 0.0383 - val_mae: 0.0844
Epoch 318/550
15/15              0s 5ms/step - loss:
0.0276 - mae: 0.0800 - val_loss: 0.0380 - val_mae: 0.0849
Epoch 319/550
15/15              0s 5ms/step - loss:
0.0276 - mae: 0.0806 - val_loss: 0.0380 - val_mae: 0.0845
Epoch 320/550
15/15              0s 5ms/step - loss:
0.0287 - mae: 0.0815 - val_loss: 0.0375 - val_mae: 0.0839
Epoch 321/550
```

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15/15              0s 6ms/step - loss:
0.0266 - mae: 0.0796 - val_loss: 0.0374 - val_mae: 0.0851
Epoch 322/550
15/15              0s 5ms/step - loss:
0.0276 - mae: 0.0806 - val_loss: 0.0371 - val_mae: 0.0840
Epoch 323/550
15/15              0s 5ms/step - loss:
0.0262 - mae: 0.0789 - val_loss: 0.0374 - val_mae: 0.0854
Epoch 324/550
15/15              0s 5ms/step - loss:
0.0264 - mae: 0.0799 - val_loss: 0.0376 - val_mae: 0.0834
Epoch 325/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0808 - val_loss: 0.0369 - val_mae: 0.0838
Epoch 326/550
15/15              0s 6ms/step - loss:
0.0284 - mae: 0.0824 - val_loss: 0.0368 - val_mae: 0.0843
Epoch 327/550
15/15              0s 5ms/step - loss:
0.0275 - mae: 0.0804 - val_loss: 0.0368 - val_mae: 0.0845
Epoch 328/550
15/15              0s 5ms/step - loss:
0.0262 - mae: 0.0797 - val_loss: 0.0369 - val_mae: 0.0839
Epoch 329/550
15/15              0s 5ms/step - loss:
0.0275 - mae: 0.0808 - val_loss: 0.0369 - val_mae: 0.0840
Epoch 330/550
15/15              0s 6ms/step - loss:
0.0267 - mae: 0.0797 - val_loss: 0.0368 - val_mae: 0.0841
Epoch 331/550
15/15              0s 6ms/step - loss:
0.0276 - mae: 0.0815 - val_loss: 0.0370 - val_mae: 0.0838
Epoch 332/550
15/15              0s 5ms/step - loss:
0.0258 - mae: 0.0786 - val_loss: 0.0364 - val_mae: 0.0832
Epoch 333/550
15/15              0s 5ms/step - loss:
0.0273 - mae: 0.0805 - val_loss: 0.0361 - val_mae: 0.0840
Epoch 334/550
15/15              0s 5ms/step - loss:
0.0253 - mae: 0.0782 - val_loss: 0.0361 - val_mae: 0.0839
Epoch 335/550
15/15              0s 5ms/step - loss:
0.0256 - mae: 0.0798 - val_loss: 0.0361 - val_mae: 0.0833
Epoch 336/550
15/15              0s 5ms/step - loss:
0.0274 - mae: 0.0815 - val_loss: 0.0361 - val_mae: 0.0844
Epoch 337/550
```

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15/15              0s 6ms/step - loss:
0.0276 - mae: 0.0816 - val_loss: 0.0363 - val_mae: 0.0831
Epoch 338/550
15/15              0s 5ms/step - loss:
0.0254 - mae: 0.0785 - val_loss: 0.0363 - val_mae: 0.0836
Epoch 339/550
15/15              0s 5ms/step - loss:
0.0257 - mae: 0.0794 - val_loss: 0.0358 - val_mae: 0.0827
Epoch 340/550
15/15              0s 5ms/step - loss:
0.0245 - mae: 0.0778 - val_loss: 0.0353 - val_mae: 0.0839
Epoch 341/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0786 - val_loss: 0.0349 - val_mae: 0.0823
Epoch 342/550
15/15              0s 6ms/step - loss:
0.0258 - mae: 0.0801 - val_loss: 0.0358 - val_mae: 0.0854
Epoch 343/550
15/15              0s 5ms/step - loss:
0.0260 - mae: 0.0808 - val_loss: 0.0356 - val_mae: 0.0836
Epoch 344/550
15/15              0s 5ms/step - loss:
0.0255 - mae: 0.0787 - val_loss: 0.0352 - val_mae: 0.0847
Epoch 345/550
15/15              0s 5ms/step - loss:
0.0261 - mae: 0.0801 - val_loss: 0.0352 - val_mae: 0.0843
Epoch 346/550
15/15              0s 5ms/step - loss:
0.0256 - mae: 0.0798 - val_loss: 0.0350 - val_mae: 0.0840
Epoch 347/550
15/15              0s 5ms/step - loss:
0.0252 - mae: 0.0788 - val_loss: 0.0349 - val_mae: 0.0827
Epoch 348/550
15/15              0s 6ms/step - loss:
0.0247 - mae: 0.0783 - val_loss: 0.0353 - val_mae: 0.0833
Epoch 349/550
15/15              0s 5ms/step - loss:
0.0245 - mae: 0.0795 - val_loss: 0.0348 - val_mae: 0.0843
Epoch 350/550
15/15              0s 5ms/step - loss:
0.0242 - mae: 0.0788 - val_loss: 0.0355 - val_mae: 0.0831
Epoch 351/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0794 - val_loss: 0.0350 - val_mae: 0.0837
Epoch 352/550
15/15              0s 6ms/step - loss:
0.0244 - mae: 0.0784 - val_loss: 0.0343 - val_mae: 0.0845
Epoch 353/550
```

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15/15              0s 5ms/step - loss:
0.0256 - mae: 0.0804 - val_loss: 0.0349 - val_mae: 0.0851
Epoch 354/550
15/15              0s 5ms/step - loss:
0.0240 - mae: 0.0781 - val_loss: 0.0349 - val_mae: 0.0846
Epoch 355/550
15/15              0s 5ms/step - loss:
0.0240 - mae: 0.0790 - val_loss: 0.0347 - val_mae: 0.0835
Epoch 356/550
15/15              0s 5ms/step - loss:
0.0232 - mae: 0.0777 - val_loss: 0.0349 - val_mae: 0.0835
Epoch 357/550
15/15              0s 5ms/step - loss:
0.0245 - mae: 0.0784 - val_loss: 0.0345 - val_mae: 0.0834
Epoch 358/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0792 - val_loss: 0.0343 - val_mae: 0.0848
Epoch 359/550
15/15              0s 5ms/step - loss:
0.0246 - mae: 0.0801 - val_loss: 0.0342 - val_mae: 0.0845
Epoch 360/550
15/15              0s 5ms/step - loss:
0.0237 - mae: 0.0787 - val_loss: 0.0342 - val_mae: 0.0845
Epoch 361/550
15/15              0s 5ms/step - loss:
0.0237 - mae: 0.0781 - val_loss: 0.0340 - val_mae: 0.0847
Epoch 362/550
15/15              0s 6ms/step - loss:
0.0237 - mae: 0.0784 - val_loss: 0.0339 - val_mae: 0.0841
Epoch 363/550
15/15              0s 5ms/step - loss:
0.0235 - mae: 0.0778 - val_loss: 0.0338 - val_mae: 0.0824
Epoch 364/550
15/15              0s 5ms/step - loss:
0.0236 - mae: 0.0790 - val_loss: 0.0337 - val_mae: 0.0833
Epoch 365/550
15/15              0s 7ms/step - loss:
0.0230 - mae: 0.0786 - val_loss: 0.0337 - val_mae: 0.0839
Epoch 366/550
15/15              0s 5ms/step - loss:
0.0222 - mae: 0.0783 - val_loss: 0.0337 - val_mae: 0.0835
Epoch 367/550
15/15              0s 5ms/step - loss:
0.0237 - mae: 0.0790 - val_loss: 0.0338 - val_mae: 0.0844
Epoch 368/550
15/15              0s 5ms/step - loss:
0.0236 - mae: 0.0799 - val_loss: 0.0335 - val_mae: 0.0835
Epoch 369/550
```

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15/15              0s 5ms/step - loss:
0.0229 - mae: 0.0784 - val_loss: 0.0332 - val_mae: 0.0826
Epoch 370/550
15/15              0s 5ms/step - loss:
0.0229 - mae: 0.0780 - val_loss: 0.0335 - val_mae: 0.0828
Epoch 371/550
15/15              0s 5ms/step - loss:
0.0216 - mae: 0.0771 - val_loss: 0.0339 - val_mae: 0.0824
Epoch 372/550
15/15              0s 5ms/step - loss:
0.0225 - mae: 0.0768 - val_loss: 0.0332 - val_mae: 0.0850
Epoch 373/550
15/15              0s 6ms/step - loss:
0.0216 - mae: 0.0772 - val_loss: 0.0329 - val_mae: 0.0834
Epoch 374/550
15/15              0s 5ms/step - loss:
0.0221 - mae: 0.0777 - val_loss: 0.0336 - val_mae: 0.0836
Epoch 375/550
15/15              0s 7ms/step - loss:
0.0229 - mae: 0.0777 - val_loss: 0.0334 - val_mae: 0.0821
Epoch 376/550
15/15              0s 5ms/step - loss:
0.0228 - mae: 0.0789 - val_loss: 0.0330 - val_mae: 0.0844
Epoch 377/550
15/15              0s 5ms/step - loss:
0.0220 - mae: 0.0779 - val_loss: 0.0325 - val_mae: 0.0824
Epoch 378/550
15/15              0s 5ms/step - loss:
0.0218 - mae: 0.0768 - val_loss: 0.0327 - val_mae: 0.0830
Epoch 379/550
15/15              0s 5ms/step - loss:
0.0226 - mae: 0.0774 - val_loss: 0.0324 - val_mae: 0.0819
Epoch 380/550
15/15              0s 6ms/step - loss:
0.0216 - mae: 0.0778 - val_loss: 0.0324 - val_mae: 0.0817
Epoch 381/550
15/15              0s 5ms/step - loss:
0.0231 - mae: 0.0788 - val_loss: 0.0327 - val_mae: 0.0837
Epoch 382/550
15/15              0s 5ms/step - loss:
0.0214 - mae: 0.0786 - val_loss: 0.0320 - val_mae: 0.0832
Epoch 383/550
15/15              0s 5ms/step - loss:
0.0217 - mae: 0.0778 - val_loss: 0.0321 - val_mae: 0.0822
Epoch 384/550
15/15              0s 6ms/step - loss:
0.0207 - mae: 0.0765 - val_loss: 0.0321 - val_mae: 0.0822
Epoch 385/550
```

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15/15              0s 5ms/step - loss:
0.0219 - mae: 0.0779 - val_loss: 0.0325 - val_mae: 0.0844
Epoch 386/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0754 - val_loss: 0.0322 - val_mae: 0.0819
Epoch 387/550
15/15              0s 5ms/step - loss:
0.0214 - mae: 0.0765 - val_loss: 0.0321 - val_mae: 0.0806
Epoch 388/550
15/15              0s 5ms/step - loss:
0.0211 - mae: 0.0765 - val_loss: 0.0318 - val_mae: 0.0819
Epoch 389/550
15/15              0s 5ms/step - loss:
0.0216 - mae: 0.0783 - val_loss: 0.0322 - val_mae: 0.0815
Epoch 390/550
15/15              0s 6ms/step - loss:
0.0214 - mae: 0.0768 - val_loss: 0.0319 - val_mae: 0.0829
Epoch 391/550
15/15              0s 5ms/step - loss:
0.0210 - mae: 0.0776 - val_loss: 0.0320 - val_mae: 0.0825
Epoch 392/550
15/15              0s 5ms/step - loss:
0.0214 - mae: 0.0776 - val_loss: 0.0315 - val_mae: 0.0811
Epoch 393/550
15/15              0s 6ms/step - loss:
0.0196 - mae: 0.0742 - val_loss: 0.0316 - val_mae: 0.0819
Epoch 394/550
15/15              0s 5ms/step - loss:
0.0214 - mae: 0.0777 - val_loss: 0.0318 - val_mae: 0.0818
Epoch 395/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0769 - val_loss: 0.0318 - val_mae: 0.0829
Epoch 396/550
15/15              0s 5ms/step - loss:
0.0207 - mae: 0.0766 - val_loss: 0.0320 - val_mae: 0.0810
Epoch 397/550
15/15              0s 5ms/step - loss:
0.0225 - mae: 0.0787 - val_loss: 0.0316 - val_mae: 0.0821
Epoch 398/550
15/15              0s 6ms/step - loss:
0.0213 - mae: 0.0773 - val_loss: 0.0317 - val_mae: 0.0816
Epoch 399/550
15/15              0s 5ms/step - loss:
0.0221 - mae: 0.0790 - val_loss: 0.0318 - val_mae: 0.0829
Epoch 400/550
15/15              0s 5ms/step - loss:
0.0205 - mae: 0.0762 - val_loss: 0.0314 - val_mae: 0.0827
Epoch 401/550
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15/15              0s 7ms/step - loss:
0.0205 - mae: 0.0767 - val_loss: 0.0314 - val_mae: 0.0814
Epoch 402/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0761 - val_loss: 0.0317 - val_mae: 0.0827
Epoch 403/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0756 - val_loss: 0.0311 - val_mae: 0.0815
Epoch 404/550
15/15              0s 5ms/step - loss:
0.0212 - mae: 0.0778 - val_loss: 0.0313 - val_mae: 0.0838
Epoch 405/550
15/15              0s 5ms/step - loss:
0.0192 - mae: 0.0744 - val_loss: 0.0316 - val_mae: 0.0818
Epoch 406/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0764 - val_loss: 0.0313 - val_mae: 0.0808
Epoch 407/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0753 - val_loss: 0.0312 - val_mae: 0.0807
Epoch 408/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0769 - val_loss: 0.0313 - val_mae: 0.0822
Epoch 409/550
15/15              0s 6ms/step - loss:
0.0202 - mae: 0.0757 - val_loss: 0.0309 - val_mae: 0.0802
Epoch 410/550
15/15              0s 7ms/step - loss:
0.0198 - mae: 0.0760 - val_loss: 0.0311 - val_mae: 0.0826
Epoch 411/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0758 - val_loss: 0.0312 - val_mae: 0.0816
Epoch 412/550
15/15              0s 5ms/step - loss:
0.0206 - mae: 0.0770 - val_loss: 0.0307 - val_mae: 0.0810
Epoch 413/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0742 - val_loss: 0.0308 - val_mae: 0.0809
Epoch 414/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0773 - val_loss: 0.0309 - val_mae: 0.0805
Epoch 415/550
15/15              0s 5ms/step - loss:
0.0202 - mae: 0.0759 - val_loss: 0.0311 - val_mae: 0.0806
Epoch 416/550
15/15              0s 5ms/step - loss:
0.0202 - mae: 0.0765 - val_loss: 0.0304 - val_mae: 0.0829
Epoch 417/550
```

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15/15              0s 6ms/step - loss:
0.0197 - mae: 0.0763 - val_loss: 0.0305 - val_mae: 0.0808
Epoch 418/550
15/15              0s 5ms/step - loss:
0.0201 - mae: 0.0766 - val_loss: 0.0308 - val_mae: 0.0809
Epoch 419/550
15/15              0s 5ms/step - loss:
0.0196 - mae: 0.0755 - val_loss: 0.0298 - val_mae: 0.0801
Epoch 420/550
15/15              0s 6ms/step - loss:
0.0192 - mae: 0.0754 - val_loss: 0.0297 - val_mae: 0.0800
Epoch 421/550
15/15              0s 5ms/step - loss:
0.0185 - mae: 0.0739 - val_loss: 0.0302 - val_mae: 0.0810
Epoch 422/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0744 - val_loss: 0.0303 - val_mae: 0.0806
Epoch 423/550
15/15              0s 5ms/step - loss:
0.0201 - mae: 0.0762 - val_loss: 0.0307 - val_mae: 0.0801
Epoch 424/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0769 - val_loss: 0.0302 - val_mae: 0.0810
Epoch 425/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0757 - val_loss: 0.0300 - val_mae: 0.0803
Epoch 426/550
15/15              0s 6ms/step - loss:
0.0195 - mae: 0.0762 - val_loss: 0.0300 - val_mae: 0.0815
Epoch 427/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0760 - val_loss: 0.0302 - val_mae: 0.0804
Epoch 428/550
15/15              0s 7ms/step - loss:
0.0188 - mae: 0.0738 - val_loss: 0.0299 - val_mae: 0.0810
Epoch 429/550
15/15              0s 5ms/step - loss:
0.0186 - mae: 0.0748 - val_loss: 0.0299 - val_mae: 0.0797
Epoch 430/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0752 - val_loss: 0.0294 - val_mae: 0.0791
Epoch 431/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0753 - val_loss: 0.0297 - val_mae: 0.0797
Epoch 432/550
15/15              0s 5ms/step - loss:
0.0202 - mae: 0.0765 - val_loss: 0.0301 - val_mae: 0.0803
Epoch 433/550
```

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15/15              0s 5ms/step - loss:
0.0190 - mae: 0.0748 - val_loss: 0.0299 - val_mae: 0.0817
Epoch 434/550
15/15              0s 5ms/step - loss:
0.0191 - mae: 0.0747 - val_loss: 0.0300 - val_mae: 0.0801
Epoch 435/550
15/15              0s 5ms/step - loss:
0.0202 - mae: 0.0767 - val_loss: 0.0299 - val_mae: 0.0812
Epoch 436/550
15/15              0s 7ms/step - loss:
0.0186 - mae: 0.0746 - val_loss: 0.0299 - val_mae: 0.0810
Epoch 437/550
15/15              0s 5ms/step - loss:
0.0182 - mae: 0.0736 - val_loss: 0.0300 - val_mae: 0.0807
Epoch 438/550
15/15              0s 6ms/step - loss:
0.0186 - mae: 0.0744 - val_loss: 0.0292 - val_mae: 0.0804
Epoch 439/550
15/15              0s 5ms/step - loss:
0.0187 - mae: 0.0741 - val_loss: 0.0294 - val_mae: 0.0802
Epoch 440/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0745 - val_loss: 0.0297 - val_mae: 0.0809
Epoch 441/550
15/15              0s 6ms/step - loss:
0.0181 - mae: 0.0735 - val_loss: 0.0296 - val_mae: 0.0804
Epoch 442/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0740 - val_loss: 0.0293 - val_mae: 0.0806
Epoch 443/550
15/15              0s 6ms/step - loss:
0.0189 - mae: 0.0736 - val_loss: 0.0296 - val_mae: 0.0806
Epoch 444/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0745 - val_loss: 0.0291 - val_mae: 0.0794
Epoch 445/550
15/15              0s 5ms/step - loss:
0.0189 - mae: 0.0749 - val_loss: 0.0299 - val_mae: 0.0817
Epoch 446/550
15/15              0s 5ms/step - loss:
0.0178 - mae: 0.0730 - val_loss: 0.0295 - val_mae: 0.0819
Epoch 447/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0757 - val_loss: 0.0297 - val_mae: 0.0817
Epoch 448/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0737 - val_loss: 0.0297 - val_mae: 0.0808
Epoch 449/550
```

```
15/15              0s 5ms/step - loss:
0.0188 - mae: 0.0741 - val_loss: 0.0298 - val_mae: 0.0825
Epoch 450/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0725 - val_loss: 0.0294 - val_mae: 0.0794
Epoch 451/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0736 - val_loss: 0.0297 - val_mae: 0.0813
Epoch 452/550
15/15              0s 6ms/step - loss:
0.0180 - mae: 0.0739 - val_loss: 0.0299 - val_mae: 0.0807
Epoch 453/550
15/15              0s 5ms/step - loss:
0.0173 - mae: 0.0726 - val_loss: 0.0298 - val_mae: 0.0789
Epoch 454/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0741 - val_loss: 0.0290 - val_mae: 0.0792
Epoch 455/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0739 - val_loss: 0.0296 - val_mae: 0.0803
Epoch 456/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0736 - val_loss: 0.0300 - val_mae: 0.0809
Epoch 457/550
15/15              0s 5ms/step - loss:
0.0192 - mae: 0.0765 - val_loss: 0.0294 - val_mae: 0.0807
Epoch 458/550
15/15              0s 5ms/step - loss:
0.0196 - mae: 0.0758 - val_loss: 0.0295 - val_mae: 0.0814
Epoch 459/550
15/15              0s 5ms/step - loss:
0.0182 - mae: 0.0732 - val_loss: 0.0299 - val_mae: 0.0809
Epoch 460/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0730 - val_loss: 0.0304 - val_mae: 0.0810
Epoch 461/550
15/15              0s 6ms/step - loss:
0.0179 - mae: 0.0738 - val_loss: 0.0306 - val_mae: 0.0805
Epoch 462/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0742 - val_loss: 0.0299 - val_mae: 0.0803
Epoch 463/550
15/15              0s 5ms/step - loss:
0.0182 - mae: 0.0741 - val_loss: 0.0291 - val_mae: 0.0811
Epoch 464/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0729 - val_loss: 0.0296 - val_mae: 0.0800
Epoch 465/550
```

```
15/15              0s 5ms/step - loss:
0.0174 - mae: 0.0728 - val_loss: 0.0291 - val_mae: 0.0800
Epoch 466/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0738 - val_loss: 0.0301 - val_mae: 0.0803
Epoch 467/550
15/15              0s 5ms/step - loss:
0.0182 - mae: 0.0733 - val_loss: 0.0290 - val_mae: 0.0802
Epoch 468/550
15/15              0s 7ms/step - loss:
0.0177 - mae: 0.0723 - val_loss: 0.0302 - val_mae: 0.0809
Epoch 469/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0746 - val_loss: 0.0299 - val_mae: 0.0807
Epoch 470/550
15/15              0s 5ms/step - loss:
0.0187 - mae: 0.0740 - val_loss: 0.0293 - val_mae: 0.0801
Epoch 471/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0735 - val_loss: 0.0300 - val_mae: 0.0817
Epoch 472/550
15/15              0s 5ms/step - loss:
0.0169 - mae: 0.0727 - val_loss: 0.0295 - val_mae: 0.0794
Epoch 473/550
15/15              0s 5ms/step - loss:
0.0183 - mae: 0.0739 - val_loss: 0.0290 - val_mae: 0.0791
Epoch 474/550
15/15              0s 5ms/step - loss:
0.0180 - mae: 0.0733 - val_loss: 0.0299 - val_mae: 0.0819
Epoch 475/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0728 - val_loss: 0.0294 - val_mae: 0.0801
Epoch 476/550
15/15              0s 5ms/step - loss:
0.0171 - mae: 0.0723 - val_loss: 0.0296 - val_mae: 0.0807
Epoch 477/550
15/15              0s 5ms/step - loss:
0.0177 - mae: 0.0728 - val_loss: 0.0290 - val_mae: 0.0811
Epoch 478/550
15/15              0s 6ms/step - loss:
0.0179 - mae: 0.0730 - val_loss: 0.0283 - val_mae: 0.0793
Epoch 479/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0722 - val_loss: 0.0301 - val_mae: 0.0798
Epoch 480/550
15/15              0s 5ms/step - loss:
0.0173 - mae: 0.0730 - val_loss: 0.0283 - val_mae: 0.0794
Epoch 481/550
```

```
15/15              0s 5ms/step - loss:
0.0182 - mae: 0.0733 - val_loss: 0.0292 - val_mae: 0.0804
Epoch 482/550
15/15              0s 6ms/step - loss:
0.0177 - mae: 0.0731 - val_loss: 0.0285 - val_mae: 0.0800
Epoch 483/550
15/15              0s 5ms/step - loss:
0.0173 - mae: 0.0724 - val_loss: 0.0293 - val_mae: 0.0799
Epoch 484/550
15/15              0s 6ms/step - loss:
0.0165 - mae: 0.0709 - val_loss: 0.0292 - val_mae: 0.0797
Epoch 485/550
15/15              0s 5ms/step - loss:
0.0171 - mae: 0.0719 - val_loss: 0.0287 - val_mae: 0.0800
Epoch 486/550
15/15              0s 5ms/step - loss:
0.0186 - mae: 0.0738 - val_loss: 0.0294 - val_mae: 0.0806
Epoch 487/550
15/15              0s 5ms/step - loss:
0.0181 - mae: 0.0745 - val_loss: 0.0286 - val_mae: 0.0785
Epoch 488/550
15/15              0s 5ms/step - loss:
0.0174 - mae: 0.0721 - val_loss: 0.0293 - val_mae: 0.0799
Epoch 489/550
15/15              0s 5ms/step - loss:
0.0171 - mae: 0.0719 - val_loss: 0.0292 - val_mae: 0.0807
Epoch 490/550
15/15              0s 5ms/step - loss:
0.0174 - mae: 0.0716 - val_loss: 0.0292 - val_mae: 0.0811
Epoch 491/550
15/15              0s 7ms/step - loss:
0.0172 - mae: 0.0715 - val_loss: 0.0292 - val_mae: 0.0806
Epoch 492/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0733 - val_loss: 0.0289 - val_mae: 0.0801
Epoch 493/550
15/15              0s 5ms/step - loss:
0.0169 - mae: 0.0721 - val_loss: 0.0285 - val_mae: 0.0793
Epoch 494/550
15/15              0s 5ms/step - loss:
0.0171 - mae: 0.0722 - val_loss: 0.0292 - val_mae: 0.0796
Epoch 495/550
15/15              0s 5ms/step - loss:
0.0170 - mae: 0.0720 - val_loss: 0.0292 - val_mae: 0.0788
Epoch 496/550
15/15              0s 5ms/step - loss:
0.0173 - mae: 0.0716 - val_loss: 0.0290 - val_mae: 0.0796
Epoch 497/550
```

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15/15              0s 5ms/step - loss:
0.0169 - mae: 0.0712 - val_loss: 0.0290 - val_mae: 0.0813
Epoch 498/550
15/15              0s 5ms/step - loss:
0.0161 - mae: 0.0706 - val_loss: 0.0287 - val_mae: 0.0807
Epoch 499/550
15/15              0s 7ms/step - loss:
0.0171 - mae: 0.0718 - val_loss: 0.0292 - val_mae: 0.0805
Epoch 500/550
15/15              0s 5ms/step - loss:
0.0171 - mae: 0.0722 - val_loss: 0.0292 - val_mae: 0.0820
Epoch 501/550
15/15              0s 5ms/step - loss:
0.0166 - mae: 0.0708 - val_loss: 0.0294 - val_mae: 0.0806
Epoch 502/550
15/15              0s 5ms/step - loss:
0.0170 - mae: 0.0712 - val_loss: 0.0298 - val_mae: 0.0802
Epoch 503/550
15/15              0s 5ms/step - loss:
0.0162 - mae: 0.0708 - val_loss: 0.0295 - val_mae: 0.0810
```


Training and Validation Loss - Fold 4

Training and Validation MAE - Fold 4
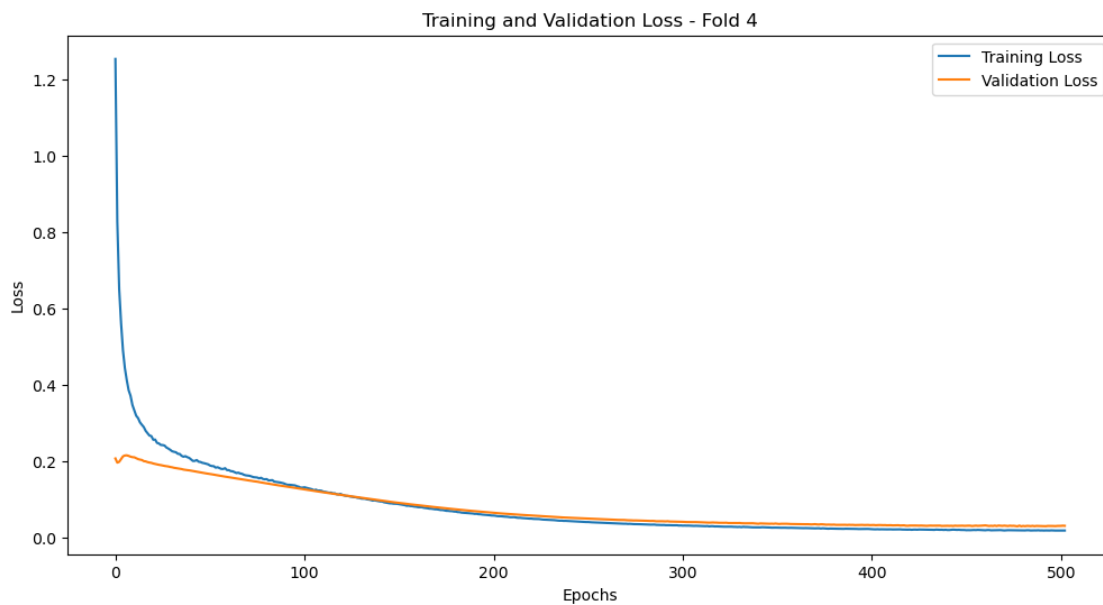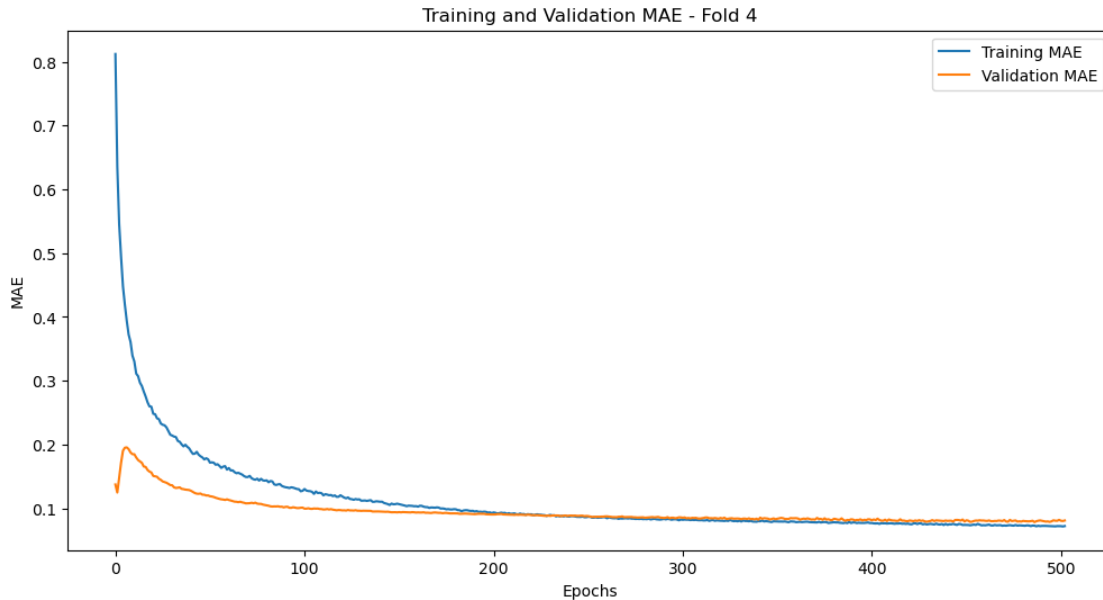
Fold Validation MAE: 0.07931095361709595
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

15/15   2s 16ms/step -
loss: 1.2926 - mae: 0.8038 - val_loss: 0.2015 - val_mae: 0.1590
Epoch 2/550
15/15   0s 6ms/step - loss:
0.8237 - mae: 0.6216 - val_loss: 0.1788 - val_mae: 0.1041
Epoch 3/550
15/15   0s 6ms/step - loss:
0.6020 - mae: 0.5082 - val_loss: 0.1775 - val_mae: 0.1182
Epoch 4/550
15/15   0s 5ms/step - loss:
0.5216 - mae: 0.4589 - val_loss: 0.1867 - val_mae: 0.1553
Epoch 5/550
15/15   0s 5ms/step - loss:
0.4390 - mae: 0.4074 - val_loss: 0.1993 - val_mae: 0.1909
Epoch 6/550
15/15   0s 5ms/step - loss:
0.3932 - mae: 0.3734 - val_loss: 0.2089 - val_mae: 0.2136
Epoch 7/550
15/15   0s 5ms/step - loss:

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0.3649 - mae: 0.3522 - val_loss: 0.2142 - val_mae: 0.2252
Epoch 8/550
15/15              0s 5ms/step - loss:
0.3415 - mae: 0.3311 - val_loss: 0.2158 - val_mae: 0.2283
Epoch 9/550
15/15              0s 5ms/step - loss:
0.3178 - mae: 0.3079 - val_loss: 0.2168 - val_mae: 0.2303
Epoch 10/550
15/15              0s 5ms/step - loss:
0.3224 - mae: 0.3105 - val_loss: 0.2095 - val_mae: 0.2151
Epoch 11/550
15/15              0s 5ms/step - loss:
0.2932 - mae: 0.2871 - val_loss: 0.2064 - val_mae: 0.2083
Epoch 12/550
15/15              0s 5ms/step - loss:
0.2888 - mae: 0.2819 - val_loss: 0.2027 - val_mae: 0.2000
Epoch 13/550
15/15              0s 5ms/step - loss:
0.2816 - mae: 0.2702 - val_loss: 0.1982 - val_mae: 0.1902
Epoch 14/550
15/15              0s 5ms/step - loss:
0.2676 - mae: 0.2586 - val_loss: 0.1953 - val_mae: 0.1841
Epoch 15/550
15/15              0s 5ms/step - loss:
0.2616 - mae: 0.2502 - val_loss: 0.1921 - val_mae: 0.1765
Epoch 16/550
15/15              0s 5ms/step - loss:
0.2562 - mae: 0.2447 - val_loss: 0.1894 - val_mae: 0.1706
Epoch 17/550
15/15              0s 5ms/step - loss:
0.2521 - mae: 0.2413 - val_loss: 0.1860 - val_mae: 0.1621
Epoch 18/550
15/15              0s 5ms/step - loss:
0.2419 - mae: 0.2306 - val_loss: 0.1822 - val_mae: 0.1526
Epoch 19/550
15/15              0s 5ms/step - loss:
0.2402 - mae: 0.2284 - val_loss: 0.1791 - val_mae: 0.1445
Epoch 20/550
15/15              0s 6ms/step - loss:
0.2379 - mae: 0.2215 - val_loss: 0.1767 - val_mae: 0.1389
Epoch 21/550
15/15              0s 6ms/step - loss:
0.2369 - mae: 0.2221 - val_loss: 0.1752 - val_mae: 0.1356
Epoch 22/550
15/15              0s 5ms/step - loss:
0.2327 - mae: 0.2170 - val_loss: 0.1733 - val_mae: 0.1311
Epoch 23/550
15/15              0s 5ms/step - loss:
```

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0.2359 - mae: 0.2164 - val_loss: 0.1708 - val_mae: 0.1235
Epoch 24/550
15/15          0s 5ms/step - loss:
0.2267 - mae: 0.2079 - val_loss: 0.1700 - val_mae: 0.1229
Epoch 25/550
15/15          0s 5ms/step - loss:
0.2218 - mae: 0.2054 - val_loss: 0.1687 - val_mae: 0.1197
Epoch 26/550
15/15          0s 5ms/step - loss:
0.2197 - mae: 0.2029 - val_loss: 0.1676 - val_mae: 0.1174
Epoch 27/550
15/15          0s 5ms/step - loss:
0.2136 - mae: 0.1950 - val_loss: 0.1665 - val_mae: 0.1156
Epoch 28/550
15/15          0s 5ms/step - loss:
0.2153 - mae: 0.1987 - val_loss: 0.1658 - val_mae: 0.1149
Epoch 29/550
15/15          0s 5ms/step - loss:
0.2189 - mae: 0.1969 - val_loss: 0.1647 - val_mae: 0.1133
Epoch 30/550
15/15          0s 5ms/step - loss:
0.2150 - mae: 0.1950 - val_loss: 0.1639 - val_mae: 0.1129
Epoch 31/550
15/15          0s 5ms/step - loss:
0.2057 - mae: 0.1864 - val_loss: 0.1630 - val_mae: 0.1118
Epoch 32/550
15/15          0s 5ms/step - loss:
0.2053 - mae: 0.1846 - val_loss: 0.1619 - val_mae: 0.1099
Epoch 33/550
15/15          0s 5ms/step - loss:
0.2078 - mae: 0.1856 - val_loss: 0.1608 - val_mae: 0.1081
Epoch 34/550
15/15          0s 5ms/step - loss:
0.2017 - mae: 0.1799 - val_loss: 0.1604 - val_mae: 0.1088
Epoch 35/550
15/15          0s 5ms/step - loss:
0.2032 - mae: 0.1819 - val_loss: 0.1597 - val_mae: 0.1078
Epoch 36/550
15/15          0s 5ms/step - loss:
0.2002 - mae: 0.1765 - val_loss: 0.1585 - val_mae: 0.1054
Epoch 37/550
15/15          0s 5ms/step - loss:
0.1933 - mae: 0.1725 - val_loss: 0.1576 - val_mae: 0.1045
Epoch 38/550
15/15          0s 5ms/step - loss:
0.1896 - mae: 0.1667 - val_loss: 0.1569 - val_mae: 0.1050
Epoch 39/550
15/15          0s 6ms/step - loss:
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0.1965 - mae: 0.1767 - val_loss: 0.1558 - val_mae: 0.1037
Epoch 40/550
15/15   0s 5ms/step - loss:
0.1923 - mae: 0.1708 - val_loss: 0.1548 - val_mae: 0.1016
Epoch 41/550
15/15   0s 6ms/step - loss:
0.1901 - mae: 0.1676 - val_loss: 0.1542 - val_mae: 0.1034
Epoch 42/550
15/15   0s 5ms/step - loss:
0.1880 - mae: 0.1649 - val_loss: 0.1532 - val_mae: 0.1007
Epoch 43/550
15/15   0s 5ms/step - loss:
0.1872 - mae: 0.1648 - val_loss: 0.1525 - val_mae: 0.1012
Epoch 44/550
15/15   0s 5ms/step - loss:
0.1891 - mae: 0.1642 - val_loss: 0.1517 - val_mae: 0.1007
Epoch 45/550
15/15   0s 5ms/step - loss:
0.1856 - mae: 0.1624 - val_loss: 0.1507 - val_mae: 0.0998
Epoch 46/550
15/15   0s 5ms/step - loss:
0.1827 - mae: 0.1613 - val_loss: 0.1496 - val_mae: 0.0990
Epoch 47/550
15/15   0s 5ms/step - loss:
0.1818 - mae: 0.1616 - val_loss: 0.1488 - val_mae: 0.0983
Epoch 48/550
15/15   0s 5ms/step - loss:
0.1781 - mae: 0.1570 - val_loss: 0.1478 - val_mae: 0.0971
Epoch 49/550
15/15   0s 5ms/step - loss:
0.1772 - mae: 0.1564 - val_loss: 0.1472 - val_mae: 0.0993
Epoch 50/550
15/15   0s 5ms/step - loss:
0.1798 - mae: 0.1571 - val_loss: 0.1461 - val_mae: 0.0963
Epoch 51/550
15/15   0s 5ms/step - loss:
0.1771 - mae: 0.1558 - val_loss: 0.1454 - val_mae: 0.0964
Epoch 52/550
15/15   0s 5ms/step - loss:
0.1746 - mae: 0.1506 - val_loss: 0.1445 - val_mae: 0.0968
Epoch 53/550
15/15   0s 5ms/step - loss:
0.1748 - mae: 0.1544 - val_loss: 0.1437 - val_mae: 0.0966
Epoch 54/550
15/15   0s 5ms/step - loss:
0.1743 - mae: 0.1534 - val_loss: 0.1427 - val_mae: 0.0957
Epoch 55/550
15/15   0s 5ms/step - loss:

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0.1679 - mae: 0.1475 - val_loss: 0.1419 - val_mae: 0.0957
Epoch 56/550
15/15          0s 5ms/step - loss:
0.1710 - mae: 0.1512 - val_loss: 0.1410 - val_mae: 0.0958
Epoch 57/550
15/15          0s 5ms/step - loss:
0.1643 - mae: 0.1451 - val_loss: 0.1402 - val_mae: 0.0967
Epoch 58/550
15/15          0s 5ms/step - loss:
0.1680 - mae: 0.1480 - val_loss: 0.1391 - val_mae: 0.0947
Epoch 59/550
15/15          0s 5ms/step - loss:
0.1658 - mae: 0.1467 - val_loss: 0.1383 - val_mae: 0.0945
Epoch 60/550
15/15          0s 5ms/step - loss:
0.1647 - mae: 0.1447 - val_loss: 0.1376 - val_mae: 0.0950
Epoch 61/550
15/15          0s 7ms/step - loss:
0.1625 - mae: 0.1436 - val_loss: 0.1368 - val_mae: 0.0955
Epoch 62/550
15/15          0s 5ms/step - loss:
0.1585 - mae: 0.1388 - val_loss: 0.1358 - val_mae: 0.0933
Epoch 63/550
15/15          0s 5ms/step - loss:
0.1611 - mae: 0.1427 - val_loss: 0.1352 - val_mae: 0.0944
Epoch 64/550
15/15          0s 6ms/step - loss:
0.1616 - mae: 0.1438 - val_loss: 0.1342 - val_mae: 0.0935
Epoch 65/550
15/15          0s 6ms/step - loss:
0.1608 - mae: 0.1440 - val_loss: 0.1332 - val_mae: 0.0923
Epoch 66/550
15/15          0s 5ms/step - loss:
0.1578 - mae: 0.1394 - val_loss: 0.1324 - val_mae: 0.0922
Epoch 67/550
15/15          0s 5ms/step - loss:
0.1561 - mae: 0.1389 - val_loss: 0.1314 - val_mae: 0.0915
Epoch 68/550
15/15          0s 5ms/step - loss:
0.1581 - mae: 0.1424 - val_loss: 0.1306 - val_mae: 0.0919
Epoch 69/550
15/15          0s 5ms/step - loss:
0.1562 - mae: 0.1387 - val_loss: 0.1299 - val_mae: 0.0913
Epoch 70/550
15/15          0s 5ms/step - loss:
0.1534 - mae: 0.1368 - val_loss: 0.1292 - val_mae: 0.0927
Epoch 71/550
15/15          0s 5ms/step - loss:
```

```
0.1528 - mae: 0.1365 - val_loss: 0.1282 - val_mae: 0.0909
Epoch 72/550
15/15              0s 5ms/step - loss:
0.1543 - mae: 0.1384 - val_loss: 0.1273 - val_mae: 0.0908
Epoch 73/550
15/15              0s 5ms/step - loss:
0.1498 - mae: 0.1358 - val_loss: 0.1266 - val_mae: 0.0916
Epoch 74/550
15/15              0s 7ms/step - loss:
0.1485 - mae: 0.1319 - val_loss: 0.1256 - val_mae: 0.0903
Epoch 75/550
15/15              0s 5ms/step - loss:
0.1466 - mae: 0.1318 - val_loss: 0.1249 - val_mae: 0.0911
Epoch 76/550
15/15              0s 5ms/step - loss:
0.1483 - mae: 0.1348 - val_loss: 0.1241 - val_mae: 0.0907
Epoch 77/550
15/15              0s 5ms/step - loss:
0.1461 - mae: 0.1304 - val_loss: 0.1230 - val_mae: 0.0896
Epoch 78/550
15/15              0s 6ms/step - loss:
0.1432 - mae: 0.1304 - val_loss: 0.1222 - val_mae: 0.0892
Epoch 79/550
15/15              0s 5ms/step - loss:
0.1418 - mae: 0.1297 - val_loss: 0.1214 - val_mae: 0.0898
Epoch 80/550
15/15              0s 5ms/step - loss:
0.1421 - mae: 0.1290 - val_loss: 0.1205 - val_mae: 0.0888
Epoch 81/550
15/15              0s 5ms/step - loss:
0.1412 - mae: 0.1302 - val_loss: 0.1197 - val_mae: 0.0887
Epoch 82/550
15/15              0s 5ms/step - loss:
0.1381 - mae: 0.1264 - val_loss: 0.1189 - val_mae: 0.0890
Epoch 83/550
15/15              0s 5ms/step - loss:
0.1409 - mae: 0.1305 - val_loss: 0.1182 - val_mae: 0.0898
Epoch 84/550
15/15              0s 5ms/step - loss:
0.1369 - mae: 0.1252 - val_loss: 0.1173 - val_mae: 0.0888
Epoch 85/550
15/15              0s 5ms/step - loss:
0.1374 - mae: 0.1289 - val_loss: 0.1164 - val_mae: 0.0887
Epoch 86/550
15/15              0s 6ms/step - loss:
0.1390 - mae: 0.1303 - val_loss: 0.1156 - val_mae: 0.0888
Epoch 87/550
15/15              0s 5ms/step - loss:
```

0.1344 - mae: 0.1253 - val_loss: 0.1148 - val_mae: 0.0886
Epoch 88/550
15/15   0s 5ms/step - loss:
0.1334 - mae: 0.1248 - val_loss: 0.1140 - val_mae: 0.0884
Epoch 89/550
15/15   0s 5ms/step - loss:
0.1343 - mae: 0.1261 - val_loss: 0.1133 - val_mae: 0.0896
Epoch 90/550
15/15   0s 5ms/step - loss:
0.1307 - mae: 0.1238 - val_loss: 0.1123 - val_mae: 0.0877
Epoch 91/550
15/15   0s 5ms/step - loss:
0.1326 - mae: 0.1250 - val_loss: 0.1116 - val_mae: 0.0885
Epoch 92/550
15/15   0s 5ms/step - loss:
0.1278 - mae: 0.1209 - val_loss: 0.1106 - val_mae: 0.0877
Epoch 93/550
15/15   0s 5ms/step - loss:
0.1301 - mae: 0.1248 - val_loss: 0.1100 - val_mae: 0.0884
Epoch 94/550
15/15   0s 5ms/step - loss:
0.1278 - mae: 0.1240 - val_loss: 0.1091 - val_mae: 0.0876
Epoch 95/550
15/15   0s 7ms/step - loss:
0.1277 - mae: 0.1222 - val_loss: 0.1082 - val_mae: 0.0872
Epoch 96/550
15/15   0s 5ms/step - loss:
0.1250 - mae: 0.1201 - val_loss: 0.1074 - val_mae: 0.0875
Epoch 97/550
15/15   0s 5ms/step - loss:
0.1248 - mae: 0.1227 - val_loss: 0.1066 - val_mae: 0.0875
Epoch 98/550
15/15   0s 5ms/step - loss:
0.1237 - mae: 0.1206 - val_loss: 0.1058 - val_mae: 0.0871
Epoch 99/550
15/15   0s 5ms/step - loss:
0.1248 - mae: 0.1223 - val_loss: 0.1050 - val_mae: 0.0870
Epoch 100/550
15/15   0s 5ms/step - loss:
0.1233 - mae: 0.1220 - val_loss: 0.1042 - val_mae: 0.0865
Epoch 101/550
15/15   0s 5ms/step - loss:
0.1192 - mae: 0.1194 - val_loss: 0.1034 - val_mae: 0.0865
Epoch 102/550
15/15   0s 5ms/step - loss:
0.1225 - mae: 0.1193 - val_loss: 0.1027 - val_mae: 0.0874
Epoch 103/550
15/15   0s 5ms/step - loss:

0.1213 - mae: 0.1214 - val_loss: 0.1019 - val_mae: 0.0871
Epoch 104/550
15/15   0s 5ms/step - loss:
0.1189 - mae: 0.1176 - val_loss: 0.1012 - val_mae: 0.0876
Epoch 105/550
15/15   0s 5ms/step - loss:
0.1183 - mae: 0.1201 - val_loss: 0.1003 - val_mae: 0.0868
Epoch 106/550
15/15   0s 5ms/step - loss:
0.1146 - mae: 0.1153 - val_loss: 0.0995 - val_mae: 0.0867
Epoch 107/550
15/15   0s 6ms/step - loss:
0.1181 - mae: 0.1190 - val_loss: 0.0987 - val_mae: 0.0865
Epoch 108/550
15/15   0s 6ms/step - loss:
0.1137 - mae: 0.1169 - val_loss: 0.0979 - val_mae: 0.0862
Epoch 109/550
15/15   0s 6ms/step - loss:
0.1116 - mae: 0.1144 - val_loss: 0.0971 - val_mae: 0.0855
Epoch 110/550
15/15   0s 5ms/step - loss:
0.1135 - mae: 0.1184 - val_loss: 0.0963 - val_mae: 0.0855
Epoch 111/550
15/15   0s 5ms/step - loss:
0.1106 - mae: 0.1161 - val_loss: 0.0956 - val_mae: 0.0868
Epoch 112/550
15/15   0s 6ms/step - loss:
0.1098 - mae: 0.1151 - val_loss: 0.0948 - val_mae: 0.0857
Epoch 113/550
15/15   0s 5ms/step - loss:
0.1099 - mae: 0.1144 - val_loss: 0.0940 - val_mae: 0.0856
Epoch 114/550
15/15   0s 5ms/step - loss:
0.1103 - mae: 0.1160 - val_loss: 0.0932 - val_mae: 0.0852
Epoch 115/550
15/15   0s 5ms/step - loss:
0.1083 - mae: 0.1152 - val_loss: 0.0926 - val_mae: 0.0857
Epoch 116/550
15/15   0s 5ms/step - loss:
0.1055 - mae: 0.1115 - val_loss: 0.0918 - val_mae: 0.0856
Epoch 117/550
15/15   0s 5ms/step - loss:
0.1050 - mae: 0.1133 - val_loss: 0.0911 - val_mae: 0.0859
Epoch 118/550
15/15   0s 5ms/step - loss:
0.1057 - mae: 0.1150 - val_loss: 0.0903 - val_mae: 0.0852
Epoch 119/550
15/15   0s 5ms/step - loss:

0.1044 - mae: 0.1138 - val_loss: 0.0897 - val_mae: 0.0864
Epoch 120/550
15/15   0s 5ms/step - loss:
0.1041 - mae: 0.1138 - val_loss: 0.0889 - val_mae: 0.0853
Epoch 121/550
15/15   0s 5ms/step - loss:
0.1009 - mae: 0.1084 - val_loss: 0.0882 - val_mae: 0.0856
Epoch 122/550
15/15   0s 5ms/step - loss:
0.1023 - mae: 0.1123 - val_loss: 0.0875 - val_mae: 0.0854
Epoch 123/550
15/15   0s 5ms/step - loss:
0.0987 - mae: 0.1111 - val_loss: 0.0867 - val_mae: 0.0857
Epoch 124/550
15/15   0s 5ms/step - loss:
0.0985 - mae: 0.1093 - val_loss: 0.0860 - val_mae: 0.0851
Epoch 125/550
15/15   0s 5ms/step - loss:
0.1002 - mae: 0.1116 - val_loss: 0.0852 - val_mae: 0.0846
Epoch 126/550
15/15   0s 5ms/step - loss:
0.1002 - mae: 0.1121 - val_loss: 0.0845 - val_mae: 0.0849
Epoch 127/550
15/15   0s 5ms/step - loss:
0.1007 - mae: 0.1137 - val_loss: 0.0839 - val_mae: 0.0847
Epoch 128/550
15/15   0s 5ms/step - loss:
0.0967 - mae: 0.1100 - val_loss: 0.0831 - val_mae: 0.0843
Epoch 129/550
15/15   0s 7ms/step - loss:
0.0973 - mae: 0.1111 - val_loss: 0.0824 - val_mae: 0.0843
Epoch 130/550
15/15   0s 6ms/step - loss:
0.0938 - mae: 0.1089 - val_loss: 0.0818 - val_mae: 0.0848
Epoch 131/550
15/15   0s 5ms/step - loss:
0.0962 - mae: 0.1116 - val_loss: 0.0811 - val_mae: 0.0847
Epoch 132/550
15/15   0s 5ms/step - loss:
0.0923 - mae: 0.1058 - val_loss: 0.0804 - val_mae: 0.0843
Epoch 133/550
15/15   0s 5ms/step - loss:
0.0918 - mae: 0.1080 - val_loss: 0.0798 - val_mae: 0.0852
Epoch 134/550
15/15   0s 5ms/step - loss:
0.0927 - mae: 0.1085 - val_loss: 0.0790 - val_mae: 0.0842
Epoch 135/550
15/15   0s 5ms/step - loss:

```
0.0924 - mae: 0.1089 - val_loss: 0.0784 - val_mae: 0.0843
Epoch 136/550
15/15          0s 5ms/step - loss:
0.0918 - mae: 0.1076 - val_loss: 0.0777 - val_mae: 0.0845
Epoch 137/550
15/15          0s 5ms/step - loss:
0.0896 - mae: 0.1074 - val_loss: 0.0770 - val_mae: 0.0840
Epoch 138/550
15/15          0s 5ms/step - loss:
0.0900 - mae: 0.1067 - val_loss: 0.0763 - val_mae: 0.0839
Epoch 139/550
15/15          0s 5ms/step - loss:
0.0892 - mae: 0.1080 - val_loss: 0.0757 - val_mae: 0.0844
Epoch 140/550
15/15          0s 5ms/step - loss:
0.0898 - mae: 0.1081 - val_loss: 0.0751 - val_mae: 0.0844
Epoch 141/550
15/15          0s 5ms/step - loss:
0.0870 - mae: 0.1051 - val_loss: 0.0744 - val_mae: 0.0840
Epoch 142/550
15/15          0s 5ms/step - loss:
0.0855 - mae: 0.1051 - val_loss: 0.0739 - val_mae: 0.0841
Epoch 143/550
15/15          0s 5ms/step - loss:
0.0850 - mae: 0.1059 - val_loss: 0.0731 - val_mae: 0.0839
Epoch 144/550
15/15          0s 6ms/step - loss:
0.0857 - mae: 0.1067 - val_loss: 0.0726 - val_mae: 0.0838
Epoch 145/550
15/15          0s 5ms/step - loss:
0.0841 - mae: 0.1051 - val_loss: 0.0719 - val_mae: 0.0840
Epoch 146/550
15/15          0s 5ms/step - loss:
0.0842 - mae: 0.1067 - val_loss: 0.0713 - val_mae: 0.0839
Epoch 147/550
15/15          0s 5ms/step - loss:
0.0830 - mae: 0.1051 - val_loss: 0.0707 - val_mae: 0.0841
Epoch 148/550
15/15          0s 5ms/step - loss:
0.0810 - mae: 0.1044 - val_loss: 0.0700 - val_mae: 0.0831
Epoch 149/550
15/15          0s 5ms/step - loss:
0.0798 - mae: 0.1031 - val_loss: 0.0694 - val_mae: 0.0834
Epoch 150/550
15/15          0s 5ms/step - loss:
0.0818 - mae: 0.1041 - val_loss: 0.0688 - val_mae: 0.0833
Epoch 151/550
15/15          0s 5ms/step - loss:
```

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0.0798 - mae: 0.1041 - val_loss: 0.0682 - val_mae: 0.0832
Epoch 152/550
15/15          0s 5ms/step - loss:
0.0798 - mae: 0.1051 - val_loss: 0.0675 - val_mae: 0.0827
Epoch 153/550
15/15          0s 5ms/step - loss:
0.0774 - mae: 0.1027 - val_loss: 0.0670 - val_mae: 0.0828
Epoch 154/550
15/15          0s 5ms/step - loss:
0.0756 - mae: 0.1011 - val_loss: 0.0663 - val_mae: 0.0828
Epoch 155/550
15/15          0s 5ms/step - loss:
0.0782 - mae: 0.1048 - val_loss: 0.0658 - val_mae: 0.0834
Epoch 156/550
15/15          0s 5ms/step - loss:
0.0747 - mae: 0.1017 - val_loss: 0.0652 - val_mae: 0.0832
Epoch 157/550
15/15          0s 5ms/step - loss:
0.0749 - mae: 0.1022 - val_loss: 0.0648 - val_mae: 0.0827
Epoch 158/550
15/15          0s 5ms/step - loss:
0.0757 - mae: 0.1038 - val_loss: 0.0641 - val_mae: 0.0828
Epoch 159/550
15/15          0s 5ms/step - loss:
0.0733 - mae: 0.1020 - val_loss: 0.0636 - val_mae: 0.0827
Epoch 160/550
15/15          0s 5ms/step - loss:
0.0727 - mae: 0.1018 - val_loss: 0.0632 - val_mae: 0.0830
Epoch 161/550
15/15          0s 5ms/step - loss:
0.0725 - mae: 0.1024 - val_loss: 0.0626 - val_mae: 0.0827
Epoch 162/550
15/15          0s 5ms/step - loss:
0.0696 - mae: 0.0985 - val_loss: 0.0620 - val_mae: 0.0823
Epoch 163/550
15/15          0s 5ms/step - loss:
0.0715 - mae: 0.1006 - val_loss: 0.0615 - val_mae: 0.0822
Epoch 164/550
15/15          0s 5ms/step - loss:
0.0722 - mae: 0.1005 - val_loss: 0.0609 - val_mae: 0.0825
Epoch 165/550
15/15          0s 5ms/step - loss:
0.0683 - mae: 0.0986 - val_loss: 0.0604 - val_mae: 0.0824
Epoch 166/550
15/15          0s 5ms/step - loss:
0.0694 - mae: 0.1000 - val_loss: 0.0599 - val_mae: 0.0824
Epoch 167/550
15/15          0s 5ms/step - loss:
```

0.0714 - mae: 0.1021 - val_loss: 0.0594 - val_mae: 0.0825
Epoch 168/550
15/15   0s 5ms/step - loss:
0.0688 - mae: 0.0997 - val_loss: 0.0589 - val_mae: 0.0819
Epoch 169/550
15/15   0s 5ms/step - loss:
0.0673 - mae: 0.0988 - val_loss: 0.0584 - val_mae: 0.0824
Epoch 170/550
15/15   0s 5ms/step - loss:
0.0694 - mae: 0.1010 - val_loss: 0.0578 - val_mae: 0.0822
Epoch 171/550
15/15   0s 5ms/step - loss:
0.0694 - mae: 0.1023 - val_loss: 0.0573 - val_mae: 0.0819
Epoch 172/550
15/15   0s 5ms/step - loss:
0.0669 - mae: 0.0999 - val_loss: 0.0569 - val_mae: 0.0819
Epoch 173/550
15/15   0s 5ms/step - loss:
0.0653 - mae: 0.0992 - val_loss: 0.0564 - val_mae: 0.0818
Epoch 174/550
15/15   0s 6ms/step - loss:
0.0636 - mae: 0.0981 - val_loss: 0.0560 - val_mae: 0.0821
Epoch 175/550
15/15   0s 5ms/step - loss:
0.0656 - mae: 0.0996 - val_loss: 0.0555 - val_mae: 0.0824
Epoch 176/550
15/15   0s 5ms/step - loss:
0.0610 - mae: 0.0956 - val_loss: 0.0550 - val_mae: 0.0825
Epoch 177/550
15/15   0s 5ms/step - loss:
0.0640 - mae: 0.0980 - val_loss: 0.0545 - val_mae: 0.0823
Epoch 178/550
15/15   0s 5ms/step - loss:
0.0635 - mae: 0.0995 - val_loss: 0.0541 - val_mae: 0.0825
Epoch 179/550
15/15   0s 5ms/step - loss:
0.0642 - mae: 0.0990 - val_loss: 0.0537 - val_mae: 0.0826
Epoch 180/550
15/15   0s 5ms/step - loss:
0.0606 - mae: 0.0949 - val_loss: 0.0533 - val_mae: 0.0822
Epoch 181/550
15/15   0s 5ms/step - loss:
0.0617 - mae: 0.0974 - val_loss: 0.0528 - val_mae: 0.0821
Epoch 182/550
15/15   0s 5ms/step - loss:
0.0604 - mae: 0.0970 - val_loss: 0.0524 - val_mae: 0.0821
Epoch 183/550
15/15   0s 5ms/step - loss:

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0.0593 - mae: 0.0950 - val_loss: 0.0519 - val_mae: 0.0827
Epoch 184/550
15/15          0s 5ms/step - loss:
0.0590 - mae: 0.0974 - val_loss: 0.0516 - val_mae: 0.0819
Epoch 185/550
15/15          0s 5ms/step - loss:
0.0595 - mae: 0.0969 - val_loss: 0.0511 - val_mae: 0.0822
Epoch 186/550
15/15          0s 5ms/step - loss:
0.0592 - mae: 0.0974 - val_loss: 0.0508 - val_mae: 0.0816
Epoch 187/550
15/15          0s 5ms/step - loss:
0.0569 - mae: 0.0953 - val_loss: 0.0503 - val_mae: 0.0812
Epoch 188/550
15/15          0s 7ms/step - loss:
0.0579 - mae: 0.0975 - val_loss: 0.0498 - val_mae: 0.0816
Epoch 189/550
15/15          0s 5ms/step - loss:
0.0575 - mae: 0.0978 - val_loss: 0.0494 - val_mae: 0.0810
Epoch 190/550
15/15          0s 5ms/step - loss:
0.0612 - mae: 0.0997 - val_loss: 0.0490 - val_mae: 0.0817
Epoch 191/550
15/15          0s 5ms/step - loss:
0.0552 - mae: 0.0950 - val_loss: 0.0486 - val_mae: 0.0808
Epoch 192/550
15/15          0s 5ms/step - loss:
0.0569 - mae: 0.0959 - val_loss: 0.0481 - val_mae: 0.0809
Epoch 193/550
15/15          0s 5ms/step - loss:
0.0561 - mae: 0.0970 - val_loss: 0.0478 - val_mae: 0.0812
Epoch 194/550
15/15          0s 5ms/step - loss:
0.0576 - mae: 0.0986 - val_loss: 0.0474 - val_mae: 0.0810
Epoch 195/550
15/15          0s 5ms/step - loss:
0.0557 - mae: 0.0964 - val_loss: 0.0470 - val_mae: 0.0807
Epoch 196/550
15/15          0s 6ms/step - loss:
0.0531 - mae: 0.0943 - val_loss: 0.0467 - val_mae: 0.0806
Epoch 197/550
15/15          0s 5ms/step - loss:
0.0552 - mae: 0.0966 - val_loss: 0.0463 - val_mae: 0.0808
Epoch 198/550
15/15          0s 5ms/step - loss:
0.0548 - mae: 0.0948 - val_loss: 0.0458 - val_mae: 0.0803
Epoch 199/550
15/15          0s 5ms/step - loss:
```

0.0519 - mae: 0.0933 - val_loss: 0.0455 - val_mae: 0.0803
Epoch 200/550
15/15   0s 5ms/step - loss:
0.0524 - mae: 0.0936 - val_loss: 0.0452 - val_mae: 0.0809
Epoch 201/550
15/15   0s 5ms/step - loss:
0.0524 - mae: 0.0947 - val_loss: 0.0450 - val_mae: 0.0811
Epoch 202/550
15/15   0s 6ms/step - loss:
0.0531 - mae: 0.0947 - val_loss: 0.0447 - val_mae: 0.0810
Epoch 203/550
15/15   0s 5ms/step - loss:
0.0508 - mae: 0.0941 - val_loss: 0.0443 - val_mae: 0.0811
Epoch 204/550
15/15   0s 5ms/step - loss:
0.0527 - mae: 0.0953 - val_loss: 0.0439 - val_mae: 0.0810
Epoch 205/550
15/15   0s 5ms/step - loss:
0.0506 - mae: 0.0939 - val_loss: 0.0435 - val_mae: 0.0808
Epoch 206/550
15/15   0s 5ms/step - loss:
0.0510 - mae: 0.0941 - val_loss: 0.0433 - val_mae: 0.0814
Epoch 207/550
15/15   0s 5ms/step - loss:
0.0486 - mae: 0.0914 - val_loss: 0.0430 - val_mae: 0.0809
Epoch 208/550
15/15   0s 5ms/step - loss:
0.0485 - mae: 0.0912 - val_loss: 0.0426 - val_mae: 0.0806
Epoch 209/550
15/15   0s 5ms/step - loss:
0.0484 - mae: 0.0927 - val_loss: 0.0424 - val_mae: 0.0808
Epoch 210/550
15/15   0s 5ms/step - loss:
0.0492 - mae: 0.0927 - val_loss: 0.0420 - val_mae: 0.0806
Epoch 211/550
15/15   0s 5ms/step - loss:
0.0484 - mae: 0.0918 - val_loss: 0.0418 - val_mae: 0.0802
Epoch 212/550
15/15   0s 5ms/step - loss:
0.0482 - mae: 0.0925 - val_loss: 0.0415 - val_mae: 0.0807
Epoch 213/550
15/15   0s 5ms/step - loss:
0.0472 - mae: 0.0934 - val_loss: 0.0411 - val_mae: 0.0803
Epoch 214/550
15/15   0s 5ms/step - loss:
0.0471 - mae: 0.0920 - val_loss: 0.0408 - val_mae: 0.0807
Epoch 215/550
15/15   0s 6ms/step - loss:

```
0.0464 - mae: 0.0915 - val_loss: 0.0405 - val_mae: 0.0808
Epoch 216/550
15/15          0s 6ms/step - loss:
0.0477 - mae: 0.0926 - val_loss: 0.0402 - val_mae: 0.0810
Epoch 217/550
15/15          0s 5ms/step - loss:
0.0472 - mae: 0.0919 - val_loss: 0.0399 - val_mae: 0.0806
Epoch 218/550
15/15          0s 6ms/step - loss:
0.0457 - mae: 0.0908 - val_loss: 0.0397 - val_mae: 0.0803
Epoch 219/550
15/15          0s 5ms/step - loss:
0.0453 - mae: 0.0907 - val_loss: 0.0395 - val_mae: 0.0812
Epoch 220/550
15/15          0s 5ms/step - loss:
0.0455 - mae: 0.0927 - val_loss: 0.0390 - val_mae: 0.0800
Epoch 221/550
15/15          0s 5ms/step - loss:
0.0446 - mae: 0.0911 - val_loss: 0.0388 - val_mae: 0.0801
Epoch 222/550
15/15          0s 5ms/step - loss:
0.0455 - mae: 0.0922 - val_loss: 0.0384 - val_mae: 0.0797
Epoch 223/550
15/15          0s 5ms/step - loss:
0.0435 - mae: 0.0902 - val_loss: 0.0384 - val_mae: 0.0795
Epoch 224/550
15/15          0s 5ms/step - loss:
0.0437 - mae: 0.0896 - val_loss: 0.0380 - val_mae: 0.0789
Epoch 225/550
15/15          0s 5ms/step - loss:
0.0445 - mae: 0.0916 - val_loss: 0.0379 - val_mae: 0.0796
Epoch 226/550
15/15          0s 7ms/step - loss:
0.0444 - mae: 0.0918 - val_loss: 0.0376 - val_mae: 0.0801
Epoch 227/550
15/15          0s 5ms/step - loss:
0.0430 - mae: 0.0899 - val_loss: 0.0374 - val_mae: 0.0792
Epoch 228/550
15/15          0s 5ms/step - loss:
0.0445 - mae: 0.0910 - val_loss: 0.0371 - val_mae: 0.0791
Epoch 229/550
15/15          0s 5ms/step - loss:
0.0403 - mae: 0.0885 - val_loss: 0.0368 - val_mae: 0.0792
Epoch 230/550
15/15          0s 5ms/step - loss:
0.0410 - mae: 0.0893 - val_loss: 0.0365 - val_mae: 0.0792
Epoch 231/550
15/15          0s 5ms/step - loss:
```

```
0.0426 - mae: 0.0909 - val_loss: 0.0364 - val_mae: 0.0802
Epoch 232/550
15/15          0s 5ms/step - loss:
0.0414 - mae: 0.0895 - val_loss: 0.0361 - val_mae: 0.0801
Epoch 233/550
15/15          0s 6ms/step - loss:
0.0405 - mae: 0.0891 - val_loss: 0.0359 - val_mae: 0.0786
Epoch 234/550
15/15          0s 5ms/step - loss:
0.0399 - mae: 0.0880 - val_loss: 0.0356 - val_mae: 0.0794
Epoch 235/550
15/15          0s 5ms/step - loss:
0.0417 - mae: 0.0914 - val_loss: 0.0354 - val_mae: 0.0790
Epoch 236/550
15/15          0s 5ms/step - loss:
0.0391 - mae: 0.0872 - val_loss: 0.0352 - val_mae: 0.0787
Epoch 237/550
15/15          0s 5ms/step - loss:
0.0399 - mae: 0.0881 - val_loss: 0.0349 - val_mae: 0.0786
Epoch 238/550
15/15          0s 7ms/step - loss:
0.0391 - mae: 0.0893 - val_loss: 0.0348 - val_mae: 0.0783
Epoch 239/550
15/15          0s 6ms/step - loss:
0.0404 - mae: 0.0906 - val_loss: 0.0345 - val_mae: 0.0778
Epoch 240/550
15/15          0s 5ms/step - loss:
0.0397 - mae: 0.0890 - val_loss: 0.0344 - val_mae: 0.0788
Epoch 241/550
15/15          0s 5ms/step - loss:
0.0391 - mae: 0.0889 - val_loss: 0.0342 - val_mae: 0.0781
Epoch 242/550
15/15          0s 5ms/step - loss:
0.0414 - mae: 0.0896 - val_loss: 0.0340 - val_mae: 0.0788
Epoch 243/550
15/15          0s 5ms/step - loss:
0.0387 - mae: 0.0885 - val_loss: 0.0338 - val_mae: 0.0792
Epoch 244/550
15/15          0s 6ms/step - loss:
0.0398 - mae: 0.0906 - val_loss: 0.0336 - val_mae: 0.0786
Epoch 245/550
15/15          0s 5ms/step - loss:
0.0392 - mae: 0.0889 - val_loss: 0.0335 - val_mae: 0.0793
Epoch 246/550
15/15          0s 6ms/step - loss:
0.0404 - mae: 0.0893 - val_loss: 0.0333 - val_mae: 0.0801
Epoch 247/550
15/15          0s 5ms/step - loss:
```

0.0392 - mae: 0.0901 - val_loss: 0.0332 - val_mae: 0.0787
Epoch 248/550
15/15   0s 5ms/step - loss:
0.0384 - mae: 0.0878 - val_loss: 0.0328 - val_mae: 0.0782
Epoch 249/550
15/15   0s 5ms/step - loss:
0.0369 - mae: 0.0877 - val_loss: 0.0328 - val_mae: 0.0794
Epoch 250/550
15/15   0s 6ms/step - loss:
0.0385 - mae: 0.0894 - val_loss: 0.0326 - val_mae: 0.0788
Epoch 251/550
15/15   0s 5ms/step - loss:
0.0377 - mae: 0.0880 - val_loss: 0.0322 - val_mae: 0.0791
Epoch 252/550
15/15   0s 5ms/step - loss:
0.0377 - mae: 0.0881 - val_loss: 0.0320 - val_mae: 0.0789
Epoch 253/550
15/15   0s 5ms/step - loss:
0.0371 - mae: 0.0883 - val_loss: 0.0319 - val_mae: 0.0789
Epoch 254/550
15/15   0s 5ms/step - loss:
0.0354 - mae: 0.0858 - val_loss: 0.0317 - val_mae: 0.0795
Epoch 255/550
15/15   0s 7ms/step - loss:
0.0358 - mae: 0.0873 - val_loss: 0.0316 - val_mae: 0.0780
Epoch 256/550
15/15   0s 5ms/step - loss:
0.0365 - mae: 0.0895 - val_loss: 0.0315 - val_mae: 0.0778
Epoch 257/550
15/15   0s 5ms/step - loss:
0.0362 - mae: 0.0875 - val_loss: 0.0314 - val_mae: 0.0774
Epoch 258/550
15/15   0s 5ms/step - loss:
0.0347 - mae: 0.0867 - val_loss: 0.0312 - val_mae: 0.0771
Epoch 259/550
15/15   0s 5ms/step - loss:
0.0373 - mae: 0.0892 - val_loss: 0.0311 - val_mae: 0.0774
Epoch 260/550
15/15   0s 5ms/step - loss:
0.0353 - mae: 0.0880 - val_loss: 0.0310 - val_mae: 0.0782
Epoch 261/550
15/15   0s 5ms/step - loss:
0.0350 - mae: 0.0864 - val_loss: 0.0310 - val_mae: 0.0783
Epoch 262/550
15/15   0s 5ms/step - loss:
0.0356 - mae: 0.0873 - val_loss: 0.0306 - val_mae: 0.0785
Epoch 263/550
15/15   0s 5ms/step - loss:

0.0343 - mae: 0.0861 - val_loss: 0.0304 - val_mae: 0.0778
Epoch 264/550
15/15   0s 5ms/step - loss:
0.0342 - mae: 0.0870 - val_loss: 0.0303 - val_mae: 0.0772
Epoch 265/550
15/15   0s 5ms/step - loss:
0.0354 - mae: 0.0869 - val_loss: 0.0301 - val_mae: 0.0774
Epoch 266/550
15/15   0s 5ms/step - loss:
0.0340 - mae: 0.0858 - val_loss: 0.0301 - val_mae: 0.0786
Epoch 267/550
15/15   0s 6ms/step - loss:
0.0338 - mae: 0.0861 - val_loss: 0.0298 - val_mae: 0.0781
Epoch 268/550
15/15   0s 5ms/step - loss:
0.0363 - mae: 0.0884 - val_loss: 0.0295 - val_mae: 0.0771
Epoch 269/550
15/15   0s 5ms/step - loss:
0.0337 - mae: 0.0852 - val_loss: 0.0295 - val_mae: 0.0780
Epoch 270/550
15/15   0s 5ms/step - loss:
0.0359 - mae: 0.0888 - val_loss: 0.0292 - val_mae: 0.0765
Epoch 271/550
15/15   0s 5ms/step - loss:
0.0339 - mae: 0.0865 - val_loss: 0.0292 - val_mae: 0.0766
Epoch 272/550
15/15   0s 5ms/step - loss:
0.0332 - mae: 0.0853 - val_loss: 0.0293 - val_mae: 0.0777
Epoch 273/550
15/15   0s 5ms/step - loss:
0.0328 - mae: 0.0869 - val_loss: 0.0292 - val_mae: 0.0775
Epoch 274/550
15/15   0s 5ms/step - loss:
0.0325 - mae: 0.0845 - val_loss: 0.0289 - val_mae: 0.0781
Epoch 275/550
15/15   0s 5ms/step - loss:
0.0352 - mae: 0.0879 - val_loss: 0.0288 - val_mae: 0.0785
Epoch 276/550
15/15   0s 5ms/step - loss:
0.0325 - mae: 0.0857 - val_loss: 0.0284 - val_mae: 0.0791
Epoch 277/550
15/15   0s 5ms/step - loss:
0.0333 - mae: 0.0856 - val_loss: 0.0283 - val_mae: 0.0789
Epoch 278/550
15/15   0s 5ms/step - loss:
0.0317 - mae: 0.0856 - val_loss: 0.0284 - val_mae: 0.0786
Epoch 279/550
15/15   0s 5ms/step - loss:

0.0323 - mae: 0.0854 - val_loss: 0.0281 - val_mae: 0.0783
Epoch 280/550
15/15   0s 5ms/step - loss:
0.0326 - mae: 0.0856 - val_loss: 0.0281 - val_mae: 0.0773
Epoch 281/550
15/15   0s 5ms/step - loss:
0.0327 - mae: 0.0868 - val_loss: 0.0280 - val_mae: 0.0779
Epoch 282/550
15/15   0s 6ms/step - loss:
0.0320 - mae: 0.0846 - val_loss: 0.0280 - val_mae: 0.0772
Epoch 283/550
15/15   0s 6ms/step - loss:
0.0316 - mae: 0.0844 - val_loss: 0.0279 - val_mae: 0.0777
Epoch 284/550
15/15   0s 7ms/step - loss:
0.0313 - mae: 0.0851 - val_loss: 0.0277 - val_mae: 0.0783
Epoch 285/550
15/15   0s 5ms/step - loss:
0.0317 - mae: 0.0844 - val_loss: 0.0278 - val_mae: 0.0790
Epoch 286/550
15/15   0s 6ms/step - loss:
0.0303 - mae: 0.0832 - val_loss: 0.0272 - val_mae: 0.0774
Epoch 287/550
15/15   0s 5ms/step - loss:
0.0311 - mae: 0.0850 - val_loss: 0.0273 - val_mae: 0.0782
Epoch 288/550
15/15   0s 5ms/step - loss:
0.0305 - mae: 0.0844 - val_loss: 0.0269 - val_mae: 0.0772
Epoch 289/550
15/15   0s 5ms/step - loss:
0.0311 - mae: 0.0851 - val_loss: 0.0272 - val_mae: 0.0772
Epoch 290/550
15/15   0s 5ms/step - loss:
0.0316 - mae: 0.0849 - val_loss: 0.0271 - val_mae: 0.0781
Epoch 291/550
15/15   0s 5ms/step - loss:
0.0293 - mae: 0.0829 - val_loss: 0.0268 - val_mae: 0.0773
Epoch 292/550
15/15   0s 5ms/step - loss:
0.0286 - mae: 0.0820 - val_loss: 0.0267 - val_mae: 0.0780
Epoch 293/550
15/15   0s 5ms/step - loss:
0.0300 - mae: 0.0837 - val_loss: 0.0267 - val_mae: 0.0770
Epoch 294/550
15/15   0s 6ms/step - loss:
0.0305 - mae: 0.0840 - val_loss: 0.0267 - val_mae: 0.0772
Epoch 295/550
15/15   0s 5ms/step - loss:

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0.0300 - mae: 0.0841 - val_loss: 0.0265 - val_mae: 0.0778
Epoch 296/550
15/15          0s 5ms/step - loss:
0.0282 - mae: 0.0827 - val_loss: 0.0262 - val_mae: 0.0771
Epoch 297/550
15/15          0s 5ms/step - loss:
0.0298 - mae: 0.0842 - val_loss: 0.0264 - val_mae: 0.0774
Epoch 298/550
15/15          0s 5ms/step - loss:
0.0282 - mae: 0.0820 - val_loss: 0.0261 - val_mae: 0.0760
Epoch 299/550
15/15          0s 5ms/step - loss:
0.0289 - mae: 0.0828 - val_loss: 0.0259 - val_mae: 0.0751
Epoch 300/550
15/15          0s 5ms/step - loss:
0.0294 - mae: 0.0837 - val_loss: 0.0259 - val_mae: 0.0754
Epoch 301/550
15/15          0s 5ms/step - loss:
0.0303 - mae: 0.0842 - val_loss: 0.0259 - val_mae: 0.0755
Epoch 302/550
15/15          0s 6ms/step - loss:
0.0300 - mae: 0.0839 - val_loss: 0.0259 - val_mae: 0.0771
Epoch 303/550
15/15          0s 5ms/step - loss:
0.0277 - mae: 0.0827 - val_loss: 0.0256 - val_mae: 0.0758
Epoch 304/550
15/15          0s 6ms/step - loss:
0.0296 - mae: 0.0838 - val_loss: 0.0255 - val_mae: 0.0754
Epoch 305/550
15/15          0s 6ms/step - loss:
0.0301 - mae: 0.0840 - val_loss: 0.0255 - val_mae: 0.0756
Epoch 306/550
15/15          0s 5ms/step - loss:
0.0275 - mae: 0.0824 - val_loss: 0.0252 - val_mae: 0.0758
Epoch 307/550
15/15          0s 5ms/step - loss:
0.0300 - mae: 0.0846 - val_loss: 0.0254 - val_mae: 0.0753
Epoch 308/550
15/15          0s 5ms/step - loss:
0.0266 - mae: 0.0814 - val_loss: 0.0251 - val_mae: 0.0750
Epoch 309/550
15/15          0s 5ms/step - loss:
0.0266 - mae: 0.0812 - val_loss: 0.0248 - val_mae: 0.0755
Epoch 310/550
15/15          0s 5ms/step - loss:
0.0268 - mae: 0.0822 - val_loss: 0.0251 - val_mae: 0.0762
Epoch 311/550
15/15          0s 6ms/step - loss:
```

```
0.0274 - mae: 0.0828 - val_loss: 0.0250 - val_mae: 0.0760
Epoch 312/550
15/15          0s 5ms/step - loss:
0.0286 - mae: 0.0837 - val_loss: 0.0249 - val_mae: 0.0759
Epoch 313/550
15/15          0s 5ms/step - loss:
0.0281 - mae: 0.0840 - val_loss: 0.0249 - val_mae: 0.0760
Epoch 314/550
15/15          0s 7ms/step - loss:
0.0272 - mae: 0.0820 - val_loss: 0.0247 - val_mae: 0.0750
Epoch 315/550
15/15          0s 5ms/step - loss:
0.0270 - mae: 0.0811 - val_loss: 0.0247 - val_mae: 0.0766
Epoch 316/550
15/15          0s 5ms/step - loss:
0.0273 - mae: 0.0822 - val_loss: 0.0244 - val_mae: 0.0762
Epoch 317/550
15/15          0s 5ms/step - loss:
0.0255 - mae: 0.0809 - val_loss: 0.0245 - val_mae: 0.0767
Epoch 318/550
15/15          0s 5ms/step - loss:
0.0272 - mae: 0.0827 - val_loss: 0.0242 - val_mae: 0.0763
Epoch 319/550
15/15          0s 5ms/step - loss:
0.0280 - mae: 0.0837 - val_loss: 0.0241 - val_mae: 0.0758
Epoch 320/550
15/15          0s 5ms/step - loss:
0.0258 - mae: 0.0816 - val_loss: 0.0243 - val_mae: 0.0771
Epoch 321/550
15/15          0s 6ms/step - loss:
0.0267 - mae: 0.0815 - val_loss: 0.0240 - val_mae: 0.0763
Epoch 322/550
15/15          0s 5ms/step - loss:
0.0261 - mae: 0.0809 - val_loss: 0.0241 - val_mae: 0.0764
Epoch 323/550
15/15          0s 5ms/step - loss:
0.0269 - mae: 0.0825 - val_loss: 0.0236 - val_mae: 0.0750
Epoch 324/550
15/15          0s 6ms/step - loss:
0.0266 - mae: 0.0814 - val_loss: 0.0239 - val_mae: 0.0763
Epoch 325/550
15/15          0s 5ms/step - loss:
0.0267 - mae: 0.0834 - val_loss: 0.0239 - val_mae: 0.0775
Epoch 326/550
15/15          0s 6ms/step - loss:
0.0249 - mae: 0.0791 - val_loss: 0.0238 - val_mae: 0.0772
Epoch 327/550
15/15          0s 5ms/step - loss:
```

```
0.0252 - mae: 0.0810 - val_loss: 0.0237 - val_mae: 0.0759
Epoch 328/550
15/15              0s 5ms/step - loss:
0.0257 - mae: 0.0811 - val_loss: 0.0237 - val_mae: 0.0757
Epoch 329/550
15/15              0s 5ms/step - loss:
0.0259 - mae: 0.0808 - val_loss: 0.0234 - val_mae: 0.0766
Epoch 330/550
15/15              0s 5ms/step - loss:
0.0269 - mae: 0.0829 - val_loss: 0.0233 - val_mae: 0.0756
Epoch 331/550
15/15              0s 5ms/step - loss:
0.0257 - mae: 0.0807 - val_loss: 0.0233 - val_mae: 0.0757
Epoch 332/550
15/15              0s 5ms/step - loss:
0.0260 - mae: 0.0823 - val_loss: 0.0233 - val_mae: 0.0768
Epoch 333/550
15/15              0s 6ms/step - loss:
0.0240 - mae: 0.0794 - val_loss: 0.0233 - val_mae: 0.0762
Epoch 334/550
15/15              0s 5ms/step - loss:
0.0261 - mae: 0.0812 - val_loss: 0.0232 - val_mae: 0.0756
Epoch 335/550
15/15              0s 5ms/step - loss:
0.0263 - mae: 0.0822 - val_loss: 0.0232 - val_mae: 0.0746
Epoch 336/550
15/15              0s 5ms/step - loss:
0.0269 - mae: 0.0828 - val_loss: 0.0234 - val_mae: 0.0761
Epoch 337/550
15/15              0s 5ms/step - loss:
0.0242 - mae: 0.0806 - val_loss: 0.0234 - val_mae: 0.0755
Epoch 338/550
15/15              0s 5ms/step - loss:
0.0248 - mae: 0.0807 - val_loss: 0.0233 - val_mae: 0.0762
Epoch 339/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0802 - val_loss: 0.0232 - val_mae: 0.0749
Epoch 340/550
15/15              0s 5ms/step - loss:
0.0230 - mae: 0.0797 - val_loss: 0.0228 - val_mae: 0.0744
Epoch 341/550
15/15              0s 8ms/step - loss:
0.0254 - mae: 0.0807 - val_loss: 0.0224 - val_mae: 0.0750
Epoch 342/550
15/15              0s 5ms/step - loss:
0.0253 - mae: 0.0814 - val_loss: 0.0222 - val_mae: 0.0751
Epoch 343/550
15/15              0s 5ms/step - loss:
```

0.0255 - mae: 0.0810 - val_loss: 0.0223 - val_mae: 0.0748
Epoch 344/550
15/15   0s 5ms/step - loss:
0.0245 - mae: 0.0808 - val_loss: 0.0227 - val_mae: 0.0763
Epoch 345/550
15/15   0s 5ms/step - loss:
0.0236 - mae: 0.0790 - val_loss: 0.0225 - val_mae: 0.0756
Epoch 346/550
15/15   0s 5ms/step - loss:
0.0237 - mae: 0.0807 - val_loss: 0.0225 - val_mae: 0.0753
Epoch 347/550
15/15   0s 5ms/step - loss:
0.0253 - mae: 0.0814 - val_loss: 0.0225 - val_mae: 0.0757
Epoch 348/550
15/15   0s 5ms/step - loss:
0.0239 - mae: 0.0805 - val_loss: 0.0225 - val_mae: 0.0767
Epoch 349/550
15/15   0s 7ms/step - loss:
0.0251 - mae: 0.0822 - val_loss: 0.0223 - val_mae: 0.0748
Epoch 350/550
15/15   0s 5ms/step - loss:
0.0242 - mae: 0.0796 - val_loss: 0.0225 - val_mae: 0.0764
Epoch 351/550
15/15   0s 5ms/step - loss:
0.0246 - mae: 0.0795 - val_loss: 0.0225 - val_mae: 0.0777
Epoch 352/550
15/15   0s 5ms/step - loss:
0.0218 - mae: 0.0778 - val_loss: 0.0222 - val_mae: 0.0754
Epoch 353/550
15/15   0s 5ms/step - loss:
0.0226 - mae: 0.0789 - val_loss: 0.0222 - val_mae: 0.0743
Epoch 354/550
15/15   0s 5ms/step - loss:
0.0237 - mae: 0.0804 - val_loss: 0.0223 - val_mae: 0.0751
Epoch 355/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0802 - val_loss: 0.0219 - val_mae: 0.0747
Epoch 356/550
15/15   0s 6ms/step - loss:
0.0253 - mae: 0.0806 - val_loss: 0.0221 - val_mae: 0.0742
Epoch 357/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0788 - val_loss: 0.0224 - val_mae: 0.0759
Epoch 358/550
15/15   0s 6ms/step - loss:
0.0240 - mae: 0.0810 - val_loss: 0.0218 - val_mae: 0.0753
Epoch 359/550
15/15   0s 5ms/step - loss:

0.0244 - mae: 0.0812 - val_loss: 0.0220 - val_mae: 0.0762
Epoch 360/550
15/15   0s 5ms/step - loss:
0.0228 - mae: 0.0786 - val_loss: 0.0218 - val_mae: 0.0747
Epoch 361/550
15/15   0s 5ms/step - loss:
0.0242 - mae: 0.0812 - val_loss: 0.0217 - val_mae: 0.0747
Epoch 362/550
15/15   0s 5ms/step - loss:
0.0231 - mae: 0.0782 - val_loss: 0.0218 - val_mae: 0.0765
Epoch 363/550
15/15   0s 5ms/step - loss:
0.0220 - mae: 0.0771 - val_loss: 0.0217 - val_mae: 0.0752
Epoch 364/550
15/15   0s 5ms/step - loss:
0.0225 - mae: 0.0783 - val_loss: 0.0218 - val_mae: 0.0753
Epoch 365/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0796 - val_loss: 0.0220 - val_mae: 0.0768
Epoch 366/550
15/15   0s 5ms/step - loss:
0.0218 - mae: 0.0776 - val_loss: 0.0221 - val_mae: 0.0757
Epoch 367/550
15/15   0s 7ms/step - loss:
0.0228 - mae: 0.0789 - val_loss: 0.0219 - val_mae: 0.0766
Epoch 368/550
15/15   0s 5ms/step - loss:
0.0232 - mae: 0.0795 - val_loss: 0.0216 - val_mae: 0.0753
Epoch 369/550
15/15   0s 6ms/step - loss:
0.0217 - mae: 0.0775 - val_loss: 0.0214 - val_mae: 0.0748
Epoch 370/550
15/15   0s 6ms/step - loss:
0.0212 - mae: 0.0774 - val_loss: 0.0214 - val_mae: 0.0748
Epoch 371/550
15/15   0s 6ms/step - loss:
0.0211 - mae: 0.0770 - val_loss: 0.0213 - val_mae: 0.0750
Epoch 372/550
15/15   0s 7ms/step - loss:
0.0219 - mae: 0.0779 - val_loss: 0.0217 - val_mae: 0.0766
Epoch 373/550
15/15   0s 5ms/step - loss:
0.0224 - mae: 0.0795 - val_loss: 0.0220 - val_mae: 0.0773
Epoch 374/550
15/15   0s 5ms/step - loss:
0.0223 - mae: 0.0776 - val_loss: 0.0213 - val_mae: 0.0736
Epoch 375/550
15/15   0s 5ms/step - loss:

0.0238 - mae: 0.0802 - val_loss: 0.0216 - val_mae: 0.0755
Epoch 376/550
15/15   0s 5ms/step - loss:
0.0212 - mae: 0.0776 - val_loss: 0.0216 - val_mae: 0.0762
Epoch 377/550
15/15   0s 6ms/step - loss:
0.0227 - mae: 0.0790 - val_loss: 0.0215 - val_mae: 0.0756
Epoch 378/550
15/15   0s 5ms/step - loss:
0.0223 - mae: 0.0781 - val_loss: 0.0214 - val_mae: 0.0737
Epoch 379/550
15/15   0s 5ms/step - loss:
0.0219 - mae: 0.0767 - val_loss: 0.0215 - val_mae: 0.0741
Epoch 380/550
15/15   0s 7ms/step - loss:
0.0216 - mae: 0.0778 - val_loss: 0.0213 - val_mae: 0.0755
Epoch 381/550
15/15   0s 6ms/step - loss:
0.0239 - mae: 0.0796 - val_loss: 0.0208 - val_mae: 0.0749
Epoch 382/550
15/15   0s 5ms/step - loss:
0.0205 - mae: 0.0769 - val_loss: 0.0212 - val_mae: 0.0760
Epoch 383/550
15/15   0s 5ms/step - loss:
0.0210 - mae: 0.0768 - val_loss: 0.0212 - val_mae: 0.0770
Epoch 384/550
15/15   0s 5ms/step - loss:
0.0202 - mae: 0.0764 - val_loss: 0.0213 - val_mae: 0.0768
Epoch 385/550
15/15   0s 5ms/step - loss:
0.0225 - mae: 0.0790 - val_loss: 0.0214 - val_mae: 0.0747
Epoch 386/550
15/15   0s 5ms/step - loss:
0.0206 - mae: 0.0764 - val_loss: 0.0215 - val_mae: 0.0739
Epoch 387/550
15/15   0s 5ms/step - loss:
0.0207 - mae: 0.0781 - val_loss: 0.0216 - val_mae: 0.0742
Epoch 388/550
15/15   0s 5ms/step - loss:
0.0217 - mae: 0.0787 - val_loss: 0.0220 - val_mae: 0.0755
Epoch 389/550
15/15   0s 7ms/step - loss:
0.0198 - mae: 0.0755 - val_loss: 0.0214 - val_mae: 0.0751
Epoch 390/550
15/15   0s 6ms/step - loss:
0.0206 - mae: 0.0767 - val_loss: 0.0216 - val_mae: 0.0742
Epoch 391/550
15/15   0s 5ms/step - loss:

```
0.0214 - mae: 0.0771 - val_loss: 0.0215 - val_mae: 0.0747
Epoch 392/550
15/15          0s 5ms/step - loss:
0.0217 - mae: 0.0782 - val_loss: 0.0214 - val_mae: 0.0756
Epoch 393/550
15/15          0s 5ms/step - loss:
0.0210 - mae: 0.0772 - val_loss: 0.0211 - val_mae: 0.0752
Epoch 394/550
15/15          0s 5ms/step - loss:
0.0199 - mae: 0.0761 - val_loss: 0.0211 - val_mae: 0.0743
Epoch 395/550
15/15          0s 5ms/step - loss:
0.0214 - mae: 0.0785 - val_loss: 0.0213 - val_mae: 0.0739
Epoch 396/550
15/15          0s 5ms/step - loss:
0.0204 - mae: 0.0763 - val_loss: 0.0211 - val_mae: 0.0746
Epoch 397/550
15/15          0s 7ms/step - loss:
0.0202 - mae: 0.0765 - val_loss: 0.0207 - val_mae: 0.0730
Epoch 398/550
15/15          0s 5ms/step - loss:
0.0213 - mae: 0.0785 - val_loss: 0.0211 - val_mae: 0.0744
Epoch 399/550
15/15          0s 5ms/step - loss:
0.0208 - mae: 0.0780 - val_loss: 0.0211 - val_mae: 0.0745
Epoch 400/550
15/15          0s 6ms/step - loss:
0.0203 - mae: 0.0771 - val_loss: 0.0209 - val_mae: 0.0746
Epoch 401/550
15/15          0s 5ms/step - loss:
0.0209 - mae: 0.0772 - val_loss: 0.0208 - val_mae: 0.0732
Epoch 402/550
15/15          0s 5ms/step - loss:
0.0211 - mae: 0.0780 - val_loss: 0.0211 - val_mae: 0.0733
Epoch 403/550
15/15          0s 5ms/step - loss:
0.0209 - mae: 0.0770 - val_loss: 0.0212 - val_mae: 0.0739
Epoch 404/550
15/15          0s 5ms/step - loss:
0.0187 - mae: 0.0747 - val_loss: 0.0210 - val_mae: 0.0725
Epoch 405/550
15/15          0s 5ms/step - loss:
0.0200 - mae: 0.0748 - val_loss: 0.0210 - val_mae: 0.0736
Epoch 406/550
15/15          0s 6ms/step - loss:
0.0198 - mae: 0.0766 - val_loss: 0.0211 - val_mae: 0.0748
Epoch 407/550
15/15          0s 5ms/step - loss:
```

0.0195 - mae: 0.0753 - val_loss: 0.0214 - val_mae: 0.0734
Epoch 408/550
15/15   0s 5ms/step - loss:
0.0211 - mae: 0.0774 - val_loss: 0.0211 - val_mae: 0.0731
Epoch 409/550
15/15   0s 5ms/step - loss:
0.0192 - mae: 0.0739 - val_loss: 0.0208 - val_mae: 0.0731
Epoch 410/550
15/15   0s 5ms/step - loss:
0.0208 - mae: 0.0771 - val_loss: 0.0206 - val_mae: 0.0738
Epoch 411/550
15/15   0s 5ms/step - loss:
0.0209 - mae: 0.0778 - val_loss: 0.0213 - val_mae: 0.0769
Epoch 412/550
15/15   0s 6ms/step - loss:
0.0199 - mae: 0.0762 - val_loss: 0.0206 - val_mae: 0.0741
Epoch 413/550
15/15   0s 5ms/step - loss:
0.0191 - mae: 0.0749 - val_loss: 0.0209 - val_mae: 0.0759
Epoch 414/550
15/15   0s 7ms/step - loss:
0.0194 - mae: 0.0759 - val_loss: 0.0207 - val_mae: 0.0743
Epoch 415/550
15/15   0s 5ms/step - loss:
0.0193 - mae: 0.0752 - val_loss: 0.0206 - val_mae: 0.0741
Epoch 416/550
15/15   0s 5ms/step - loss:
0.0203 - mae: 0.0762 - val_loss: 0.0205 - val_mae: 0.0744
Epoch 417/550
15/15   0s 5ms/step - loss:
0.0191 - mae: 0.0747 - val_loss: 0.0205 - val_mae: 0.0740
Epoch 418/550
15/15   0s 5ms/step - loss:
0.0183 - mae: 0.0738 - val_loss: 0.0210 - val_mae: 0.0755
Epoch 419/550
15/15   0s 5ms/step - loss:
0.0200 - mae: 0.0762 - val_loss: 0.0206 - val_mae: 0.0748
Epoch 420/550
15/15   0s 6ms/step - loss:
0.0203 - mae: 0.0767 - val_loss: 0.0213 - val_mae: 0.0754
Epoch 421/550
15/15   0s 5ms/step - loss:
0.0196 - mae: 0.0759 - val_loss: 0.0214 - val_mae: 0.0743
Epoch 422/550
15/15   0s 7ms/step - loss:
0.0189 - mae: 0.0744 - val_loss: 0.0209 - val_mae: 0.0746
Epoch 423/550
15/15   0s 5ms/step - loss:

```
0.0200 - mae: 0.0764 - val_loss: 0.0209 - val_mae: 0.0734
Epoch 424/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0740 - val_loss: 0.0211 - val_mae: 0.0741
Epoch 425/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0747 - val_loss: 0.0207 - val_mae: 0.0735
Epoch 426/550
15/15          0s 5ms/step - loss:
0.0197 - mae: 0.0755 - val_loss: 0.0211 - val_mae: 0.0746
Epoch 427/550
15/15          0s 5ms/step - loss:
0.0180 - mae: 0.0737 - val_loss: 0.0209 - val_mae: 0.0735
Epoch 428/550
15/15          0s 5ms/step - loss:
0.0179 - mae: 0.0738 - val_loss: 0.0210 - val_mae: 0.0730
Epoch 429/550
15/15          0s 5ms/step - loss:
0.0185 - mae: 0.0747 - val_loss: 0.0206 - val_mae: 0.0735
Epoch 430/550
15/15          0s 7ms/step - loss:
0.0194 - mae: 0.0741 - val_loss: 0.0208 - val_mae: 0.0735
Epoch 431/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0751 - val_loss: 0.0210 - val_mae: 0.0756
Epoch 432/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0745 - val_loss: 0.0207 - val_mae: 0.0735
Epoch 433/550
15/15          0s 5ms/step - loss:
0.0203 - mae: 0.0756 - val_loss: 0.0217 - val_mae: 0.0750
Epoch 434/550
15/15          0s 6ms/step - loss:
0.0186 - mae: 0.0730 - val_loss: 0.0209 - val_mae: 0.0736
Epoch 435/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0752 - val_loss: 0.0216 - val_mae: 0.0763
Epoch 436/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0746 - val_loss: 0.0213 - val_mae: 0.0761
Epoch 437/550
15/15          0s 5ms/step - loss:
0.0185 - mae: 0.0732 - val_loss: 0.0221 - val_mae: 0.0782
Epoch 438/550
15/15          0s 6ms/step - loss:
0.0184 - mae: 0.0743 - val_loss: 0.0216 - val_mae: 0.0757
Epoch 439/550
15/15          0s 5ms/step - loss:
```

```
0.0191 - mae: 0.0753 - val_loss: 0.0211 - val_mae: 0.0741
Epoch 440/550
15/15              0s 5ms/step - loss:
0.0186 - mae: 0.0739 - val_loss: 0.0209 - val_mae: 0.0732
Epoch 441/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0732 - val_loss: 0.0208 - val_mae: 0.0737
```
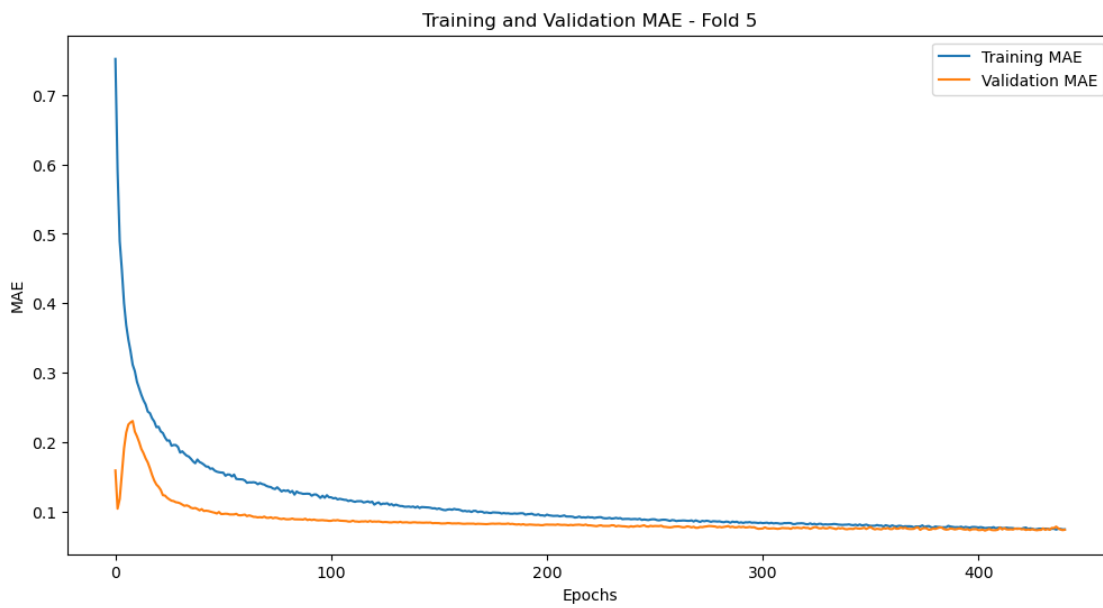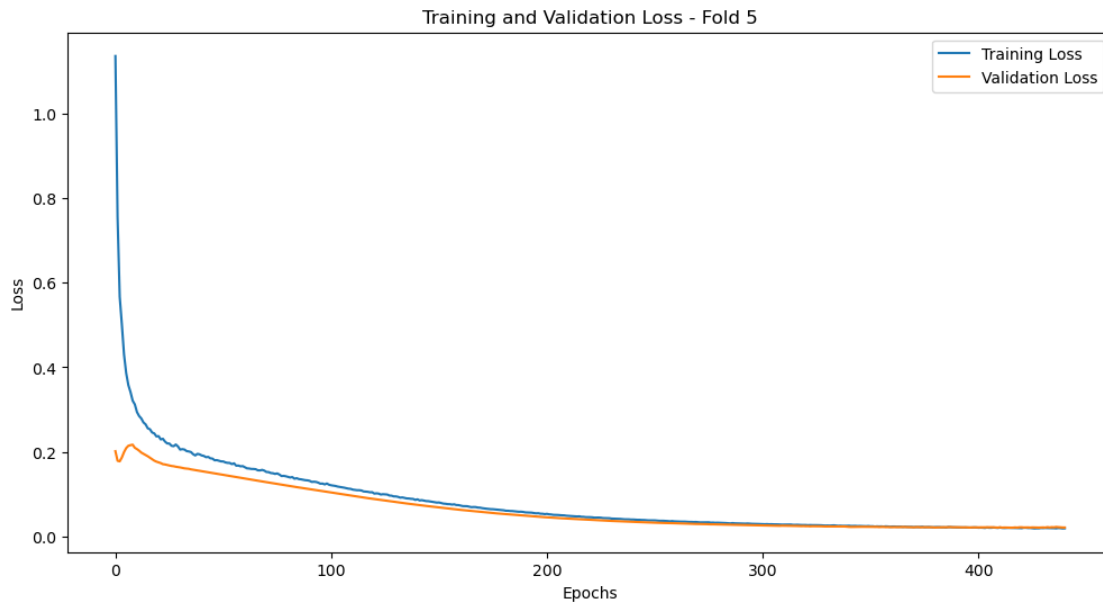
Fold Validation MAE: 0.07436167448759079
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

15/15   2s 17ms/step -
loss: 2.4002 - mae: 1.1056 - val_loss: 0.2219 - val_mae: 0.1835
Epoch 2/550
15/15   0s 5ms/step - loss:
1.1032 - mae: 0.7598 - val_loss: 0.1912 - val_mae: 0.1383
Epoch 3/550
15/15   0s 5ms/step - loss:
0.8648 - mae: 0.6527 - val_loss: 0.2200 - val_mae: 0.2177
Epoch 4/550
15/15   0s 5ms/step - loss:
0.7054 - mae: 0.5802 - val_loss: 0.2610 - val_mae: 0.2924
Epoch 5/550
15/15   0s 5ms/step - loss:
0.6132 - mae: 0.5258 - val_loss: 0.2947 - val_mae: 0.3411
Epoch 6/550
15/15   0s 5ms/step - loss:
0.5377 - mae: 0.4797 - val_loss: 0.3083 - val_mae: 0.3583
Epoch 7/550
15/15   0s 5ms/step - loss:
0.4982 - mae: 0.4524 - val_loss: 0.3090 - val_mae: 0.3578
Epoch 8/550
15/15   0s 5ms/step - loss:
0.4754 - mae: 0.4378 - val_loss: 0.3045 - val_mae: 0.3512
Epoch 9/550
15/15   0s 5ms/step - loss:
0.4381 - mae: 0.4116 - val_loss: 0.2981 - val_mae: 0.3415
Epoch 10/550
15/15   0s 5ms/step - loss:
0.4085 - mae: 0.3901 - val_loss: 0.2879 - val_mae: 0.3273
Epoch 11/550
15/15   0s 5ms/step - loss:
0.3937 - mae: 0.3806 - val_loss: 0.2692 - val_mae: 0.3005
Epoch 12/550
15/15   0s 5ms/step - loss:
0.3790 - mae: 0.3682 - val_loss: 0.2599 - val_mae: 0.2859
Epoch 13/550
15/15   0s 5ms/step - loss:
0.3559 - mae: 0.3481 - val_loss: 0.2473 - val_mae: 0.2653
Epoch 14/550
15/15   0s 5ms/step - loss:

```
0.3550 - mae: 0.3456 - val_loss: 0.2384 - val_mae: 0.2496
Epoch 15/550
15/15          0s 5ms/step - loss:
0.3407 - mae: 0.3344 - val_loss: 0.2302 - val_mae: 0.2338
Epoch 16/550
15/15          0s 5ms/step - loss:
0.3276 - mae: 0.3193 - val_loss: 0.2189 - val_mae: 0.2141
Epoch 17/550
15/15          0s 5ms/step - loss:
0.3205 - mae: 0.3133 - val_loss: 0.2140 - val_mae: 0.2060
Epoch 18/550
15/15          0s 5ms/step - loss:
0.3220 - mae: 0.3177 - val_loss: 0.2076 - val_mae: 0.1923
Epoch 19/550
15/15          0s 6ms/step - loss:
0.3047 - mae: 0.3001 - val_loss: 0.2045 - val_mae: 0.1848
Epoch 20/550
15/15          0s 5ms/step - loss:
0.3007 - mae: 0.2963 - val_loss: 0.2015 - val_mae: 0.1782
Epoch 21/550
15/15          0s 5ms/step - loss:
0.2927 - mae: 0.2851 - val_loss: 0.1974 - val_mae: 0.1681
Epoch 22/550
15/15          0s 5ms/step - loss:
0.2842 - mae: 0.2802 - val_loss: 0.1954 - val_mae: 0.1635
Epoch 23/550
15/15          0s 5ms/step - loss:
0.2806 - mae: 0.2758 - val_loss: 0.1928 - val_mae: 0.1565
Epoch 24/550
15/15          0s 5ms/step - loss:
0.2753 - mae: 0.2691 - val_loss: 0.1905 - val_mae: 0.1508
Epoch 25/550
15/15          0s 5ms/step - loss:
0.2804 - mae: 0.2725 - val_loss: 0.1892 - val_mae: 0.1481
Epoch 26/550
15/15          0s 5ms/step - loss:
0.2772 - mae: 0.2707 - val_loss: 0.1881 - val_mae: 0.1467
Epoch 27/550
15/15          0s 5ms/step - loss:
0.2660 - mae: 0.2585 - val_loss: 0.1872 - val_mae: 0.1453
Epoch 28/550
15/15          0s 5ms/step - loss:
0.2630 - mae: 0.2580 - val_loss: 0.1871 - val_mae: 0.1456
Epoch 29/550
15/15          0s 5ms/step - loss:
0.2636 - mae: 0.2580 - val_loss: 0.1857 - val_mae: 0.1425
Epoch 30/550
15/15          0s 5ms/step - loss:
```

```
0.2561 - mae: 0.2507 - val_loss: 0.1844 - val_mae: 0.1401
Epoch 31/550
15/15          0s 5ms/step - loss:
0.2511 - mae: 0.2447 - val_loss: 0.1829 - val_mae: 0.1362
Epoch 32/550
15/15          0s 5ms/step - loss:
0.2519 - mae: 0.2454 - val_loss: 0.1821 - val_mae: 0.1351
Epoch 33/550
15/15          0s 5ms/step - loss:
0.2459 - mae: 0.2381 - val_loss: 0.1815 - val_mae: 0.1345
Epoch 34/550
15/15          0s 6ms/step - loss:
0.2423 - mae: 0.2358 - val_loss: 0.1802 - val_mae: 0.1312
Epoch 35/550
15/15          0s 5ms/step - loss:
0.2415 - mae: 0.2310 - val_loss: 0.1795 - val_mae: 0.1311
Epoch 36/550
15/15          0s 5ms/step - loss:
0.2423 - mae: 0.2326 - val_loss: 0.1787 - val_mae: 0.1300
Epoch 37/550
15/15          0s 5ms/step - loss:
0.2359 - mae: 0.2279 - val_loss: 0.1780 - val_mae: 0.1288
Epoch 38/550
15/15          0s 5ms/step - loss:
0.2299 - mae: 0.2235 - val_loss: 0.1768 - val_mae: 0.1266
Epoch 39/550
15/15          0s 5ms/step - loss:
0.2297 - mae: 0.2201 - val_loss: 0.1761 - val_mae: 0.1253
Epoch 40/550
15/15          0s 7ms/step - loss:
0.2296 - mae: 0.2205 - val_loss: 0.1752 - val_mae: 0.1252
Epoch 41/550
15/15          0s 5ms/step - loss:
0.2327 - mae: 0.2214 - val_loss: 0.1744 - val_mae: 0.1252
Epoch 42/550
15/15          0s 5ms/step - loss:
0.2247 - mae: 0.2129 - val_loss: 0.1736 - val_mae: 0.1245
Epoch 43/550
15/15          0s 5ms/step - loss:
0.2261 - mae: 0.2143 - val_loss: 0.1729 - val_mae: 0.1223
Epoch 44/550
15/15          0s 5ms/step - loss:
0.2204 - mae: 0.2109 - val_loss: 0.1717 - val_mae: 0.1209
Epoch 45/550
15/15          0s 5ms/step - loss:
0.2187 - mae: 0.2087 - val_loss: 0.1710 - val_mae: 0.1201
Epoch 46/550
15/15          0s 5ms/step - loss:
```

```
0.2199 - mae: 0.2065 - val_loss: 0.1705 - val_mae: 0.1201
Epoch 47/550
15/15          0s 5ms/step - loss:
0.2175 - mae: 0.2038 - val_loss: 0.1695 - val_mae: 0.1178
Epoch 48/550
15/15          0s 5ms/step - loss:
0.2122 - mae: 0.2019 - val_loss: 0.1686 - val_mae: 0.1176
Epoch 49/550
15/15          0s 5ms/step - loss:
0.2074 - mae: 0.1965 - val_loss: 0.1678 - val_mae: 0.1166
Epoch 50/550
15/15          0s 5ms/step - loss:
0.2121 - mae: 0.2004 - val_loss: 0.1673 - val_mae: 0.1162
Epoch 51/550
15/15          0s 5ms/step - loss:
0.2087 - mae: 0.1981 - val_loss: 0.1667 - val_mae: 0.1153
Epoch 52/550
15/15          0s 5ms/step - loss:
0.2101 - mae: 0.1966 - val_loss: 0.1657 - val_mae: 0.1143
Epoch 53/550
15/15          0s 5ms/step - loss:
0.2117 - mae: 0.2004 - val_loss: 0.1651 - val_mae: 0.1145
Epoch 54/550
15/15          0s 5ms/step - loss:
0.2075 - mae: 0.1954 - val_loss: 0.1641 - val_mae: 0.1135
Epoch 55/550
15/15          0s 5ms/step - loss:
0.2050 - mae: 0.1910 - val_loss: 0.1636 - val_mae: 0.1126
Epoch 56/550
15/15          0s 6ms/step - loss:
0.2022 - mae: 0.1928 - val_loss: 0.1630 - val_mae: 0.1130
Epoch 57/550
15/15          0s 5ms/step - loss:
0.2018 - mae: 0.1900 - val_loss: 0.1621 - val_mae: 0.1107
Epoch 58/550
15/15          0s 7ms/step - loss:
0.2016 - mae: 0.1877 - val_loss: 0.1615 - val_mae: 0.1111
Epoch 59/550
15/15          0s 5ms/step - loss:
0.2011 - mae: 0.1884 - val_loss: 0.1608 - val_mae: 0.1102
Epoch 60/550
15/15          0s 5ms/step - loss:
0.1963 - mae: 0.1843 - val_loss: 0.1600 - val_mae: 0.1095
Epoch 61/550
15/15          0s 5ms/step - loss:
0.1975 - mae: 0.1836 - val_loss: 0.1594 - val_mae: 0.1102
Epoch 62/550
15/15          0s 5ms/step - loss:
```

0.1955 - mae: 0.1845 - val_loss: 0.1587 - val_mae: 0.1095
Epoch 63/550
15/15   0s 5ms/step - loss:
0.1981 - mae: 0.1839 - val_loss: 0.1579 - val_mae: 0.1081
Epoch 64/550
15/15   0s 5ms/step - loss:
0.1930 - mae: 0.1817 - val_loss: 0.1572 - val_mae: 0.1080
Epoch 65/550
15/15   0s 5ms/step - loss:
0.1927 - mae: 0.1786 - val_loss: 0.1566 - val_mae: 0.1080
Epoch 66/550
15/15   0s 5ms/step - loss:
0.1884 - mae: 0.1781 - val_loss: 0.1559 - val_mae: 0.1067
Epoch 67/550
15/15   0s 5ms/step - loss:
0.1911 - mae: 0.1790 - val_loss: 0.1551 - val_mae: 0.1067
Epoch 68/550
15/15   0s 5ms/step - loss:
0.1861 - mae: 0.1767 - val_loss: 0.1543 - val_mae: 0.1062
Epoch 69/550
15/15   0s 5ms/step - loss:
0.1866 - mae: 0.1764 - val_loss: 0.1542 - val_mae: 0.1053
Epoch 70/550
15/15   0s 5ms/step - loss:
0.1818 - mae: 0.1706 - val_loss: 0.1535 - val_mae: 0.1063
Epoch 71/550
15/15   0s 5ms/step - loss:
0.1803 - mae: 0.1692 - val_loss: 0.1524 - val_mae: 0.1059
Epoch 72/550
15/15   0s 5ms/step - loss:
0.1814 - mae: 0.1695 - val_loss: 0.1519 - val_mae: 0.1047
Epoch 73/550
15/15   0s 5ms/step - loss:
0.1807 - mae: 0.1698 - val_loss: 0.1511 - val_mae: 0.1042
Epoch 74/550
15/15   0s 5ms/step - loss:
0.1842 - mae: 0.1709 - val_loss: 0.1504 - val_mae: 0.1029
Epoch 75/550
15/15   0s 5ms/step - loss:
0.1787 - mae: 0.1680 - val_loss: 0.1496 - val_mae: 0.1038
Epoch 76/550
15/15   0s 5ms/step - loss:
0.1771 - mae: 0.1674 - val_loss: 0.1490 - val_mae: 0.1038
Epoch 77/550
15/15   0s 6ms/step - loss:
0.1789 - mae: 0.1671 - val_loss: 0.1483 - val_mae: 0.1029
Epoch 78/550
15/15   0s 6ms/step - loss:

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0.1727 - mae: 0.1634 - val_loss: 0.1475 - val_mae: 0.1022
Epoch 79/550
15/15          0s 6ms/step - loss:
0.1740 - mae: 0.1639 - val_loss: 0.1469 - val_mae: 0.1011
Epoch 80/550
15/15          0s 5ms/step - loss:
0.1758 - mae: 0.1628 - val_loss: 0.1464 - val_mae: 0.1023
Epoch 81/550
15/15          0s 5ms/step - loss:
0.1721 - mae: 0.1638 - val_loss: 0.1456 - val_mae: 0.1013
Epoch 82/550
15/15          0s 6ms/step - loss:
0.1706 - mae: 0.1609 - val_loss: 0.1449 - val_mae: 0.1006
Epoch 83/550
15/15          0s 5ms/step - loss:
0.1710 - mae: 0.1619 - val_loss: 0.1443 - val_mae: 0.1003
Epoch 84/550
15/15          0s 5ms/step - loss:
0.1701 - mae: 0.1568 - val_loss: 0.1435 - val_mae: 0.1006
Epoch 85/550
15/15          0s 5ms/step - loss:
0.1664 - mae: 0.1570 - val_loss: 0.1428 - val_mae: 0.0996
Epoch 86/550
15/15          0s 5ms/step - loss:
0.1637 - mae: 0.1543 - val_loss: 0.1424 - val_mae: 0.0996
Epoch 87/550
15/15          0s 5ms/step - loss:
0.1675 - mae: 0.1585 - val_loss: 0.1417 - val_mae: 0.0989
Epoch 88/550
15/15          0s 5ms/step - loss:
0.1627 - mae: 0.1547 - val_loss: 0.1408 - val_mae: 0.0988
Epoch 89/550
15/15          0s 5ms/step - loss:
0.1635 - mae: 0.1549 - val_loss: 0.1403 - val_mae: 0.0991
Epoch 90/550
15/15          0s 5ms/step - loss:
0.1604 - mae: 0.1497 - val_loss: 0.1396 - val_mae: 0.0998
Epoch 91/550
15/15          0s 5ms/step - loss:
0.1612 - mae: 0.1522 - val_loss: 0.1391 - val_mae: 0.0990
Epoch 92/550
15/15          0s 5ms/step - loss:
0.1629 - mae: 0.1550 - val_loss: 0.1382 - val_mae: 0.0982
Epoch 93/550
15/15          0s 5ms/step - loss:
0.1621 - mae: 0.1536 - val_loss: 0.1376 - val_mae: 0.0993
Epoch 94/550
15/15          0s 7ms/step - loss:
```

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0.1574 - mae: 0.1486 - val_loss: 0.1368 - val_mae: 0.0974
Epoch 95/550
15/15          0s 5ms/step - loss:
0.1557 - mae: 0.1487 - val_loss: 0.1362 - val_mae: 0.0974
Epoch 96/550
15/15          0s 5ms/step - loss:
0.1582 - mae: 0.1524 - val_loss: 0.1356 - val_mae: 0.0972
Epoch 97/550
15/15          0s 5ms/step - loss:
0.1584 - mae: 0.1506 - val_loss: 0.1348 - val_mae: 0.0969
Epoch 98/550
15/15          0s 5ms/step - loss:
0.1566 - mae: 0.1488 - val_loss: 0.1344 - val_mae: 0.0981
Epoch 99/550
15/15          0s 5ms/step - loss:
0.1564 - mae: 0.1505 - val_loss: 0.1337 - val_mae: 0.0967
Epoch 100/550
15/15          0s 5ms/step - loss:
0.1546 - mae: 0.1509 - val_loss: 0.1328 - val_mae: 0.0967
Epoch 101/550
15/15          0s 6ms/step - loss:
0.1529 - mae: 0.1462 - val_loss: 0.1321 - val_mae: 0.0965
Epoch 102/550
15/15          0s 5ms/step - loss:
0.1510 - mae: 0.1475 - val_loss: 0.1315 - val_mae: 0.0956
Epoch 103/550
15/15          0s 6ms/step - loss:
0.1515 - mae: 0.1467 - val_loss: 0.1307 - val_mae: 0.0950
Epoch 104/550
15/15          0s 5ms/step - loss:
0.1449 - mae: 0.1407 - val_loss: 0.1300 - val_mae: 0.0961
Epoch 105/550
15/15          0s 5ms/step - loss:
0.1473 - mae: 0.1455 - val_loss: 0.1297 - val_mae: 0.0954
Epoch 106/550
15/15          0s 5ms/step - loss:
0.1466 - mae: 0.1419 - val_loss: 0.1291 - val_mae: 0.0957
Epoch 107/550
15/15          0s 5ms/step - loss:
0.1451 - mae: 0.1402 - val_loss: 0.1283 - val_mae: 0.0956
Epoch 108/550
15/15          0s 5ms/step - loss:
0.1458 - mae: 0.1425 - val_loss: 0.1276 - val_mae: 0.0959
Epoch 109/550
15/15          0s 5ms/step - loss:
0.1442 - mae: 0.1396 - val_loss: 0.1270 - val_mae: 0.0956
Epoch 110/550
15/15          0s 5ms/step - loss:
```

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0.1422 - mae: 0.1392 - val_loss: 0.1263 - val_mae: 0.0950
Epoch 111/550
15/15              0s 6ms/step - loss:
0.1441 - mae: 0.1428 - val_loss: 0.1256 - val_mae: 0.0945
Epoch 112/550
15/15              0s 5ms/step - loss:
0.1429 - mae: 0.1409 - val_loss: 0.1250 - val_mae: 0.0948
Epoch 113/550
15/15              0s 5ms/step - loss:
0.1424 - mae: 0.1393 - val_loss: 0.1245 - val_mae: 0.0960
Epoch 114/550
15/15              0s 5ms/step - loss:
0.1389 - mae: 0.1375 - val_loss: 0.1238 - val_mae: 0.0958
Epoch 115/550
15/15              0s 5ms/step - loss:
0.1388 - mae: 0.1404 - val_loss: 0.1230 - val_mae: 0.0958
Epoch 116/550
15/15              0s 5ms/step - loss:
0.1367 - mae: 0.1374 - val_loss: 0.1224 - val_mae: 0.0946
Epoch 117/550
15/15              0s 5ms/step - loss:
0.1353 - mae: 0.1353 - val_loss: 0.1217 - val_mae: 0.0951
Epoch 118/550
15/15              0s 5ms/step - loss:
0.1359 - mae: 0.1361 - val_loss: 0.1211 - val_mae: 0.0949
Epoch 119/550
15/15              0s 5ms/step - loss:
0.1348 - mae: 0.1363 - val_loss: 0.1206 - val_mae: 0.0950
Epoch 120/550
15/15              0s 5ms/step - loss:
0.1364 - mae: 0.1379 - val_loss: 0.1197 - val_mae: 0.0938
Epoch 121/550
15/15              0s 5ms/step - loss:
0.1340 - mae: 0.1375 - val_loss: 0.1192 - val_mae: 0.0947
Epoch 122/550
15/15              0s 6ms/step - loss:
0.1323 - mae: 0.1348 - val_loss: 0.1184 - val_mae: 0.0946
Epoch 123/550
15/15              0s 6ms/step - loss:
0.1323 - mae: 0.1353 - val_loss: 0.1176 - val_mae: 0.0940
Epoch 124/550
15/15              0s 6ms/step - loss:
0.1303 - mae: 0.1336 - val_loss: 0.1171 - val_mae: 0.0942
Epoch 125/550
15/15              0s 5ms/step - loss:
0.1291 - mae: 0.1336 - val_loss: 0.1164 - val_mae: 0.0947
Epoch 126/550
15/15              0s 6ms/step - loss:
```

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0.1280 - mae: 0.1302 - val_loss: 0.1158 - val_mae: 0.0942
Epoch 127/550
15/15          0s 5ms/step - loss:
0.1284 - mae: 0.1326 - val_loss: 0.1151 - val_mae: 0.0942
Epoch 128/550
15/15          0s 5ms/step - loss:
0.1260 - mae: 0.1310 - val_loss: 0.1145 - val_mae: 0.0926
Epoch 129/550
15/15          0s 6ms/step - loss:
0.1266 - mae: 0.1303 - val_loss: 0.1138 - val_mae: 0.0943
Epoch 130/550
15/15          0s 5ms/step - loss:
0.1247 - mae: 0.1294 - val_loss: 0.1132 - val_mae: 0.0940
Epoch 131/550
15/15          0s 5ms/step - loss:
0.1256 - mae: 0.1309 - val_loss: 0.1126 - val_mae: 0.0923
Epoch 132/550
15/15          0s 5ms/step - loss:
0.1212 - mae: 0.1265 - val_loss: 0.1119 - val_mae: 0.0928
Epoch 133/550
15/15          0s 5ms/step - loss:
0.1221 - mae: 0.1282 - val_loss: 0.1112 - val_mae: 0.0926
Epoch 134/550
15/15          0s 5ms/step - loss:
0.1211 - mae: 0.1273 - val_loss: 0.1106 - val_mae: 0.0935
Epoch 135/550
15/15          0s 5ms/step - loss:
0.1201 - mae: 0.1269 - val_loss: 0.1099 - val_mae: 0.0921
Epoch 136/550
15/15          0s 5ms/step - loss:
0.1214 - mae: 0.1265 - val_loss: 0.1093 - val_mae: 0.0927
Epoch 137/550
15/15          0s 5ms/step - loss:
0.1202 - mae: 0.1302 - val_loss: 0.1087 - val_mae: 0.0936
Epoch 138/550
15/15          0s 5ms/step - loss:
0.1200 - mae: 0.1282 - val_loss: 0.1082 - val_mae: 0.0933
Epoch 139/550
15/15          0s 5ms/step - loss:
0.1192 - mae: 0.1295 - val_loss: 0.1073 - val_mae: 0.0928
Epoch 140/550
15/15          0s 5ms/step - loss:
0.1174 - mae: 0.1260 - val_loss: 0.1070 - val_mae: 0.0921
Epoch 141/550
15/15          0s 5ms/step - loss:
0.1170 - mae: 0.1268 - val_loss: 0.1060 - val_mae: 0.0910
Epoch 142/550
15/15          0s 5ms/step - loss:
```

0.1159 - mae: 0.1250 - val_loss: 0.1053 - val_mae: 0.0916
Epoch 143/550
15/15   0s 7ms/step - loss:
0.1133 - mae: 0.1217 - val_loss: 0.1048 - val_mae: 0.0915
Epoch 144/550
15/15   0s 5ms/step - loss:
0.1175 - mae: 0.1289 - val_loss: 0.1042 - val_mae: 0.0914
Epoch 145/550
15/15   0s 6ms/step - loss:
0.1139 - mae: 0.1268 - val_loss: 0.1037 - val_mae: 0.0934
Epoch 146/550
15/15   0s 5ms/step - loss:
0.1126 - mae: 0.1249 - val_loss: 0.1029 - val_mae: 0.0910
Epoch 147/550
15/15   0s 5ms/step - loss:
0.1102 - mae: 0.1214 - val_loss: 0.1022 - val_mae: 0.0922
Epoch 148/550
15/15   0s 5ms/step - loss:
0.1139 - mae: 0.1257 - val_loss: 0.1016 - val_mae: 0.0918
Epoch 149/550
15/15   0s 5ms/step - loss:
0.1094 - mae: 0.1244 - val_loss: 0.1011 - val_mae: 0.0918
Epoch 150/550
15/15   0s 5ms/step - loss:
0.1114 - mae: 0.1255 - val_loss: 0.1005 - val_mae: 0.0920
Epoch 151/550
15/15   0s 5ms/step - loss:
0.1087 - mae: 0.1215 - val_loss: 0.0997 - val_mae: 0.0914
Epoch 152/550
15/15   0s 5ms/step - loss:
0.1065 - mae: 0.1210 - val_loss: 0.0993 - val_mae: 0.0916
Epoch 153/550
15/15   0s 5ms/step - loss:
0.1061 - mae: 0.1193 - val_loss: 0.0984 - val_mae: 0.0922
Epoch 154/550
15/15   0s 5ms/step - loss:
0.1052 - mae: 0.1208 - val_loss: 0.0980 - val_mae: 0.0916
Epoch 155/550
15/15   0s 5ms/step - loss:
0.1049 - mae: 0.1206 - val_loss: 0.0974 - val_mae: 0.0909
Epoch 156/550
15/15   0s 5ms/step - loss:
0.1045 - mae: 0.1205 - val_loss: 0.0967 - val_mae: 0.0904
Epoch 157/550
15/15   0s 5ms/step - loss:
0.1054 - mae: 0.1214 - val_loss: 0.0962 - val_mae: 0.0903
Epoch 158/550
15/15   0s 7ms/step - loss:

0.1041 - mae: 0.1187 - val_loss: 0.0955 - val_mae: 0.0909
Epoch 159/550
15/15   0s 5ms/step - loss:
0.0997 - mae: 0.1170 - val_loss: 0.0949 - val_mae: 0.0904
Epoch 160/550
15/15   0s 5ms/step - loss:
0.1005 - mae: 0.1168 - val_loss: 0.0943 - val_mae: 0.0897
Epoch 161/550
15/15   0s 5ms/step - loss:
0.1005 - mae: 0.1172 - val_loss: 0.0937 - val_mae: 0.0899
Epoch 162/550
15/15   0s 5ms/step - loss:
0.1007 - mae: 0.1183 - val_loss: 0.0929 - val_mae: 0.0905
Epoch 163/550
15/15   0s 5ms/step - loss:
0.0999 - mae: 0.1189 - val_loss: 0.0924 - val_mae: 0.0906
Epoch 164/550
15/15   0s 5ms/step - loss:
0.0982 - mae: 0.1180 - val_loss: 0.0919 - val_mae: 0.0904
Epoch 165/550
15/15   0s 6ms/step - loss:
0.0977 - mae: 0.1164 - val_loss: 0.0913 - val_mae: 0.0904
Epoch 166/550
15/15   0s 6ms/step - loss:
0.0963 - mae: 0.1166 - val_loss: 0.0906 - val_mae: 0.0905
Epoch 167/550
15/15   0s 6ms/step - loss:
0.0974 - mae: 0.1194 - val_loss: 0.0901 - val_mae: 0.0897
Epoch 168/550
15/15   0s 5ms/step - loss:
0.0976 - mae: 0.1179 - val_loss: 0.0894 - val_mae: 0.0890
Epoch 169/550
15/15   0s 5ms/step - loss:
0.0962 - mae: 0.1150 - val_loss: 0.0890 - val_mae: 0.0899
Epoch 170/550
15/15   0s 5ms/step - loss:
0.0939 - mae: 0.1145 - val_loss: 0.0883 - val_mae: 0.0909
Epoch 171/550
15/15   0s 5ms/step - loss:
0.0942 - mae: 0.1146 - val_loss: 0.0878 - val_mae: 0.0901
Epoch 172/550
15/15   0s 7ms/step - loss:
0.0941 - mae: 0.1150 - val_loss: 0.0871 - val_mae: 0.0898
Epoch 173/550
15/15   0s 6ms/step - loss:
0.0908 - mae: 0.1122 - val_loss: 0.0866 - val_mae: 0.0895
Epoch 174/550
15/15   0s 5ms/step - loss:

0.0927 - mae: 0.1138 - val_loss: 0.0859 - val_mae: 0.0895
Epoch 175/550
15/15   0s 5ms/step - loss:
0.0888 - mae: 0.1115 - val_loss: 0.0852 - val_mae: 0.0888
Epoch 176/550
15/15   0s 5ms/step - loss:
0.0889 - mae: 0.1117 - val_loss: 0.0849 - val_mae: 0.0891
Epoch 177/550
15/15   0s 5ms/step - loss:
0.0902 - mae: 0.1140 - val_loss: 0.0843 - val_mae: 0.0891
Epoch 178/550
15/15   0s 5ms/step - loss:
0.0891 - mae: 0.1138 - val_loss: 0.0835 - val_mae: 0.0884
Epoch 179/550
15/15   0s 5ms/step - loss:
0.0901 - mae: 0.1140 - val_loss: 0.0831 - val_mae: 0.0888
Epoch 180/550
15/15   0s 5ms/step - loss:
0.0853 - mae: 0.1106 - val_loss: 0.0827 - val_mae: 0.0894
Epoch 181/550
15/15   0s 5ms/step - loss:
0.0867 - mae: 0.1111 - val_loss: 0.0822 - val_mae: 0.0887
Epoch 182/550
15/15   0s 5ms/step - loss:
0.0869 - mae: 0.1119 - val_loss: 0.0815 - val_mae: 0.0892
Epoch 183/550
15/15   0s 5ms/step - loss:
0.0842 - mae: 0.1101 - val_loss: 0.0809 - val_mae: 0.0883
Epoch 184/550
15/15   0s 5ms/step - loss:
0.0862 - mae: 0.1123 - val_loss: 0.0804 - val_mae: 0.0887
Epoch 185/550
15/15   0s 5ms/step - loss:
0.0855 - mae: 0.1111 - val_loss: 0.0800 - val_mae: 0.0882
Epoch 186/550
15/15   0s 6ms/step - loss:
0.0853 - mae: 0.1123 - val_loss: 0.0793 - val_mae: 0.0884
Epoch 187/550
15/15   0s 5ms/step - loss:
0.0823 - mae: 0.1083 - val_loss: 0.0788 - val_mae: 0.0888
Epoch 188/550
15/15   0s 6ms/step - loss:
0.0812 - mae: 0.1098 - val_loss: 0.0785 - val_mae: 0.0887
Epoch 189/550
15/15   0s 5ms/step - loss:
0.0821 - mae: 0.1111 - val_loss: 0.0778 - val_mae: 0.0881
Epoch 190/550
15/15   0s 5ms/step - loss:

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0.0805 - mae: 0.1079 - val_loss: 0.0772 - val_mae: 0.0885
Epoch 191/550
15/15          0s 5ms/step - loss:
0.0809 - mae: 0.1086 - val_loss: 0.0768 - val_mae: 0.0885
Epoch 192/550
15/15          0s 5ms/step - loss:
0.0802 - mae: 0.1086 - val_loss: 0.0763 - val_mae: 0.0877
Epoch 193/550
15/15          0s 5ms/step - loss:
0.0776 - mae: 0.1066 - val_loss: 0.0756 - val_mae: 0.0875
Epoch 194/550
15/15          0s 5ms/step - loss:
0.0780 - mae: 0.1063 - val_loss: 0.0752 - val_mae: 0.0887
Epoch 195/550
15/15          0s 5ms/step - loss:
0.0792 - mae: 0.1102 - val_loss: 0.0749 - val_mae: 0.0890
Epoch 196/550
15/15          0s 5ms/step - loss:
0.0781 - mae: 0.1076 - val_loss: 0.0744 - val_mae: 0.0879
Epoch 197/550
15/15          0s 5ms/step - loss:
0.0764 - mae: 0.1066 - val_loss: 0.0739 - val_mae: 0.0878
Epoch 198/550
15/15          0s 5ms/step - loss:
0.0752 - mae: 0.1065 - val_loss: 0.0733 - val_mae: 0.0870
Epoch 199/550
15/15          0s 6ms/step - loss:
0.0746 - mae: 0.1037 - val_loss: 0.0727 - val_mae: 0.0870
Epoch 200/550
15/15          0s 5ms/step - loss:
0.0737 - mae: 0.1049 - val_loss: 0.0722 - val_mae: 0.0875
Epoch 201/550
15/15          0s 5ms/step - loss:
0.0766 - mae: 0.1086 - val_loss: 0.0717 - val_mae: 0.0871
Epoch 202/550
15/15          0s 5ms/step - loss:
0.0730 - mae: 0.1050 - val_loss: 0.0713 - val_mae: 0.0868
Epoch 203/550
15/15          0s 5ms/step - loss:
0.0722 - mae: 0.1049 - val_loss: 0.0709 - val_mae: 0.0872
Epoch 204/550
15/15          0s 5ms/step - loss:
0.0740 - mae: 0.1063 - val_loss: 0.0703 - val_mae: 0.0867
Epoch 205/550
15/15          0s 5ms/step - loss:
0.0731 - mae: 0.1070 - val_loss: 0.0699 - val_mae: 0.0869
Epoch 206/550
15/15          0s 5ms/step - loss:
```

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0.0712 - mae: 0.1047 - val_loss: 0.0695 - val_mae: 0.0864
Epoch 207/550
15/15          0s 5ms/step - loss:
0.0730 - mae: 0.1065 - val_loss: 0.0689 - val_mae: 0.0868
Epoch 208/550
15/15          0s 5ms/step - loss:
0.0735 - mae: 0.1059 - val_loss: 0.0684 - val_mae: 0.0872
Epoch 209/550
15/15          0s 5ms/step - loss:
0.0723 - mae: 0.1051 - val_loss: 0.0680 - val_mae: 0.0870
Epoch 210/550
15/15          0s 6ms/step - loss:
0.0707 - mae: 0.1042 - val_loss: 0.0675 - val_mae: 0.0866
Epoch 211/550
15/15          0s 6ms/step - loss:
0.0674 - mae: 0.1027 - val_loss: 0.0671 - val_mae: 0.0872
Epoch 212/550
15/15          0s 7ms/step - loss:
0.0683 - mae: 0.1020 - val_loss: 0.0667 - val_mae: 0.0881
Epoch 213/550
15/15          0s 5ms/step - loss:
0.0680 - mae: 0.1023 - val_loss: 0.0663 - val_mae: 0.0871
Epoch 214/550
15/15          0s 5ms/step - loss:
0.0706 - mae: 0.1047 - val_loss: 0.0658 - val_mae: 0.0870
Epoch 215/550
15/15          0s 5ms/step - loss:
0.0687 - mae: 0.1055 - val_loss: 0.0652 - val_mae: 0.0863
Epoch 216/550
15/15          0s 5ms/step - loss:
0.0659 - mae: 0.1020 - val_loss: 0.0648 - val_mae: 0.0862
Epoch 217/550
15/15          0s 5ms/step - loss:
0.0644 - mae: 0.0996 - val_loss: 0.0644 - val_mae: 0.0866
Epoch 218/550
15/15          0s 5ms/step - loss:
0.0641 - mae: 0.0989 - val_loss: 0.0639 - val_mae: 0.0861
Epoch 219/550
15/15          0s 5ms/step - loss:
0.0673 - mae: 0.1025 - val_loss: 0.0635 - val_mae: 0.0865
Epoch 220/550
15/15          0s 5ms/step - loss:
0.0637 - mae: 0.0998 - val_loss: 0.0631 - val_mae: 0.0865
Epoch 221/550
15/15          0s 5ms/step - loss:
0.0640 - mae: 0.1013 - val_loss: 0.0627 - val_mae: 0.0868
Epoch 222/550
15/15          0s 5ms/step - loss:
```

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0.0643 - mae: 0.1010 - val_loss: 0.0625 - val_mae: 0.0869
Epoch 223/550
15/15          0s 5ms/step - loss:
0.0626 - mae: 0.1016 - val_loss: 0.0619 - val_mae: 0.0860
Epoch 224/550
15/15          0s 5ms/step - loss:
0.0641 - mae: 0.1023 - val_loss: 0.0615 - val_mae: 0.0861
Epoch 225/550
15/15          0s 7ms/step - loss:
0.0630 - mae: 0.1008 - val_loss: 0.0612 - val_mae: 0.0863
Epoch 226/550
15/15          0s 5ms/step - loss:
0.0611 - mae: 0.1003 - val_loss: 0.0608 - val_mae: 0.0867
Epoch 227/550
15/15          0s 5ms/step - loss:
0.0603 - mae: 0.0988 - val_loss: 0.0604 - val_mae: 0.0860
Epoch 228/550
15/15          0s 5ms/step - loss:
0.0606 - mae: 0.0991 - val_loss: 0.0598 - val_mae: 0.0854
Epoch 229/550
15/15          0s 5ms/step - loss:
0.0611 - mae: 0.0991 - val_loss: 0.0595 - val_mae: 0.0859
Epoch 230/550
15/15          0s 5ms/step - loss:
0.0602 - mae: 0.1004 - val_loss: 0.0591 - val_mae: 0.0857
Epoch 231/550
15/15          0s 5ms/step - loss:
0.0596 - mae: 0.0996 - val_loss: 0.0588 - val_mae: 0.0858
Epoch 232/550
15/15          0s 6ms/step - loss:
0.0585 - mae: 0.0979 - val_loss: 0.0586 - val_mae: 0.0859
Epoch 233/550
15/15          0s 5ms/step - loss:
0.0577 - mae: 0.0979 - val_loss: 0.0582 - val_mae: 0.0856
Epoch 234/550
15/15          0s 5ms/step - loss:
0.0564 - mae: 0.0976 - val_loss: 0.0576 - val_mae: 0.0854
Epoch 235/550
15/15          0s 5ms/step - loss:
0.0576 - mae: 0.0977 - val_loss: 0.0572 - val_mae: 0.0854
Epoch 236/550
15/15          0s 5ms/step - loss:
0.0568 - mae: 0.0975 - val_loss: 0.0569 - val_mae: 0.0851
Epoch 237/550
15/15          0s 7ms/step - loss:
0.0563 - mae: 0.0971 - val_loss: 0.0565 - val_mae: 0.0848
Epoch 238/550
15/15          0s 5ms/step - loss:
```

```
0.0552 - mae: 0.0969 - val_loss: 0.0561 - val_mae: 0.0846
Epoch 239/550
15/15          0s 5ms/step - loss:
0.0562 - mae: 0.0996 - val_loss: 0.0560 - val_mae: 0.0861
Epoch 240/550
15/15          0s 5ms/step - loss:
0.0543 - mae: 0.0967 - val_loss: 0.0556 - val_mae: 0.0848
Epoch 241/550
15/15          0s 5ms/step - loss:
0.0564 - mae: 0.0984 - val_loss: 0.0553 - val_mae: 0.0860
Epoch 242/550
15/15          0s 5ms/step - loss:
0.0523 - mae: 0.0947 - val_loss: 0.0549 - val_mae: 0.0847
Epoch 243/550
15/15          0s 5ms/step - loss:
0.0544 - mae: 0.0974 - val_loss: 0.0545 - val_mae: 0.0850
Epoch 244/550
15/15          0s 5ms/step - loss:
0.0541 - mae: 0.0973 - val_loss: 0.0542 - val_mae: 0.0850
Epoch 245/550
15/15          0s 5ms/step - loss:
0.0543 - mae: 0.0983 - val_loss: 0.0537 - val_mae: 0.0845
Epoch 246/550
15/15          0s 5ms/step - loss:
0.0526 - mae: 0.0952 - val_loss: 0.0535 - val_mae: 0.0848
Epoch 247/550
15/15          0s 5ms/step - loss:
0.0527 - mae: 0.0966 - val_loss: 0.0530 - val_mae: 0.0847
Epoch 248/550
15/15          0s 5ms/step - loss:
0.0522 - mae: 0.0950 - val_loss: 0.0528 - val_mae: 0.0851
Epoch 249/550
15/15          0s 6ms/step - loss:
0.0514 - mae: 0.0952 - val_loss: 0.0525 - val_mae: 0.0848
Epoch 250/550
15/15          0s 5ms/step - loss:
0.0506 - mae: 0.0935 - val_loss: 0.0522 - val_mae: 0.0840
Epoch 251/550
15/15          0s 5ms/step - loss:
0.0509 - mae: 0.0948 - val_loss: 0.0520 - val_mae: 0.0848
Epoch 252/550
15/15          0s 5ms/step - loss:
0.0502 - mae: 0.0938 - val_loss: 0.0517 - val_mae: 0.0842
Epoch 253/550
15/15          0s 5ms/step - loss:
0.0513 - mae: 0.0962 - val_loss: 0.0514 - val_mae: 0.0846
Epoch 254/550
15/15          0s 6ms/step - loss:
```

0.0501 - mae: 0.0949 - val_loss: 0.0510 - val_mae: 0.0851
Epoch 255/550
15/15   0s 5ms/step - loss:
0.0507 - mae: 0.0959 - val_loss: 0.0507 - val_mae: 0.0843
Epoch 256/550
15/15   0s 5ms/step - loss:
0.0485 - mae: 0.0939 - val_loss: 0.0504 - val_mae: 0.0839
Epoch 257/550
15/15   0s 5ms/step - loss:
0.0490 - mae: 0.0936 - val_loss: 0.0502 - val_mae: 0.0849
Epoch 258/550
15/15   0s 5ms/step - loss:
0.0481 - mae: 0.0937 - val_loss: 0.0496 - val_mae: 0.0833
Epoch 259/550
15/15   0s 5ms/step - loss:
0.0504 - mae: 0.0963 - val_loss: 0.0494 - val_mae: 0.0840
Epoch 260/550
15/15   0s 7ms/step - loss:
0.0492 - mae: 0.0941 - val_loss: 0.0491 - val_mae: 0.0832
Epoch 261/550
15/15   0s 5ms/step - loss:
0.0480 - mae: 0.0936 - val_loss: 0.0489 - val_mae: 0.0832
Epoch 262/550
15/15   0s 5ms/step - loss:
0.0476 - mae: 0.0932 - val_loss: 0.0487 - val_mae: 0.0835
Epoch 263/550
15/15   0s 5ms/step - loss:
0.0477 - mae: 0.0935 - val_loss: 0.0483 - val_mae: 0.0827
Epoch 264/550
15/15   0s 5ms/step - loss:
0.0473 - mae: 0.0928 - val_loss: 0.0479 - val_mae: 0.0827
Epoch 265/550
15/15   0s 5ms/step - loss:
0.0490 - mae: 0.0952 - val_loss: 0.0477 - val_mae: 0.0830
Epoch 266/550
15/15   0s 5ms/step - loss:
0.0468 - mae: 0.0927 - val_loss: 0.0475 - val_mae: 0.0825
Epoch 267/550
15/15   0s 5ms/step - loss:
0.0452 - mae: 0.0912 - val_loss: 0.0472 - val_mae: 0.0820
Epoch 268/550
15/15   0s 5ms/step - loss:
0.0456 - mae: 0.0924 - val_loss: 0.0469 - val_mae: 0.0826
Epoch 269/550
15/15   0s 5ms/step - loss:
0.0445 - mae: 0.0921 - val_loss: 0.0466 - val_mae: 0.0827
Epoch 270/550
15/15   0s 5ms/step - loss:

0.0460 - mae: 0.0921 - val_loss: 0.0465 - val_mae: 0.0833
Epoch 271/550
15/15   0s 5ms/step - loss:
0.0436 - mae: 0.0902 - val_loss: 0.0462 - val_mae: 0.0830
Epoch 272/550
15/15   0s 5ms/step - loss:
0.0447 - mae: 0.0924 - val_loss: 0.0462 - val_mae: 0.0834
Epoch 273/550
15/15   0s 5ms/step - loss:
0.0433 - mae: 0.0902 - val_loss: 0.0458 - val_mae: 0.0829
Epoch 274/550
15/15   0s 6ms/step - loss:
0.0436 - mae: 0.0903 - val_loss: 0.0456 - val_mae: 0.0836
Epoch 275/550
15/15   0s 5ms/step - loss:
0.0420 - mae: 0.0898 - val_loss: 0.0454 - val_mae: 0.0830
Epoch 276/550
15/15   0s 6ms/step - loss:
0.0427 - mae: 0.0911 - val_loss: 0.0453 - val_mae: 0.0843
Epoch 277/550
15/15   0s 5ms/step - loss:
0.0422 - mae: 0.0897 - val_loss: 0.0450 - val_mae: 0.0828
Epoch 278/550
15/15   0s 5ms/step - loss:
0.0454 - mae: 0.0931 - val_loss: 0.0446 - val_mae: 0.0826
Epoch 279/550
15/15   0s 5ms/step - loss:
0.0430 - mae: 0.0907 - val_loss: 0.0441 - val_mae: 0.0820
Epoch 280/550
15/15   0s 5ms/step - loss:
0.0430 - mae: 0.0904 - val_loss: 0.0442 - val_mae: 0.0825
Epoch 281/550
15/15   0s 5ms/step - loss:
0.0418 - mae: 0.0903 - val_loss: 0.0439 - val_mae: 0.0817
Epoch 282/550
15/15   0s 5ms/step - loss:
0.0419 - mae: 0.0903 - val_loss: 0.0435 - val_mae: 0.0818
Epoch 283/550
15/15   0s 5ms/step - loss:
0.0428 - mae: 0.0918 - val_loss: 0.0434 - val_mae: 0.0821
Epoch 284/550
15/15   0s 5ms/step - loss:
0.0417 - mae: 0.0897 - val_loss: 0.0432 - val_mae: 0.0823
Epoch 285/550
15/15   0s 7ms/step - loss:
0.0395 - mae: 0.0886 - val_loss: 0.0431 - val_mae: 0.0827
Epoch 286/550
15/15   0s 5ms/step - loss:

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0.0400 - mae: 0.0890 - val_loss: 0.0428 - val_mae: 0.0822
Epoch 287/550
15/15            0s 5ms/step - loss:
0.0398 - mae: 0.0890 - val_loss: 0.0424 - val_mae: 0.0821
Epoch 288/550
15/15            0s 5ms/step - loss:
0.0394 - mae: 0.0879 - val_loss: 0.0422 - val_mae: 0.0822
Epoch 289/550
15/15            0s 5ms/step - loss:
0.0395 - mae: 0.0890 - val_loss: 0.0419 - val_mae: 0.0819
Epoch 290/550
15/15            0s 5ms/step - loss:
0.0389 - mae: 0.0887 - val_loss: 0.0419 - val_mae: 0.0823
Epoch 291/550
15/15            0s 5ms/step - loss:
0.0410 - mae: 0.0913 - val_loss: 0.0419 - val_mae: 0.0822
Epoch 292/550
15/15            0s 5ms/step - loss:
0.0407 - mae: 0.0914 - val_loss: 0.0416 - val_mae: 0.0822
Epoch 293/550
15/15            0s 5ms/step - loss:
0.0389 - mae: 0.0873 - val_loss: 0.0414 - val_mae: 0.0823
Epoch 294/550
15/15            0s 5ms/step - loss:
0.0391 - mae: 0.0887 - val_loss: 0.0412 - val_mae: 0.0815
Epoch 295/550
15/15            0s 5ms/step - loss:
0.0386 - mae: 0.0891 - val_loss: 0.0411 - val_mae: 0.0817
Epoch 296/550
15/15            0s 5ms/step - loss:
0.0379 - mae: 0.0867 - val_loss: 0.0408 - val_mae: 0.0815
Epoch 297/550
15/15            0s 7ms/step - loss:
0.0380 - mae: 0.0890 - val_loss: 0.0408 - val_mae: 0.0818
Epoch 298/550
15/15            0s 6ms/step - loss:
0.0383 - mae: 0.0878 - val_loss: 0.0407 - val_mae: 0.0821
Epoch 299/550
15/15            0s 5ms/step - loss:
0.0376 - mae: 0.0875 - val_loss: 0.0405 - val_mae: 0.0820
Epoch 300/550
15/15            0s 5ms/step - loss:
0.0378 - mae: 0.0887 - val_loss: 0.0407 - val_mae: 0.0824
Epoch 301/550
15/15            0s 5ms/step - loss:
0.0382 - mae: 0.0880 - val_loss: 0.0400 - val_mae: 0.0811
Epoch 302/550
15/15            0s 5ms/step - loss:
```

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0.0358 - mae: 0.0861 - val_loss: 0.0398 - val_mae: 0.0819
Epoch 303/550
15/15          0s 5ms/step - loss:
0.0362 - mae: 0.0879 - val_loss: 0.0395 - val_mae: 0.0808
Epoch 304/550
15/15          0s 5ms/step - loss:
0.0378 - mae: 0.0877 - val_loss: 0.0396 - val_mae: 0.0816
Epoch 305/550
15/15          0s 5ms/step - loss:
0.0377 - mae: 0.0886 - val_loss: 0.0391 - val_mae: 0.0806
Epoch 306/550
15/15          0s 5ms/step - loss:
0.0352 - mae: 0.0856 - val_loss: 0.0390 - val_mae: 0.0815
Epoch 307/550
15/15          0s 5ms/step - loss:
0.0350 - mae: 0.0851 - val_loss: 0.0389 - val_mae: 0.0818
Epoch 308/550
15/15          0s 6ms/step - loss:
0.0364 - mae: 0.0874 - val_loss: 0.0387 - val_mae: 0.0824
Epoch 309/550
15/15          0s 5ms/step - loss:
0.0364 - mae: 0.0875 - val_loss: 0.0386 - val_mae: 0.0825
Epoch 310/550
15/15          0s 5ms/step - loss:
0.0343 - mae: 0.0850 - val_loss: 0.0385 - val_mae: 0.0822
Epoch 311/550
15/15          0s 5ms/step - loss:
0.0342 - mae: 0.0860 - val_loss: 0.0382 - val_mae: 0.0814
Epoch 312/550
15/15          0s 5ms/step - loss:
0.0362 - mae: 0.0865 - val_loss: 0.0379 - val_mae: 0.0812
Epoch 313/550
15/15          0s 5ms/step - loss:
0.0349 - mae: 0.0859 - val_loss: 0.0379 - val_mae: 0.0808
Epoch 314/550
15/15          0s 5ms/step - loss:
0.0342 - mae: 0.0864 - val_loss: 0.0376 - val_mae: 0.0806
Epoch 315/550
15/15          0s 5ms/step - loss:
0.0334 - mae: 0.0841 - val_loss: 0.0377 - val_mae: 0.0815
Epoch 316/550
15/15          0s 5ms/step - loss:
0.0321 - mae: 0.0840 - val_loss: 0.0375 - val_mae: 0.0809
Epoch 317/550
15/15          0s 5ms/step - loss:
0.0334 - mae: 0.0849 - val_loss: 0.0372 - val_mae: 0.0811
Epoch 318/550
15/15          0s 6ms/step - loss:
```

0.0330 - mae: 0.0845 - val_loss: 0.0373 - val_mae: 0.0824
Epoch 319/550
15/15   0s 5ms/step - loss:
0.0346 - mae: 0.0856 - val_loss: 0.0368 - val_mae: 0.0806
Epoch 320/550
15/15   0s 6ms/step - loss:
0.0325 - mae: 0.0845 - val_loss: 0.0365 - val_mae: 0.0810
Epoch 321/550
15/15   0s 5ms/step - loss:
0.0332 - mae: 0.0855 - val_loss: 0.0367 - val_mae: 0.0808
Epoch 322/550
15/15   0s 6ms/step - loss:
0.0340 - mae: 0.0862 - val_loss: 0.0362 - val_mae: 0.0807
Epoch 323/550
15/15   0s 6ms/step - loss:
0.0347 - mae: 0.0869 - val_loss: 0.0364 - val_mae: 0.0810
Epoch 324/550
15/15   0s 5ms/step - loss:
0.0329 - mae: 0.0850 - val_loss: 0.0365 - val_mae: 0.0817
Epoch 325/550
15/15   0s 5ms/step - loss:
0.0316 - mae: 0.0824 - val_loss: 0.0363 - val_mae: 0.0808
Epoch 326/550
15/15   0s 5ms/step - loss:
0.0324 - mae: 0.0847 - val_loss: 0.0361 - val_mae: 0.0811
Epoch 327/550
15/15   0s 5ms/step - loss:
0.0316 - mae: 0.0839 - val_loss: 0.0357 - val_mae: 0.0812
Epoch 328/550
15/15   0s 5ms/step - loss:
0.0330 - mae: 0.0855 - val_loss: 0.0359 - val_mae: 0.0820
Epoch 329/550
15/15   0s 5ms/step - loss:
0.0337 - mae: 0.0857 - val_loss: 0.0354 - val_mae: 0.0810
Epoch 330/550
15/15   0s 5ms/step - loss:
0.0319 - mae: 0.0843 - val_loss: 0.0353 - val_mae: 0.0811
Epoch 331/550
15/15   0s 5ms/step - loss:
0.0330 - mae: 0.0874 - val_loss: 0.0355 - val_mae: 0.0815
Epoch 332/550
15/15   0s 5ms/step - loss:
0.0324 - mae: 0.0858 - val_loss: 0.0350 - val_mae: 0.0803
Epoch 333/550
15/15   0s 5ms/step - loss:
0.0316 - mae: 0.0849 - val_loss: 0.0349 - val_mae: 0.0804
Epoch 334/550
15/15   0s 6ms/step - loss:

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0.0338 - mae: 0.0858 - val_loss: 0.0347 - val_mae: 0.0812
Epoch 335/550
15/15              0s 5ms/step - loss:
0.0331 - mae: 0.0847 - val_loss: 0.0347 - val_mae: 0.0806
Epoch 336/550
15/15              0s 5ms/step - loss:
0.0310 - mae: 0.0824 - val_loss: 0.0345 - val_mae: 0.0813
Epoch 337/550
15/15              0s 5ms/step - loss:
0.0308 - mae: 0.0832 - val_loss: 0.0346 - val_mae: 0.0810
Epoch 338/550
15/15              0s 5ms/step - loss:
0.0312 - mae: 0.0853 - val_loss: 0.0347 - val_mae: 0.0811
Epoch 339/550
15/15              0s 5ms/step - loss:
0.0311 - mae: 0.0847 - val_loss: 0.0344 - val_mae: 0.0809
Epoch 340/550
15/15              0s 5ms/step - loss:
0.0295 - mae: 0.0823 - val_loss: 0.0341 - val_mae: 0.0810
Epoch 341/550
15/15              0s 5ms/step - loss:
0.0312 - mae: 0.0840 - val_loss: 0.0342 - val_mae: 0.0806
Epoch 342/550
15/15              0s 6ms/step - loss:
0.0302 - mae: 0.0841 - val_loss: 0.0340 - val_mae: 0.0806
Epoch 343/550
15/15              0s 5ms/step - loss:
0.0304 - mae: 0.0840 - val_loss: 0.0342 - val_mae: 0.0808
Epoch 344/550
15/15              0s 6ms/step - loss:
0.0293 - mae: 0.0816 - val_loss: 0.0344 - val_mae: 0.0819
Epoch 345/550
15/15              0s 6ms/step - loss:
0.0303 - mae: 0.0837 - val_loss: 0.0338 - val_mae: 0.0797
Epoch 346/550
15/15              0s 5ms/step - loss:
0.0299 - mae: 0.0826 - val_loss: 0.0335 - val_mae: 0.0817
Epoch 347/550
15/15              0s 5ms/step - loss:
0.0302 - mae: 0.0832 - val_loss: 0.0332 - val_mae: 0.0800
Epoch 348/550
15/15              0s 5ms/step - loss:
0.0289 - mae: 0.0817 - val_loss: 0.0334 - val_mae: 0.0815
Epoch 349/550
15/15              0s 5ms/step - loss:
0.0296 - mae: 0.0829 - val_loss: 0.0330 - val_mae: 0.0808
Epoch 350/550
15/15              0s 5ms/step - loss:
```

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0.0291 - mae: 0.0824 - val_loss: 0.0331 - val_mae: 0.0809
Epoch 351/550
15/15          0s 5ms/step - loss:
0.0296 - mae: 0.0813 - val_loss: 0.0329 - val_mae: 0.0796
Epoch 352/550
15/15          0s 5ms/step - loss:
0.0274 - mae: 0.0813 - val_loss: 0.0329 - val_mae: 0.0803
Epoch 353/550
15/15          0s 6ms/step - loss:
0.0286 - mae: 0.0830 - val_loss: 0.0327 - val_mae: 0.0797
Epoch 354/550
15/15          0s 5ms/step - loss:
0.0295 - mae: 0.0836 - val_loss: 0.0328 - val_mae: 0.0798
Epoch 355/550
15/15          0s 5ms/step - loss:
0.0285 - mae: 0.0816 - val_loss: 0.0323 - val_mae: 0.0781
Epoch 356/550
15/15          0s 5ms/step - loss:
0.0282 - mae: 0.0824 - val_loss: 0.0326 - val_mae: 0.0803
Epoch 357/550
15/15          0s 5ms/step - loss:
0.0299 - mae: 0.0834 - val_loss: 0.0322 - val_mae: 0.0793
Epoch 358/550
15/15          0s 5ms/step - loss:
0.0298 - mae: 0.0841 - val_loss: 0.0325 - val_mae: 0.0801
Epoch 359/550
15/15          0s 5ms/step - loss:
0.0276 - mae: 0.0815 - val_loss: 0.0320 - val_mae: 0.0792
Epoch 360/550
15/15          0s 5ms/step - loss:
0.0282 - mae: 0.0817 - val_loss: 0.0324 - val_mae: 0.0799
Epoch 361/550
15/15          0s 5ms/step - loss:
0.0276 - mae: 0.0819 - val_loss: 0.0319 - val_mae: 0.0792
Epoch 362/550
15/15          0s 6ms/step - loss:
0.0277 - mae: 0.0817 - val_loss: 0.0326 - val_mae: 0.0803
Epoch 363/550
15/15          0s 6ms/step - loss:
0.0276 - mae: 0.0819 - val_loss: 0.0318 - val_mae: 0.0791
Epoch 364/550
15/15          0s 5ms/step - loss:
0.0274 - mae: 0.0810 - val_loss: 0.0323 - val_mae: 0.0802
Epoch 365/550
15/15          0s 5ms/step - loss:
0.0270 - mae: 0.0809 - val_loss: 0.0316 - val_mae: 0.0807
Epoch 366/550
15/15          0s 5ms/step - loss:
```

0.0274 - mae: 0.0815 - val_loss: 0.0312 - val_mae: 0.0805
Epoch 367/550
15/15   0s 5ms/step - loss:
0.0279 - mae: 0.0810 - val_loss: 0.0313 - val_mae: 0.0797
Epoch 368/550
15/15   0s 5ms/step - loss:
0.0260 - mae: 0.0802 - val_loss: 0.0316 - val_mae: 0.0810
Epoch 369/550
15/15   0s 5ms/step - loss:
0.0290 - mae: 0.0825 - val_loss: 0.0317 - val_mae: 0.0801
Epoch 370/550
15/15   0s 5ms/step - loss:
0.0277 - mae: 0.0824 - val_loss: 0.0313 - val_mae: 0.0802
Epoch 371/550
15/15   0s 6ms/step - loss:
0.0270 - mae: 0.0812 - val_loss: 0.0313 - val_mae: 0.0811
Epoch 372/550
15/15   0s 5ms/step - loss:
0.0265 - mae: 0.0803 - val_loss: 0.0312 - val_mae: 0.0806
Epoch 373/550
15/15   0s 5ms/step - loss:
0.0256 - mae: 0.0794 - val_loss: 0.0316 - val_mae: 0.0820
Epoch 374/550
15/15   0s 5ms/step - loss:
0.0264 - mae: 0.0807 - val_loss: 0.0308 - val_mae: 0.0801
Epoch 375/550
15/15   0s 5ms/step - loss:
0.0259 - mae: 0.0801 - val_loss: 0.0314 - val_mae: 0.0804
Epoch 376/550
15/15   0s 5ms/step - loss:
0.0266 - mae: 0.0817 - val_loss: 0.0307 - val_mae: 0.0792
Epoch 377/550
15/15   0s 5ms/step - loss:
0.0260 - mae: 0.0819 - val_loss: 0.0314 - val_mae: 0.0815
Epoch 378/550
15/15   0s 5ms/step - loss:
0.0263 - mae: 0.0808 - val_loss: 0.0307 - val_mae: 0.0806
Epoch 379/550
15/15   0s 5ms/step - loss:
0.0262 - mae: 0.0805 - val_loss: 0.0308 - val_mae: 0.0808
Epoch 380/550
15/15   0s 6ms/step - loss:
0.0254 - mae: 0.0796 - val_loss: 0.0307 - val_mae: 0.0798
Epoch 381/550
15/15   0s 5ms/step - loss:
0.0251 - mae: 0.0800 - val_loss: 0.0304 - val_mae: 0.0791
Epoch 382/550
15/15   0s 5ms/step - loss:

0.0256 - mae: 0.0792 - val_loss: 0.0303 - val_mae: 0.0795
Epoch 383/550
15/15   0s 5ms/step - loss:
0.0247 - mae: 0.0782 - val_loss: 0.0306 - val_mae: 0.0795
Epoch 384/550
15/15   0s 5ms/step - loss:
0.0252 - mae: 0.0800 - val_loss: 0.0303 - val_mae: 0.0792
Epoch 385/550
15/15   0s 5ms/step - loss:
0.0266 - mae: 0.0807 - val_loss: 0.0301 - val_mae: 0.0789
Epoch 386/550
15/15   0s 5ms/step - loss:
0.0262 - mae: 0.0814 - val_loss: 0.0308 - val_mae: 0.0809
Epoch 387/550
15/15   0s 5ms/step - loss:
0.0259 - mae: 0.0806 - val_loss: 0.0300 - val_mae: 0.0793
Epoch 388/550
15/15   0s 5ms/step - loss:
0.0253 - mae: 0.0802 - val_loss: 0.0298 - val_mae: 0.0799
Epoch 389/550
15/15   0s 6ms/step - loss:
0.0249 - mae: 0.0799 - val_loss: 0.0300 - val_mae: 0.0806
Epoch 390/550
15/15   0s 5ms/step - loss:
0.0259 - mae: 0.0806 - val_loss: 0.0298 - val_mae: 0.0792
Epoch 391/550
15/15   0s 5ms/step - loss:
0.0245 - mae: 0.0798 - val_loss: 0.0300 - val_mae: 0.0806
Epoch 392/550
15/15   0s 5ms/step - loss:
0.0246 - mae: 0.0796 - val_loss: 0.0294 - val_mae: 0.0796
Epoch 393/550
15/15   0s 5ms/step - loss:
0.0240 - mae: 0.0787 - val_loss: 0.0290 - val_mae: 0.0786
Epoch 394/550
15/15   0s 5ms/step - loss:
0.0236 - mae: 0.0791 - val_loss: 0.0293 - val_mae: 0.0798
Epoch 395/550
15/15   0s 5ms/step - loss:
0.0227 - mae: 0.0777 - val_loss: 0.0288 - val_mae: 0.0798
Epoch 396/550
15/15   0s 5ms/step - loss:
0.0244 - mae: 0.0798 - val_loss: 0.0293 - val_mae: 0.0790
Epoch 397/550
15/15   0s 5ms/step - loss:
0.0250 - mae: 0.0799 - val_loss: 0.0294 - val_mae: 0.0792
Epoch 398/550
15/15   0s 5ms/step - loss:

0.0246 - mae: 0.0791 - val_loss: 0.0288 - val_mae: 0.0789
Epoch 399/550
15/15   0s 7ms/step - loss:
0.0234 - mae: 0.0778 - val_loss: 0.0293 - val_mae: 0.0797
Epoch 400/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0791 - val_loss: 0.0290 - val_mae: 0.0796
Epoch 401/550
15/15   0s 5ms/step - loss:
0.0247 - mae: 0.0798 - val_loss: 0.0286 - val_mae: 0.0785
Epoch 402/550
15/15   0s 5ms/step - loss:
0.0231 - mae: 0.0777 - val_loss: 0.0289 - val_mae: 0.0788
Epoch 403/550
15/15   0s 5ms/step - loss:
0.0228 - mae: 0.0784 - val_loss: 0.0293 - val_mae: 0.0791
Epoch 404/550
15/15   0s 5ms/step - loss:
0.0237 - mae: 0.0776 - val_loss: 0.0287 - val_mae: 0.0783
Epoch 405/550
15/15   0s 5ms/step - loss:
0.0227 - mae: 0.0774 - val_loss: 0.0283 - val_mae: 0.0778
Epoch 406/550
15/15   0s 5ms/step - loss:
0.0239 - mae: 0.0803 - val_loss: 0.0285 - val_mae: 0.0785
Epoch 407/550
15/15   0s 6ms/step - loss:
0.0246 - mae: 0.0792 - val_loss: 0.0290 - val_mae: 0.0801
Epoch 408/550
15/15   0s 7ms/step - loss:
0.0242 - mae: 0.0801 - val_loss: 0.0285 - val_mae: 0.0791
Epoch 409/550
15/15   0s 5ms/step - loss:
0.0225 - mae: 0.0779 - val_loss: 0.0284 - val_mae: 0.0787
Epoch 410/550
15/15   0s 5ms/step - loss:
0.0238 - mae: 0.0793 - val_loss: 0.0282 - val_mae: 0.0778
Epoch 411/550
15/15   0s 5ms/step - loss:
0.0227 - mae: 0.0786 - val_loss: 0.0291 - val_mae: 0.0808
Epoch 412/550
15/15   0s 5ms/step - loss:
0.0224 - mae: 0.0774 - val_loss: 0.0286 - val_mae: 0.0792
Epoch 413/550
15/15   0s 5ms/step - loss:
0.0221 - mae: 0.0775 - val_loss: 0.0287 - val_mae: 0.0788
Epoch 414/550
15/15   0s 5ms/step - loss:

0.0226 - mae: 0.0786 - val_loss: 0.0283 - val_mae: 0.0777
Epoch 415/550
15/15   0s 5ms/step - loss:
0.0231 - mae: 0.0793 - val_loss: 0.0281 - val_mae: 0.0783
Epoch 416/550
15/15   0s 6ms/step - loss:
0.0223 - mae: 0.0779 - val_loss: 0.0285 - val_mae: 0.0774
Epoch 417/550
15/15   0s 6ms/step - loss:
0.0234 - mae: 0.0790 - val_loss: 0.0282 - val_mae: 0.0777
Epoch 418/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0799 - val_loss: 0.0280 - val_mae: 0.0779
Epoch 419/550
15/15   0s 5ms/step - loss:
0.0219 - mae: 0.0777 - val_loss: 0.0279 - val_mae: 0.0777
Epoch 420/550
15/15   0s 5ms/step - loss:
0.0220 - mae: 0.0777 - val_loss: 0.0283 - val_mae: 0.0787
Epoch 421/550
15/15   0s 5ms/step - loss:
0.0215 - mae: 0.0766 - val_loss: 0.0281 - val_mae: 0.0793
Epoch 422/550
15/15   0s 5ms/step - loss:
0.0216 - mae: 0.0770 - val_loss: 0.0278 - val_mae: 0.0780
Epoch 423/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0800 - val_loss: 0.0277 - val_mae: 0.0792
Epoch 424/550
15/15   0s 7ms/step - loss:
0.0222 - mae: 0.0774 - val_loss: 0.0278 - val_mae: 0.0791
Epoch 425/550
15/15   0s 6ms/step - loss:
0.0216 - mae: 0.0770 - val_loss: 0.0278 - val_mae: 0.0787
Epoch 426/550
15/15   0s 5ms/step - loss:
0.0222 - mae: 0.0779 - val_loss: 0.0278 - val_mae: 0.0787
Epoch 427/550
15/15   0s 5ms/step - loss:
0.0225 - mae: 0.0781 - val_loss: 0.0274 - val_mae: 0.0784
Epoch 428/550
15/15   0s 5ms/step - loss:
0.0218 - mae: 0.0776 - val_loss: 0.0273 - val_mae: 0.0780
Epoch 429/550
15/15   0s 5ms/step - loss:
0.0222 - mae: 0.0791 - val_loss: 0.0277 - val_mae: 0.0787
Epoch 430/550
15/15   0s 6ms/step - loss:

```
0.0216 - mae: 0.0777 - val_loss: 0.0268 - val_mae: 0.0772
Epoch 431/550
15/15              0s 6ms/step - loss:
0.0215 - mae: 0.0770 - val_loss: 0.0275 - val_mae: 0.0774
Epoch 432/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0755 - val_loss: 0.0270 - val_mae: 0.0783
Epoch 433/550
15/15              0s 5ms/step - loss:
0.0208 - mae: 0.0761 - val_loss: 0.0272 - val_mae: 0.0787
Epoch 434/550
15/15              0s 5ms/step - loss:
0.0215 - mae: 0.0767 - val_loss: 0.0275 - val_mae: 0.0781
Epoch 435/550
15/15              0s 5ms/step - loss:
0.0209 - mae: 0.0768 - val_loss: 0.0274 - val_mae: 0.0786
Epoch 436/550
15/15              0s 5ms/step - loss:
0.0210 - mae: 0.0773 - val_loss: 0.0270 - val_mae: 0.0769
Epoch 437/550
15/15              0s 5ms/step - loss:
0.0207 - mae: 0.0770 - val_loss: 0.0278 - val_mae: 0.0789
Epoch 438/550
15/15              0s 5ms/step - loss:
0.0214 - mae: 0.0774 - val_loss: 0.0266 - val_mae: 0.0774
Epoch 439/550
15/15              0s 6ms/step - loss:
0.0220 - mae: 0.0776 - val_loss: 0.0270 - val_mae: 0.0779
Epoch 440/550
15/15              0s 5ms/step - loss:
0.0215 - mae: 0.0774 - val_loss: 0.0275 - val_mae: 0.0780
Epoch 441/550
15/15              0s 5ms/step - loss:
0.0223 - mae: 0.0781 - val_loss: 0.0277 - val_mae: 0.0797
Epoch 442/550
15/15              0s 5ms/step - loss:
0.0219 - mae: 0.0777 - val_loss: 0.0267 - val_mae: 0.0774
Epoch 443/550
15/15              0s 5ms/step - loss:
0.0195 - mae: 0.0751 - val_loss: 0.0269 - val_mae: 0.0776
Epoch 444/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0753 - val_loss: 0.0275 - val_mae: 0.0782
Epoch 445/550
15/15              0s 5ms/step - loss:
0.0202 - mae: 0.0758 - val_loss: 0.0271 - val_mae: 0.0790
Epoch 446/550
15/15              0s 5ms/step - loss:
```

```
0.0201 - mae: 0.0757 - val_loss: 0.0265 - val_mae: 0.0786
Epoch 447/550
15/15              0s 7ms/step - loss:
0.0206 - mae: 0.0760 - val_loss: 0.0269 - val_mae: 0.0798
Epoch 448/550
15/15              0s 5ms/step - loss:
0.0217 - mae: 0.0773 - val_loss: 0.0272 - val_mae: 0.0798
Epoch 449/550
15/15              0s 5ms/step - loss:
0.0202 - mae: 0.0775 - val_loss: 0.0273 - val_mae: 0.0792
Epoch 450/550
15/15              0s 5ms/step - loss:
0.0205 - mae: 0.0767 - val_loss: 0.0271 - val_mae: 0.0791
Epoch 451/550
15/15              0s 6ms/step - loss:
0.0207 - mae: 0.0782 - val_loss: 0.0270 - val_mae: 0.0789
Epoch 452/550
15/15              0s 5ms/step - loss:
0.0208 - mae: 0.0766 - val_loss: 0.0263 - val_mae: 0.0789
Epoch 453/550
15/15              0s 5ms/step - loss:
0.0201 - mae: 0.0765 - val_loss: 0.0268 - val_mae: 0.0784
Epoch 454/550
15/15              0s 6ms/step - loss:
0.0193 - mae: 0.0751 - val_loss: 0.0263 - val_mae: 0.0768
Epoch 455/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0765 - val_loss: 0.0266 - val_mae: 0.0782
Epoch 456/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0762 - val_loss: 0.0261 - val_mae: 0.0775
Epoch 457/550
15/15              0s 5ms/step - loss:
0.0197 - mae: 0.0756 - val_loss: 0.0267 - val_mae: 0.0784
Epoch 458/550
15/15              0s 5ms/step - loss:
0.0212 - mae: 0.0769 - val_loss: 0.0264 - val_mae: 0.0764
Epoch 459/550
15/15              0s 5ms/step - loss:
0.0204 - mae: 0.0776 - val_loss: 0.0269 - val_mae: 0.0782
Epoch 460/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0759 - val_loss: 0.0270 - val_mae: 0.0793
Epoch 461/550
15/15              0s 5ms/step - loss:
0.0195 - mae: 0.0753 - val_loss: 0.0263 - val_mae: 0.0779
Epoch 462/550
15/15              0s 6ms/step - loss:
```

0.0215 - mae: 0.0769 - val_loss: 0.0263 - val_mae: 0.0793
Epoch 463/550
15/15   0s 5ms/step - loss:
0.0203 - mae: 0.0778 - val_loss: 0.0266 - val_mae: 0.0789
Epoch 464/550
15/15   0s 5ms/step - loss:
0.0199 - mae: 0.0762 - val_loss: 0.0263 - val_mae: 0.0780
Epoch 465/550
15/15   0s 5ms/step - loss:
0.0205 - mae: 0.0764 - val_loss: 0.0269 - val_mae: 0.0778
Epoch 466/550
15/15   0s 5ms/step - loss:
0.0193 - mae: 0.0754 - val_loss: 0.0265 - val_mae: 0.0786
Epoch 467/550
15/15   0s 5ms/step - loss:
0.0188 - mae: 0.0738 - val_loss: 0.0275 - val_mae: 0.0790
Epoch 468/550
15/15   0s 5ms/step - loss:
0.0202 - mae: 0.0763 - val_loss: 0.0262 - val_mae: 0.0772
Epoch 469/550
15/15   0s 5ms/step - loss:
0.0195 - mae: 0.0758 - val_loss: 0.0275 - val_mae: 0.0791
Epoch 470/550
15/15   0s 5ms/step - loss:
0.0202 - mae: 0.0771 - val_loss: 0.0270 - val_mae: 0.0784
Epoch 471/550
15/15   0s 5ms/step - loss:
0.0194 - mae: 0.0753 - val_loss: 0.0270 - val_mae: 0.0788
Epoch 472/550
15/15   0s 5ms/step - loss:
0.0196 - mae: 0.0757 - val_loss: 0.0272 - val_mae: 0.0787
Epoch 473/550
15/15   0s 5ms/step - loss:
0.0195 - mae: 0.0753 - val_loss: 0.0265 - val_mae: 0.0773
Epoch 474/550
15/15   0s 5ms/step - loss:
0.0200 - mae: 0.0762 - val_loss: 0.0270 - val_mae: 0.0771
Epoch 475/550
15/15   0s 5ms/step - loss:
0.0193 - mae: 0.0756 - val_loss: 0.0262 - val_mae: 0.0761
Epoch 476/550
15/15   0s 5ms/step - loss:
0.0198 - mae: 0.0755 - val_loss: 0.0266 - val_mae: 0.0769
Epoch 477/550
15/15   0s 6ms/step - loss:
0.0193 - mae: 0.0767 - val_loss: 0.0261 - val_mae: 0.0771
Epoch 478/550
15/15   0s 5ms/step - loss:

```
0.0191 - mae: 0.0753 - val_loss: 0.0265 - val_mae: 0.0774
Epoch 479/550
15/15            0s 5ms/step - loss:
0.0190 - mae: 0.0754 - val_loss: 0.0268 - val_mae: 0.0778
Epoch 480/550
15/15            0s 5ms/step - loss:
0.0196 - mae: 0.0757 - val_loss: 0.0267 - val_mae: 0.0778
Epoch 481/550
15/15            0s 5ms/step - loss:
0.0200 - mae: 0.0758 - val_loss: 0.0271 - val_mae: 0.0792
```


Training and Validation Loss - Fold 6

Training and Validation MAE - Fold 6
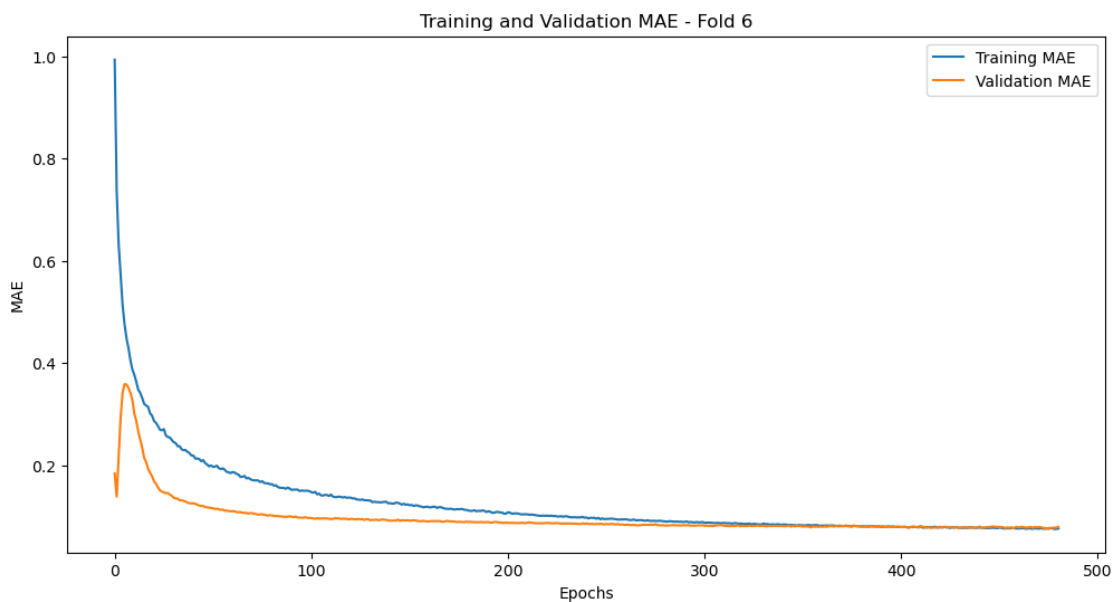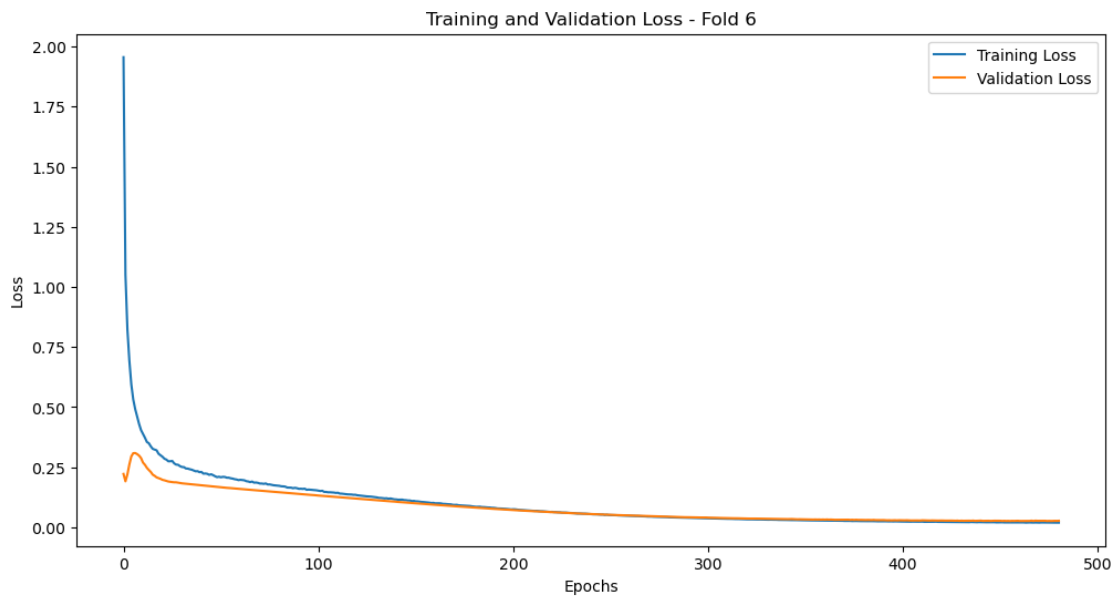
```
Fold Validation MAE: 0.07753296196460724
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

15/15              2s 17ms/step -
loss: 1.4942 - mae: 0.9074 - val_loss: 0.1894 - val_mae: 0.1188
Epoch 2/550
15/15              0s 5ms/step - loss:
0.8948 - mae: 0.6784 - val_loss: 0.1879 - val_mae: 0.1332
Epoch 3/550
15/15              0s 5ms/step - loss:
0.6751 - mae: 0.5645 - val_loss: 0.1974 - val_mae: 0.1670
Epoch 4/550
15/15              0s 5ms/step - loss:
0.5792 - mae: 0.5119 - val_loss: 0.2049 - val_mae: 0.1871
Epoch 5/550
15/15              0s 5ms/step - loss:
0.5020 - mae: 0.4599 - val_loss: 0.2100 - val_mae: 0.1983
Epoch 6/550
15/15              0s 5ms/step - loss:
0.4545 - mae: 0.4300 - val_loss: 0.2121 - val_mae: 0.2019
Epoch 7/550
15/15              0s 5ms/step - loss:
0.4196 - mae: 0.4069 - val_loss: 0.2099 - val_mae: 0.1964
Epoch 8/550
15/15              0s 5ms/step - loss:
0.3970 - mae: 0.3826 - val_loss: 0.2078 - val_mae: 0.1900
Epoch 9/550
15/15              0s 5ms/step - loss:
0.3747 - mae: 0.3674 - val_loss: 0.2063 - val_mae: 0.1845
Epoch 10/550
15/15              0s 5ms/step - loss:
0.3451 - mae: 0.3405 - val_loss: 0.2050 - val_mae: 0.1794
Epoch 11/550
15/15              0s 5ms/step - loss:
0.3404 - mae: 0.3372 - val_loss: 0.2006 - val_mae: 0.1698
Epoch 12/550
15/15              0s 5ms/step - loss:
0.3214 - mae: 0.3212 - val_loss: 0.2010 - val_mae: 0.1724
Epoch 13/550
15/15              0s 5ms/step - loss:
```

0.3092 - mae: 0.3092 - val_loss: 0.1980 - val_mae: 0.1631
Epoch 14/550
15/15   0s 5ms/step - loss:
0.3029 - mae: 0.3015 - val_loss: 0.1958 - val_mae: 0.1584
Epoch 15/550
15/15   0s 5ms/step - loss:
0.3021 - mae: 0.3002 - val_loss: 0.1953 - val_mae: 0.1578
Epoch 16/550
15/15   0s 5ms/step - loss:
0.2963 - mae: 0.2935 - val_loss: 0.1945 - val_mae: 0.1565
Epoch 17/550
15/15   0s 5ms/step - loss:
0.2810 - mae: 0.2821 - val_loss: 0.1917 - val_mae: 0.1504
Epoch 18/550
15/15   0s 5ms/step - loss:
0.2749 - mae: 0.2736 - val_loss: 0.1909 - val_mae: 0.1501
Epoch 19/550
15/15   0s 7ms/step - loss:
0.2665 - mae: 0.2644 - val_loss: 0.1882 - val_mae: 0.1443
Epoch 20/550
15/15   0s 5ms/step - loss:
0.2637 - mae: 0.2603 - val_loss: 0.1873 - val_mae: 0.1440
Epoch 21/550
15/15   0s 5ms/step - loss:
0.2605 - mae: 0.2577 - val_loss: 0.1873 - val_mae: 0.1438
Epoch 22/550
15/15   0s 5ms/step - loss:
0.2518 - mae: 0.2467 - val_loss: 0.1855 - val_mae: 0.1409
Epoch 23/550
15/15   0s 5ms/step - loss:
0.2486 - mae: 0.2448 - val_loss: 0.1835 - val_mae: 0.1379
Epoch 24/550
15/15   0s 5ms/step - loss:
0.2483 - mae: 0.2432 - val_loss: 0.1831 - val_mae: 0.1367
Epoch 25/550
15/15   0s 5ms/step - loss:
0.2429 - mae: 0.2362 - val_loss: 0.1820 - val_mae: 0.1364
Epoch 26/550
15/15   0s 5ms/step - loss:
0.2331 - mae: 0.2282 - val_loss: 0.1793 - val_mae: 0.1309
Epoch 27/550
15/15   0s 5ms/step - loss:
0.2393 - mae: 0.2316 - val_loss: 0.1796 - val_mae: 0.1326
Epoch 28/550
15/15   0s 5ms/step - loss:
0.2330 - mae: 0.2273 - val_loss: 0.1778 - val_mae: 0.1299
Epoch 29/550
15/15   0s 5ms/step - loss:

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0.2320 - mae: 0.2230 - val_loss: 0.1761 - val_mae: 0.1269
Epoch 30/550
15/15          0s 5ms/step - loss:
0.2211 - mae: 0.2137 - val_loss: 0.1748 - val_mae: 0.1252
Epoch 31/550
15/15          0s 5ms/step - loss:
0.2278 - mae: 0.2169 - val_loss: 0.1745 - val_mae: 0.1258
Epoch 32/550
15/15          0s 5ms/step - loss:
0.2204 - mae: 0.2100 - val_loss: 0.1733 - val_mae: 0.1226
Epoch 33/550
15/15          0s 5ms/step - loss:
0.2221 - mae: 0.2095 - val_loss: 0.1722 - val_mae: 0.1207
Epoch 34/550
15/15          0s 6ms/step - loss:
0.2143 - mae: 0.2040 - val_loss: 0.1706 - val_mae: 0.1176
Epoch 35/550
15/15          0s 6ms/step - loss:
0.2199 - mae: 0.2064 - val_loss: 0.1701 - val_mae: 0.1171
Epoch 36/550
15/15          0s 6ms/step - loss:
0.2125 - mae: 0.2014 - val_loss: 0.1689 - val_mae: 0.1158
Epoch 37/550
15/15          0s 5ms/step - loss:
0.2099 - mae: 0.1972 - val_loss: 0.1676 - val_mae: 0.1130
Epoch 38/550
15/15          0s 6ms/step - loss:
0.2102 - mae: 0.1966 - val_loss: 0.1667 - val_mae: 0.1122
Epoch 39/550
15/15          0s 5ms/step - loss:
0.2091 - mae: 0.1937 - val_loss: 0.1661 - val_mae: 0.1115
Epoch 40/550
15/15          0s 5ms/step - loss:
0.2047 - mae: 0.1916 - val_loss: 0.1652 - val_mae: 0.1102
Epoch 41/550
15/15          0s 5ms/step - loss:
0.2016 - mae: 0.1889 - val_loss: 0.1639 - val_mae: 0.1079
Epoch 42/550
15/15          0s 5ms/step - loss:
0.2017 - mae: 0.1879 - val_loss: 0.1630 - val_mae: 0.1074
Epoch 43/550
15/15          0s 5ms/step - loss:
0.1979 - mae: 0.1837 - val_loss: 0.1625 - val_mae: 0.1081
Epoch 44/550
15/15          0s 5ms/step - loss:
0.1959 - mae: 0.1813 - val_loss: 0.1616 - val_mae: 0.1067
Epoch 45/550
15/15          0s 5ms/step - loss:
```

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0.1943 - mae: 0.1827 - val_loss: 0.1606 - val_mae: 0.1048
Epoch 46/550
15/15            0s 5ms/step - loss:
0.2002 - mae: 0.1850 - val_loss: 0.1599 - val_mae: 0.1045
Epoch 47/550
15/15            0s 5ms/step - loss:
0.1931 - mae: 0.1775 - val_loss: 0.1593 - val_mae: 0.1051
Epoch 48/550
15/15            0s 6ms/step - loss:
0.1928 - mae: 0.1764 - val_loss: 0.1586 - val_mae: 0.1053
Epoch 49/550
15/15            0s 5ms/step - loss:
0.1902 - mae: 0.1764 - val_loss: 0.1576 - val_mae: 0.1029
Epoch 50/550
15/15            0s 5ms/step - loss:
0.1905 - mae: 0.1766 - val_loss: 0.1568 - val_mae: 0.1024
Epoch 51/550
15/15            0s 5ms/step - loss:
0.1860 - mae: 0.1706 - val_loss: 0.1562 - val_mae: 0.1023
Epoch 52/550
15/15            0s 5ms/step - loss:
0.1869 - mae: 0.1706 - val_loss: 0.1551 - val_mae: 0.1004
Epoch 53/550
15/15            0s 5ms/step - loss:
0.1826 - mae: 0.1663 - val_loss: 0.1541 - val_mae: 0.0997
Epoch 54/550
15/15            0s 5ms/step - loss:
0.1822 - mae: 0.1680 - val_loss: 0.1536 - val_mae: 0.0999
Epoch 55/550
15/15            0s 5ms/step - loss:
0.1841 - mae: 0.1689 - val_loss: 0.1532 - val_mae: 0.1008
Epoch 56/550
15/15            0s 5ms/step - loss:
0.1782 - mae: 0.1635 - val_loss: 0.1521 - val_mae: 0.0986
Epoch 57/550
15/15            0s 6ms/step - loss:
0.1803 - mae: 0.1645 - val_loss: 0.1514 - val_mae: 0.0986
Epoch 58/550
15/15            0s 5ms/step - loss:
0.1755 - mae: 0.1601 - val_loss: 0.1507 - val_mae: 0.0982
Epoch 59/550
15/15            0s 6ms/step - loss:
0.1742 - mae: 0.1590 - val_loss: 0.1498 - val_mae: 0.0976
Epoch 60/550
15/15            0s 5ms/step - loss:
0.1734 - mae: 0.1598 - val_loss: 0.1495 - val_mae: 0.0987
Epoch 61/550
15/15            0s 5ms/step - loss:
```

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0.1761 - mae: 0.1611 - val_loss: 0.1485 - val_mae: 0.0975
Epoch 62/550
15/15          0s 5ms/step - loss:
0.1723 - mae: 0.1587 - val_loss: 0.1475 - val_mae: 0.0960
Epoch 63/550
15/15          0s 5ms/step - loss:
0.1732 - mae: 0.1584 - val_loss: 0.1467 - val_mae: 0.0954
Epoch 64/550
15/15          0s 6ms/step - loss:
0.1693 - mae: 0.1552 - val_loss: 0.1459 - val_mae: 0.0951
Epoch 65/550
15/15          0s 5ms/step - loss:
0.1700 - mae: 0.1549 - val_loss: 0.1452 - val_mae: 0.0954
Epoch 66/550
15/15          0s 5ms/step - loss:
0.1678 - mae: 0.1555 - val_loss: 0.1445 - val_mae: 0.0947
Epoch 67/550
15/15          0s 5ms/step - loss:
0.1644 - mae: 0.1516 - val_loss: 0.1436 - val_mae: 0.0940
Epoch 68/550
15/15          0s 5ms/step - loss:
0.1653 - mae: 0.1511 - val_loss: 0.1427 - val_mae: 0.0930
Epoch 69/550
15/15          0s 5ms/step - loss:
0.1651 - mae: 0.1526 - val_loss: 0.1419 - val_mae: 0.0925
Epoch 70/550
15/15          0s 5ms/step - loss:
0.1629 - mae: 0.1496 - val_loss: 0.1411 - val_mae: 0.0925
Epoch 71/550
15/15          0s 5ms/step - loss:
0.1627 - mae: 0.1496 - val_loss: 0.1403 - val_mae: 0.0921
Epoch 72/550
15/15          0s 5ms/step - loss:
0.1596 - mae: 0.1464 - val_loss: 0.1396 - val_mae: 0.0925
Epoch 73/550
15/15          0s 5ms/step - loss:
0.1617 - mae: 0.1503 - val_loss: 0.1388 - val_mae: 0.0920
Epoch 74/550
15/15          0s 5ms/step - loss:
0.1594 - mae: 0.1514 - val_loss: 0.1381 - val_mae: 0.0916
Epoch 75/550
15/15          0s 5ms/step - loss:
0.1583 - mae: 0.1456 - val_loss: 0.1373 - val_mae: 0.0924
Epoch 76/550
15/15          0s 7ms/step - loss:
0.1584 - mae: 0.1488 - val_loss: 0.1368 - val_mae: 0.0923
Epoch 77/550
15/15          0s 6ms/step - loss:
```

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0.1537 - mae: 0.1432 - val_loss: 0.1359 - val_mae: 0.0920
Epoch 78/550
15/15          0s 6ms/step - loss:
0.1536 - mae: 0.1425 - val_loss: 0.1350 - val_mae: 0.0926
Epoch 79/550
15/15          0s 6ms/step - loss:
0.1548 - mae: 0.1447 - val_loss: 0.1343 - val_mae: 0.0913
Epoch 80/550
15/15          0s 5ms/step - loss:
0.1506 - mae: 0.1407 - val_loss: 0.1335 - val_mae: 0.0904
Epoch 81/550
15/15          0s 5ms/step - loss:
0.1494 - mae: 0.1402 - val_loss: 0.1328 - val_mae: 0.0906
Epoch 82/550
15/15          0s 5ms/step - loss:
0.1507 - mae: 0.1419 - val_loss: 0.1321 - val_mae: 0.0914
Epoch 83/550
15/15          0s 5ms/step - loss:
0.1484 - mae: 0.1411 - val_loss: 0.1312 - val_mae: 0.0918
Epoch 84/550
15/15          0s 5ms/step - loss:
0.1460 - mae: 0.1383 - val_loss: 0.1305 - val_mae: 0.0905
Epoch 85/550
15/15          0s 5ms/step - loss:
0.1446 - mae: 0.1366 - val_loss: 0.1298 - val_mae: 0.0905
Epoch 86/550
15/15          0s 5ms/step - loss:
0.1477 - mae: 0.1405 - val_loss: 0.1292 - val_mae: 0.0909
Epoch 87/550
15/15          0s 5ms/step - loss:
0.1450 - mae: 0.1357 - val_loss: 0.1283 - val_mae: 0.0902
Epoch 88/550
15/15          0s 5ms/step - loss:
0.1445 - mae: 0.1381 - val_loss: 0.1275 - val_mae: 0.0898
Epoch 89/550
15/15          0s 5ms/step - loss:
0.1465 - mae: 0.1400 - val_loss: 0.1267 - val_mae: 0.0892
Epoch 90/550
15/15          0s 5ms/step - loss:
0.1409 - mae: 0.1346 - val_loss: 0.1260 - val_mae: 0.0889
Epoch 91/550
15/15          0s 5ms/step - loss:
0.1398 - mae: 0.1334 - val_loss: 0.1252 - val_mae: 0.0883
Epoch 92/550
15/15          0s 7ms/step - loss:
0.1386 - mae: 0.1338 - val_loss: 0.1244 - val_mae: 0.0883
Epoch 93/550
15/15          0s 5ms/step - loss:
```

0.1401 - mae: 0.1334 - val_loss: 0.1237 - val_mae: 0.0891
Epoch 94/550
15/15   0s 5ms/step - loss:
0.1362 - mae: 0.1317 - val_loss: 0.1228 - val_mae: 0.0887
Epoch 95/550
15/15   0s 5ms/step - loss:
0.1368 - mae: 0.1323 - val_loss: 0.1221 - val_mae: 0.0877
Epoch 96/550
15/15   0s 5ms/step - loss:
0.1357 - mae: 0.1321 - val_loss: 0.1213 - val_mae: 0.0878
Epoch 97/550
15/15   0s 5ms/step - loss:
0.1342 - mae: 0.1298 - val_loss: 0.1206 - val_mae: 0.0881
Epoch 98/550
15/15   0s 5ms/step - loss:
0.1322 - mae: 0.1276 - val_loss: 0.1198 - val_mae: 0.0878
Epoch 99/550
15/15   0s 5ms/step - loss:
0.1319 - mae: 0.1305 - val_loss: 0.1190 - val_mae: 0.0876
Epoch 100/550
15/15   0s 6ms/step - loss:
0.1325 - mae: 0.1306 - val_loss: 0.1184 - val_mae: 0.0874
Epoch 101/550
15/15   0s 5ms/step - loss:
0.1307 - mae: 0.1287 - val_loss: 0.1177 - val_mae: 0.0877
Epoch 102/550
15/15   0s 5ms/step - loss:
0.1313 - mae: 0.1316 - val_loss: 0.1167 - val_mae: 0.0868
Epoch 103/550
15/15   0s 5ms/step - loss:
0.1290 - mae: 0.1284 - val_loss: 0.1159 - val_mae: 0.0863
Epoch 104/550
15/15   0s 5ms/step - loss:
0.1269 - mae: 0.1270 - val_loss: 0.1152 - val_mae: 0.0857
Epoch 105/550
15/15   0s 5ms/step - loss:
0.1279 - mae: 0.1286 - val_loss: 0.1145 - val_mae: 0.0863
Epoch 106/550
15/15   0s 5ms/step - loss:
0.1260 - mae: 0.1259 - val_loss: 0.1138 - val_mae: 0.0871
Epoch 107/550
15/15   0s 5ms/step - loss:
0.1253 - mae: 0.1258 - val_loss: 0.1130 - val_mae: 0.0867
Epoch 108/550
15/15   0s 7ms/step - loss:
0.1236 - mae: 0.1260 - val_loss: 0.1123 - val_mae: 0.0869
Epoch 109/550
15/15   0s 5ms/step - loss:

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0.1240 - mae: 0.1259 - val_loss: 0.1115 - val_mae: 0.0865
Epoch 110/550
15/15          0s 5ms/step - loss:
0.1227 - mae: 0.1257 - val_loss: 0.1108 - val_mae: 0.0865
Epoch 111/550
15/15          0s 5ms/step - loss:
0.1205 - mae: 0.1243 - val_loss: 0.1102 - val_mae: 0.0861
Epoch 112/550
15/15          0s 5ms/step - loss:
0.1212 - mae: 0.1244 - val_loss: 0.1094 - val_mae: 0.0863
Epoch 113/550
15/15          0s 5ms/step - loss:
0.1177 - mae: 0.1208 - val_loss: 0.1086 - val_mae: 0.0852
Epoch 114/550
15/15          0s 5ms/step - loss:
0.1172 - mae: 0.1222 - val_loss: 0.1079 - val_mae: 0.0858
Epoch 115/550
15/15          0s 5ms/step - loss:
0.1177 - mae: 0.1222 - val_loss: 0.1072 - val_mae: 0.0855
Epoch 116/550
15/15          0s 5ms/step - loss:
0.1157 - mae: 0.1220 - val_loss: 0.1065 - val_mae: 0.0862
Epoch 117/550
15/15          0s 5ms/step - loss:
0.1190 - mae: 0.1246 - val_loss: 0.1058 - val_mae: 0.0863
Epoch 118/550
15/15          0s 5ms/step - loss:
0.1167 - mae: 0.1242 - val_loss: 0.1050 - val_mae: 0.0853
Epoch 119/550
15/15          0s 5ms/step - loss:
0.1134 - mae: 0.1218 - val_loss: 0.1043 - val_mae: 0.0859
Epoch 120/550
15/15          0s 5ms/step - loss:
0.1147 - mae: 0.1222 - val_loss: 0.1037 - val_mae: 0.0861
Epoch 121/550
15/15          0s 5ms/step - loss:
0.1150 - mae: 0.1244 - val_loss: 0.1031 - val_mae: 0.0860
Epoch 122/550
15/15          0s 6ms/step - loss:
0.1110 - mae: 0.1206 - val_loss: 0.1021 - val_mae: 0.0854
Epoch 123/550
15/15          0s 5ms/step - loss:
0.1099 - mae: 0.1190 - val_loss: 0.1015 - val_mae: 0.0849
Epoch 124/550
15/15          0s 6ms/step - loss:
0.1100 - mae: 0.1207 - val_loss: 0.1007 - val_mae: 0.0853
Epoch 125/550
15/15          0s 5ms/step - loss:
```

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0.1093 - mae: 0.1178 - val_loss: 0.1000 - val_mae: 0.0846
Epoch 126/550
15/15          0s 5ms/step - loss:
0.1070 - mae: 0.1172 - val_loss: 0.0994 - val_mae: 0.0836
Epoch 127/550
15/15          0s 5ms/step - loss:
0.1062 - mae: 0.1190 - val_loss: 0.0986 - val_mae: 0.0847
Epoch 128/550
15/15          0s 5ms/step - loss:
0.1060 - mae: 0.1182 - val_loss: 0.0980 - val_mae: 0.0838
Epoch 129/550
15/15          0s 5ms/step - loss:
0.1049 - mae: 0.1150 - val_loss: 0.0972 - val_mae: 0.0853
Epoch 130/550
15/15          0s 5ms/step - loss:
0.1033 - mae: 0.1161 - val_loss: 0.0966 - val_mae: 0.0851
Epoch 131/550
15/15          0s 5ms/step - loss:
0.1031 - mae: 0.1149 - val_loss: 0.0959 - val_mae: 0.0844
Epoch 132/550
15/15          0s 5ms/step - loss:
0.1040 - mae: 0.1181 - val_loss: 0.0952 - val_mae: 0.0849
Epoch 133/550
15/15          0s 5ms/step - loss:
0.1015 - mae: 0.1139 - val_loss: 0.0945 - val_mae: 0.0850
Epoch 134/550
15/15          0s 5ms/step - loss:
0.1019 - mae: 0.1157 - val_loss: 0.0938 - val_mae: 0.0845
Epoch 135/550
15/15          0s 5ms/step - loss:
0.0995 - mae: 0.1141 - val_loss: 0.0931 - val_mae: 0.0837
Epoch 136/550
15/15          0s 5ms/step - loss:
0.1024 - mae: 0.1181 - val_loss: 0.0925 - val_mae: 0.0848
Epoch 137/550
15/15          0s 5ms/step - loss:
0.0982 - mae: 0.1128 - val_loss: 0.0919 - val_mae: 0.0841
Epoch 138/550
15/15          0s 5ms/step - loss:
0.0981 - mae: 0.1135 - val_loss: 0.0912 - val_mae: 0.0843
Epoch 139/550
15/15          0s 5ms/step - loss:
0.0981 - mae: 0.1158 - val_loss: 0.0905 - val_mae: 0.0840
Epoch 140/550
15/15          0s 5ms/step - loss:
0.0966 - mae: 0.1133 - val_loss: 0.0899 - val_mae: 0.0835
Epoch 141/550
15/15          0s 7ms/step - loss:
```

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0.0947 - mae: 0.1107 - val_loss: 0.0891 - val_mae: 0.0839
Epoch 142/550
15/15          0s 5ms/step - loss:
0.0968 - mae: 0.1136 - val_loss: 0.0885 - val_mae: 0.0834
Epoch 143/550
15/15          0s 6ms/step - loss:
0.0927 - mae: 0.1102 - val_loss: 0.0878 - val_mae: 0.0831
Epoch 144/550
15/15          0s 6ms/step - loss:
0.0944 - mae: 0.1125 - val_loss: 0.0871 - val_mae: 0.0834
Epoch 145/550
15/15          0s 5ms/step - loss:
0.0941 - mae: 0.1129 - val_loss: 0.0866 - val_mae: 0.0839
Epoch 146/550
15/15          0s 5ms/step - loss:
0.0901 - mae: 0.1093 - val_loss: 0.0860 - val_mae: 0.0835
Epoch 147/550
15/15          0s 5ms/step - loss:
0.0936 - mae: 0.1148 - val_loss: 0.0853 - val_mae: 0.0833
Epoch 148/550
15/15          0s 6ms/step - loss:
0.0909 - mae: 0.1114 - val_loss: 0.0847 - val_mae: 0.0828
Epoch 149/550
15/15          0s 5ms/step - loss:
0.0888 - mae: 0.1101 - val_loss: 0.0841 - val_mae: 0.0832
Epoch 150/550
15/15          0s 5ms/step - loss:
0.0897 - mae: 0.1110 - val_loss: 0.0833 - val_mae: 0.0838
Epoch 151/550
15/15          0s 5ms/step - loss:
0.0889 - mae: 0.1111 - val_loss: 0.0828 - val_mae: 0.0837
Epoch 152/550
15/15          0s 5ms/step - loss:
0.0883 - mae: 0.1097 - val_loss: 0.0822 - val_mae: 0.0829
Epoch 153/550
15/15          0s 5ms/step - loss:
0.0868 - mae: 0.1102 - val_loss: 0.0815 - val_mae: 0.0824
Epoch 154/550
15/15          0s 6ms/step - loss:
0.0856 - mae: 0.1089 - val_loss: 0.0809 - val_mae: 0.0829
Epoch 155/550
15/15          0s 5ms/step - loss:
0.0844 - mae: 0.1081 - val_loss: 0.0803 - val_mae: 0.0826
Epoch 156/550
15/15          0s 5ms/step - loss:
0.0836 - mae: 0.1084 - val_loss: 0.0797 - val_mae: 0.0830
Epoch 157/550
15/15          0s 5ms/step - loss:
```

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0.0823 - mae: 0.1065 - val_loss: 0.0791 - val_mae: 0.0822
Epoch 158/550
15/15          0s 5ms/step - loss:
0.0829 - mae: 0.1073 - val_loss: 0.0785 - val_mae: 0.0821
Epoch 159/550
15/15          0s 5ms/step - loss:
0.0851 - mae: 0.1106 - val_loss: 0.0779 - val_mae: 0.0824
Epoch 160/550
15/15          0s 5ms/step - loss:
0.0799 - mae: 0.1054 - val_loss: 0.0774 - val_mae: 0.0821
Epoch 161/550
15/15          0s 5ms/step - loss:
0.0794 - mae: 0.1051 - val_loss: 0.0768 - val_mae: 0.0823
Epoch 162/550
15/15          0s 5ms/step - loss:
0.0792 - mae: 0.1052 - val_loss: 0.0763 - val_mae: 0.0827
Epoch 163/550
15/15          0s 5ms/step - loss:
0.0794 - mae: 0.1074 - val_loss: 0.0757 - val_mae: 0.0825
Epoch 164/550
15/15          0s 5ms/step - loss:
0.0796 - mae: 0.1061 - val_loss: 0.0750 - val_mae: 0.0826
Epoch 165/550
15/15          0s 6ms/step - loss:
0.0794 - mae: 0.1069 - val_loss: 0.0745 - val_mae: 0.0822
Epoch 166/550
15/15          0s 6ms/step - loss:
0.0769 - mae: 0.1049 - val_loss: 0.0739 - val_mae: 0.0826
Epoch 167/550
15/15          0s 6ms/step - loss:
0.0788 - mae: 0.1075 - val_loss: 0.0734 - val_mae: 0.0831
Epoch 168/550
15/15          0s 5ms/step - loss:
0.0749 - mae: 0.1034 - val_loss: 0.0729 - val_mae: 0.0822
Epoch 169/550
15/15          0s 7ms/step - loss:
0.0758 - mae: 0.1050 - val_loss: 0.0722 - val_mae: 0.0825
Epoch 170/550
15/15          0s 5ms/step - loss:
0.0757 - mae: 0.1053 - val_loss: 0.0717 - val_mae: 0.0819
Epoch 171/550
15/15          0s 5ms/step - loss:
0.0730 - mae: 0.1026 - val_loss: 0.0713 - val_mae: 0.0822
Epoch 172/550
15/15          0s 5ms/step - loss:
0.0741 - mae: 0.1040 - val_loss: 0.0707 - val_mae: 0.0824
Epoch 173/550
15/15          0s 5ms/step - loss:
```

0.0748 - mae: 0.1057 - val_loss: 0.0702 - val_mae: 0.0822
Epoch 174/550
15/15   0s 5ms/step - loss:
0.0729 - mae: 0.1053 - val_loss: 0.0697 - val_mae: 0.0818
Epoch 175/550
15/15   0s 5ms/step - loss:
0.0713 - mae: 0.1029 - val_loss: 0.0691 - val_mae: 0.0820
Epoch 176/550
15/15   0s 5ms/step - loss:
0.0734 - mae: 0.1034 - val_loss: 0.0686 - val_mae: 0.0819
Epoch 177/550
15/15   0s 5ms/step - loss:
0.0703 - mae: 0.1024 - val_loss: 0.0681 - val_mae: 0.0816
Epoch 178/550
15/15   0s 5ms/step - loss:
0.0705 - mae: 0.1029 - val_loss: 0.0676 - val_mae: 0.0816
Epoch 179/550
15/15   0s 5ms/step - loss:
0.0704 - mae: 0.1028 - val_loss: 0.0671 - val_mae: 0.0814
Epoch 180/550
15/15   0s 5ms/step - loss:
0.0687 - mae: 0.1019 - val_loss: 0.0666 - val_mae: 0.0814
Epoch 181/550
15/15   0s 5ms/step - loss:
0.0673 - mae: 0.1002 - val_loss: 0.0661 - val_mae: 0.0814
Epoch 182/550
15/15   0s 7ms/step - loss:
0.0679 - mae: 0.1019 - val_loss: 0.0656 - val_mae: 0.0814
Epoch 183/550
15/15   0s 5ms/step - loss:
0.0667 - mae: 0.1005 - val_loss: 0.0651 - val_mae: 0.0811
Epoch 184/550
15/15   0s 5ms/step - loss:
0.0650 - mae: 0.0991 - val_loss: 0.0646 - val_mae: 0.0810
Epoch 185/550
15/15   0s 5ms/step - loss:
0.0659 - mae: 0.1009 - val_loss: 0.0642 - val_mae: 0.0818
Epoch 186/550
15/15   0s 5ms/step - loss:
0.0654 - mae: 0.1005 - val_loss: 0.0638 - val_mae: 0.0816
Epoch 187/550
15/15   0s 6ms/step - loss:
0.0665 - mae: 0.1021 - val_loss: 0.0633 - val_mae: 0.0813
Epoch 188/550
15/15   0s 6ms/step - loss:
0.0636 - mae: 0.0994 - val_loss: 0.0629 - val_mae: 0.0818
Epoch 189/550
15/15   0s 5ms/step - loss:

```
0.0631 - mae: 0.1002 - val_loss: 0.0624 - val_mae: 0.0814
Epoch 190/550
15/15              0s 5ms/step - loss:
0.0646 - mae: 0.1012 - val_loss: 0.0619 - val_mae: 0.0819
Epoch 191/550
15/15              0s 5ms/step - loss:
0.0654 - mae: 0.1015 - val_loss: 0.0615 - val_mae: 0.0812
Epoch 192/550
15/15              0s 5ms/step - loss:
0.0619 - mae: 0.0993 - val_loss: 0.0610 - val_mae: 0.0814
Epoch 193/550
15/15              0s 5ms/step - loss:
0.0600 - mae: 0.0969 - val_loss: 0.0606 - val_mae: 0.0817
Epoch 194/550
15/15              0s 5ms/step - loss:
0.0642 - mae: 0.1020 - val_loss: 0.0601 - val_mae: 0.0824
Epoch 195/550
15/15              0s 5ms/step - loss:
0.0632 - mae: 0.1011 - val_loss: 0.0598 - val_mae: 0.0815
Epoch 196/550
15/15              0s 6ms/step - loss:
0.0629 - mae: 0.1012 - val_loss: 0.0594 - val_mae: 0.0812
Epoch 197/550
15/15              0s 5ms/step - loss:
0.0603 - mae: 0.0991 - val_loss: 0.0589 - val_mae: 0.0811
Epoch 198/550
15/15              0s 5ms/step - loss:
0.0600 - mae: 0.0989 - val_loss: 0.0585 - val_mae: 0.0812
Epoch 199/550
15/15              0s 5ms/step - loss:
0.0600 - mae: 0.0995 - val_loss: 0.0580 - val_mae: 0.0812
Epoch 200/550
15/15              0s 5ms/step - loss:
0.0586 - mae: 0.0993 - val_loss: 0.0577 - val_mae: 0.0807
Epoch 201/550
15/15              0s 5ms/step - loss:
0.0583 - mae: 0.0981 - val_loss: 0.0574 - val_mae: 0.0808
Epoch 202/550
15/15              0s 5ms/step - loss:
0.0559 - mae: 0.0962 - val_loss: 0.0569 - val_mae: 0.0810
Epoch 203/550
15/15              0s 5ms/step - loss:
0.0566 - mae: 0.0970 - val_loss: 0.0565 - val_mae: 0.0814
Epoch 204/550
15/15              0s 5ms/step - loss:
0.0560 - mae: 0.0969 - val_loss: 0.0561 - val_mae: 0.0804
Epoch 205/550
15/15              0s 5ms/step - loss:
```

```
0.0566 - mae: 0.0975 - val_loss: 0.0556 - val_mae: 0.0802
Epoch 206/550
15/15          0s 5ms/step - loss:
0.0583 - mae: 0.0992 - val_loss: 0.0553 - val_mae: 0.0797
Epoch 207/550
15/15          0s 5ms/step - loss:
0.0539 - mae: 0.0948 - val_loss: 0.0550 - val_mae: 0.0796
Epoch 208/550
15/15          0s 5ms/step - loss:
0.0563 - mae: 0.0969 - val_loss: 0.0546 - val_mae: 0.0797
Epoch 209/550
15/15          0s 8ms/step - loss:
0.0534 - mae: 0.0939 - val_loss: 0.0542 - val_mae: 0.0797
Epoch 210/550
15/15          0s 5ms/step - loss:
0.0532 - mae: 0.0946 - val_loss: 0.0538 - val_mae: 0.0796
Epoch 211/550
15/15          0s 5ms/step - loss:
0.0533 - mae: 0.0960 - val_loss: 0.0535 - val_mae: 0.0800
Epoch 212/550
15/15          0s 5ms/step - loss:
0.0542 - mae: 0.0960 - val_loss: 0.0532 - val_mae: 0.0807
Epoch 213/550
15/15          0s 5ms/step - loss:
0.0540 - mae: 0.0971 - val_loss: 0.0529 - val_mae: 0.0794
Epoch 214/550
15/15          0s 5ms/step - loss:
0.0505 - mae: 0.0917 - val_loss: 0.0526 - val_mae: 0.0795
Epoch 215/550
15/15          0s 5ms/step - loss:
0.0514 - mae: 0.0942 - val_loss: 0.0522 - val_mae: 0.0806
Epoch 216/550
15/15          0s 6ms/step - loss:
0.0522 - mae: 0.0962 - val_loss: 0.0520 - val_mae: 0.0805
Epoch 217/550
15/15          0s 5ms/step - loss:
0.0519 - mae: 0.0969 - val_loss: 0.0514 - val_mae: 0.0800
Epoch 218/550
15/15          0s 5ms/step - loss:
0.0502 - mae: 0.0942 - val_loss: 0.0511 - val_mae: 0.0794
Epoch 219/550
15/15          0s 5ms/step - loss:
0.0493 - mae: 0.0936 - val_loss: 0.0509 - val_mae: 0.0795
Epoch 220/550
15/15          0s 5ms/step - loss:
0.0497 - mae: 0.0923 - val_loss: 0.0505 - val_mae: 0.0796
Epoch 221/550
15/15          0s 7ms/step - loss:
```

0.0479 - mae: 0.0926 - val_loss: 0.0501 - val_mae: 0.0791
Epoch 222/550
15/15   0s 5ms/step - loss:
0.0475 - mae: 0.0931 - val_loss: 0.0498 - val_mae: 0.0797
Epoch 223/550
15/15   0s 5ms/step - loss:
0.0478 - mae: 0.0916 - val_loss: 0.0495 - val_mae: 0.0794
Epoch 224/550
15/15   0s 5ms/step - loss:
0.0470 - mae: 0.0924 - val_loss: 0.0492 - val_mae: 0.0788
Epoch 225/550
15/15   0s 5ms/step - loss:
0.0495 - mae: 0.0944 - val_loss: 0.0491 - val_mae: 0.0796
Epoch 226/550
15/15   0s 5ms/step - loss:
0.0458 - mae: 0.0909 - val_loss: 0.0487 - val_mae: 0.0788
Epoch 227/550
15/15   0s 5ms/step - loss:
0.0461 - mae: 0.0914 - val_loss: 0.0484 - val_mae: 0.0791
Epoch 228/550
15/15   0s 5ms/step - loss:
0.0469 - mae: 0.0923 - val_loss: 0.0481 - val_mae: 0.0793
Epoch 229/550
15/15   0s 5ms/step - loss:
0.0455 - mae: 0.0921 - val_loss: 0.0477 - val_mae: 0.0787
Epoch 230/550
15/15   0s 6ms/step - loss:
0.0453 - mae: 0.0918 - val_loss: 0.0475 - val_mae: 0.0789
Epoch 231/550
15/15   0s 6ms/step - loss:
0.0451 - mae: 0.0907 - val_loss: 0.0471 - val_mae: 0.0791
Epoch 232/550
15/15   0s 5ms/step - loss:
0.0451 - mae: 0.0909 - val_loss: 0.0468 - val_mae: 0.0793
Epoch 233/550
15/15   0s 7ms/step - loss:
0.0457 - mae: 0.0934 - val_loss: 0.0466 - val_mae: 0.0788
Epoch 234/550
15/15   0s 5ms/step - loss:
0.0432 - mae: 0.0894 - val_loss: 0.0463 - val_mae: 0.0789
Epoch 235/550
15/15   0s 5ms/step - loss:
0.0455 - mae: 0.0920 - val_loss: 0.0460 - val_mae: 0.0785
Epoch 236/550
15/15   0s 5ms/step - loss:
0.0444 - mae: 0.0910 - val_loss: 0.0459 - val_mae: 0.0780
Epoch 237/550
15/15   0s 5ms/step - loss:

0.0449 - mae: 0.0908 - val_loss: 0.0455 - val_mae: 0.0783
Epoch 238/550
15/15   0s 5ms/step - loss:
0.0432 - mae: 0.0902 - val_loss: 0.0453 - val_mae: 0.0782
Epoch 239/550
15/15   0s 5ms/step - loss:
0.0432 - mae: 0.0901 - val_loss: 0.0450 - val_mae: 0.0777
Epoch 240/550
15/15   0s 5ms/step - loss:
0.0433 - mae: 0.0903 - val_loss: 0.0448 - val_mae: 0.0782
Epoch 241/550
15/15   0s 6ms/step - loss:
0.0425 - mae: 0.0906 - val_loss: 0.0445 - val_mae: 0.0781
Epoch 242/550
15/15   0s 5ms/step - loss:
0.0451 - mae: 0.0935 - val_loss: 0.0442 - val_mae: 0.0783
Epoch 243/550
15/15   0s 5ms/step - loss:
0.0460 - mae: 0.0934 - val_loss: 0.0441 - val_mae: 0.0785
Epoch 244/550
15/15   0s 5ms/step - loss:
0.0422 - mae: 0.0905 - val_loss: 0.0439 - val_mae: 0.0790
Epoch 245/550
15/15   0s 5ms/step - loss:
0.0405 - mae: 0.0896 - val_loss: 0.0437 - val_mae: 0.0783
Epoch 246/550
15/15   0s 7ms/step - loss:
0.0428 - mae: 0.0915 - val_loss: 0.0434 - val_mae: 0.0785
Epoch 247/550
15/15   0s 5ms/step - loss:
0.0412 - mae: 0.0910 - val_loss: 0.0431 - val_mae: 0.0782
Epoch 248/550
15/15   0s 5ms/step - loss:
0.0408 - mae: 0.0904 - val_loss: 0.0428 - val_mae: 0.0783
Epoch 249/550
15/15   0s 6ms/step - loss:
0.0412 - mae: 0.0900 - val_loss: 0.0426 - val_mae: 0.0777
Epoch 250/550
15/15   0s 5ms/step - loss:
0.0404 - mae: 0.0894 - val_loss: 0.0425 - val_mae: 0.0781
Epoch 251/550
15/15   0s 6ms/step - loss:
0.0386 - mae: 0.0873 - val_loss: 0.0422 - val_mae: 0.0777
Epoch 252/550
15/15   0s 6ms/step - loss:
0.0403 - mae: 0.0898 - val_loss: 0.0420 - val_mae: 0.0785
Epoch 253/550
15/15   0s 5ms/step - loss:

0.0412 - mae: 0.0906 - val_loss: 0.0417 - val_mae: 0.0777
Epoch 254/550
15/15   0s 6ms/step - loss:
0.0399 - mae: 0.0893 - val_loss: 0.0416 - val_mae: 0.0788
Epoch 255/550
15/15   0s 7ms/step - loss:
0.0396 - mae: 0.0899 - val_loss: 0.0415 - val_mae: 0.0780
Epoch 256/550
15/15   0s 5ms/step - loss:
0.0387 - mae: 0.0890 - val_loss: 0.0412 - val_mae: 0.0784
Epoch 257/550
15/15   0s 5ms/step - loss:
0.0393 - mae: 0.0897 - val_loss: 0.0410 - val_mae: 0.0784
Epoch 258/550
15/15   0s 6ms/step - loss:
0.0382 - mae: 0.0884 - val_loss: 0.0409 - val_mae: 0.0777
Epoch 259/550
15/15   0s 6ms/step - loss:
0.0388 - mae: 0.0886 - val_loss: 0.0408 - val_mae: 0.0788
Epoch 260/550
15/15   0s 5ms/step - loss:
0.0388 - mae: 0.0886 - val_loss: 0.0404 - val_mae: 0.0780
Epoch 261/550
15/15   0s 5ms/step - loss:
0.0379 - mae: 0.0887 - val_loss: 0.0402 - val_mae: 0.0788
Epoch 262/550
15/15   0s 5ms/step - loss:
0.0372 - mae: 0.0881 - val_loss: 0.0402 - val_mae: 0.0780
Epoch 263/550
15/15   0s 5ms/step - loss:
0.0378 - mae: 0.0882 - val_loss: 0.0399 - val_mae: 0.0783
Epoch 264/550
15/15   0s 5ms/step - loss:
0.0375 - mae: 0.0881 - val_loss: 0.0399 - val_mae: 0.0784
Epoch 265/550
15/15   0s 5ms/step - loss:
0.0375 - mae: 0.0877 - val_loss: 0.0396 - val_mae: 0.0781
Epoch 266/550
15/15   0s 5ms/step - loss:
0.0364 - mae: 0.0881 - val_loss: 0.0395 - val_mae: 0.0780
Epoch 267/550
15/15   0s 6ms/step - loss:
0.0359 - mae: 0.0873 - val_loss: 0.0391 - val_mae: 0.0778
Epoch 268/550
15/15   0s 5ms/step - loss:
0.0355 - mae: 0.0867 - val_loss: 0.0391 - val_mae: 0.0787
Epoch 269/550
15/15   0s 5ms/step - loss:

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0.0364 - mae: 0.0873 - val_loss: 0.0390 - val_mae: 0.0778
Epoch 270/550
15/15            0s 6ms/step - loss:
0.0346 - mae: 0.0860 - val_loss: 0.0388 - val_mae: 0.0783
Epoch 271/550
15/15            0s 5ms/step - loss:
0.0351 - mae: 0.0874 - val_loss: 0.0387 - val_mae: 0.0779
Epoch 272/550
15/15            0s 5ms/step - loss:
0.0362 - mae: 0.0871 - val_loss: 0.0386 - val_mae: 0.0778
Epoch 273/550
15/15            0s 6ms/step - loss:
0.0373 - mae: 0.0881 - val_loss: 0.0383 - val_mae: 0.0777
Epoch 274/550
15/15            0s 5ms/step - loss:
0.0335 - mae: 0.0847 - val_loss: 0.0383 - val_mae: 0.0776
Epoch 275/550
15/15            0s 5ms/step - loss:
0.0351 - mae: 0.0863 - val_loss: 0.0379 - val_mae: 0.0782
Epoch 276/550
15/15            0s 5ms/step - loss:
0.0351 - mae: 0.0867 - val_loss: 0.0378 - val_mae: 0.0779
Epoch 277/550
15/15            0s 7ms/step - loss:
0.0344 - mae: 0.0861 - val_loss: 0.0378 - val_mae: 0.0783
Epoch 278/550
15/15            0s 5ms/step - loss:
0.0341 - mae: 0.0865 - val_loss: 0.0376 - val_mae: 0.0777
Epoch 279/550
15/15            0s 5ms/step - loss:
0.0344 - mae: 0.0869 - val_loss: 0.0374 - val_mae: 0.0773
Epoch 280/550
15/15            0s 5ms/step - loss:
0.0325 - mae: 0.0846 - val_loss: 0.0373 - val_mae: 0.0770
Epoch 281/550
15/15            0s 5ms/step - loss:
0.0334 - mae: 0.0865 - val_loss: 0.0373 - val_mae: 0.0763
Epoch 282/550
15/15            0s 6ms/step - loss:
0.0352 - mae: 0.0867 - val_loss: 0.0372 - val_mae: 0.0778
Epoch 283/550
15/15            0s 5ms/step - loss:
0.0340 - mae: 0.0860 - val_loss: 0.0370 - val_mae: 0.0778
Epoch 284/550
15/15            0s 5ms/step - loss:
0.0327 - mae: 0.0851 - val_loss: 0.0370 - val_mae: 0.0779
Epoch 285/550
15/15            0s 6ms/step - loss:
```

0.0329 - mae: 0.0846 - val_loss: 0.0368 - val_mae: 0.0784
Epoch 286/550
15/15   0s 5ms/step - loss:
0.0350 - mae: 0.0883 - val_loss: 0.0364 - val_mae: 0.0780
Epoch 287/550
15/15   0s 5ms/step - loss:
0.0326 - mae: 0.0848 - val_loss: 0.0362 - val_mae: 0.0775
Epoch 288/550
15/15   0s 6ms/step - loss:
0.0318 - mae: 0.0842 - val_loss: 0.0364 - val_mae: 0.0791
Epoch 289/550
15/15   0s 5ms/step - loss:
0.0345 - mae: 0.0883 - val_loss: 0.0361 - val_mae: 0.0774
Epoch 290/550
15/15   0s 5ms/step - loss:
0.0325 - mae: 0.0842 - val_loss: 0.0361 - val_mae: 0.0786
Epoch 291/550
15/15   0s 5ms/step - loss:
0.0326 - mae: 0.0864 - val_loss: 0.0362 - val_mae: 0.0773
Epoch 292/550
15/15   0s 5ms/step - loss:
0.0323 - mae: 0.0855 - val_loss: 0.0359 - val_mae: 0.0772
Epoch 293/550
15/15   0s 5ms/step - loss:
0.0324 - mae: 0.0850 - val_loss: 0.0358 - val_mae: 0.0770
Epoch 294/550
15/15   0s 5ms/step - loss:
0.0321 - mae: 0.0861 - val_loss: 0.0359 - val_mae: 0.0781
Epoch 295/550
15/15   0s 5ms/step - loss:
0.0330 - mae: 0.0869 - val_loss: 0.0356 - val_mae: 0.0775
Epoch 296/550
15/15   0s 5ms/step - loss:
0.0322 - mae: 0.0844 - val_loss: 0.0355 - val_mae: 0.0786
Epoch 297/550
15/15   0s 5ms/step - loss:
0.0305 - mae: 0.0850 - val_loss: 0.0353 - val_mae: 0.0786
Epoch 298/550
15/15   0s 5ms/step - loss:
0.0301 - mae: 0.0829 - val_loss: 0.0352 - val_mae: 0.0779
Epoch 299/550
15/15   0s 5ms/step - loss:
0.0308 - mae: 0.0845 - val_loss: 0.0352 - val_mae: 0.0785
Epoch 300/550
15/15   0s 5ms/step - loss:
0.0313 - mae: 0.0852 - val_loss: 0.0352 - val_mae: 0.0781
Epoch 301/550
15/15   0s 5ms/step - loss:

0.0310 - mae: 0.0838 - val_loss: 0.0350 - val_mae: 0.0778
Epoch 302/550
15/15   0s 5ms/step - loss:
0.0291 - mae: 0.0823 - val_loss: 0.0349 - val_mae: 0.0773
Epoch 303/550
15/15   0s 5ms/step - loss:
0.0315 - mae: 0.0857 - val_loss: 0.0343 - val_mae: 0.0779
Epoch 304/550
15/15   0s 5ms/step - loss:
0.0323 - mae: 0.0863 - val_loss: 0.0342 - val_mae: 0.0776
Epoch 305/550
15/15   0s 5ms/step - loss:
0.0307 - mae: 0.0829 - val_loss: 0.0344 - val_mae: 0.0783
Epoch 306/550
15/15   0s 5ms/step - loss:
0.0306 - mae: 0.0848 - val_loss: 0.0342 - val_mae: 0.0776
Epoch 307/550
15/15   0s 5ms/step - loss:
0.0304 - mae: 0.0840 - val_loss: 0.0342 - val_mae: 0.0776
Epoch 308/550
15/15   0s 6ms/step - loss:
0.0283 - mae: 0.0807 - val_loss: 0.0340 - val_mae: 0.0785
Epoch 309/550
15/15   0s 6ms/step - loss:
0.0293 - mae: 0.0831 - val_loss: 0.0341 - val_mae: 0.0779
Epoch 310/550
15/15   0s 5ms/step - loss:
0.0305 - mae: 0.0849 - val_loss: 0.0343 - val_mae: 0.0769
Epoch 311/550
15/15   0s 5ms/step - loss:
0.0292 - mae: 0.0831 - val_loss: 0.0338 - val_mae: 0.0765
Epoch 312/550
15/15   0s 6ms/step - loss:
0.0289 - mae: 0.0832 - val_loss: 0.0337 - val_mae: 0.0778
Epoch 313/550
15/15   0s 5ms/step - loss:
0.0299 - mae: 0.0844 - val_loss: 0.0334 - val_mae: 0.0785
Epoch 314/550
15/15   0s 5ms/step - loss:
0.0293 - mae: 0.0833 - val_loss: 0.0335 - val_mae: 0.0775
Epoch 315/550
15/15   0s 5ms/step - loss:
0.0290 - mae: 0.0836 - val_loss: 0.0334 - val_mae: 0.0781
Epoch 316/550
15/15   0s 6ms/step - loss:
0.0297 - mae: 0.0843 - val_loss: 0.0333 - val_mae: 0.0788
Epoch 317/550
15/15   0s 6ms/step - loss:

0.0280 - mae: 0.0816 - val_loss: 0.0331 - val_mae: 0.0784
Epoch 318/550
15/15   0s 7ms/step - loss:
0.0277 - mae: 0.0821 - val_loss: 0.0330 - val_mae: 0.0773
Epoch 319/550
15/15   0s 5ms/step - loss:
0.0301 - mae: 0.0834 - val_loss: 0.0330 - val_mae: 0.0792
Epoch 320/550
15/15   0s 5ms/step - loss:
0.0290 - mae: 0.0835 - val_loss: 0.0332 - val_mae: 0.0792
Epoch 321/550
15/15   0s 5ms/step - loss:
0.0276 - mae: 0.0824 - val_loss: 0.0331 - val_mae: 0.0783
Epoch 322/550
15/15   0s 5ms/step - loss:
0.0278 - mae: 0.0822 - val_loss: 0.0330 - val_mae: 0.0771
Epoch 323/550
15/15   0s 5ms/step - loss:
0.0270 - mae: 0.0820 - val_loss: 0.0327 - val_mae: 0.0766
Epoch 324/550
15/15   0s 5ms/step - loss:
0.0284 - mae: 0.0844 - val_loss: 0.0326 - val_mae: 0.0788
Epoch 325/550
15/15   0s 5ms/step - loss:
0.0273 - mae: 0.0807 - val_loss: 0.0324 - val_mae: 0.0767
Epoch 326/550
15/15   0s 5ms/step - loss:
0.0284 - mae: 0.0828 - val_loss: 0.0320 - val_mae: 0.0766
Epoch 327/550
15/15   0s 5ms/step - loss:
0.0271 - mae: 0.0810 - val_loss: 0.0322 - val_mae: 0.0762
Epoch 328/550
15/15   0s 5ms/step - loss:
0.0275 - mae: 0.0827 - val_loss: 0.0324 - val_mae: 0.0776
Epoch 329/550
15/15   0s 7ms/step - loss:
0.0268 - mae: 0.0820 - val_loss: 0.0321 - val_mae: 0.0764
Epoch 330/550
15/15   0s 6ms/step - loss:
0.0272 - mae: 0.0824 - val_loss: 0.0319 - val_mae: 0.0785
Epoch 331/550
15/15   0s 6ms/step - loss:
0.0274 - mae: 0.0816 - val_loss: 0.0318 - val_mae: 0.0773
Epoch 332/550
15/15   0s 6ms/step - loss:
0.0299 - mae: 0.0847 - val_loss: 0.0319 - val_mae: 0.0769
Epoch 333/550
15/15   0s 6ms/step - loss:

0.0258 - mae: 0.0802 - val_loss: 0.0317 - val_mae: 0.0761
Epoch 334/550
15/15   0s 6ms/step - loss:
0.0254 - mae: 0.0808 - val_loss: 0.0316 - val_mae: 0.0760
Epoch 335/550
15/15   0s 5ms/step - loss:
0.0271 - mae: 0.0822 - val_loss: 0.0316 - val_mae: 0.0769
Epoch 336/550
15/15   0s 7ms/step - loss:
0.0266 - mae: 0.0806 - val_loss: 0.0314 - val_mae: 0.0770
Epoch 337/550
15/15   0s 6ms/step - loss:
0.0250 - mae: 0.0805 - val_loss: 0.0312 - val_mae: 0.0764
Epoch 338/550
15/15   0s 5ms/step - loss:
0.0269 - mae: 0.0823 - val_loss: 0.0313 - val_mae: 0.0764
Epoch 339/550
15/15   0s 5ms/step - loss:
0.0256 - mae: 0.0800 - val_loss: 0.0316 - val_mae: 0.0783
Epoch 340/550
15/15   0s 5ms/step - loss:
0.0265 - mae: 0.0820 - val_loss: 0.0311 - val_mae: 0.0772
Epoch 341/550
15/15   0s 5ms/step - loss:
0.0249 - mae: 0.0805 - val_loss: 0.0316 - val_mae: 0.0778
Epoch 342/550
15/15   0s 5ms/step - loss:
0.0262 - mae: 0.0807 - val_loss: 0.0310 - val_mae: 0.0769
Epoch 343/550
15/15   0s 5ms/step - loss:
0.0262 - mae: 0.0819 - val_loss: 0.0311 - val_mae: 0.0771
Epoch 344/550
15/15   0s 5ms/step - loss:
0.0246 - mae: 0.0793 - val_loss: 0.0310 - val_mae: 0.0769
Epoch 345/550
15/15   0s 6ms/step - loss:
0.0266 - mae: 0.0822 - val_loss: 0.0313 - val_mae: 0.0777
Epoch 346/550
15/15   0s 6ms/step - loss:
0.0246 - mae: 0.0802 - val_loss: 0.0306 - val_mae: 0.0757
Epoch 347/550
15/15   0s 5ms/step - loss:
0.0246 - mae: 0.0790 - val_loss: 0.0305 - val_mae: 0.0755
Epoch 348/550
15/15   0s 5ms/step - loss:
0.0264 - mae: 0.0811 - val_loss: 0.0307 - val_mae: 0.0768
Epoch 349/550
15/15   0s 5ms/step - loss:

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0.0257 - mae: 0.0806 - val_loss: 0.0305 - val_mae: 0.0760
Epoch 350/550
15/15          0s 5ms/step - loss:
0.0249 - mae: 0.0793 - val_loss: 0.0303 - val_mae: 0.0761
Epoch 351/550
15/15          0s 5ms/step - loss:
0.0249 - mae: 0.0803 - val_loss: 0.0304 - val_mae: 0.0766
Epoch 352/550
15/15          0s 6ms/step - loss:
0.0252 - mae: 0.0803 - val_loss: 0.0302 - val_mae: 0.0761
Epoch 353/550
15/15          0s 6ms/step - loss:
0.0259 - mae: 0.0810 - val_loss: 0.0298 - val_mae: 0.0756
Epoch 354/550
15/15          0s 7ms/step - loss:
0.0257 - mae: 0.0821 - val_loss: 0.0306 - val_mae: 0.0771
Epoch 355/550
15/15          0s 5ms/step - loss:
0.0237 - mae: 0.0803 - val_loss: 0.0298 - val_mae: 0.0757
Epoch 356/550
15/15          0s 5ms/step - loss:
0.0244 - mae: 0.0802 - val_loss: 0.0302 - val_mae: 0.0758
Epoch 357/550
15/15          0s 5ms/step - loss:
0.0229 - mae: 0.0790 - val_loss: 0.0301 - val_mae: 0.0759
Epoch 358/550
15/15          0s 6ms/step - loss:
0.0251 - mae: 0.0803 - val_loss: 0.0305 - val_mae: 0.0772
Epoch 359/550
15/15          0s 5ms/step - loss:
0.0245 - mae: 0.0803 - val_loss: 0.0298 - val_mae: 0.0765
Epoch 360/550
15/15          0s 5ms/step - loss:
0.0238 - mae: 0.0795 - val_loss: 0.0296 - val_mae: 0.0772
Epoch 361/550
15/15          0s 5ms/step - loss:
0.0250 - mae: 0.0816 - val_loss: 0.0299 - val_mae: 0.0769
Epoch 362/550
15/15          0s 7ms/step - loss:
0.0233 - mae: 0.0792 - val_loss: 0.0295 - val_mae: 0.0761
Epoch 363/550
15/15          0s 5ms/step - loss:
0.0234 - mae: 0.0790 - val_loss: 0.0296 - val_mae: 0.0755
Epoch 364/550
15/15          0s 5ms/step - loss:
0.0253 - mae: 0.0812 - val_loss: 0.0297 - val_mae: 0.0771
Epoch 365/550
15/15          0s 5ms/step - loss:
```

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0.0241 - mae: 0.0789 - val_loss: 0.0295 - val_mae: 0.0764
Epoch 366/550
15/15            0s 5ms/step - loss:
0.0236 - mae: 0.0792 - val_loss: 0.0295 - val_mae: 0.0764
Epoch 367/550
15/15            0s 5ms/step - loss:
0.0243 - mae: 0.0795 - val_loss: 0.0301 - val_mae: 0.0784
Epoch 368/550
15/15            0s 6ms/step - loss:
0.0235 - mae: 0.0792 - val_loss: 0.0293 - val_mae: 0.0768
Epoch 369/550
15/15            0s 6ms/step - loss:
0.0230 - mae: 0.0786 - val_loss: 0.0295 - val_mae: 0.0770
Epoch 370/550
15/15            0s 7ms/step - loss:
0.0227 - mae: 0.0789 - val_loss: 0.0293 - val_mae: 0.0759
Epoch 371/550
15/15            0s 5ms/step - loss:
0.0239 - mae: 0.0796 - val_loss: 0.0292 - val_mae: 0.0772
Epoch 372/550
15/15            0s 6ms/step - loss:
0.0230 - mae: 0.0784 - val_loss: 0.0287 - val_mae: 0.0774
Epoch 373/550
15/15            0s 5ms/step - loss:
0.0225 - mae: 0.0787 - val_loss: 0.0290 - val_mae: 0.0768
Epoch 374/550
15/15            0s 5ms/step - loss:
0.0244 - mae: 0.0793 - val_loss: 0.0290 - val_mae: 0.0766
Epoch 375/550
15/15            0s 5ms/step - loss:
0.0224 - mae: 0.0788 - val_loss: 0.0289 - val_mae: 0.0760
Epoch 376/550
15/15            0s 5ms/step - loss:
0.0216 - mae: 0.0777 - val_loss: 0.0283 - val_mae: 0.0756
Epoch 377/550
15/15            0s 5ms/step - loss:
0.0226 - mae: 0.0786 - val_loss: 0.0290 - val_mae: 0.0768
Epoch 378/550
15/15            0s 7ms/step - loss:
0.0219 - mae: 0.0776 - val_loss: 0.0293 - val_mae: 0.0779
Epoch 379/550
15/15            0s 6ms/step - loss:
0.0218 - mae: 0.0781 - val_loss: 0.0288 - val_mae: 0.0772
Epoch 380/550
15/15            0s 5ms/step - loss:
0.0220 - mae: 0.0779 - val_loss: 0.0288 - val_mae: 0.0771
Epoch 381/550
15/15            0s 5ms/step - loss:
```

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0.0213 - mae: 0.0763 - val_loss: 0.0290 - val_mae: 0.0778
Epoch 382/550
15/15          0s 5ms/step - loss:
0.0222 - mae: 0.0779 - val_loss: 0.0289 - val_mae: 0.0771
Epoch 383/550
15/15          0s 5ms/step - loss:
0.0236 - mae: 0.0799 - val_loss: 0.0285 - val_mae: 0.0777
Epoch 384/550
15/15          0s 5ms/step - loss:
0.0240 - mae: 0.0808 - val_loss: 0.0282 - val_mae: 0.0770
Epoch 385/550
15/15          0s 5ms/step - loss:
0.0219 - mae: 0.0780 - val_loss: 0.0288 - val_mae: 0.0785
Epoch 386/550
15/15          0s 7ms/step - loss:
0.0236 - mae: 0.0798 - val_loss: 0.0281 - val_mae: 0.0769
Epoch 387/550
15/15          0s 5ms/step - loss:
0.0216 - mae: 0.0776 - val_loss: 0.0282 - val_mae: 0.0772
Epoch 388/550
15/15          0s 5ms/step - loss:
0.0223 - mae: 0.0782 - val_loss: 0.0282 - val_mae: 0.0772
Epoch 389/550
15/15          0s 5ms/step - loss:
0.0212 - mae: 0.0782 - val_loss: 0.0280 - val_mae: 0.0772
Epoch 390/550
15/15          0s 5ms/step - loss:
0.0219 - mae: 0.0779 - val_loss: 0.0279 - val_mae: 0.0766
Epoch 391/550
15/15          0s 5ms/step - loss:
0.0216 - mae: 0.0782 - val_loss: 0.0281 - val_mae: 0.0764
Epoch 392/550
15/15          0s 5ms/step - loss:
0.0204 - mae: 0.0760 - val_loss: 0.0278 - val_mae: 0.0761
Epoch 393/550
15/15          0s 5ms/step - loss:
0.0213 - mae: 0.0769 - val_loss: 0.0281 - val_mae: 0.0772
Epoch 394/550
15/15          0s 5ms/step - loss:
0.0204 - mae: 0.0774 - val_loss: 0.0279 - val_mae: 0.0759
Epoch 395/550
15/15          0s 7ms/step - loss:
0.0216 - mae: 0.0782 - val_loss: 0.0275 - val_mae: 0.0753
Epoch 396/550
15/15          0s 5ms/step - loss:
0.0222 - mae: 0.0782 - val_loss: 0.0280 - val_mae: 0.0751
Epoch 397/550
15/15          0s 5ms/step - loss:
```

0.0208 - mae: 0.0770 - val_loss: 0.0273 - val_mae: 0.0757
Epoch 398/550
15/15   0s 5ms/step - loss:
0.0221 - mae: 0.0775 - val_loss: 0.0276 - val_mae: 0.0753
Epoch 399/550
15/15   0s 5ms/step - loss:
0.0212 - mae: 0.0778 - val_loss: 0.0274 - val_mae: 0.0762
Epoch 400/550
15/15   0s 6ms/step - loss:
0.0210 - mae: 0.0769 - val_loss: 0.0280 - val_mae: 0.0759
Epoch 401/550
15/15   0s 6ms/step - loss:
0.0211 - mae: 0.0771 - val_loss: 0.0275 - val_mae: 0.0760
Epoch 402/550
15/15   0s 5ms/step - loss:
0.0203 - mae: 0.0761 - val_loss: 0.0271 - val_mae: 0.0748
Epoch 403/550
15/15   0s 5ms/step - loss:
0.0218 - mae: 0.0783 - val_loss: 0.0279 - val_mae: 0.0755
Epoch 404/550
15/15   0s 7ms/step - loss:
0.0211 - mae: 0.0770 - val_loss: 0.0274 - val_mae: 0.0757
Epoch 405/550
15/15   0s 5ms/step - loss:
0.0212 - mae: 0.0773 - val_loss: 0.0277 - val_mae: 0.0749
Epoch 406/550
15/15   0s 5ms/step - loss:
0.0214 - mae: 0.0782 - val_loss: 0.0273 - val_mae: 0.0752
Epoch 407/550
15/15   0s 5ms/step - loss:
0.0205 - mae: 0.0763 - val_loss: 0.0273 - val_mae: 0.0763
Epoch 408/550
15/15   0s 5ms/step - loss:
0.0211 - mae: 0.0769 - val_loss: 0.0269 - val_mae: 0.0747
Epoch 409/550
15/15   0s 5ms/step - loss:
0.0197 - mae: 0.0758 - val_loss: 0.0270 - val_mae: 0.0743
Epoch 410/550
15/15   0s 5ms/step - loss:
0.0209 - mae: 0.0779 - val_loss: 0.0270 - val_mae: 0.0754
Epoch 411/550
15/15   0s 5ms/step - loss:
0.0195 - mae: 0.0757 - val_loss: 0.0278 - val_mae: 0.0764
Epoch 412/550
15/15   0s 6ms/step - loss:
0.0224 - mae: 0.0789 - val_loss: 0.0269 - val_mae: 0.0736
Epoch 413/550
15/15   0s 5ms/step - loss:

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0.0202 - mae: 0.0757 - val_loss: 0.0273 - val_mae: 0.0744
Epoch 414/550
15/15              0s 6ms/step - loss:
0.0199 - mae: 0.0762 - val_loss: 0.0267 - val_mae: 0.0752
Epoch 415/550
15/15              0s 5ms/step - loss:
0.0192 - mae: 0.0746 - val_loss: 0.0266 - val_mae: 0.0744
Epoch 416/550
15/15              0s 6ms/step - loss:
0.0182 - mae: 0.0741 - val_loss: 0.0265 - val_mae: 0.0746
Epoch 417/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0747 - val_loss: 0.0267 - val_mae: 0.0751
Epoch 418/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0763 - val_loss: 0.0266 - val_mae: 0.0756
Epoch 419/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0759 - val_loss: 0.0265 - val_mae: 0.0751
Epoch 420/550
15/15              0s 7ms/step - loss:
0.0218 - mae: 0.0785 - val_loss: 0.0268 - val_mae: 0.0749
Epoch 421/550
15/15              0s 5ms/step - loss:
0.0206 - mae: 0.0770 - val_loss: 0.0265 - val_mae: 0.0749
Epoch 422/550
15/15              0s 6ms/step - loss:
0.0196 - mae: 0.0750 - val_loss: 0.0266 - val_mae: 0.0739
Epoch 423/550
15/15              0s 6ms/step - loss:
0.0192 - mae: 0.0755 - val_loss: 0.0263 - val_mae: 0.0747
Epoch 424/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0761 - val_loss: 0.0264 - val_mae: 0.0739
Epoch 425/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0761 - val_loss: 0.0267 - val_mae: 0.0753
Epoch 426/550
15/15              0s 6ms/step - loss:
0.0192 - mae: 0.0750 - val_loss: 0.0261 - val_mae: 0.0739
Epoch 427/550
15/15              0s 6ms/step - loss:
0.0189 - mae: 0.0742 - val_loss: 0.0261 - val_mae: 0.0744
Epoch 428/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0753 - val_loss: 0.0272 - val_mae: 0.0746
Epoch 429/550
15/15              0s 5ms/step - loss:
```

```
0.0192 - mae: 0.0766 - val_loss: 0.0269 - val_mae: 0.0766
Epoch 430/550
15/15          0s 5ms/step - loss:
0.0182 - mae: 0.0745 - val_loss: 0.0266 - val_mae: 0.0748
Epoch 431/550
15/15          0s 5ms/step - loss:
0.0201 - mae: 0.0760 - val_loss: 0.0273 - val_mae: 0.0756
Epoch 432/550
15/15          0s 5ms/step - loss:
0.0196 - mae: 0.0761 - val_loss: 0.0264 - val_mae: 0.0753
Epoch 433/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0758 - val_loss: 0.0272 - val_mae: 0.0756
Epoch 434/550
15/15          0s 5ms/step - loss:
0.0185 - mae: 0.0746 - val_loss: 0.0269 - val_mae: 0.0756
Epoch 435/550
15/15          0s 5ms/step - loss:
0.0189 - mae: 0.0745 - val_loss: 0.0263 - val_mae: 0.0748
Epoch 436/550
15/15          0s 5ms/step - loss:
0.0191 - mae: 0.0746 - val_loss: 0.0275 - val_mae: 0.0748
Epoch 437/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0756 - val_loss: 0.0261 - val_mae: 0.0741
Epoch 438/550
15/15          0s 5ms/step - loss:
0.0200 - mae: 0.0764 - val_loss: 0.0262 - val_mae: 0.0746
Epoch 439/550
15/15          0s 5ms/step - loss:
0.0191 - mae: 0.0759 - val_loss: 0.0262 - val_mae: 0.0768
Epoch 440/550
15/15          0s 5ms/step - loss:
0.0207 - mae: 0.0775 - val_loss: 0.0270 - val_mae: 0.0764
Epoch 441/550
15/15          0s 5ms/step - loss:
0.0191 - mae: 0.0742 - val_loss: 0.0256 - val_mae: 0.0746
Epoch 442/550
15/15          0s 5ms/step - loss:
0.0200 - mae: 0.0748 - val_loss: 0.0260 - val_mae: 0.0750
Epoch 443/550
15/15          0s 5ms/step - loss:
0.0189 - mae: 0.0741 - val_loss: 0.0264 - val_mae: 0.0762
Epoch 444/550
15/15          0s 6ms/step - loss:
0.0182 - mae: 0.0738 - val_loss: 0.0266 - val_mae: 0.0751
Epoch 445/550
15/15          0s 5ms/step - loss:
```

0.0209 - mae: 0.0768 - val_loss: 0.0270 - val_mae: 0.0757
Epoch 446/550
15/15   0s 5ms/step - loss:
0.0185 - mae: 0.0753 - val_loss: 0.0264 - val_mae: 0.0749
Epoch 447/550
15/15   0s 5ms/step - loss:
0.0181 - mae: 0.0729 - val_loss: 0.0265 - val_mae: 0.0755
Epoch 448/550
15/15   0s 5ms/step - loss:
0.0183 - mae: 0.0737 - val_loss: 0.0265 - val_mae: 0.0755
Epoch 449/550
15/15   0s 5ms/step - loss:
0.0191 - mae: 0.0753 - val_loss: 0.0270 - val_mae: 0.0762
Epoch 450/550
15/15   0s 5ms/step - loss:
0.0196 - mae: 0.0753 - val_loss: 0.0261 - val_mae: 0.0749
Epoch 451/550
15/15   0s 6ms/step - loss:
0.0194 - mae: 0.0753 - val_loss: 0.0266 - val_mae: 0.0756
Epoch 452/550
15/15   0s 5ms/step - loss:
0.0188 - mae: 0.0749 - val_loss: 0.0267 - val_mae: 0.0745
Epoch 453/550
15/15   0s 5ms/step - loss:
0.0190 - mae: 0.0753 - val_loss: 0.0270 - val_mae: 0.0755
Epoch 454/550
15/15   0s 5ms/step - loss:
0.0188 - mae: 0.0739 - val_loss: 0.0258 - val_mae: 0.0734
Epoch 455/550
15/15   0s 6ms/step - loss:
0.0192 - mae: 0.0752 - val_loss: 0.0270 - val_mae: 0.0756
Epoch 456/550
15/15   0s 5ms/step - loss:
0.0170 - mae: 0.0718 - val_loss: 0.0258 - val_mae: 0.0743
Epoch 457/550
15/15   0s 5ms/step - loss:
0.0187 - mae: 0.0739 - val_loss: 0.0273 - val_mae: 0.0758
Epoch 458/550
15/15   0s 5ms/step - loss:
0.0186 - mae: 0.0752 - val_loss: 0.0272 - val_mae: 0.0746
Epoch 459/550
15/15   0s 7ms/step - loss:
0.0180 - mae: 0.0732 - val_loss: 0.0268 - val_mae: 0.0749
Epoch 460/550
15/15   0s 5ms/step - loss:
0.0175 - mae: 0.0733 - val_loss: 0.0266 - val_mae: 0.0745
Epoch 461/550
15/15   0s 5ms/step - loss:

```
0.0177 - mae: 0.0729 - val_loss: 0.0266 - val_mae: 0.0744
Epoch 462/550
15/15              0s 5ms/step - loss:
0.0188 - mae: 0.0743 - val_loss: 0.0263 - val_mae: 0.0738
Epoch 463/550
15/15              0s 5ms/step - loss:
0.0179 - mae: 0.0743 - val_loss: 0.0260 - val_mae: 0.0742
Epoch 464/550
15/15              0s 5ms/step - loss:
0.0178 - mae: 0.0727 - val_loss: 0.0257 - val_mae: 0.0745
Epoch 465/550
15/15              0s 5ms/step - loss:
0.0182 - mae: 0.0739 - val_loss: 0.0265 - val_mae: 0.0762
Epoch 466/550
15/15              0s 7ms/step - loss:
0.0185 - mae: 0.0739 - val_loss: 0.0263 - val_mae: 0.0744
```


Training and Validation Loss - Fold 7

Training and Validation MAE - Fold 7
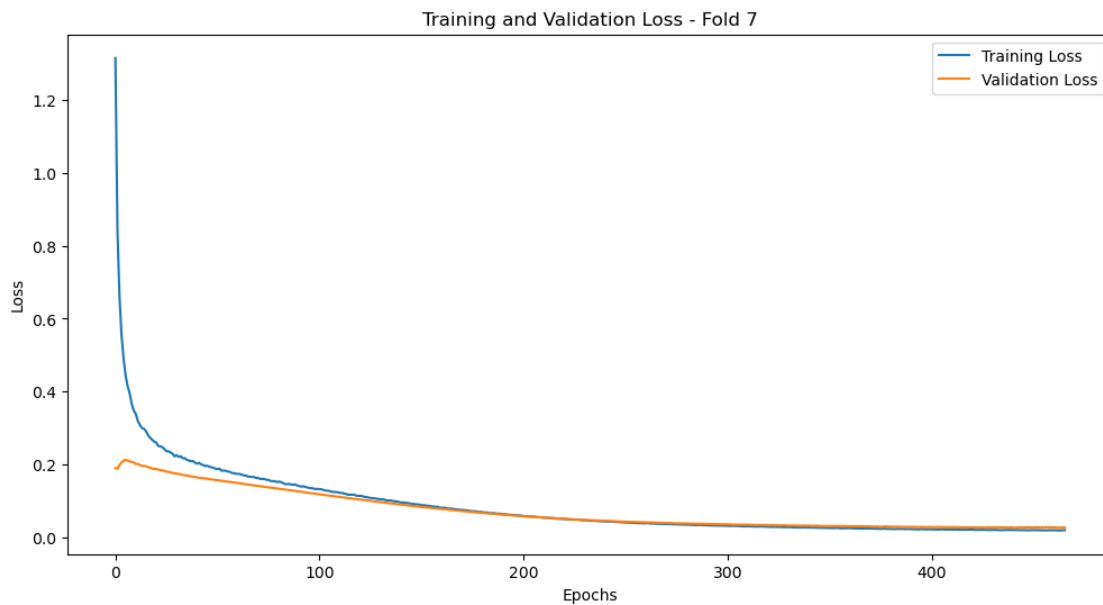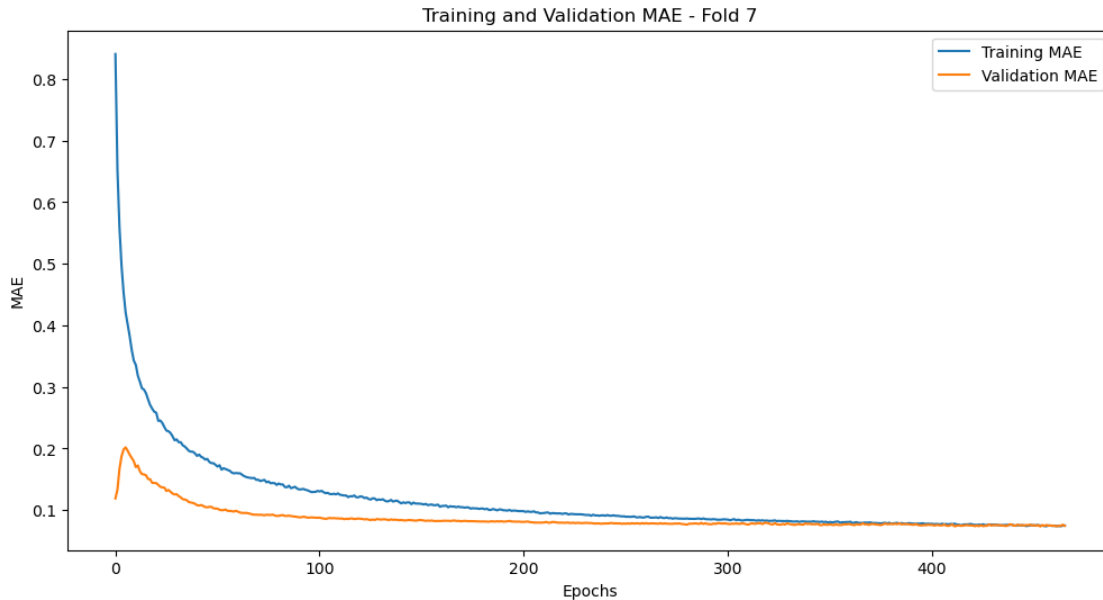
Fold Validation MAE: 0.07457193732261658
Epoch 1/550

```
C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
15/15                2s 17ms/step -
loss: 1.7923 - mae: 0.9709 - val_loss: 0.2068 - val_mae: 0.1618
Epoch 2/550
15/15                0s 6ms/step - loss:
1.0242 - mae: 0.7187 - val_loss: 0.1914 - val_mae: 0.1251
Epoch 3/550
15/15                0s 5ms/step - loss:
0.7737 - mae: 0.6074 - val_loss: 0.1886 - val_mae: 0.1284
Epoch 4/550
15/15                0s 5ms/step - loss:
0.6343 - mae: 0.5367 - val_loss: 0.1909 - val_mae: 0.1387
Epoch 5/550
15/15                0s 5ms/step - loss:
0.5739 - mae: 0.5016 - val_loss: 0.1927 - val_mae: 0.1461
Epoch 6/550
15/15                0s 5ms/step - loss:
0.5045 - mae: 0.4552 - val_loss: 0.1942 - val_mae: 0.1508
Epoch 7/550
15/15                0s 5ms/step - loss:
```

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```
0.4702 - mae: 0.4311 - val_loss: 0.1963 - val_mae: 0.1570
Epoch 8/550
15/15              0s 5ms/step - loss:
0.4370 - mae: 0.4097 - val_loss: 0.1967 - val_mae: 0.1586
Epoch 9/550
15/15              0s 5ms/step - loss:
0.3963 - mae: 0.3815 - val_loss: 0.1961 - val_mae: 0.1586
Epoch 10/550
15/15              0s 5ms/step - loss:
0.3834 - mae: 0.3705 - val_loss: 0.1972 - val_mae: 0.1627
Epoch 11/550
15/15              0s 5ms/step - loss:
0.3720 - mae: 0.3618 - val_loss: 0.1977 - val_mae: 0.1654
Epoch 12/550
15/15              0s 5ms/step - loss:
0.3409 - mae: 0.3343 - val_loss: 0.1974 - val_mae: 0.1670
Epoch 13/550
15/15              0s 5ms/step - loss:
0.3317 - mae: 0.3242 - val_loss: 0.1945 - val_mae: 0.1618
Epoch 14/550
15/15              0s 6ms/step - loss:
0.3231 - mae: 0.3162 - val_loss: 0.1933 - val_mae: 0.1574
Epoch 15/550
15/15              0s 5ms/step - loss:
0.3224 - mae: 0.3099 - val_loss: 0.1923 - val_mae: 0.1557
Epoch 16/550
15/15              0s 5ms/step - loss:
0.3107 - mae: 0.3020 - val_loss: 0.1903 - val_mae: 0.1535
Epoch 17/550
15/15              0s 5ms/step - loss:
0.3018 - mae: 0.2924 - val_loss: 0.1888 - val_mae: 0.1484
Epoch 18/550
15/15              0s 6ms/step - loss:
0.2873 - mae: 0.2792 - val_loss: 0.1869 - val_mae: 0.1445
Epoch 19/550
15/15              0s 5ms/step - loss:
0.2844 - mae: 0.2774 - val_loss: 0.1849 - val_mae: 0.1404
Epoch 20/550
15/15              0s 5ms/step - loss:
0.2731 - mae: 0.2662 - val_loss: 0.1837 - val_mae: 0.1382
Epoch 21/550
15/15              0s 5ms/step - loss:
0.2791 - mae: 0.2727 - val_loss: 0.1824 - val_mae: 0.1340
Epoch 22/550
15/15              0s 5ms/step - loss:
0.2740 - mae: 0.2597 - val_loss: 0.1819 - val_mae: 0.1349
Epoch 23/550
15/15              0s 5ms/step - loss:
```

```
0.2709 - mae: 0.2599 - val_loss: 0.1811 - val_mae: 0.1332
Epoch 24/550
15/15              0s 5ms/step - loss:
0.2661 - mae: 0.2512 - val_loss: 0.1798 - val_mae: 0.1302
Epoch 25/550
15/15              0s 5ms/step - loss:
0.2518 - mae: 0.2378 - val_loss: 0.1789 - val_mae: 0.1297
Epoch 26/550
15/15              0s 5ms/step - loss:
0.2506 - mae: 0.2374 - val_loss: 0.1782 - val_mae: 0.1300
Epoch 27/550
15/15              0s 6ms/step - loss:
0.2525 - mae: 0.2387 - val_loss: 0.1769 - val_mae: 0.1277
Epoch 28/550
15/15              0s 5ms/step - loss:
0.2452 - mae: 0.2340 - val_loss: 0.1762 - val_mae: 0.1267
Epoch 29/550
15/15              0s 6ms/step - loss:
0.2456 - mae: 0.2331 - val_loss: 0.1752 - val_mae: 0.1262
Epoch 30/550
15/15              0s 8ms/step - loss:
0.2453 - mae: 0.2321 - val_loss: 0.1745 - val_mae: 0.1252
Epoch 31/550
15/15              0s 5ms/step - loss:
0.2329 - mae: 0.2186 - val_loss: 0.1740 - val_mae: 0.1260
Epoch 32/550
15/15              0s 5ms/step - loss:
0.2319 - mae: 0.2178 - val_loss: 0.1734 - val_mae: 0.1244
Epoch 33/550
15/15              0s 5ms/step - loss:
0.2328 - mae: 0.2180 - val_loss: 0.1727 - val_mae: 0.1235
Epoch 34/550
15/15              0s 6ms/step - loss:
0.2273 - mae: 0.2123 - val_loss: 0.1717 - val_mae: 0.1219
Epoch 35/550
15/15              0s 5ms/step - loss:
0.2267 - mae: 0.2092 - val_loss: 0.1710 - val_mae: 0.1208
Epoch 36/550
15/15              0s 5ms/step - loss:
0.2293 - mae: 0.2129 - val_loss: 0.1703 - val_mae: 0.1205
Epoch 37/550
15/15              0s 5ms/step - loss:
0.2306 - mae: 0.2128 - val_loss: 0.1695 - val_mae: 0.1198
Epoch 38/550
15/15              0s 5ms/step - loss:
0.2203 - mae: 0.2018 - val_loss: 0.1690 - val_mae: 0.1201
Epoch 39/550
15/15              0s 6ms/step - loss:
```

0.2202 - mae: 0.2053 - val_loss: 0.1683 - val_mae: 0.1194
Epoch 40/550
15/15   0s 6ms/step - loss:
0.2200 - mae: 0.2014 - val_loss: 0.1674 - val_mae: 0.1186
Epoch 41/550
15/15   0s 6ms/step - loss:
0.2167 - mae: 0.1957 - val_loss: 0.1668 - val_mae: 0.1173
Epoch 42/550
15/15   0s 5ms/step - loss:
0.2177 - mae: 0.1996 - val_loss: 0.1657 - val_mae: 0.1164
Epoch 43/550
15/15   0s 6ms/step - loss:
0.2139 - mae: 0.1970 - val_loss: 0.1647 - val_mae: 0.1146
Epoch 44/550
15/15   0s 5ms/step - loss:
0.2097 - mae: 0.1910 - val_loss: 0.1639 - val_mae: 0.1148
Epoch 45/550
15/15   0s 7ms/step - loss:
0.2102 - mae: 0.1919 - val_loss: 0.1633 - val_mae: 0.1137
Epoch 46/550
15/15   0s 5ms/step - loss:
0.2076 - mae: 0.1886 - val_loss: 0.1624 - val_mae: 0.1122
Epoch 47/550
15/15   0s 6ms/step - loss:
0.2040 - mae: 0.1838 - val_loss: 0.1617 - val_mae: 0.1112
Epoch 48/550
15/15   0s 5ms/step - loss:
0.2005 - mae: 0.1825 - val_loss: 0.1611 - val_mae: 0.1120
Epoch 49/550
15/15   0s 5ms/step - loss:
0.2067 - mae: 0.1869 - val_loss: 0.1601 - val_mae: 0.1100
Epoch 50/550
15/15   0s 5ms/step - loss:
0.1981 - mae: 0.1807 - val_loss: 0.1598 - val_mae: 0.1110
Epoch 51/550
15/15   0s 5ms/step - loss:
0.1983 - mae: 0.1792 - val_loss: 0.1593 - val_mae: 0.1106
Epoch 52/550
15/15   0s 5ms/step - loss:
0.1994 - mae: 0.1789 - val_loss: 0.1585 - val_mae: 0.1104
Epoch 53/550
15/15   0s 5ms/step - loss:
0.1981 - mae: 0.1773 - val_loss: 0.1576 - val_mae: 0.1100
Epoch 54/550
15/15   0s 5ms/step - loss:
0.1982 - mae: 0.1803 - val_loss: 0.1570 - val_mae: 0.1099
Epoch 55/550
15/15   0s 5ms/step - loss:

0.1991 - mae: 0.1798 - val_loss: 0.1561 - val_mae: 0.1085
Epoch 56/550
15/15   0s 5ms/step - loss:
0.1911 - mae: 0.1698 - val_loss: 0.1556 - val_mae: 0.1093
Epoch 57/550
15/15   0s 5ms/step - loss:
0.1925 - mae: 0.1731 - val_loss: 0.1546 - val_mae: 0.1085
Epoch 58/550
15/15   0s 5ms/step - loss:
0.1904 - mae: 0.1698 - val_loss: 0.1539 - val_mae: 0.1075
Epoch 59/550
15/15   0s 5ms/step - loss:
0.1915 - mae: 0.1723 - val_loss: 0.1531 - val_mae: 0.1073
Epoch 60/550
15/15   0s 5ms/step - loss:
0.1912 - mae: 0.1711 - val_loss: 0.1523 - val_mae: 0.1073
Epoch 61/550
15/15   0s 6ms/step - loss:
0.1899 - mae: 0.1713 - val_loss: 0.1516 - val_mae: 0.1058
Epoch 62/550
15/15   0s 6ms/step - loss:
0.1892 - mae: 0.1671 - val_loss: 0.1512 - val_mae: 0.1073
Epoch 63/550
15/15   0s 6ms/step - loss:
0.1866 - mae: 0.1669 - val_loss: 0.1506 - val_mae: 0.1078
Epoch 64/550
15/15   0s 5ms/step - loss:
0.1817 - mae: 0.1639 - val_loss: 0.1495 - val_mae: 0.1059
Epoch 65/550
15/15   0s 5ms/step - loss:
0.1836 - mae: 0.1658 - val_loss: 0.1487 - val_mae: 0.1053
Epoch 66/550
15/15   0s 5ms/step - loss:
0.1775 - mae: 0.1589 - val_loss: 0.1478 - val_mae: 0.1041
Epoch 67/550
15/15   0s 5ms/step - loss:
0.1808 - mae: 0.1609 - val_loss: 0.1471 - val_mae: 0.1037
Epoch 68/550
15/15   0s 6ms/step - loss:
0.1786 - mae: 0.1602 - val_loss: 0.1465 - val_mae: 0.1038
Epoch 69/550
15/15   0s 5ms/step - loss:
0.1758 - mae: 0.1575 - val_loss: 0.1458 - val_mae: 0.1030
Epoch 70/550
15/15   0s 5ms/step - loss:
0.1791 - mae: 0.1630 - val_loss: 0.1450 - val_mae: 0.1022
Epoch 71/550
15/15   0s 5ms/step - loss:

```
0.1774 - mae: 0.1586 - val_loss: 0.1442 - val_mae: 0.1016
Epoch 72/550
15/15          0s 5ms/step - loss:
0.1750 - mae: 0.1552 - val_loss: 0.1435 - val_mae: 0.1009
Epoch 73/550
15/15          0s 6ms/step - loss:
0.1731 - mae: 0.1557 - val_loss: 0.1430 - val_mae: 0.1017
Epoch 74/550
15/15          0s 6ms/step - loss:
0.1736 - mae: 0.1574 - val_loss: 0.1424 - val_mae: 0.1022
Epoch 75/550
15/15          0s 6ms/step - loss:
0.1708 - mae: 0.1542 - val_loss: 0.1416 - val_mae: 0.1019
Epoch 76/550
15/15          0s 6ms/step - loss:
0.1679 - mae: 0.1516 - val_loss: 0.1407 - val_mae: 0.1012
Epoch 77/550
15/15          0s 6ms/step - loss:
0.1684 - mae: 0.1528 - val_loss: 0.1399 - val_mae: 0.0994
Epoch 78/550
15/15          0s 7ms/step - loss:
0.1686 - mae: 0.1548 - val_loss: 0.1392 - val_mae: 0.0988
Epoch 79/550
15/15          0s 6ms/step - loss:
0.1655 - mae: 0.1475 - val_loss: 0.1385 - val_mae: 0.0989
Epoch 80/550
15/15          0s 6ms/step - loss:
0.1662 - mae: 0.1501 - val_loss: 0.1377 - val_mae: 0.0982
Epoch 81/550
15/15          0s 6ms/step - loss:
0.1654 - mae: 0.1489 - val_loss: 0.1369 - val_mae: 0.0974
Epoch 82/550
15/15          0s 6ms/step - loss:
0.1605 - mae: 0.1463 - val_loss: 0.1364 - val_mae: 0.0989
Epoch 83/550
15/15          0s 6ms/step - loss:
0.1594 - mae: 0.1437 - val_loss: 0.1357 - val_mae: 0.0978
Epoch 84/550
15/15          0s 6ms/step - loss:
0.1601 - mae: 0.1458 - val_loss: 0.1349 - val_mae: 0.0973
Epoch 85/550
15/15          0s 5ms/step - loss:
0.1610 - mae: 0.1462 - val_loss: 0.1342 - val_mae: 0.0976
Epoch 86/550
15/15          0s 5ms/step - loss:
0.1615 - mae: 0.1480 - val_loss: 0.1334 - val_mae: 0.0976
Epoch 87/550
15/15          0s 6ms/step - loss:
```

```
0.1625 - mae: 0.1490 - val_loss: 0.1326 - val_mae: 0.0957
Epoch 88/550
15/15              0s 6ms/step - loss:
0.1574 - mae: 0.1430 - val_loss: 0.1322 - val_mae: 0.0962
Epoch 89/550
15/15              0s 6ms/step - loss:
0.1545 - mae: 0.1417 - val_loss: 0.1313 - val_mae: 0.0958
Epoch 90/550
15/15              0s 6ms/step - loss:
0.1559 - mae: 0.1438 - val_loss: 0.1308 - val_mae: 0.0967
Epoch 91/550
15/15              0s 7ms/step - loss:
0.1527 - mae: 0.1416 - val_loss: 0.1300 - val_mae: 0.0980
Epoch 92/550
15/15              0s 6ms/step - loss:
0.1552 - mae: 0.1455 - val_loss: 0.1293 - val_mae: 0.0963
Epoch 93/550
15/15              0s 6ms/step - loss:
0.1507 - mae: 0.1401 - val_loss: 0.1284 - val_mae: 0.0947
Epoch 94/550
15/15              0s 6ms/step - loss:
0.1486 - mae: 0.1386 - val_loss: 0.1277 - val_mae: 0.0958
Epoch 95/550
15/15              0s 6ms/step - loss:
0.1481 - mae: 0.1376 - val_loss: 0.1269 - val_mae: 0.0956
Epoch 96/550
15/15              0s 6ms/step - loss:
0.1507 - mae: 0.1410 - val_loss: 0.1262 - val_mae: 0.0954
Epoch 97/550
15/15              0s 5ms/step - loss:
0.1480 - mae: 0.1383 - val_loss: 0.1254 - val_mae: 0.0956
Epoch 98/550
15/15              0s 5ms/step - loss:
0.1471 - mae: 0.1376 - val_loss: 0.1248 - val_mae: 0.0955
Epoch 99/550
15/15              0s 5ms/step - loss:
0.1458 - mae: 0.1382 - val_loss: 0.1241 - val_mae: 0.0960
Epoch 100/550
15/15              0s 5ms/step - loss:
0.1467 - mae: 0.1380 - val_loss: 0.1234 - val_mae: 0.0960
Epoch 101/550
15/15              0s 5ms/step - loss:
0.1433 - mae: 0.1341 - val_loss: 0.1226 - val_mae: 0.0943
Epoch 102/550
15/15              0s 5ms/step - loss:
0.1443 - mae: 0.1349 - val_loss: 0.1218 - val_mae: 0.0945
Epoch 103/550
15/15              0s 6ms/step - loss:
```

```
0.1427 - mae: 0.1345 - val_loss: 0.1213 - val_mae: 0.0963
Epoch 104/550
15/15            0s 6ms/step - loss:
0.1385 - mae: 0.1306 - val_loss: 0.1204 - val_mae: 0.0949
Epoch 105/550
15/15            0s 6ms/step - loss:
0.1395 - mae: 0.1315 - val_loss: 0.1198 - val_mae: 0.0940
Epoch 106/550
15/15            0s 6ms/step - loss:
0.1414 - mae: 0.1330 - val_loss: 0.1189 - val_mae: 0.0933
Epoch 107/550
15/15            0s 5ms/step - loss:
0.1371 - mae: 0.1308 - val_loss: 0.1183 - val_mae: 0.0942
Epoch 108/550
15/15            0s 6ms/step - loss:
0.1356 - mae: 0.1309 - val_loss: 0.1176 - val_mae: 0.0941
Epoch 109/550
15/15            0s 6ms/step - loss:
0.1367 - mae: 0.1322 - val_loss: 0.1170 - val_mae: 0.0945
Epoch 110/550
15/15            0s 6ms/step - loss:
0.1324 - mae: 0.1293 - val_loss: 0.1160 - val_mae: 0.0925
Epoch 111/550
15/15            0s 6ms/step - loss:
0.1378 - mae: 0.1344 - val_loss: 0.1153 - val_mae: 0.0924
Epoch 112/550
15/15            0s 6ms/step - loss:
0.1357 - mae: 0.1302 - val_loss: 0.1147 - val_mae: 0.0930
Epoch 113/550
15/15            0s 6ms/step - loss:
0.1308 - mae: 0.1283 - val_loss: 0.1139 - val_mae: 0.0919
Epoch 114/550
15/15            0s 5ms/step - loss:
0.1342 - mae: 0.1307 - val_loss: 0.1132 - val_mae: 0.0926
Epoch 115/550
15/15            0s 6ms/step - loss:
0.1308 - mae: 0.1284 - val_loss: 0.1125 - val_mae: 0.0919
Epoch 116/550
15/15            0s 5ms/step - loss:
0.1280 - mae: 0.1267 - val_loss: 0.1120 - val_mae: 0.0926
Epoch 117/550
15/15            0s 7ms/step - loss:
0.1303 - mae: 0.1287 - val_loss: 0.1112 - val_mae: 0.0935
Epoch 118/550
15/15            0s 5ms/step - loss:
0.1269 - mae: 0.1265 - val_loss: 0.1104 - val_mae: 0.0916
Epoch 119/550
15/15            0s 5ms/step - loss:
```

```
0.1255 - mae: 0.1260 - val_loss: 0.1100 - val_mae: 0.0936
Epoch 120/550
15/15            0s 6ms/step - loss:
0.1266 - mae: 0.1278 - val_loss: 0.1091 - val_mae: 0.0930
Epoch 121/550
15/15            0s 5ms/step - loss:
0.1270 - mae: 0.1278 - val_loss: 0.1083 - val_mae: 0.0911
Epoch 122/550
15/15            0s 6ms/step - loss:
0.1250 - mae: 0.1259 - val_loss: 0.1076 - val_mae: 0.0904
Epoch 123/550
15/15            0s 6ms/step - loss:
0.1213 - mae: 0.1225 - val_loss: 0.1069 - val_mae: 0.0908
Epoch 124/550
15/15            0s 6ms/step - loss:
0.1260 - mae: 0.1246 - val_loss: 0.1063 - val_mae: 0.0910
Epoch 125/550
15/15            0s 5ms/step - loss:
0.1214 - mae: 0.1244 - val_loss: 0.1055 - val_mae: 0.0910
Epoch 126/550
15/15            0s 6ms/step - loss:
0.1181 - mae: 0.1215 - val_loss: 0.1048 - val_mae: 0.0908
Epoch 127/550
15/15            0s 5ms/step - loss:
0.1194 - mae: 0.1222 - val_loss: 0.1041 - val_mae: 0.0902
Epoch 128/550
15/15            0s 6ms/step - loss:
0.1225 - mae: 0.1258 - val_loss: 0.1036 - val_mae: 0.0913
Epoch 129/550
15/15            0s 5ms/step - loss:
0.1199 - mae: 0.1250 - val_loss: 0.1028 - val_mae: 0.0903
Epoch 130/550
15/15            0s 7ms/step - loss:
0.1163 - mae: 0.1231 - val_loss: 0.1020 - val_mae: 0.0901
Epoch 131/550
15/15            0s 6ms/step - loss:
0.1153 - mae: 0.1209 - val_loss: 0.1014 - val_mae: 0.0913
Epoch 132/550
15/15            0s 5ms/step - loss:
0.1167 - mae: 0.1239 - val_loss: 0.1007 - val_mae: 0.0901
Epoch 133/550
15/15            0s 5ms/step - loss:
0.1145 - mae: 0.1202 - val_loss: 0.0999 - val_mae: 0.0899
Epoch 134/550
15/15            0s 5ms/step - loss:
0.1118 - mae: 0.1198 - val_loss: 0.0994 - val_mae: 0.0904
Epoch 135/550
15/15            0s 5ms/step - loss:
```

0.1140 - mae: 0.1224 - val_loss: 0.0985 - val_mae: 0.0899
Epoch 136/550
15/15   0s 5ms/step - loss:
0.1123 - mae: 0.1228 - val_loss: 0.0980 - val_mae: 0.0898
Epoch 137/550
15/15   0s 5ms/step - loss:
0.1142 - mae: 0.1218 - val_loss: 0.0973 - val_mae: 0.0895
Epoch 138/550
15/15   0s 5ms/step - loss:
0.1097 - mae: 0.1181 - val_loss: 0.0965 - val_mae: 0.0892
Epoch 139/550
15/15   0s 5ms/step - loss:
0.1105 - mae: 0.1188 - val_loss: 0.0958 - val_mae: 0.0885
Epoch 140/550
15/15   0s 5ms/step - loss:
0.1098 - mae: 0.1189 - val_loss: 0.0952 - val_mae: 0.0890
Epoch 141/550
15/15   0s 5ms/step - loss:
0.1077 - mae: 0.1162 - val_loss: 0.0946 - val_mae: 0.0898
Epoch 142/550
15/15   0s 6ms/step - loss:
0.1067 - mae: 0.1163 - val_loss: 0.0939 - val_mae: 0.0892
Epoch 143/550
15/15   0s 6ms/step - loss:
0.1071 - mae: 0.1154 - val_loss: 0.0932 - val_mae: 0.0884
Epoch 144/550
15/15   0s 6ms/step - loss:
0.1079 - mae: 0.1192 - val_loss: 0.0927 - val_mae: 0.0896
Epoch 145/550
15/15   0s 6ms/step - loss:
0.1052 - mae: 0.1159 - val_loss: 0.0920 - val_mae: 0.0899
Epoch 146/550
15/15   0s 5ms/step - loss:
0.1019 - mae: 0.1142 - val_loss: 0.0914 - val_mae: 0.0882
Epoch 147/550
15/15   0s 6ms/step - loss:
0.1033 - mae: 0.1163 - val_loss: 0.0906 - val_mae: 0.0885
Epoch 148/550
15/15   0s 6ms/step - loss:
0.1024 - mae: 0.1149 - val_loss: 0.0901 - val_mae: 0.0888
Epoch 149/550
15/15   0s 5ms/step - loss:
0.0996 - mae: 0.1119 - val_loss: 0.0894 - val_mae: 0.0888
Epoch 150/550
15/15   0s 6ms/step - loss:
0.1017 - mae: 0.1143 - val_loss: 0.0889 - val_mae: 0.0896
Epoch 151/550
15/15   0s 5ms/step - loss:

0.0989 - mae: 0.1134 - val_loss: 0.0881 - val_mae: 0.0888
Epoch 152/550
15/15   0s 5ms/step - loss:
0.1024 - mae: 0.1173 - val_loss: 0.0874 - val_mae: 0.0888
Epoch 153/550
15/15   0s 5ms/step - loss:
0.1002 - mae: 0.1140 - val_loss: 0.0867 - val_mae: 0.0880
Epoch 154/550
15/15   0s 5ms/step - loss:
0.0976 - mae: 0.1135 - val_loss: 0.0861 - val_mae: 0.0877
Epoch 155/550
15/15   0s 5ms/step - loss:
0.0968 - mae: 0.1122 - val_loss: 0.0856 - val_mae: 0.0881
Epoch 156/550
15/15   0s 6ms/step - loss:
0.0983 - mae: 0.1151 - val_loss: 0.0850 - val_mae: 0.0887
Epoch 157/550
15/15   0s 6ms/step - loss:
0.0947 - mae: 0.1125 - val_loss: 0.0844 - val_mae: 0.0883
Epoch 158/550
15/15   0s 5ms/step - loss:
0.0930 - mae: 0.1091 - val_loss: 0.0837 - val_mae: 0.0872
Epoch 159/550
15/15   0s 5ms/step - loss:
0.0940 - mae: 0.1096 - val_loss: 0.0831 - val_mae: 0.0880
Epoch 160/550
15/15   0s 5ms/step - loss:
0.0940 - mae: 0.1124 - val_loss: 0.0826 - val_mae: 0.0888
Epoch 161/550
15/15   0s 4ms/step - loss:
0.0960 - mae: 0.1151 - val_loss: 0.0820 - val_mae: 0.0888
Epoch 162/550
15/15   0s 5ms/step - loss:
0.0930 - mae: 0.1116 - val_loss: 0.0812 - val_mae: 0.0869
Epoch 163/550
15/15   0s 5ms/step - loss:
0.0917 - mae: 0.1105 - val_loss: 0.0807 - val_mae: 0.0877
Epoch 164/550
15/15   0s 5ms/step - loss:
0.0900 - mae: 0.1099 - val_loss: 0.0800 - val_mae: 0.0874
Epoch 165/550
15/15   0s 6ms/step - loss:
0.0886 - mae: 0.1068 - val_loss: 0.0795 - val_mae: 0.0871
Epoch 166/550
15/15   0s 6ms/step - loss:
0.0868 - mae: 0.1075 - val_loss: 0.0789 - val_mae: 0.0883
Epoch 167/550
15/15   0s 5ms/step - loss:

0.0874 - mae: 0.1082 - val_loss: 0.0784 - val_mae: 0.0888
Epoch 168/550
15/15   0s 5ms/step - loss:
0.0885 - mae: 0.1102 - val_loss: 0.0777 - val_mae: 0.0876
Epoch 169/550
15/15   0s 7ms/step - loss:
0.0868 - mae: 0.1094 - val_loss: 0.0771 - val_mae: 0.0872
Epoch 170/550
15/15   0s 5ms/step - loss:
0.0868 - mae: 0.1095 - val_loss: 0.0766 - val_mae: 0.0869
Epoch 171/550
15/15   0s 6ms/step - loss:
0.0856 - mae: 0.1079 - val_loss: 0.0760 - val_mae: 0.0867
Epoch 172/550
15/15   0s 5ms/step - loss:
0.0857 - mae: 0.1092 - val_loss: 0.0754 - val_mae: 0.0864
Epoch 173/550
15/15   0s 5ms/step - loss:
0.0861 - mae: 0.1102 - val_loss: 0.0750 - val_mae: 0.0875
Epoch 174/550
15/15   0s 5ms/step - loss:
0.0846 - mae: 0.1086 - val_loss: 0.0742 - val_mae: 0.0858
Epoch 175/550
15/15   0s 6ms/step - loss:
0.0830 - mae: 0.1068 - val_loss: 0.0737 - val_mae: 0.0865
Epoch 176/550
15/15   0s 6ms/step - loss:
0.0846 - mae: 0.1096 - val_loss: 0.0732 - val_mae: 0.0869
Epoch 177/550
15/15   0s 5ms/step - loss:
0.0847 - mae: 0.1096 - val_loss: 0.0727 - val_mae: 0.0868
Epoch 178/550
15/15   0s 5ms/step - loss:
0.0821 - mae: 0.1078 - val_loss: 0.0722 - val_mae: 0.0868
Epoch 179/550
15/15   0s 6ms/step - loss:
0.0821 - mae: 0.1080 - val_loss: 0.0715 - val_mae: 0.0861
Epoch 180/550
15/15   0s 6ms/step - loss:
0.0784 - mae: 0.1050 - val_loss: 0.0710 - val_mae: 0.0861
Epoch 181/550
15/15   0s 7ms/step - loss:
0.0782 - mae: 0.1048 - val_loss: 0.0706 - val_mae: 0.0869
Epoch 182/550
15/15   0s 5ms/step - loss:
0.0779 - mae: 0.1053 - val_loss: 0.0698 - val_mae: 0.0857
Epoch 183/550
15/15   0s 5ms/step - loss:

0.0775 - mae: 0.1040 - val_loss: 0.0694 - val_mae: 0.0871
Epoch 184/550
15/15   0s 5ms/step - loss:
0.0776 - mae: 0.1058 - val_loss: 0.0687 - val_mae: 0.0863
Epoch 185/550
15/15   0s 5ms/step - loss:
0.0772 - mae: 0.1048 - val_loss: 0.0682 - val_mae: 0.0862
Epoch 186/550
15/15   0s 5ms/step - loss:
0.0758 - mae: 0.1043 - val_loss: 0.0677 - val_mae: 0.0860
Epoch 187/550
15/15   0s 5ms/step - loss:
0.0749 - mae: 0.1035 - val_loss: 0.0672 - val_mae: 0.0862
Epoch 188/550
15/15   0s 5ms/step - loss:
0.0756 - mae: 0.1055 - val_loss: 0.0667 - val_mae: 0.0857
Epoch 189/550
15/15   0s 6ms/step - loss:
0.0756 - mae: 0.1048 - val_loss: 0.0662 - val_mae: 0.0860
Epoch 190/550
15/15   0s 5ms/step - loss:
0.0767 - mae: 0.1074 - val_loss: 0.0657 - val_mae: 0.0854
Epoch 191/550
15/15   0s 5ms/step - loss:
0.0736 - mae: 0.1021 - val_loss: 0.0652 - val_mae: 0.0854
Epoch 192/550
15/15   0s 5ms/step - loss:
0.0721 - mae: 0.1025 - val_loss: 0.0647 - val_mae: 0.0855
Epoch 193/550
15/15   0s 5ms/step - loss:
0.0731 - mae: 0.1036 - val_loss: 0.0641 - val_mae: 0.0857
Epoch 194/550
15/15   0s 5ms/step - loss:
0.0730 - mae: 0.1055 - val_loss: 0.0637 - val_mae: 0.0853
Epoch 195/550
15/15   0s 6ms/step - loss:
0.0716 - mae: 0.1040 - val_loss: 0.0632 - val_mae: 0.0860
Epoch 196/550
15/15   0s 5ms/step - loss:
0.0693 - mae: 0.1020 - val_loss: 0.0626 - val_mae: 0.0851
Epoch 197/550
15/15   0s 5ms/step - loss:
0.0702 - mae: 0.1034 - val_loss: 0.0623 - val_mae: 0.0855
Epoch 198/550
15/15   0s 6ms/step - loss:
0.0686 - mae: 0.1014 - val_loss: 0.0618 - val_mae: 0.0857
Epoch 199/550
15/15   0s 6ms/step - loss:

0.0690 - mae: 0.1031 - val_loss: 0.0613 - val_mae: 0.0857
Epoch 200/550
15/15   0s 5ms/step - loss:
0.0704 - mae: 0.1039 - val_loss: 0.0609 - val_mae: 0.0850
Epoch 201/550
15/15   0s 6ms/step - loss:
0.0678 - mae: 0.1022 - val_loss: 0.0604 - val_mae: 0.0853
Epoch 202/550
15/15   0s 6ms/step - loss:
0.0696 - mae: 0.1037 - val_loss: 0.0599 - val_mae: 0.0854
Epoch 203/550
15/15   0s 5ms/step - loss:
0.0675 - mae: 0.1021 - val_loss: 0.0595 - val_mae: 0.0855
Epoch 204/550
15/15   0s 6ms/step - loss:
0.0662 - mae: 0.1009 - val_loss: 0.0590 - val_mae: 0.0853
Epoch 205/550
15/15   0s 5ms/step - loss:
0.0648 - mae: 0.0990 - val_loss: 0.0586 - val_mae: 0.0848
Epoch 206/550
15/15   0s 6ms/step - loss:
0.0649 - mae: 0.1004 - val_loss: 0.0580 - val_mae: 0.0847
Epoch 207/550
15/15   0s 5ms/step - loss:
0.0632 - mae: 0.0981 - val_loss: 0.0577 - val_mae: 0.0856
Epoch 208/550
15/15   0s 6ms/step - loss:
0.0651 - mae: 0.1018 - val_loss: 0.0572 - val_mae: 0.0848
Epoch 209/550
15/15   0s 6ms/step - loss:
0.0641 - mae: 0.0999 - val_loss: 0.0568 - val_mae: 0.0848
Epoch 210/550
15/15   0s 5ms/step - loss:
0.0646 - mae: 0.1006 - val_loss: 0.0564 - val_mae: 0.0840
Epoch 211/550
15/15   0s 5ms/step - loss:
0.0625 - mae: 0.0989 - val_loss: 0.0559 - val_mae: 0.0845
Epoch 212/550
15/15   0s 5ms/step - loss:
0.0622 - mae: 0.0994 - val_loss: 0.0556 - val_mae: 0.0847
Epoch 213/550
15/15   0s 5ms/step - loss:
0.0618 - mae: 0.1000 - val_loss: 0.0551 - val_mae: 0.0840
Epoch 214/550
15/15   0s 6ms/step - loss:
0.0621 - mae: 0.0993 - val_loss: 0.0547 - val_mae: 0.0843
Epoch 215/550
15/15   0s 6ms/step - loss:

0.0587 - mae: 0.0964 - val_loss: 0.0543 - val_mae: 0.0838
Epoch 216/550
15/15   0s 5ms/step - loss:
0.0597 - mae: 0.0974 - val_loss: 0.0539 - val_mae: 0.0842
Epoch 217/550
15/15   0s 5ms/step - loss:
0.0605 - mae: 0.0989 - val_loss: 0.0535 - val_mae: 0.0838
Epoch 218/550
15/15   0s 5ms/step - loss:
0.0589 - mae: 0.0970 - val_loss: 0.0531 - val_mae: 0.0839
Epoch 219/550
15/15   0s 5ms/step - loss:
0.0593 - mae: 0.0977 - val_loss: 0.0527 - val_mae: 0.0833
Epoch 220/550
15/15   0s 5ms/step - loss:
0.0578 - mae: 0.0964 - val_loss: 0.0523 - val_mae: 0.0833
Epoch 221/550
15/15   0s 5ms/step - loss:
0.0586 - mae: 0.0989 - val_loss: 0.0519 - val_mae: 0.0833
Epoch 222/550
15/15   0s 5ms/step - loss:
0.0585 - mae: 0.0976 - val_loss: 0.0516 - val_mae: 0.0831
Epoch 223/550
15/15   0s 7ms/step - loss:
0.0561 - mae: 0.0951 - val_loss: 0.0511 - val_mae: 0.0827
Epoch 224/550
15/15   0s 5ms/step - loss:
0.0565 - mae: 0.0945 - val_loss: 0.0508 - val_mae: 0.0831
Epoch 225/550
15/15   0s 5ms/step - loss:
0.0553 - mae: 0.0953 - val_loss: 0.0505 - val_mae: 0.0833
Epoch 226/550
15/15   0s 5ms/step - loss:
0.0567 - mae: 0.0970 - val_loss: 0.0500 - val_mae: 0.0834
Epoch 227/550
15/15   0s 5ms/step - loss:
0.0545 - mae: 0.0956 - val_loss: 0.0497 - val_mae: 0.0835
Epoch 228/550
15/15   0s 5ms/step - loss:
0.0538 - mae: 0.0940 - val_loss: 0.0494 - val_mae: 0.0831
Epoch 229/550
15/15   0s 6ms/step - loss:
0.0542 - mae: 0.0953 - val_loss: 0.0491 - val_mae: 0.0843
Epoch 230/550
15/15   0s 6ms/step - loss:
0.0543 - mae: 0.0982 - val_loss: 0.0486 - val_mae: 0.0838
Epoch 231/550
15/15   0s 6ms/step - loss:

0.0530 - mae: 0.0947 - val_loss: 0.0484 - val_mae: 0.0838
Epoch 232/550
15/15   0s 5ms/step - loss:
0.0547 - mae: 0.0973 - val_loss: 0.0480 - val_mae: 0.0834
Epoch 233/550
15/15   0s 5ms/step - loss:
0.0518 - mae: 0.0933 - val_loss: 0.0476 - val_mae: 0.0833
Epoch 234/550
15/15   0s 5ms/step - loss:
0.0529 - mae: 0.0953 - val_loss: 0.0473 - val_mae: 0.0832
Epoch 235/550
15/15   0s 7ms/step - loss:
0.0515 - mae: 0.0940 - val_loss: 0.0469 - val_mae: 0.0831
Epoch 236/550
15/15   0s 5ms/step - loss:
0.0511 - mae: 0.0944 - val_loss: 0.0465 - val_mae: 0.0831
Epoch 237/550
15/15   0s 5ms/step - loss:
0.0531 - mae: 0.0967 - val_loss: 0.0463 - val_mae: 0.0828
Epoch 238/550
15/15   0s 6ms/step - loss:
0.0507 - mae: 0.0940 - val_loss: 0.0459 - val_mae: 0.0826
Epoch 239/550
15/15   0s 5ms/step - loss:
0.0510 - mae: 0.0954 - val_loss: 0.0455 - val_mae: 0.0829
Epoch 240/550
15/15   0s 5ms/step - loss:
0.0502 - mae: 0.0939 - val_loss: 0.0453 - val_mae: 0.0824
Epoch 241/550
15/15   0s 5ms/step - loss:
0.0493 - mae: 0.0934 - val_loss: 0.0449 - val_mae: 0.0819
Epoch 242/550
15/15   0s 5ms/step - loss:
0.0506 - mae: 0.0949 - val_loss: 0.0446 - val_mae: 0.0823
Epoch 243/550
15/15   0s 5ms/step - loss:
0.0473 - mae: 0.0917 - val_loss: 0.0442 - val_mae: 0.0810
Epoch 244/550
15/15   0s 5ms/step - loss:
0.0502 - mae: 0.0953 - val_loss: 0.0439 - val_mae: 0.0817
Epoch 245/550
15/15   0s 5ms/step - loss:
0.0506 - mae: 0.0940 - val_loss: 0.0437 - val_mae: 0.0816
Epoch 246/550
15/15   0s 5ms/step - loss:
0.0495 - mae: 0.0943 - val_loss: 0.0434 - val_mae: 0.0818
Epoch 247/550
15/15   0s 6ms/step - loss:

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0.0468 - mae: 0.0918 - val_loss: 0.0431 - val_mae: 0.0807
Epoch 248/550
15/15          0s 5ms/step - loss:
0.0483 - mae: 0.0930 - val_loss: 0.0428 - val_mae: 0.0816
Epoch 249/550
15/15          0s 5ms/step - loss:
0.0461 - mae: 0.0912 - val_loss: 0.0426 - val_mae: 0.0817
Epoch 250/550
15/15          0s 5ms/step - loss:
0.0464 - mae: 0.0925 - val_loss: 0.0424 - val_mae: 0.0813
Epoch 251/550
15/15          0s 6ms/step - loss:
0.0464 - mae: 0.0941 - val_loss: 0.0420 - val_mae: 0.0807
Epoch 252/550
15/15          0s 5ms/step - loss:
0.0460 - mae: 0.0925 - val_loss: 0.0416 - val_mae: 0.0810
Epoch 253/550
15/15          0s 5ms/step - loss:
0.0470 - mae: 0.0924 - val_loss: 0.0414 - val_mae: 0.0809
Epoch 254/550
15/15          0s 6ms/step - loss:
0.0458 - mae: 0.0920 - val_loss: 0.0412 - val_mae: 0.0803
Epoch 255/550
15/15          0s 5ms/step - loss:
0.0456 - mae: 0.0916 - val_loss: 0.0409 - val_mae: 0.0809
Epoch 256/550
15/15          0s 6ms/step - loss:
0.0458 - mae: 0.0913 - val_loss: 0.0409 - val_mae: 0.0814
Epoch 257/550
15/15          0s 5ms/step - loss:
0.0456 - mae: 0.0923 - val_loss: 0.0403 - val_mae: 0.0804
Epoch 258/550
15/15          0s 5ms/step - loss:
0.0459 - mae: 0.0924 - val_loss: 0.0401 - val_mae: 0.0806
Epoch 259/550
15/15          0s 5ms/step - loss:
0.0452 - mae: 0.0921 - val_loss: 0.0400 - val_mae: 0.0805
Epoch 260/550
15/15          0s 7ms/step - loss:
0.0451 - mae: 0.0914 - val_loss: 0.0396 - val_mae: 0.0806
Epoch 261/550
15/15          0s 5ms/step - loss:
0.0438 - mae: 0.0922 - val_loss: 0.0393 - val_mae: 0.0803
Epoch 262/550
15/15          0s 5ms/step - loss:
0.0422 - mae: 0.0880 - val_loss: 0.0391 - val_mae: 0.0813
Epoch 263/550
15/15          0s 5ms/step - loss:
```

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0.0409 - mae: 0.0879 - val_loss: 0.0390 - val_mae: 0.0807
Epoch 264/550
15/15              0s 5ms/step - loss:
0.0454 - mae: 0.0934 - val_loss: 0.0387 - val_mae: 0.0801
Epoch 265/550
15/15              0s 5ms/step - loss:
0.0404 - mae: 0.0885 - val_loss: 0.0385 - val_mae: 0.0806
Epoch 266/550
15/15              0s 5ms/step - loss:
0.0413 - mae: 0.0895 - val_loss: 0.0382 - val_mae: 0.0805
Epoch 267/550
15/15              0s 5ms/step - loss:
0.0415 - mae: 0.0900 - val_loss: 0.0379 - val_mae: 0.0812
Epoch 268/550
15/15              0s 5ms/step - loss:
0.0412 - mae: 0.0907 - val_loss: 0.0377 - val_mae: 0.0817
Epoch 269/550
15/15              0s 5ms/step - loss:
0.0424 - mae: 0.0915 - val_loss: 0.0375 - val_mae: 0.0806
Epoch 270/550
15/15              0s 5ms/step - loss:
0.0398 - mae: 0.0877 - val_loss: 0.0373 - val_mae: 0.0813
Epoch 271/550
15/15              0s 5ms/step - loss:
0.0390 - mae: 0.0875 - val_loss: 0.0370 - val_mae: 0.0801
Epoch 272/550
15/15              0s 7ms/step - loss:
0.0420 - mae: 0.0912 - val_loss: 0.0367 - val_mae: 0.0797
Epoch 273/550
15/15              0s 6ms/step - loss:
0.0418 - mae: 0.0913 - val_loss: 0.0366 - val_mae: 0.0808
Epoch 274/550
15/15              0s 5ms/step - loss:
0.0415 - mae: 0.0903 - val_loss: 0.0365 - val_mae: 0.0804
Epoch 275/550
15/15              0s 6ms/step - loss:
0.0390 - mae: 0.0883 - val_loss: 0.0364 - val_mae: 0.0807
Epoch 276/550
15/15              0s 6ms/step - loss:
0.0396 - mae: 0.0907 - val_loss: 0.0361 - val_mae: 0.0804
Epoch 277/550
15/15              0s 6ms/step - loss:
0.0380 - mae: 0.0874 - val_loss: 0.0358 - val_mae: 0.0800
Epoch 278/550
15/15              0s 6ms/step - loss:
0.0387 - mae: 0.0891 - val_loss: 0.0356 - val_mae: 0.0796
Epoch 279/550
15/15              0s 6ms/step - loss:
```

0.0381 - mae: 0.0870 - val_loss: 0.0354 - val_mae: 0.0794
Epoch 280/550
15/15   0s 6ms/step - loss:
0.0381 - mae: 0.0876 - val_loss: 0.0352 - val_mae: 0.0790
Epoch 281/550
15/15   0s 6ms/step - loss:
0.0401 - mae: 0.0917 - val_loss: 0.0350 - val_mae: 0.0804
Epoch 282/550
15/15   0s 5ms/step - loss:
0.0397 - mae: 0.0903 - val_loss: 0.0350 - val_mae: 0.0796
Epoch 283/550
15/15   0s 5ms/step - loss:
0.0386 - mae: 0.0895 - val_loss: 0.0347 - val_mae: 0.0795
Epoch 284/550
15/15   0s 5ms/step - loss:
0.0383 - mae: 0.0892 - val_loss: 0.0343 - val_mae: 0.0789
Epoch 285/550
15/15   0s 5ms/step - loss:
0.0377 - mae: 0.0884 - val_loss: 0.0343 - val_mae: 0.0789
Epoch 286/550
15/15   0s 5ms/step - loss:
0.0354 - mae: 0.0844 - val_loss: 0.0340 - val_mae: 0.0790
Epoch 287/550
15/15   0s 5ms/step - loss:
0.0375 - mae: 0.0881 - val_loss: 0.0338 - val_mae: 0.0794
Epoch 288/550
15/15   0s 5ms/step - loss:
0.0371 - mae: 0.0879 - val_loss: 0.0337 - val_mae: 0.0795
Epoch 289/550
15/15   0s 5ms/step - loss:
0.0352 - mae: 0.0864 - val_loss: 0.0335 - val_mae: 0.0792
Epoch 290/550
15/15   0s 5ms/step - loss:
0.0370 - mae: 0.0876 - val_loss: 0.0334 - val_mae: 0.0789
Epoch 291/550
15/15   0s 5ms/step - loss:
0.0372 - mae: 0.0872 - val_loss: 0.0333 - val_mae: 0.0791
Epoch 292/550
15/15   0s 7ms/step - loss:
0.0361 - mae: 0.0878 - val_loss: 0.0331 - val_mae: 0.0795
Epoch 293/550
15/15   0s 5ms/step - loss:
0.0386 - mae: 0.0894 - val_loss: 0.0331 - val_mae: 0.0796
Epoch 294/550
15/15   0s 6ms/step - loss:
0.0350 - mae: 0.0859 - val_loss: 0.0328 - val_mae: 0.0788
Epoch 295/550
15/15   0s 5ms/step - loss:

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0.0343 - mae: 0.0855 - val_loss: 0.0325 - val_mae: 0.0793
Epoch 296/550
15/15              0s 5ms/step - loss:
0.0343 - mae: 0.0866 - val_loss: 0.0323 - val_mae: 0.0789
Epoch 297/550
15/15              0s 5ms/step - loss:
0.0371 - mae: 0.0890 - val_loss: 0.0324 - val_mae: 0.0802
Epoch 298/550
15/15              0s 5ms/step - loss:
0.0337 - mae: 0.0854 - val_loss: 0.0319 - val_mae: 0.0794
Epoch 299/550
15/15              0s 5ms/step - loss:
0.0356 - mae: 0.0870 - val_loss: 0.0319 - val_mae: 0.0802
Epoch 300/550
15/15              0s 5ms/step - loss:
0.0355 - mae: 0.0876 - val_loss: 0.0319 - val_mae: 0.0792
Epoch 301/550
15/15              0s 5ms/step - loss:
0.0338 - mae: 0.0852 - val_loss: 0.0316 - val_mae: 0.0789
Epoch 302/550
15/15              0s 7ms/step - loss:
0.0338 - mae: 0.0866 - val_loss: 0.0317 - val_mae: 0.0790
Epoch 303/550
15/15              0s 5ms/step - loss:
0.0344 - mae: 0.0855 - val_loss: 0.0313 - val_mae: 0.0780
Epoch 304/550
15/15              0s 5ms/step - loss:
0.0337 - mae: 0.0855 - val_loss: 0.0311 - val_mae: 0.0793
Epoch 305/550
15/15              0s 5ms/step - loss:
0.0314 - mae: 0.0835 - val_loss: 0.0311 - val_mae: 0.0794
Epoch 306/550
15/15              0s 5ms/step - loss:
0.0338 - mae: 0.0852 - val_loss: 0.0310 - val_mae: 0.0794
Epoch 307/550
15/15              0s 5ms/step - loss:
0.0333 - mae: 0.0849 - val_loss: 0.0310 - val_mae: 0.0797
Epoch 308/550
15/15              0s 5ms/step - loss:
0.0335 - mae: 0.0867 - val_loss: 0.0308 - val_mae: 0.0788
Epoch 309/550
15/15              0s 5ms/step - loss:
0.0319 - mae: 0.0844 - val_loss: 0.0307 - val_mae: 0.0798
Epoch 310/550
15/15              0s 6ms/step - loss:
0.0339 - mae: 0.0878 - val_loss: 0.0306 - val_mae: 0.0782
Epoch 311/550
15/15              0s 7ms/step - loss:
```

```
0.0335 - mae: 0.0855 - val_loss: 0.0304 - val_mae: 0.0792
Epoch 312/550
15/15          0s 5ms/step - loss:
0.0322 - mae: 0.0853 - val_loss: 0.0302 - val_mae: 0.0806
Epoch 313/550
15/15          0s 6ms/step - loss:
0.0326 - mae: 0.0861 - val_loss: 0.0300 - val_mae: 0.0788
Epoch 314/550
15/15          0s 5ms/step - loss:
0.0322 - mae: 0.0853 - val_loss: 0.0299 - val_mae: 0.0785
Epoch 315/550
15/15          0s 5ms/step - loss:
0.0325 - mae: 0.0852 - val_loss: 0.0298 - val_mae: 0.0795
Epoch 316/550
15/15          0s 6ms/step - loss:
0.0318 - mae: 0.0851 - val_loss: 0.0296 - val_mae: 0.0776
Epoch 317/550
15/15          0s 5ms/step - loss:
0.0325 - mae: 0.0857 - val_loss: 0.0295 - val_mae: 0.0772
Epoch 318/550
15/15          0s 5ms/step - loss:
0.0324 - mae: 0.0843 - val_loss: 0.0295 - val_mae: 0.0774
Epoch 319/550
15/15          0s 6ms/step - loss:
0.0319 - mae: 0.0838 - val_loss: 0.0294 - val_mae: 0.0779
Epoch 320/550
15/15          0s 6ms/step - loss:
0.0320 - mae: 0.0861 - val_loss: 0.0292 - val_mae: 0.0777
Epoch 321/550
15/15          0s 5ms/step - loss:
0.0328 - mae: 0.0854 - val_loss: 0.0294 - val_mae: 0.0777
Epoch 322/550
15/15          0s 5ms/step - loss:
0.0302 - mae: 0.0833 - val_loss: 0.0290 - val_mae: 0.0789
Epoch 323/550
15/15          0s 5ms/step - loss:
0.0306 - mae: 0.0851 - val_loss: 0.0288 - val_mae: 0.0789
Epoch 324/550
15/15          0s 5ms/step - loss:
0.0306 - mae: 0.0836 - val_loss: 0.0290 - val_mae: 0.0791
Epoch 325/550
15/15          0s 5ms/step - loss:
0.0301 - mae: 0.0828 - val_loss: 0.0288 - val_mae: 0.0790
Epoch 326/550
15/15          0s 5ms/step - loss:
0.0304 - mae: 0.0835 - val_loss: 0.0288 - val_mae: 0.0796
Epoch 327/550
15/15          0s 6ms/step - loss:
```

0.0304 - mae: 0.0840 - val_loss: 0.0285 - val_mae: 0.0791
Epoch 328/550
15/15   0s 5ms/step - loss:
0.0311 - mae: 0.0846 - val_loss: 0.0283 - val_mae: 0.0785
Epoch 329/550
15/15   0s 5ms/step - loss:
0.0304 - mae: 0.0834 - val_loss: 0.0283 - val_mae: 0.0772
Epoch 330/550
15/15   0s 7ms/step - loss:
0.0300 - mae: 0.0835 - val_loss: 0.0283 - val_mae: 0.0777
Epoch 331/550
15/15   0s 5ms/step - loss:
0.0306 - mae: 0.0848 - val_loss: 0.0280 - val_mae: 0.0780
Epoch 332/550
15/15   0s 5ms/step - loss:
0.0300 - mae: 0.0827 - val_loss: 0.0279 - val_mae: 0.0767
Epoch 333/550
15/15   0s 6ms/step - loss:
0.0299 - mae: 0.0833 - val_loss: 0.0278 - val_mae: 0.0768
Epoch 334/550
15/15   0s 6ms/step - loss:
0.0276 - mae: 0.0820 - val_loss: 0.0276 - val_mae: 0.0779
Epoch 335/550
15/15   0s 5ms/step - loss:
0.0303 - mae: 0.0848 - val_loss: 0.0278 - val_mae: 0.0783
Epoch 336/550
15/15   0s 5ms/step - loss:
0.0285 - mae: 0.0828 - val_loss: 0.0276 - val_mae: 0.0775
Epoch 337/550
15/15   0s 6ms/step - loss:
0.0273 - mae: 0.0815 - val_loss: 0.0276 - val_mae: 0.0775
Epoch 338/550
15/15   0s 5ms/step - loss:
0.0289 - mae: 0.0828 - val_loss: 0.0274 - val_mae: 0.0780
Epoch 339/550
15/15   0s 6ms/step - loss:
0.0284 - mae: 0.0819 - val_loss: 0.0273 - val_mae: 0.0786
Epoch 340/550
15/15   0s 5ms/step - loss:
0.0296 - mae: 0.0843 - val_loss: 0.0276 - val_mae: 0.0793
Epoch 341/550
15/15   0s 5ms/step - loss:
0.0286 - mae: 0.0813 - val_loss: 0.0274 - val_mae: 0.0795
Epoch 342/550
15/15   0s 5ms/step - loss:
0.0287 - mae: 0.0832 - val_loss: 0.0275 - val_mae: 0.0797
Epoch 343/550
15/15   0s 6ms/step - loss:

0.0274 - mae: 0.0813 - val_loss: 0.0271 - val_mae: 0.0774
Epoch 344/550
15/15   0s 5ms/step - loss:
0.0284 - mae: 0.0822 - val_loss: 0.0271 - val_mae: 0.0779
Epoch 345/550
15/15   0s 5ms/step - loss:
0.0258 - mae: 0.0804 - val_loss: 0.0270 - val_mae: 0.0799
Epoch 346/550
15/15   0s 5ms/step - loss:
0.0284 - mae: 0.0833 - val_loss: 0.0268 - val_mae: 0.0777
Epoch 347/550
15/15   0s 5ms/step - loss:
0.0277 - mae: 0.0818 - val_loss: 0.0266 - val_mae: 0.0780
Epoch 348/550
15/15   0s 6ms/step - loss:
0.0273 - mae: 0.0808 - val_loss: 0.0266 - val_mae: 0.0780
Epoch 349/550
15/15   0s 5ms/step - loss:
0.0289 - mae: 0.0834 - val_loss: 0.0266 - val_mae: 0.0784
Epoch 350/550
15/15   0s 5ms/step - loss:
0.0265 - mae: 0.0806 - val_loss: 0.0265 - val_mae: 0.0778
Epoch 351/550
15/15   0s 6ms/step - loss:
0.0283 - mae: 0.0821 - val_loss: 0.0264 - val_mae: 0.0772
Epoch 352/550
15/15   0s 5ms/step - loss:
0.0266 - mae: 0.0802 - val_loss: 0.0266 - val_mae: 0.0782
Epoch 353/550
15/15   0s 5ms/step - loss:
0.0257 - mae: 0.0794 - val_loss: 0.0263 - val_mae: 0.0783
Epoch 354/550
15/15   0s 6ms/step - loss:
0.0266 - mae: 0.0808 - val_loss: 0.0261 - val_mae: 0.0781
Epoch 355/550
15/15   0s 5ms/step - loss:
0.0280 - mae: 0.0825 - val_loss: 0.0260 - val_mae: 0.0788
Epoch 356/550
15/15   0s 6ms/step - loss:
0.0259 - mae: 0.0803 - val_loss: 0.0259 - val_mae: 0.0785
Epoch 357/550
15/15   0s 5ms/step - loss:
0.0273 - mae: 0.0808 - val_loss: 0.0260 - val_mae: 0.0782
Epoch 358/550
15/15   0s 6ms/step - loss:
0.0260 - mae: 0.0810 - val_loss: 0.0257 - val_mae: 0.0777
Epoch 359/550
15/15   0s 5ms/step - loss:

0.0262 - mae: 0.0816 - val_loss: 0.0259 - val_mae: 0.0791
Epoch 360/550
15/15   0s 5ms/step - loss:
0.0264 - mae: 0.0819 - val_loss: 0.0255 - val_mae: 0.0782
Epoch 361/550
15/15   0s 6ms/step - loss:
0.0248 - mae: 0.0786 - val_loss: 0.0253 - val_mae: 0.0771
Epoch 362/550
15/15   0s 5ms/step - loss:
0.0250 - mae: 0.0806 - val_loss: 0.0256 - val_mae: 0.0772
Epoch 363/550
15/15   0s 5ms/step - loss:
0.0263 - mae: 0.0806 - val_loss: 0.0255 - val_mae: 0.0786
Epoch 364/550
15/15   0s 7ms/step - loss:
0.0261 - mae: 0.0814 - val_loss: 0.0257 - val_mae: 0.0781
Epoch 365/550
15/15   0s 6ms/step - loss:
0.0248 - mae: 0.0802 - val_loss: 0.0254 - val_mae: 0.0781
Epoch 366/550
15/15   0s 5ms/step - loss:
0.0262 - mae: 0.0819 - val_loss: 0.0255 - val_mae: 0.0780
Epoch 367/550
15/15   0s 6ms/step - loss:
0.0262 - mae: 0.0823 - val_loss: 0.0250 - val_mae: 0.0771
Epoch 368/550
15/15   0s 5ms/step - loss:
0.0242 - mae: 0.0782 - val_loss: 0.0254 - val_mae: 0.0774
Epoch 369/550
15/15   0s 5ms/step - loss:
0.0257 - mae: 0.0808 - val_loss: 0.0250 - val_mae: 0.0761
Epoch 370/550
15/15   0s 5ms/step - loss:
0.0263 - mae: 0.0819 - val_loss: 0.0249 - val_mae: 0.0764
Epoch 371/550
15/15   0s 5ms/step - loss:
0.0262 - mae: 0.0809 - val_loss: 0.0251 - val_mae: 0.0764
Epoch 372/550
15/15   0s 5ms/step - loss:
0.0254 - mae: 0.0801 - val_loss: 0.0252 - val_mae: 0.0769
Epoch 373/550
15/15   0s 6ms/step - loss:
0.0249 - mae: 0.0800 - val_loss: 0.0246 - val_mae: 0.0765
Epoch 374/550
15/15   0s 5ms/step - loss:
0.0240 - mae: 0.0779 - val_loss: 0.0249 - val_mae: 0.0784
Epoch 375/550
15/15   0s 5ms/step - loss:

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0.0250 - mae: 0.0792 - val_loss: 0.0247 - val_mae: 0.0766
Epoch 376/550
15/15          0s 5ms/step - loss:
0.0233 - mae: 0.0774 - val_loss: 0.0248 - val_mae: 0.0770
Epoch 377/550
15/15          0s 5ms/step - loss:
0.0253 - mae: 0.0810 - val_loss: 0.0247 - val_mae: 0.0770
Epoch 378/550
15/15          0s 6ms/step - loss:
0.0229 - mae: 0.0782 - val_loss: 0.0245 - val_mae: 0.0773
Epoch 379/550
15/15          0s 6ms/step - loss:
0.0250 - mae: 0.0815 - val_loss: 0.0244 - val_mae: 0.0766
Epoch 380/550
15/15          0s 6ms/step - loss:
0.0247 - mae: 0.0790 - val_loss: 0.0250 - val_mae: 0.0777
Epoch 381/550
15/15          0s 8ms/step - loss:
0.0242 - mae: 0.0796 - val_loss: 0.0242 - val_mae: 0.0767
Epoch 382/550
15/15          0s 5ms/step - loss:
0.0242 - mae: 0.0795 - val_loss: 0.0242 - val_mae: 0.0780
Epoch 383/550
15/15          0s 5ms/step - loss:
0.0236 - mae: 0.0787 - val_loss: 0.0244 - val_mae: 0.0767
Epoch 384/550
15/15          0s 5ms/step - loss:
0.0233 - mae: 0.0781 - val_loss: 0.0241 - val_mae: 0.0775
Epoch 385/550
15/15          0s 6ms/step - loss:
0.0238 - mae: 0.0795 - val_loss: 0.0240 - val_mae: 0.0768
Epoch 386/550
15/15          0s 5ms/step - loss:
0.0246 - mae: 0.0800 - val_loss: 0.0244 - val_mae: 0.0780
Epoch 387/550
15/15          0s 5ms/step - loss:
0.0250 - mae: 0.0808 - val_loss: 0.0242 - val_mae: 0.0776
Epoch 388/550
15/15          0s 5ms/step - loss:
0.0237 - mae: 0.0794 - val_loss: 0.0241 - val_mae: 0.0762
Epoch 389/550
15/15          0s 5ms/step - loss:
0.0228 - mae: 0.0777 - val_loss: 0.0244 - val_mae: 0.0772
Epoch 390/550
15/15          0s 5ms/step - loss:
0.0236 - mae: 0.0792 - val_loss: 0.0240 - val_mae: 0.0776
Epoch 391/550
15/15          0s 5ms/step - loss:
```

0.0245 - mae: 0.0805 - val_loss: 0.0238 - val_mae: 0.0773
Epoch 392/550
15/15   0s 6ms/step - loss:
0.0235 - mae: 0.0793 - val_loss: 0.0238 - val_mae: 0.0778
Epoch 393/550
15/15   0s 6ms/step - loss:
0.0221 - mae: 0.0774 - val_loss: 0.0240 - val_mae: 0.0770
Epoch 394/550
15/15   0s 5ms/step - loss:
0.0225 - mae: 0.0779 - val_loss: 0.0245 - val_mae: 0.0789
Epoch 395/550
15/15   0s 6ms/step - loss:
0.0219 - mae: 0.0773 - val_loss: 0.0234 - val_mae: 0.0775
Epoch 396/550
15/15   0s 5ms/step - loss:
0.0219 - mae: 0.0768 - val_loss: 0.0235 - val_mae: 0.0759
Epoch 397/550
15/15   0s 5ms/step - loss:
0.0234 - mae: 0.0792 - val_loss: 0.0237 - val_mae: 0.0777
Epoch 398/550
15/15   0s 5ms/step - loss:
0.0236 - mae: 0.0793 - val_loss: 0.0232 - val_mae: 0.0767
Epoch 399/550
15/15   0s 5ms/step - loss:
0.0230 - mae: 0.0780 - val_loss: 0.0233 - val_mae: 0.0778
Epoch 400/550
15/15   0s 6ms/step - loss:
0.0239 - mae: 0.0799 - val_loss: 0.0233 - val_mae: 0.0771
Epoch 401/550
15/15   0s 5ms/step - loss:
0.0231 - mae: 0.0776 - val_loss: 0.0234 - val_mae: 0.0770
Epoch 402/550
15/15   0s 6ms/step - loss:
0.0215 - mae: 0.0766 - val_loss: 0.0236 - val_mae: 0.0772
Epoch 403/550
15/15   0s 6ms/step - loss:
0.0236 - mae: 0.0795 - val_loss: 0.0232 - val_mae: 0.0757
Epoch 404/550
15/15   0s 5ms/step - loss:
0.0217 - mae: 0.0782 - val_loss: 0.0232 - val_mae: 0.0764
Epoch 405/550
15/15   0s 5ms/step - loss:
0.0228 - mae: 0.0774 - val_loss: 0.0238 - val_mae: 0.0775
Epoch 406/550
15/15   0s 6ms/step - loss:
0.0212 - mae: 0.0765 - val_loss: 0.0235 - val_mae: 0.0764
Epoch 407/550
15/15   0s 5ms/step - loss:

0.0217 - mae: 0.0777 - val_loss: 0.0237 - val_mae: 0.0787
Epoch 408/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0797 - val_loss: 0.0240 - val_mae: 0.0782
Epoch 409/550
15/15   0s 6ms/step - loss:
0.0225 - mae: 0.0785 - val_loss: 0.0230 - val_mae: 0.0774
Epoch 410/550
15/15   0s 6ms/step - loss:
0.0223 - mae: 0.0782 - val_loss: 0.0230 - val_mae: 0.0765
Epoch 411/550
15/15   0s 5ms/step - loss:
0.0221 - mae: 0.0785 - val_loss: 0.0232 - val_mae: 0.0776
Epoch 412/550
15/15   0s 5ms/step - loss:
0.0221 - mae: 0.0777 - val_loss: 0.0231 - val_mae: 0.0765
Epoch 413/550
15/15   0s 6ms/step - loss:
0.0211 - mae: 0.0770 - val_loss: 0.0233 - val_mae: 0.0771
Epoch 414/550
15/15   0s 5ms/step - loss:
0.0237 - mae: 0.0803 - val_loss: 0.0228 - val_mae: 0.0780
Epoch 415/550
15/15   0s 5ms/step - loss:
0.0212 - mae: 0.0763 - val_loss: 0.0232 - val_mae: 0.0765
Epoch 416/550
15/15   0s 5ms/step - loss:
0.0217 - mae: 0.0774 - val_loss: 0.0233 - val_mae: 0.0777
Epoch 417/550
15/15   0s 5ms/step - loss:
0.0223 - mae: 0.0786 - val_loss: 0.0233 - val_mae: 0.0769
Epoch 418/550
15/15   0s 5ms/step - loss:
0.0211 - mae: 0.0766 - val_loss: 0.0233 - val_mae: 0.0775
Epoch 419/550
15/15   0s 5ms/step - loss:
0.0203 - mae: 0.0743 - val_loss: 0.0226 - val_mae: 0.0764
Epoch 420/550
15/15   0s 6ms/step - loss:
0.0202 - mae: 0.0747 - val_loss: 0.0226 - val_mae: 0.0772
Epoch 421/550
15/15   0s 6ms/step - loss:
0.0212 - mae: 0.0765 - val_loss: 0.0227 - val_mae: 0.0776
Epoch 422/550
15/15   0s 5ms/step - loss:
0.0208 - mae: 0.0771 - val_loss: 0.0233 - val_mae: 0.0776
Epoch 423/550
15/15   0s 5ms/step - loss:

```
0.0222 - mae: 0.0783 - val_loss: 0.0230 - val_mae: 0.0774
Epoch 424/550
15/15          0s 7ms/step - loss:
0.0214 - mae: 0.0779 - val_loss: 0.0225 - val_mae: 0.0759
Epoch 425/550
15/15          0s 5ms/step - loss:
0.0200 - mae: 0.0758 - val_loss: 0.0225 - val_mae: 0.0766
Epoch 426/550
15/15          0s 5ms/step - loss:
0.0217 - mae: 0.0773 - val_loss: 0.0228 - val_mae: 0.0766
Epoch 427/550
15/15          0s 5ms/step - loss:
0.0211 - mae: 0.0766 - val_loss: 0.0225 - val_mae: 0.0775
Epoch 428/550
15/15          0s 5ms/step - loss:
0.0209 - mae: 0.0767 - val_loss: 0.0228 - val_mae: 0.0774
Epoch 429/550
15/15          0s 5ms/step - loss:
0.0204 - mae: 0.0761 - val_loss: 0.0223 - val_mae: 0.0766
Epoch 430/550
15/15          0s 5ms/step - loss:
0.0202 - mae: 0.0765 - val_loss: 0.0224 - val_mae: 0.0759
Epoch 431/550
15/15          0s 5ms/step - loss:
0.0206 - mae: 0.0771 - val_loss: 0.0225 - val_mae: 0.0755
Epoch 432/550
15/15          0s 7ms/step - loss:
0.0213 - mae: 0.0771 - val_loss: 0.0219 - val_mae: 0.0765
Epoch 433/550
15/15          0s 5ms/step - loss:
0.0203 - mae: 0.0757 - val_loss: 0.0230 - val_mae: 0.0773
Epoch 434/550
15/15          0s 6ms/step - loss:
0.0203 - mae: 0.0759 - val_loss: 0.0219 - val_mae: 0.0752
Epoch 435/550
15/15          0s 5ms/step - loss:
0.0212 - mae: 0.0768 - val_loss: 0.0226 - val_mae: 0.0770
Epoch 436/550
15/15          0s 5ms/step - loss:
0.0213 - mae: 0.0763 - val_loss: 0.0222 - val_mae: 0.0747
Epoch 437/550
15/15          0s 5ms/step - loss:
0.0223 - mae: 0.0790 - val_loss: 0.0223 - val_mae: 0.0744
Epoch 438/550
15/15          0s 5ms/step - loss:
0.0199 - mae: 0.0747 - val_loss: 0.0219 - val_mae: 0.0756
Epoch 439/550
15/15          0s 7ms/step - loss:
```

```
0.0213 - mae: 0.0773 - val_loss: 0.0222 - val_mae: 0.0756
Epoch 440/550
15/15          0s 5ms/step - loss:
0.0194 - mae: 0.0749 - val_loss: 0.0221 - val_mae: 0.0748
Epoch 441/550
15/15          0s 5ms/step - loss:
0.0212 - mae: 0.0769 - val_loss: 0.0224 - val_mae: 0.0751
Epoch 442/550
15/15          0s 6ms/step - loss:
0.0203 - mae: 0.0756 - val_loss: 0.0220 - val_mae: 0.0750
Epoch 443/550
15/15          0s 6ms/step - loss:
0.0195 - mae: 0.0753 - val_loss: 0.0220 - val_mae: 0.0753
Epoch 444/550
15/15          0s 5ms/step - loss:
0.0198 - mae: 0.0753 - val_loss: 0.0219 - val_mae: 0.0758
Epoch 445/550
15/15          0s 7ms/step - loss:
0.0196 - mae: 0.0751 - val_loss: 0.0215 - val_mae: 0.0750
Epoch 446/550
15/15          0s 5ms/step - loss:
0.0211 - mae: 0.0769 - val_loss: 0.0221 - val_mae: 0.0761
Epoch 447/550
15/15          0s 5ms/step - loss:
0.0207 - mae: 0.0767 - val_loss: 0.0226 - val_mae: 0.0780
Epoch 448/550
15/15          0s 5ms/step - loss:
0.0204 - mae: 0.0771 - val_loss: 0.0222 - val_mae: 0.0758
Epoch 449/550
15/15          0s 5ms/step - loss:
0.0198 - mae: 0.0748 - val_loss: 0.0226 - val_mae: 0.0758
Epoch 450/550
15/15          0s 5ms/step - loss:
0.0196 - mae: 0.0758 - val_loss: 0.0218 - val_mae: 0.0749
Epoch 451/550
15/15          0s 5ms/step - loss:
0.0211 - mae: 0.0771 - val_loss: 0.0216 - val_mae: 0.0743
Epoch 452/550
15/15          0s 5ms/step - loss:
0.0202 - mae: 0.0744 - val_loss: 0.0222 - val_mae: 0.0759
Epoch 453/550
15/15          0s 7ms/step - loss:
0.0194 - mae: 0.0750 - val_loss: 0.0222 - val_mae: 0.0750
Epoch 454/550
15/15          0s 5ms/step - loss:
0.0206 - mae: 0.0770 - val_loss: 0.0222 - val_mae: 0.0757
Epoch 455/550
15/15          0s 6ms/step - loss:
```

```
0.0204 - mae: 0.0765 - val_loss: 0.0226 - val_mae: 0.0770
Epoch 456/550
15/15          0s 5ms/step - loss:
0.0191 - mae: 0.0743 - val_loss: 0.0227 - val_mae: 0.0771
Epoch 457/550
15/15          0s 5ms/step - loss:
0.0189 - mae: 0.0736 - val_loss: 0.0226 - val_mae: 0.0767
Epoch 458/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0743 - val_loss: 0.0220 - val_mae: 0.0745
Epoch 459/550
15/15          0s 5ms/step - loss:
0.0202 - mae: 0.0769 - val_loss: 0.0217 - val_mae: 0.0761
Epoch 460/550
15/15          0s 7ms/step - loss:
0.0194 - mae: 0.0748 - val_loss: 0.0221 - val_mae: 0.0758
Epoch 461/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0752 - val_loss: 0.0227 - val_mae: 0.0766
Epoch 462/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0738 - val_loss: 0.0230 - val_mae: 0.0761
Epoch 463/550
15/15          0s 6ms/step - loss:
0.0197 - mae: 0.0754 - val_loss: 0.0221 - val_mae: 0.0753
Epoch 464/550
15/15          0s 6ms/step - loss:
0.0199 - mae: 0.0759 - val_loss: 0.0215 - val_mae: 0.0761
Epoch 465/550
15/15          0s 5ms/step - loss:
0.0205 - mae: 0.0758 - val_loss: 0.0229 - val_mae: 0.0774
Epoch 466/550
15/15          0s 5ms/step - loss:
0.0185 - mae: 0.0737 - val_loss: 0.0221 - val_mae: 0.0754
Epoch 467/550
15/15          0s 7ms/step - loss:
0.0193 - mae: 0.0751 - val_loss: 0.0222 - val_mae: 0.0749
Epoch 468/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0739 - val_loss: 0.0218 - val_mae: 0.0745
Epoch 469/550
15/15          0s 6ms/step - loss:
0.0199 - mae: 0.0752 - val_loss: 0.0211 - val_mae: 0.0735
Epoch 470/550
15/15          0s 5ms/step - loss:
0.0176 - mae: 0.0731 - val_loss: 0.0227 - val_mae: 0.0752
Epoch 471/550
15/15          0s 5ms/step - loss:
```

0.0211 - mae: 0.0764 - val_loss: 0.0221 - val_mae: 0.0745
Epoch 472/550
15/15   0s 5ms/step - loss:
0.0194 - mae: 0.0749 - val_loss: 0.0222 - val_mae: 0.0767
Epoch 473/550
15/15   0s 5ms/step - loss:
0.0192 - mae: 0.0741 - val_loss: 0.0223 - val_mae: 0.0767
Epoch 474/550
15/15   0s 7ms/step - loss:
0.0198 - mae: 0.0754 - val_loss: 0.0216 - val_mae: 0.0756
Epoch 475/550
15/15   0s 6ms/step - loss:
0.0198 - mae: 0.0750 - val_loss: 0.0221 - val_mae: 0.0761
Epoch 476/550
15/15   0s 5ms/step - loss:
0.0187 - mae: 0.0737 - val_loss: 0.0227 - val_mae: 0.0771
Epoch 477/550
15/15   0s 5ms/step - loss:
0.0189 - mae: 0.0734 - val_loss: 0.0226 - val_mae: 0.0776
Epoch 478/550
15/15   0s 5ms/step - loss:
0.0190 - mae: 0.0743 - val_loss: 0.0215 - val_mae: 0.0766
Epoch 479/550
15/15   0s 5ms/step - loss:
0.0192 - mae: 0.0743 - val_loss: 0.0221 - val_mae: 0.0773
Epoch 480/550
15/15   0s 6ms/step - loss:
0.0177 - mae: 0.0722 - val_loss: 0.0217 - val_mae: 0.0760
Epoch 481/550
15/15   0s 5ms/step - loss:
0.0192 - mae: 0.0741 - val_loss: 0.0221 - val_mae: 0.0748
Epoch 482/550
15/15   0s 5ms/step - loss:
0.0185 - mae: 0.0727 - val_loss: 0.0229 - val_mae: 0.0771
Epoch 483/550
15/15   0s 5ms/step - loss:
0.0199 - mae: 0.0752 - val_loss: 0.0224 - val_mae: 0.0753
Epoch 484/550
15/15   0s 6ms/step - loss:
0.0188 - mae: 0.0731 - val_loss: 0.0231 - val_mae: 0.0770
Epoch 485/550
15/15   0s 5ms/step - loss:
0.0184 - mae: 0.0730 - val_loss: 0.0219 - val_mae: 0.0745
Epoch 486/550
15/15   0s 7ms/step - loss:
0.0196 - mae: 0.0745 - val_loss: 0.0226 - val_mae: 0.0766
Epoch 487/550
15/15   0s 5ms/step - loss:

```
0.0185 - mae: 0.0741 - val_loss: 0.0235 - val_mae: 0.0787
Epoch 488/550
15/15          0s 5ms/step - loss:
0.0179 - mae: 0.0721 - val_loss: 0.0234 - val_mae: 0.0772
Epoch 489/550
15/15          0s 5ms/step - loss:
0.0181 - mae: 0.0725 - val_loss: 0.0223 - val_mae: 0.0765
Epoch 490/550
15/15          0s 5ms/step - loss:
0.0187 - mae: 0.0742 - val_loss: 0.0221 - val_mae: 0.0770
Epoch 491/550
15/15          0s 5ms/step - loss:
0.0184 - mae: 0.0733 - val_loss: 0.0236 - val_mae: 0.0779
Epoch 492/550
15/15          0s 5ms/step - loss:
0.0181 - mae: 0.0735 - val_loss: 0.0234 - val_mae: 0.0780
Epoch 493/550
15/15          0s 7ms/step - loss:
0.0177 - mae: 0.0724 - val_loss: 0.0218 - val_mae: 0.0750
Epoch 494/550
15/15          0s 5ms/step - loss:
0.0188 - mae: 0.0735 - val_loss: 0.0217 - val_mae: 0.0748
```
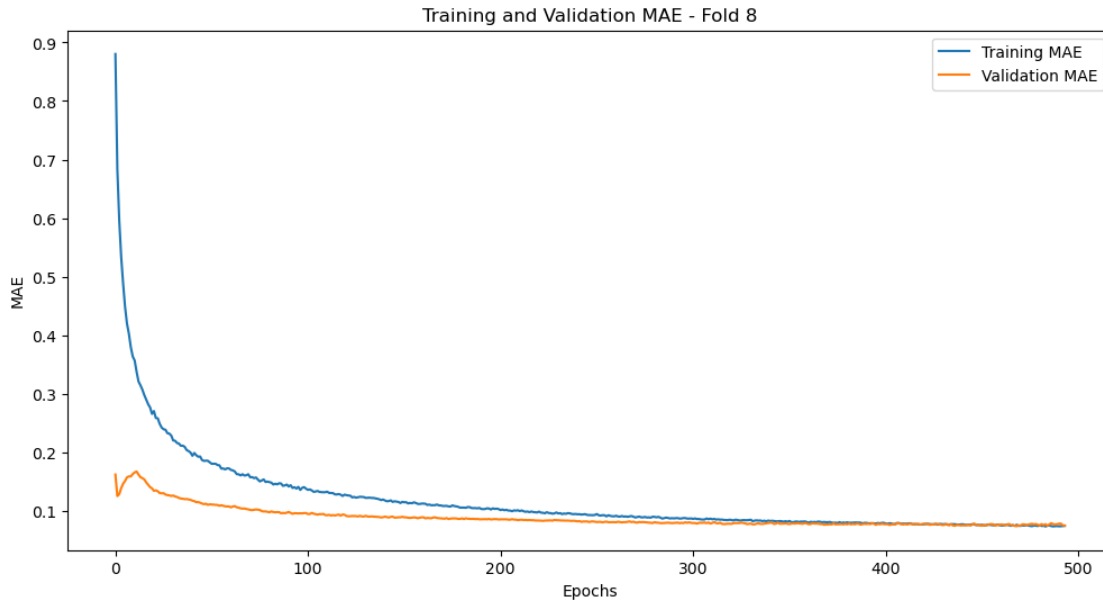

Training and Validation Loss - Fold 8

Training and Validation MAE - Fold 8
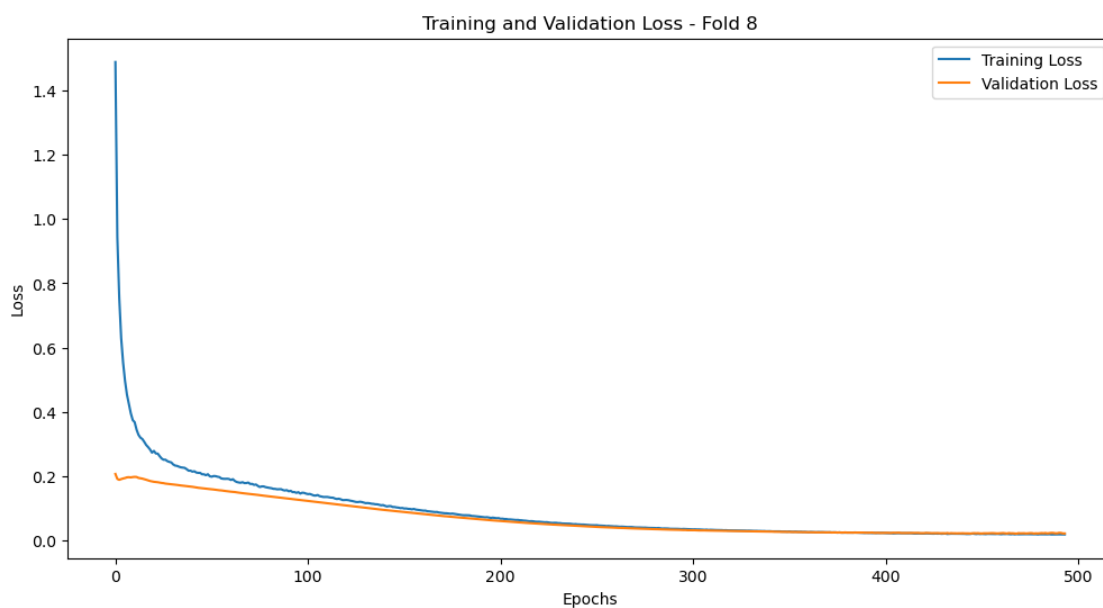
Fold Validation MAE: 0.07351244986057281
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

15/15   2s 16ms/step -
loss: 2.0914 - mae: 1.0765 - val_loss: 0.1908 - val_mae: 0.1345
Epoch 2/550
15/15   0s 5ms/step - loss:
1.3029 - mae: 0.8236 - val_loss: 0.1845 - val_mae: 0.1193
Epoch 3/550
15/15   0s 5ms/step - loss:
0.9254 - mae: 0.6778 - val_loss: 0.1810 - val_mae: 0.1150
Epoch 4/550
15/15   0s 5ms/step - loss:
0.7467 - mae: 0.5963 - val_loss: 0.1824 - val_mae: 0.1224
Epoch 5/550
15/15   0s 5ms/step - loss:
0.6489 - mae: 0.5417 - val_loss: 0.1854 - val_mae: 0.1314
Epoch 6/550
15/15   0s 5ms/step - loss:
0.5819 - mae: 0.5040 - val_loss: 0.1896 - val_mae: 0.1408
Epoch 7/550
15/15   0s 5ms/step - loss:

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0.5346 - mae: 0.4718 - val_loss: 0.1937 - val_mae: 0.1523
Epoch 8/550
15/15          0s 5ms/step - loss:
0.4723 - mae: 0.4398 - val_loss: 0.1960 - val_mae: 0.1581
Epoch 9/550
15/15          0s 5ms/step - loss:
0.4411 - mae: 0.4168 - val_loss: 0.2013 - val_mae: 0.1688
Epoch 10/550
15/15          0s 5ms/step - loss:
0.4149 - mae: 0.3921 - val_loss: 0.2011 - val_mae: 0.1691
Epoch 11/550
15/15          0s 5ms/step - loss:
0.4131 - mae: 0.3935 - val_loss: 0.1998 - val_mae: 0.1676
Epoch 12/550
15/15          0s 5ms/step - loss:
0.3800 - mae: 0.3676 - val_loss: 0.1989 - val_mae: 0.1661
Epoch 13/550
15/15          0s 5ms/step - loss:
0.3701 - mae: 0.3562 - val_loss: 0.1989 - val_mae: 0.1684
Epoch 14/550
15/15          0s 5ms/step - loss:
0.3642 - mae: 0.3543 - val_loss: 0.1990 - val_mae: 0.1685
Epoch 15/550
15/15          0s 5ms/step - loss:
0.3501 - mae: 0.3395 - val_loss: 0.1954 - val_mae: 0.1618
Epoch 16/550
15/15          0s 5ms/step - loss:
0.3399 - mae: 0.3307 - val_loss: 0.1941 - val_mae: 0.1595
Epoch 17/550
15/15          0s 5ms/step - loss:
0.3269 - mae: 0.3207 - val_loss: 0.1931 - val_mae: 0.1584
Epoch 18/550
15/15          0s 5ms/step - loss:
0.3243 - mae: 0.3134 - val_loss: 0.1902 - val_mae: 0.1525
Epoch 19/550
15/15          0s 5ms/step - loss:
0.3221 - mae: 0.3131 - val_loss: 0.1872 - val_mae: 0.1466
Epoch 20/550
15/15          0s 5ms/step - loss:
0.3151 - mae: 0.3073 - val_loss: 0.1872 - val_mae: 0.1476
Epoch 21/550
15/15          0s 5ms/step - loss:
0.2944 - mae: 0.2897 - val_loss: 0.1858 - val_mae: 0.1452
Epoch 22/550
15/15          0s 5ms/step - loss:
0.2905 - mae: 0.2845 - val_loss: 0.1835 - val_mae: 0.1408
Epoch 23/550
15/15          0s 5ms/step - loss:
```

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0.2933 - mae: 0.2885 - val_loss: 0.1817 - val_mae: 0.1367
Epoch 24/550
15/15            0s 5ms/step - loss:
0.2840 - mae: 0.2757 - val_loss: 0.1817 - val_mae: 0.1382
Epoch 25/550
15/15            0s 5ms/step - loss:
0.2801 - mae: 0.2724 - val_loss: 0.1793 - val_mae: 0.1330
Epoch 26/550
15/15            0s 5ms/step - loss:
0.2724 - mae: 0.2657 - val_loss: 0.1795 - val_mae: 0.1345
Epoch 27/550
15/15            0s 5ms/step - loss:
0.2681 - mae: 0.2629 - val_loss: 0.1771 - val_mae: 0.1291
Epoch 28/550
15/15            0s 5ms/step - loss:
0.2657 - mae: 0.2602 - val_loss: 0.1760 - val_mae: 0.1280
Epoch 29/550
15/15            0s 5ms/step - loss:
0.2618 - mae: 0.2551 - val_loss: 0.1751 - val_mae: 0.1268
Epoch 30/550
15/15            0s 5ms/step - loss:
0.2588 - mae: 0.2476 - val_loss: 0.1742 - val_mae: 0.1251
Epoch 31/550
15/15            0s 5ms/step - loss:
0.2606 - mae: 0.2510 - val_loss: 0.1744 - val_mae: 0.1271
Epoch 32/550
15/15            0s 5ms/step - loss:
0.2516 - mae: 0.2442 - val_loss: 0.1728 - val_mae: 0.1238
Epoch 33/550
15/15            0s 5ms/step - loss:
0.2466 - mae: 0.2382 - val_loss: 0.1729 - val_mae: 0.1256
Epoch 34/550
15/15            0s 5ms/step - loss:
0.2461 - mae: 0.2397 - val_loss: 0.1710 - val_mae: 0.1221
Epoch 35/550
15/15            0s 5ms/step - loss:
0.2420 - mae: 0.2329 - val_loss: 0.1700 - val_mae: 0.1202
Epoch 36/550
15/15            0s 5ms/step - loss:
0.2404 - mae: 0.2309 - val_loss: 0.1698 - val_mae: 0.1201
Epoch 37/550
15/15            0s 5ms/step - loss:
0.2401 - mae: 0.2292 - val_loss: 0.1689 - val_mae: 0.1187
Epoch 38/550
15/15            0s 7ms/step - loss:
0.2441 - mae: 0.2294 - val_loss: 0.1693 - val_mae: 0.1222
Epoch 39/550
15/15            0s 5ms/step - loss:
```

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0.2330 - mae: 0.2223 - val_loss: 0.1678 - val_mae: 0.1190
Epoch 40/550
15/15          0s 5ms/step - loss:
0.2350 - mae: 0.2204 - val_loss: 0.1670 - val_mae: 0.1179
Epoch 41/550
15/15          0s 5ms/step - loss:
0.2312 - mae: 0.2169 - val_loss: 0.1667 - val_mae: 0.1188
Epoch 42/550
15/15          0s 5ms/step - loss:
0.2297 - mae: 0.2174 - val_loss: 0.1661 - val_mae: 0.1173
Epoch 43/550
15/15          0s 6ms/step - loss:
0.2294 - mae: 0.2147 - val_loss: 0.1649 - val_mae: 0.1154
Epoch 44/550
15/15          0s 5ms/step - loss:
0.2292 - mae: 0.2149 - val_loss: 0.1640 - val_mae: 0.1145
Epoch 45/550
15/15          0s 5ms/step - loss:
0.2236 - mae: 0.2104 - val_loss: 0.1632 - val_mae: 0.1133
Epoch 46/550
15/15          0s 5ms/step - loss:
0.2211 - mae: 0.2092 - val_loss: 0.1621 - val_mae: 0.1109
Epoch 47/550
15/15          0s 5ms/step - loss:
0.2225 - mae: 0.2108 - val_loss: 0.1615 - val_mae: 0.1120
Epoch 48/550
15/15          0s 5ms/step - loss:
0.2171 - mae: 0.2027 - val_loss: 0.1607 - val_mae: 0.1100
Epoch 49/550
15/15          0s 5ms/step - loss:
0.2178 - mae: 0.2050 - val_loss: 0.1603 - val_mae: 0.1097
Epoch 50/550
15/15          0s 5ms/step - loss:
0.2140 - mae: 0.1991 - val_loss: 0.1594 - val_mae: 0.1090
Epoch 51/550
15/15          0s 5ms/step - loss:
0.2152 - mae: 0.1993 - val_loss: 0.1586 - val_mae: 0.1076
Epoch 52/550
15/15          0s 6ms/step - loss:
0.2152 - mae: 0.1992 - val_loss: 0.1582 - val_mae: 0.1075
Epoch 53/550
15/15          0s 6ms/step - loss:
0.2113 - mae: 0.1947 - val_loss: 0.1571 - val_mae: 0.1051
Epoch 54/550
15/15          0s 7ms/step - loss:
0.2095 - mae: 0.1963 - val_loss: 0.1565 - val_mae: 0.1052
Epoch 55/550
15/15          0s 5ms/step - loss:
```

0.2070 - mae: 0.1915 - val_loss: 0.1556 - val_mae: 0.1043
Epoch 56/550
15/15   0s 5ms/step - loss:
0.2085 - mae: 0.1946 - val_loss: 0.1555 - val_mae: 0.1049
Epoch 57/550
15/15   0s 5ms/step - loss:
0.2082 - mae: 0.1950 - val_loss: 0.1546 - val_mae: 0.1033
Epoch 58/550
15/15   0s 5ms/step - loss:
0.2053 - mae: 0.1897 - val_loss: 0.1534 - val_mae: 0.1010
Epoch 59/550
15/15   0s 5ms/step - loss:
0.2048 - mae: 0.1906 - val_loss: 0.1526 - val_mae: 0.1012
Epoch 60/550
15/15   0s 5ms/step - loss:
0.2020 - mae: 0.1880 - val_loss: 0.1525 - val_mae: 0.1016
Epoch 61/550
15/15   0s 5ms/step - loss:
0.2014 - mae: 0.1847 - val_loss: 0.1513 - val_mae: 0.1000
Epoch 62/550
15/15   0s 5ms/step - loss:
0.1975 - mae: 0.1828 - val_loss: 0.1505 - val_mae: 0.0991
Epoch 63/550
15/15   0s 6ms/step - loss:
0.1987 - mae: 0.1853 - val_loss: 0.1504 - val_mae: 0.0996
Epoch 64/550
15/15   0s 6ms/step - loss:
0.1978 - mae: 0.1845 - val_loss: 0.1494 - val_mae: 0.0991
Epoch 65/550
15/15   0s 5ms/step - loss:
0.1908 - mae: 0.1758 - val_loss: 0.1489 - val_mae: 0.0993
Epoch 66/550
15/15   0s 5ms/step - loss:
0.1918 - mae: 0.1765 - val_loss: 0.1485 - val_mae: 0.0991
Epoch 67/550
15/15   0s 5ms/step - loss:
0.1862 - mae: 0.1727 - val_loss: 0.1475 - val_mae: 0.0977
Epoch 68/550
15/15   0s 5ms/step - loss:
0.1913 - mae: 0.1781 - val_loss: 0.1468 - val_mae: 0.0982
Epoch 69/550
15/15   0s 5ms/step - loss:
0.1909 - mae: 0.1741 - val_loss: 0.1465 - val_mae: 0.0976
Epoch 70/550
15/15   0s 5ms/step - loss:
0.1911 - mae: 0.1766 - val_loss: 0.1463 - val_mae: 0.0983
Epoch 71/550
15/15   0s 5ms/step - loss:

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0.1877 - mae: 0.1739 - val_loss: 0.1448 - val_mae: 0.0957
Epoch 72/550
15/15          0s 7ms/step - loss:
0.1871 - mae: 0.1712 - val_loss: 0.1446 - val_mae: 0.0966
Epoch 73/550
15/15          0s 5ms/step - loss:
0.1825 - mae: 0.1694 - val_loss: 0.1434 - val_mae: 0.0951
Epoch 74/550
15/15          0s 6ms/step - loss:
0.1831 - mae: 0.1689 - val_loss: 0.1431 - val_mae: 0.0943
Epoch 75/550
15/15          0s 6ms/step - loss:
0.1844 - mae: 0.1722 - val_loss: 0.1423 - val_mae: 0.0939
Epoch 76/550
15/15          0s 5ms/step - loss:
0.1797 - mae: 0.1640 - val_loss: 0.1416 - val_mae: 0.0936
Epoch 77/550
15/15          0s 5ms/step - loss:
0.1797 - mae: 0.1660 - val_loss: 0.1411 - val_mae: 0.0938
Epoch 78/550
15/15          0s 5ms/step - loss:
0.1805 - mae: 0.1678 - val_loss: 0.1401 - val_mae: 0.0927
Epoch 79/550
15/15          0s 5ms/step - loss:
0.1801 - mae: 0.1656 - val_loss: 0.1398 - val_mae: 0.0929
Epoch 80/550
15/15          0s 5ms/step - loss:
0.1790 - mae: 0.1661 - val_loss: 0.1388 - val_mae: 0.0927
Epoch 81/550
15/15          0s 5ms/step - loss:
0.1788 - mae: 0.1663 - val_loss: 0.1383 - val_mae: 0.0925
Epoch 82/550
15/15          0s 5ms/step - loss:
0.1759 - mae: 0.1628 - val_loss: 0.1381 - val_mae: 0.0939
Epoch 83/550
15/15          0s 5ms/step - loss:
0.1747 - mae: 0.1617 - val_loss: 0.1371 - val_mae: 0.0925
Epoch 84/550
15/15          0s 5ms/step - loss:
0.1725 - mae: 0.1612 - val_loss: 0.1363 - val_mae: 0.0915
Epoch 85/550
15/15          0s 5ms/step - loss:
0.1741 - mae: 0.1631 - val_loss: 0.1357 - val_mae: 0.0919
Epoch 86/550
15/15          0s 6ms/step - loss:
0.1705 - mae: 0.1590 - val_loss: 0.1350 - val_mae: 0.0904
Epoch 87/550
15/15          0s 5ms/step - loss:
```

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0.1711 - mae: 0.1585 - val_loss: 0.1343 - val_mae: 0.0903
Epoch 88/550
15/15              0s 5ms/step - loss:
0.1669 - mae: 0.1549 - val_loss: 0.1337 - val_mae: 0.0911
Epoch 89/550
15/15              0s 6ms/step - loss:
0.1689 - mae: 0.1566 - val_loss: 0.1332 - val_mae: 0.0903
Epoch 90/550
15/15              0s 5ms/step - loss:
0.1689 - mae: 0.1570 - val_loss: 0.1325 - val_mae: 0.0900
Epoch 91/550
15/15              0s 5ms/step - loss:
0.1677 - mae: 0.1543 - val_loss: 0.1317 - val_mae: 0.0895
Epoch 92/550
15/15              0s 5ms/step - loss:
0.1687 - mae: 0.1568 - val_loss: 0.1309 - val_mae: 0.0885
Epoch 93/550
15/15              0s 5ms/step - loss:
0.1673 - mae: 0.1556 - val_loss: 0.1309 - val_mae: 0.0893
Epoch 94/550
15/15              0s 5ms/step - loss:
0.1611 - mae: 0.1515 - val_loss: 0.1299 - val_mae: 0.0888
Epoch 95/550
15/15              0s 5ms/step - loss:
0.1612 - mae: 0.1506 - val_loss: 0.1288 - val_mae: 0.0878
Epoch 96/550
15/15              0s 6ms/step - loss:
0.1649 - mae: 0.1538 - val_loss: 0.1285 - val_mae: 0.0880
Epoch 97/550
15/15              0s 5ms/step - loss:
0.1607 - mae: 0.1504 - val_loss: 0.1276 - val_mae: 0.0879
Epoch 98/550
15/15              0s 5ms/step - loss:
0.1619 - mae: 0.1524 - val_loss: 0.1270 - val_mae: 0.0875
Epoch 99/550
15/15              0s 5ms/step - loss:
0.1572 - mae: 0.1495 - val_loss: 0.1263 - val_mae: 0.0875
Epoch 100/550
15/15              0s 5ms/step - loss:
0.1607 - mae: 0.1492 - val_loss: 0.1260 - val_mae: 0.0885
Epoch 101/550
15/15              0s 5ms/step - loss:
0.1550 - mae: 0.1477 - val_loss: 0.1253 - val_mae: 0.0873
Epoch 102/550
15/15              0s 6ms/step - loss:
0.1531 - mae: 0.1451 - val_loss: 0.1244 - val_mae: 0.0873
Epoch 103/550
15/15              0s 5ms/step - loss:
```

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0.1534 - mae: 0.1462 - val_loss: 0.1235 - val_mae: 0.0866
Epoch 104/550
15/15          0s 5ms/step - loss:
0.1527 - mae: 0.1440 - val_loss: 0.1230 - val_mae: 0.0854
Epoch 105/550
15/15          0s 7ms/step - loss:
0.1510 - mae: 0.1439 - val_loss: 0.1222 - val_mae: 0.0852
Epoch 106/550
15/15          0s 6ms/step - loss:
0.1507 - mae: 0.1445 - val_loss: 0.1216 - val_mae: 0.0853
Epoch 107/550
15/15          0s 5ms/step - loss:
0.1509 - mae: 0.1423 - val_loss: 0.1209 - val_mae: 0.0853
Epoch 108/550
15/15          0s 5ms/step - loss:
0.1505 - mae: 0.1444 - val_loss: 0.1203 - val_mae: 0.0852
Epoch 109/550
15/15          0s 6ms/step - loss:
0.1479 - mae: 0.1408 - val_loss: 0.1198 - val_mae: 0.0860
Epoch 110/550
15/15          0s 6ms/step - loss:
0.1438 - mae: 0.1382 - val_loss: 0.1190 - val_mae: 0.0854
Epoch 111/550
15/15          0s 6ms/step - loss:
0.1467 - mae: 0.1419 - val_loss: 0.1182 - val_mae: 0.0843
Epoch 112/550
15/15          0s 6ms/step - loss:
0.1493 - mae: 0.1450 - val_loss: 0.1176 - val_mae: 0.0837
Epoch 113/550
15/15          0s 6ms/step - loss:
0.1488 - mae: 0.1437 - val_loss: 0.1170 - val_mae: 0.0846
Epoch 114/550
15/15          0s 6ms/step - loss:
0.1455 - mae: 0.1409 - val_loss: 0.1162 - val_mae: 0.0838
Epoch 115/550
15/15          0s 5ms/step - loss:
0.1441 - mae: 0.1393 - val_loss: 0.1155 - val_mae: 0.0833
Epoch 116/550
15/15          0s 5ms/step - loss:
0.1437 - mae: 0.1387 - val_loss: 0.1150 - val_mae: 0.0834
Epoch 117/550
15/15          0s 6ms/step - loss:
0.1394 - mae: 0.1358 - val_loss: 0.1143 - val_mae: 0.0846
Epoch 118/550
15/15          0s 7ms/step - loss:
0.1428 - mae: 0.1403 - val_loss: 0.1135 - val_mae: 0.0827
Epoch 119/550
15/15          0s 5ms/step - loss:
```

0.1406 - mae: 0.1373 - val_loss: 0.1130 - val_mae: 0.0839
Epoch 120/550
15/15   0s 5ms/step - loss:
0.1401 - mae: 0.1373 - val_loss: 0.1122 - val_mae: 0.0828
Epoch 121/550
15/15   0s 5ms/step - loss:
0.1383 - mae: 0.1355 - val_loss: 0.1116 - val_mae: 0.0837
Epoch 122/550
15/15   0s 6ms/step - loss:
0.1378 - mae: 0.1345 - val_loss: 0.1109 - val_mae: 0.0819
Epoch 123/550
15/15   0s 5ms/step - loss:
0.1381 - mae: 0.1371 - val_loss: 0.1103 - val_mae: 0.0830
Epoch 124/550
15/15   0s 5ms/step - loss:
0.1339 - mae: 0.1324 - val_loss: 0.1094 - val_mae: 0.0822
Epoch 125/550
15/15   0s 6ms/step - loss:
0.1347 - mae: 0.1337 - val_loss: 0.1088 - val_mae: 0.0819
Epoch 126/550
15/15   0s 5ms/step - loss:
0.1350 - mae: 0.1338 - val_loss: 0.1082 - val_mae: 0.0813
Epoch 127/550
15/15   0s 5ms/step - loss:
0.1324 - mae: 0.1344 - val_loss: 0.1076 - val_mae: 0.0815
Epoch 128/550
15/15   0s 5ms/step - loss:
0.1352 - mae: 0.1351 - val_loss: 0.1069 - val_mae: 0.0819
Epoch 129/550
15/15   0s 5ms/step - loss:
0.1336 - mae: 0.1342 - val_loss: 0.1063 - val_mae: 0.0821
Epoch 130/550
15/15   0s 5ms/step - loss:
0.1296 - mae: 0.1322 - val_loss: 0.1057 - val_mae: 0.0813
Epoch 131/550
15/15   0s 5ms/step - loss:
0.1318 - mae: 0.1331 - val_loss: 0.1050 - val_mae: 0.0822
Epoch 132/550
15/15   0s 7ms/step - loss:
0.1285 - mae: 0.1318 - val_loss: 0.1043 - val_mae: 0.0813
Epoch 133/550
15/15   0s 5ms/step - loss:
0.1295 - mae: 0.1332 - val_loss: 0.1037 - val_mae: 0.0824
Epoch 134/550
15/15   0s 5ms/step - loss:
0.1258 - mae: 0.1297 - val_loss: 0.1030 - val_mae: 0.0805
Epoch 135/550
15/15   0s 6ms/step - loss:

```
0.1259 - mae: 0.1300 - val_loss: 0.1023 - val_mae: 0.0805
Epoch 136/550
15/15          0s 5ms/step - loss:
0.1280 - mae: 0.1326 - val_loss: 0.1017 - val_mae: 0.0805
Epoch 137/550
15/15          0s 5ms/step - loss:
0.1250 - mae: 0.1293 - val_loss: 0.1009 - val_mae: 0.0797
Epoch 138/550
15/15          0s 6ms/step - loss:
0.1242 - mae: 0.1281 - val_loss: 0.1004 - val_mae: 0.0800
Epoch 139/550
15/15          0s 5ms/step - loss:
0.1221 - mae: 0.1266 - val_loss: 0.0997 - val_mae: 0.0801
Epoch 140/550
15/15          0s 5ms/step - loss:
0.1225 - mae: 0.1269 - val_loss: 0.0992 - val_mae: 0.0809
Epoch 141/550
15/15          0s 5ms/step - loss:
0.1199 - mae: 0.1273 - val_loss: 0.0984 - val_mae: 0.0799
Epoch 142/550
15/15          0s 5ms/step - loss:
0.1233 - mae: 0.1285 - val_loss: 0.0978 - val_mae: 0.0796
Epoch 143/550
15/15          0s 5ms/step - loss:
0.1204 - mae: 0.1252 - val_loss: 0.0972 - val_mae: 0.0808
Epoch 144/550
15/15          0s 5ms/step - loss:
0.1197 - mae: 0.1264 - val_loss: 0.0964 - val_mae: 0.0791
Epoch 145/550
15/15          0s 5ms/step - loss:
0.1202 - mae: 0.1276 - val_loss: 0.0959 - val_mae: 0.0798
Epoch 146/550
15/15          0s 5ms/step - loss:
0.1176 - mae: 0.1249 - val_loss: 0.0953 - val_mae: 0.0801
Epoch 147/550
15/15          0s 7ms/step - loss:
0.1190 - mae: 0.1278 - val_loss: 0.0946 - val_mae: 0.0795
Epoch 148/550
15/15          0s 6ms/step - loss:
0.1175 - mae: 0.1248 - val_loss: 0.0940 - val_mae: 0.0790
Epoch 149/550
15/15          0s 5ms/step - loss:
0.1140 - mae: 0.1239 - val_loss: 0.0932 - val_mae: 0.0790
Epoch 150/550
15/15          0s 5ms/step - loss:
0.1154 - mae: 0.1235 - val_loss: 0.0927 - val_mae: 0.0791
Epoch 151/550
15/15          0s 5ms/step - loss:
```

```
0.1096 - mae: 0.1183 - val_loss: 0.0921 - val_mae: 0.0802
Epoch 152/550
15/15          0s 5ms/step - loss:
0.1151 - mae: 0.1252 - val_loss: 0.0915 - val_mae: 0.0792
Epoch 153/550
15/15          0s 5ms/step - loss:
0.1120 - mae: 0.1209 - val_loss: 0.0909 - val_mae: 0.0791
Epoch 154/550
15/15          0s 5ms/step - loss:
0.1105 - mae: 0.1201 - val_loss: 0.0903 - val_mae: 0.0786
Epoch 155/550
15/15          0s 5ms/step - loss:
0.1098 - mae: 0.1208 - val_loss: 0.0897 - val_mae: 0.0794
Epoch 156/550
15/15          0s 5ms/step - loss:
0.1073 - mae: 0.1186 - val_loss: 0.0890 - val_mae: 0.0791
Epoch 157/550
15/15          0s 5ms/step - loss:
0.1088 - mae: 0.1226 - val_loss: 0.0885 - val_mae: 0.0789
Epoch 158/550
15/15          0s 5ms/step - loss:
0.1077 - mae: 0.1219 - val_loss: 0.0879 - val_mae: 0.0793
Epoch 159/550
15/15          0s 5ms/step - loss:
0.1061 - mae: 0.1185 - val_loss: 0.0873 - val_mae: 0.0793
Epoch 160/550
15/15          0s 6ms/step - loss:
0.1037 - mae: 0.1187 - val_loss: 0.0866 - val_mae: 0.0790
Epoch 161/550
15/15          0s 7ms/step - loss:
0.1041 - mae: 0.1171 - val_loss: 0.0859 - val_mae: 0.0783
Epoch 162/550
15/15          0s 5ms/step - loss:
0.1046 - mae: 0.1180 - val_loss: 0.0854 - val_mae: 0.0788
Epoch 163/550
15/15          0s 6ms/step - loss:
0.1030 - mae: 0.1170 - val_loss: 0.0848 - val_mae: 0.0789
Epoch 164/550
15/15          0s 5ms/step - loss:
0.1063 - mae: 0.1219 - val_loss: 0.0841 - val_mae: 0.0786
Epoch 165/550
15/15          0s 6ms/step - loss:
0.1039 - mae: 0.1176 - val_loss: 0.0836 - val_mae: 0.0780
Epoch 166/550
15/15          0s 5ms/step - loss:
0.1024 - mae: 0.1183 - val_loss: 0.0830 - val_mae: 0.0775
Epoch 167/550
15/15          0s 5ms/step - loss:
```

```
0.0997 - mae: 0.1157 - val_loss: 0.0823 - val_mae: 0.0773
Epoch 168/550
15/15              0s 5ms/step - loss:
0.1006 - mae: 0.1159 - val_loss: 0.0819 - val_mae: 0.0776
Epoch 169/550
15/15              0s 5ms/step - loss:
0.0987 - mae: 0.1144 - val_loss: 0.0812 - val_mae: 0.0784
Epoch 170/550
15/15              0s 6ms/step - loss:
0.0983 - mae: 0.1165 - val_loss: 0.0806 - val_mae: 0.0776
Epoch 171/550
15/15              0s 5ms/step - loss:
0.0970 - mae: 0.1147 - val_loss: 0.0800 - val_mae: 0.0777
Epoch 172/550
15/15              0s 5ms/step - loss:
0.0986 - mae: 0.1159 - val_loss: 0.0795 - val_mae: 0.0787
Epoch 173/550
15/15              0s 5ms/step - loss:
0.0951 - mae: 0.1126 - val_loss: 0.0789 - val_mae: 0.0775
Epoch 174/550
15/15              0s 6ms/step - loss:
0.0975 - mae: 0.1152 - val_loss: 0.0782 - val_mae: 0.0774
Epoch 175/550
15/15              0s 5ms/step - loss:
0.0945 - mae: 0.1130 - val_loss: 0.0777 - val_mae: 0.0765
Epoch 176/550
15/15              0s 5ms/step - loss:
0.0951 - mae: 0.1134 - val_loss: 0.0771 - val_mae: 0.0769
Epoch 177/550
15/15              0s 5ms/step - loss:
0.0965 - mae: 0.1160 - val_loss: 0.0766 - val_mae: 0.0778
Epoch 178/550
15/15              0s 6ms/step - loss:
0.0930 - mae: 0.1132 - val_loss: 0.0761 - val_mae: 0.0775
Epoch 179/550
15/15              0s 5ms/step - loss:
0.0933 - mae: 0.1148 - val_loss: 0.0755 - val_mae: 0.0778
Epoch 180/550
15/15              0s 5ms/step - loss:
0.0911 - mae: 0.1123 - val_loss: 0.0748 - val_mae: 0.0779
Epoch 181/550
15/15              0s 5ms/step - loss:
0.0918 - mae: 0.1128 - val_loss: 0.0742 - val_mae: 0.0770
Epoch 182/550
15/15              0s 6ms/step - loss:
0.0899 - mae: 0.1107 - val_loss: 0.0738 - val_mae: 0.0771
Epoch 183/550
15/15              0s 5ms/step - loss:
```

```
0.0908 - mae: 0.1139 - val_loss: 0.0732 - val_mae: 0.0777
Epoch 184/550
15/15              0s 6ms/step - loss:
0.0892 - mae: 0.1115 - val_loss: 0.0726 - val_mae: 0.0768
Epoch 185/550
15/15              0s 5ms/step - loss:
0.0893 - mae: 0.1124 - val_loss: 0.0721 - val_mae: 0.0764
Epoch 186/550
15/15              0s 5ms/step - loss:
0.0867 - mae: 0.1104 - val_loss: 0.0715 - val_mae: 0.0764
Epoch 187/550
15/15              0s 5ms/step - loss:
0.0865 - mae: 0.1108 - val_loss: 0.0710 - val_mae: 0.0774
Epoch 188/550
15/15              0s 7ms/step - loss:
0.0888 - mae: 0.1118 - val_loss: 0.0705 - val_mae: 0.0772
Epoch 189/550
15/15              0s 6ms/step - loss:
0.0852 - mae: 0.1098 - val_loss: 0.0700 - val_mae: 0.0767
Epoch 190/550
15/15              0s 5ms/step - loss:
0.0864 - mae: 0.1115 - val_loss: 0.0694 - val_mae: 0.0768
Epoch 191/550
15/15              0s 6ms/step - loss:
0.0861 - mae: 0.1101 - val_loss: 0.0689 - val_mae: 0.0767
Epoch 192/550
15/15              0s 5ms/step - loss:
0.0835 - mae: 0.1085 - val_loss: 0.0684 - val_mae: 0.0762
Epoch 193/550
15/15              0s 5ms/step - loss:
0.0830 - mae: 0.1086 - val_loss: 0.0678 - val_mae: 0.0761
Epoch 194/550
15/15              0s 5ms/step - loss:
0.0846 - mae: 0.1103 - val_loss: 0.0673 - val_mae: 0.0767
Epoch 195/550
15/15              0s 5ms/step - loss:
0.0818 - mae: 0.1078 - val_loss: 0.0668 - val_mae: 0.0768
Epoch 196/550
15/15              0s 7ms/step - loss:
0.0805 - mae: 0.1065 - val_loss: 0.0663 - val_mae: 0.0768
Epoch 197/550
15/15              0s 6ms/step - loss:
0.0833 - mae: 0.1104 - val_loss: 0.0659 - val_mae: 0.0773
Epoch 198/550
15/15              0s 5ms/step - loss:
0.0804 - mae: 0.1087 - val_loss: 0.0653 - val_mae: 0.0763
Epoch 199/550
15/15              0s 5ms/step - loss:
```

```
0.0790 - mae: 0.1063 - val_loss: 0.0648 - val_mae: 0.0765
Epoch 200/550
15/15          0s 5ms/step - loss:
0.0786 - mae: 0.1062 - val_loss: 0.0642 - val_mae: 0.0759
Epoch 201/550
15/15          0s 5ms/step - loss:
0.0782 - mae: 0.1064 - val_loss: 0.0638 - val_mae: 0.0760
Epoch 202/550
15/15          0s 5ms/step - loss:
0.0779 - mae: 0.1069 - val_loss: 0.0633 - val_mae: 0.0757
Epoch 203/550
15/15          0s 6ms/step - loss:
0.0771 - mae: 0.1063 - val_loss: 0.0628 - val_mae: 0.0756
Epoch 204/550
15/15          0s 6ms/step - loss:
0.0760 - mae: 0.1056 - val_loss: 0.0623 - val_mae: 0.0756
Epoch 205/550
15/15          0s 6ms/step - loss:
0.0745 - mae: 0.1019 - val_loss: 0.0618 - val_mae: 0.0753
Epoch 206/550
15/15          0s 5ms/step - loss:
0.0744 - mae: 0.1050 - val_loss: 0.0613 - val_mae: 0.0753
Epoch 207/550
15/15          0s 7ms/step - loss:
0.0754 - mae: 0.1068 - val_loss: 0.0609 - val_mae: 0.0764
Epoch 208/550
15/15          0s 5ms/step - loss:
0.0747 - mae: 0.1058 - val_loss: 0.0604 - val_mae: 0.0761
Epoch 209/550
15/15          0s 5ms/step - loss:
0.0730 - mae: 0.1048 - val_loss: 0.0599 - val_mae: 0.0753
Epoch 210/550
15/15          0s 5ms/step - loss:
0.0734 - mae: 0.1040 - val_loss: 0.0596 - val_mae: 0.0763
Epoch 211/550
15/15          0s 5ms/step - loss:
0.0725 - mae: 0.1034 - val_loss: 0.0590 - val_mae: 0.0759
Epoch 212/550
15/15          0s 5ms/step - loss:
0.0719 - mae: 0.1042 - val_loss: 0.0587 - val_mae: 0.0763
Epoch 213/550
15/15          0s 6ms/step - loss:
0.0714 - mae: 0.1045 - val_loss: 0.0582 - val_mae: 0.0764
Epoch 214/550
15/15          0s 5ms/step - loss:
0.0737 - mae: 0.1059 - val_loss: 0.0577 - val_mae: 0.0755
Epoch 215/550
15/15          0s 6ms/step - loss:
```

```
0.0691 - mae: 0.1027 - val_loss: 0.0572 - val_mae: 0.0752
Epoch 216/550
15/15          0s 5ms/step - loss:
0.0689 - mae: 0.1011 - val_loss: 0.0567 - val_mae: 0.0760
Epoch 217/550
15/15          0s 5ms/step - loss:
0.0688 - mae: 0.1027 - val_loss: 0.0563 - val_mae: 0.0755
Epoch 218/550
15/15          0s 5ms/step - loss:
0.0705 - mae: 0.1037 - val_loss: 0.0558 - val_mae: 0.0753
Epoch 219/550
15/15          0s 7ms/step - loss:
0.0681 - mae: 0.1022 - val_loss: 0.0553 - val_mae: 0.0750
Epoch 220/550
15/15          0s 5ms/step - loss:
0.0683 - mae: 0.1019 - val_loss: 0.0550 - val_mae: 0.0754
Epoch 221/550
15/15          0s 5ms/step - loss:
0.0667 - mae: 0.1003 - val_loss: 0.0546 - val_mae: 0.0757
Epoch 222/550
15/15          0s 6ms/step - loss:
0.0661 - mae: 0.1018 - val_loss: 0.0541 - val_mae: 0.0752
Epoch 223/550
15/15          0s 5ms/step - loss:
0.0661 - mae: 0.1011 - val_loss: 0.0538 - val_mae: 0.0748
Epoch 224/550
15/15          0s 6ms/step - loss:
0.0662 - mae: 0.1016 - val_loss: 0.0533 - val_mae: 0.0752
Epoch 225/550
15/15          0s 6ms/step - loss:
0.0660 - mae: 0.1011 - val_loss: 0.0529 - val_mae: 0.0753
Epoch 226/550
15/15          0s 5ms/step - loss:
0.0649 - mae: 0.1012 - val_loss: 0.0525 - val_mae: 0.0750
Epoch 227/550
15/15          0s 5ms/step - loss:
0.0660 - mae: 0.1031 - val_loss: 0.0521 - val_mae: 0.0752
Epoch 228/550
15/15          0s 5ms/step - loss:
0.0668 - mae: 0.1042 - val_loss: 0.0517 - val_mae: 0.0749
Epoch 229/550
15/15          0s 5ms/step - loss:
0.0654 - mae: 0.1033 - val_loss: 0.0512 - val_mae: 0.0752
Epoch 230/550
15/15          0s 7ms/step - loss:
0.0629 - mae: 0.1001 - val_loss: 0.0508 - val_mae: 0.0747
Epoch 231/550
15/15          0s 5ms/step - loss:
```

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0.0629 - mae: 0.1014 - val_loss: 0.0505 - val_mae: 0.0754
Epoch 232/550
15/15              0s 5ms/step - loss:
0.0641 - mae: 0.1018 - val_loss: 0.0501 - val_mae: 0.0752
Epoch 233/550
15/15              0s 5ms/step - loss:
0.0635 - mae: 0.1010 - val_loss: 0.0498 - val_mae: 0.0753
Epoch 234/550
15/15              0s 5ms/step - loss:
0.0615 - mae: 0.1004 - val_loss: 0.0494 - val_mae: 0.0754
Epoch 235/550
15/15              0s 6ms/step - loss:
0.0625 - mae: 0.1023 - val_loss: 0.0490 - val_mae: 0.0747
Epoch 236/550
15/15              0s 5ms/step - loss:
0.0605 - mae: 0.1001 - val_loss: 0.0486 - val_mae: 0.0750
Epoch 237/550
15/15              0s 5ms/step - loss:
0.0613 - mae: 0.0988 - val_loss: 0.0483 - val_mae: 0.0744
Epoch 238/550
15/15              0s 5ms/step - loss:
0.0594 - mae: 0.0980 - val_loss: 0.0479 - val_mae: 0.0749
Epoch 239/550
15/15              0s 5ms/step - loss:
0.0603 - mae: 0.1000 - val_loss: 0.0475 - val_mae: 0.0751
Epoch 240/550
15/15              0s 5ms/step - loss:
0.0593 - mae: 0.0980 - val_loss: 0.0472 - val_mae: 0.0749
Epoch 241/550
15/15              0s 7ms/step - loss:
0.0580 - mae: 0.0989 - val_loss: 0.0468 - val_mae: 0.0745
Epoch 242/550
15/15              0s 5ms/step - loss:
0.0578 - mae: 0.0987 - val_loss: 0.0464 - val_mae: 0.0744
Epoch 243/550
15/15              0s 5ms/step - loss:
0.0565 - mae: 0.0971 - val_loss: 0.0461 - val_mae: 0.0744
Epoch 244/550
15/15              0s 5ms/step - loss:
0.0553 - mae: 0.0967 - val_loss: 0.0457 - val_mae: 0.0747
Epoch 245/550
15/15              0s 6ms/step - loss:
0.0589 - mae: 0.1002 - val_loss: 0.0455 - val_mae: 0.0752
Epoch 246/550
15/15              0s 6ms/step - loss:
0.0557 - mae: 0.0961 - val_loss: 0.0450 - val_mae: 0.0742
Epoch 247/550
15/15              0s 6ms/step - loss:
```

0.0540 - mae: 0.0952 - val_loss: 0.0448 - val_mae: 0.0740
Epoch 248/550
15/15   0s 6ms/step - loss:
0.0567 - mae: 0.0993 - val_loss: 0.0445 - val_mae: 0.0743
Epoch 249/550
15/15   0s 6ms/step - loss:
0.0556 - mae: 0.0973 - val_loss: 0.0440 - val_mae: 0.0741
Epoch 250/550
15/15   0s 5ms/step - loss:
0.0542 - mae: 0.0954 - val_loss: 0.0438 - val_mae: 0.0741
Epoch 251/550
15/15   0s 6ms/step - loss:
0.0550 - mae: 0.0979 - val_loss: 0.0434 - val_mae: 0.0740
Epoch 252/550
15/15   0s 6ms/step - loss:
0.0541 - mae: 0.0959 - val_loss: 0.0431 - val_mae: 0.0739
Epoch 253/550
15/15   0s 6ms/step - loss:
0.0539 - mae: 0.0949 - val_loss: 0.0428 - val_mae: 0.0742
Epoch 254/550
15/15   0s 5ms/step - loss:
0.0537 - mae: 0.0981 - val_loss: 0.0425 - val_mae: 0.0731
Epoch 255/550
15/15   0s 5ms/step - loss:
0.0532 - mae: 0.0969 - val_loss: 0.0420 - val_mae: 0.0732
Epoch 256/550
15/15   0s 6ms/step - loss:
0.0510 - mae: 0.0944 - val_loss: 0.0418 - val_mae: 0.0728
Epoch 257/550
15/15   0s 5ms/step - loss:
0.0507 - mae: 0.0942 - val_loss: 0.0415 - val_mae: 0.0732
Epoch 258/550
15/15   0s 5ms/step - loss:
0.0499 - mae: 0.0941 - val_loss: 0.0412 - val_mae: 0.0730
Epoch 259/550
15/15   0s 6ms/step - loss:
0.0512 - mae: 0.0944 - val_loss: 0.0410 - val_mae: 0.0740
Epoch 260/550
15/15   0s 5ms/step - loss:
0.0510 - mae: 0.0949 - val_loss: 0.0407 - val_mae: 0.0743
Epoch 261/550
15/15   0s 6ms/step - loss:
0.0496 - mae: 0.0944 - val_loss: 0.0405 - val_mae: 0.0738
Epoch 262/550
15/15   0s 5ms/step - loss:
0.0497 - mae: 0.0957 - val_loss: 0.0402 - val_mae: 0.0736
Epoch 263/550
15/15   0s 5ms/step - loss:

```
0.0511 - mae: 0.0952 - val_loss: 0.0399 - val_mae: 0.0741
Epoch 264/550
15/15          0s 5ms/step - loss:
0.0511 - mae: 0.0967 - val_loss: 0.0395 - val_mae: 0.0736
Epoch 265/550
15/15          0s 6ms/step - loss:
0.0491 - mae: 0.0954 - val_loss: 0.0392 - val_mae: 0.0732
Epoch 266/550
15/15          0s 6ms/step - loss:
0.0497 - mae: 0.0951 - val_loss: 0.0389 - val_mae: 0.0725
Epoch 267/550
15/15          0s 6ms/step - loss:
0.0500 - mae: 0.0952 - val_loss: 0.0386 - val_mae: 0.0727
Epoch 268/550
15/15          0s 5ms/step - loss:
0.0462 - mae: 0.0921 - val_loss: 0.0383 - val_mae: 0.0730
Epoch 269/550
15/15          0s 5ms/step - loss:
0.0482 - mae: 0.0926 - val_loss: 0.0382 - val_mae: 0.0743
Epoch 270/550
15/15          0s 5ms/step - loss:
0.0471 - mae: 0.0938 - val_loss: 0.0379 - val_mae: 0.0739
Epoch 271/550
15/15          0s 5ms/step - loss:
0.0467 - mae: 0.0920 - val_loss: 0.0375 - val_mae: 0.0740
Epoch 272/550
15/15          0s 7ms/step - loss:
0.0469 - mae: 0.0931 - val_loss: 0.0372 - val_mae: 0.0728
Epoch 273/550
15/15          0s 5ms/step - loss:
0.0467 - mae: 0.0928 - val_loss: 0.0372 - val_mae: 0.0734
Epoch 274/550
15/15          0s 5ms/step - loss:
0.0461 - mae: 0.0930 - val_loss: 0.0367 - val_mae: 0.0730
Epoch 275/550
15/15          0s 5ms/step - loss:
0.0454 - mae: 0.0918 - val_loss: 0.0365 - val_mae: 0.0726
Epoch 276/550
15/15          0s 5ms/step - loss:
0.0458 - mae: 0.0932 - val_loss: 0.0362 - val_mae: 0.0722
Epoch 277/550
15/15          0s 5ms/step - loss:
0.0465 - mae: 0.0943 - val_loss: 0.0359 - val_mae: 0.0722
Epoch 278/550
15/15          0s 6ms/step - loss:
0.0468 - mae: 0.0923 - val_loss: 0.0357 - val_mae: 0.0725
Epoch 279/550
15/15          0s 5ms/step - loss:
```

```
0.0450 - mae: 0.0922 - val_loss: 0.0355 - val_mae: 0.0730
Epoch 280/550
15/15            0s 5ms/step - loss:
0.0438 - mae: 0.0904 - val_loss: 0.0353 - val_mae: 0.0725
Epoch 281/550
15/15            0s 5ms/step - loss:
0.0423 - mae: 0.0891 - val_loss: 0.0350 - val_mae: 0.0725
Epoch 282/550
15/15            0s 5ms/step - loss:
0.0438 - mae: 0.0922 - val_loss: 0.0348 - val_mae: 0.0726
Epoch 283/550
15/15            0s 6ms/step - loss:
0.0439 - mae: 0.0912 - val_loss: 0.0346 - val_mae: 0.0726
Epoch 284/550
15/15            0s 5ms/step - loss:
0.0458 - mae: 0.0928 - val_loss: 0.0344 - val_mae: 0.0732
Epoch 285/550
15/15            0s 5ms/step - loss:
0.0412 - mae: 0.0896 - val_loss: 0.0342 - val_mae: 0.0724
Epoch 286/550
15/15            0s 6ms/step - loss:
0.0412 - mae: 0.0900 - val_loss: 0.0339 - val_mae: 0.0725
Epoch 287/550
15/15            0s 5ms/step - loss:
0.0447 - mae: 0.0929 - val_loss: 0.0338 - val_mae: 0.0735
Epoch 288/550
15/15            0s 6ms/step - loss:
0.0420 - mae: 0.0905 - val_loss: 0.0336 - val_mae: 0.0724
Epoch 289/550
15/15            0s 5ms/step - loss:
0.0415 - mae: 0.0899 - val_loss: 0.0333 - val_mae: 0.0715
Epoch 290/550
15/15            0s 6ms/step - loss:
0.0435 - mae: 0.0926 - val_loss: 0.0332 - val_mae: 0.0723
Epoch 291/550
15/15            0s 5ms/step - loss:
0.0408 - mae: 0.0902 - val_loss: 0.0330 - val_mae: 0.0720
Epoch 292/550
15/15            0s 5ms/step - loss:
0.0426 - mae: 0.0913 - val_loss: 0.0327 - val_mae: 0.0721
Epoch 293/550
15/15            0s 6ms/step - loss:
0.0429 - mae: 0.0925 - val_loss: 0.0325 - val_mae: 0.0730
Epoch 294/550
15/15            0s 5ms/step - loss:
0.0416 - mae: 0.0904 - val_loss: 0.0323 - val_mae: 0.0726
Epoch 295/550
15/15            0s 6ms/step - loss:
```

```
0.0419 - mae: 0.0907 - val_loss: 0.0321 - val_mae: 0.0732
Epoch 296/550
15/15          0s 5ms/step - loss:
0.0401 - mae: 0.0900 - val_loss: 0.0319 - val_mae: 0.0728
Epoch 297/550
15/15          0s 5ms/step - loss:
0.0387 - mae: 0.0886 - val_loss: 0.0317 - val_mae: 0.0726
Epoch 298/550
15/15          0s 5ms/step - loss:
0.0414 - mae: 0.0917 - val_loss: 0.0317 - val_mae: 0.0735
Epoch 299/550
15/15          0s 5ms/step - loss:
0.0406 - mae: 0.0905 - val_loss: 0.0314 - val_mae: 0.0727
Epoch 300/550
15/15          0s 5ms/step - loss:
0.0411 - mae: 0.0897 - val_loss: 0.0311 - val_mae: 0.0721
Epoch 301/550
15/15          0s 5ms/step - loss:
0.0398 - mae: 0.0901 - val_loss: 0.0310 - val_mae: 0.0719
Epoch 302/550
15/15          0s 5ms/step - loss:
0.0384 - mae: 0.0876 - val_loss: 0.0308 - val_mae: 0.0721
Epoch 303/550
15/15          0s 6ms/step - loss:
0.0380 - mae: 0.0873 - val_loss: 0.0307 - val_mae: 0.0723
Epoch 304/550
15/15          0s 5ms/step - loss:
0.0376 - mae: 0.0886 - val_loss: 0.0305 - val_mae: 0.0722
Epoch 305/550
15/15          0s 5ms/step - loss:
0.0406 - mae: 0.0900 - val_loss: 0.0302 - val_mae: 0.0722
Epoch 306/550
15/15          0s 5ms/step - loss:
0.0378 - mae: 0.0885 - val_loss: 0.0302 - val_mae: 0.0716
Epoch 307/550
15/15          0s 5ms/step - loss:
0.0385 - mae: 0.0883 - val_loss: 0.0300 - val_mae: 0.0722
Epoch 308/550
15/15          0s 5ms/step - loss:
0.0372 - mae: 0.0876 - val_loss: 0.0298 - val_mae: 0.0726
Epoch 309/550
15/15          0s 5ms/step - loss:
0.0374 - mae: 0.0881 - val_loss: 0.0297 - val_mae: 0.0717
Epoch 310/550
15/15          0s 6ms/step - loss:
0.0374 - mae: 0.0881 - val_loss: 0.0295 - val_mae: 0.0716
Epoch 311/550
15/15          0s 5ms/step - loss:
```

```
0.0368 - mae: 0.0874 - val_loss: 0.0294 - val_mae: 0.0713
Epoch 312/550
15/15          0s 5ms/step - loss:
0.0361 - mae: 0.0862 - val_loss: 0.0291 - val_mae: 0.0705
Epoch 313/550
15/15          0s 5ms/step - loss:
0.0377 - mae: 0.0892 - val_loss: 0.0290 - val_mae: 0.0711
Epoch 314/550
15/15          0s 7ms/step - loss:
0.0365 - mae: 0.0873 - val_loss: 0.0289 - val_mae: 0.0710
Epoch 315/550
15/15          0s 5ms/step - loss:
0.0350 - mae: 0.0861 - val_loss: 0.0288 - val_mae: 0.0710
Epoch 316/550
15/15          0s 5ms/step - loss:
0.0372 - mae: 0.0883 - val_loss: 0.0286 - val_mae: 0.0713
Epoch 317/550
15/15          0s 5ms/step - loss:
0.0357 - mae: 0.0876 - val_loss: 0.0284 - val_mae: 0.0710
Epoch 318/550
15/15          0s 5ms/step - loss:
0.0350 - mae: 0.0871 - val_loss: 0.0282 - val_mae: 0.0708
Epoch 319/550
15/15          0s 5ms/step - loss:
0.0360 - mae: 0.0869 - val_loss: 0.0282 - val_mae: 0.0715
Epoch 320/550
15/15          0s 5ms/step - loss:
0.0351 - mae: 0.0860 - val_loss: 0.0280 - val_mae: 0.0708
Epoch 321/550
15/15          0s 5ms/step - loss:
0.0368 - mae: 0.0885 - val_loss: 0.0277 - val_mae: 0.0716
Epoch 322/550
15/15          0s 5ms/step - loss:
0.0362 - mae: 0.0865 - val_loss: 0.0277 - val_mae: 0.0711
Epoch 323/550
15/15          0s 5ms/step - loss:
0.0358 - mae: 0.0878 - val_loss: 0.0276 - val_mae: 0.0705
Epoch 324/550
15/15          0s 7ms/step - loss:
0.0349 - mae: 0.0867 - val_loss: 0.0273 - val_mae: 0.0707
Epoch 325/550
15/15          0s 6ms/step - loss:
0.0330 - mae: 0.0854 - val_loss: 0.0273 - val_mae: 0.0708
Epoch 326/550
15/15          0s 6ms/step - loss:
0.0366 - mae: 0.0892 - val_loss: 0.0271 - val_mae: 0.0716
Epoch 327/550
15/15          0s 6ms/step - loss:
```

```
0.0344 - mae: 0.0869 - val_loss: 0.0270 - val_mae: 0.0710
Epoch 328/550
15/15          0s 6ms/step - loss:
0.0344 - mae: 0.0865 - val_loss: 0.0268 - val_mae: 0.0714
Epoch 329/550
15/15          0s 6ms/step - loss:
0.0332 - mae: 0.0863 - val_loss: 0.0268 - val_mae: 0.0717
Epoch 330/550
15/15          0s 6ms/step - loss:
0.0334 - mae: 0.0857 - val_loss: 0.0265 - val_mae: 0.0711
Epoch 331/550
15/15          0s 6ms/step - loss:
0.0339 - mae: 0.0875 - val_loss: 0.0263 - val_mae: 0.0709
Epoch 332/550
15/15          0s 6ms/step - loss:
0.0334 - mae: 0.0861 - val_loss: 0.0264 - val_mae: 0.0714
Epoch 333/550
15/15          0s 5ms/step - loss:
0.0320 - mae: 0.0846 - val_loss: 0.0263 - val_mae: 0.0722
Epoch 334/550
15/15          0s 5ms/step - loss:
0.0335 - mae: 0.0878 - val_loss: 0.0260 - val_mae: 0.0712
Epoch 335/550
15/15          0s 5ms/step - loss:
0.0338 - mae: 0.0859 - val_loss: 0.0261 - val_mae: 0.0710
Epoch 336/550
15/15          0s 5ms/step - loss:
0.0334 - mae: 0.0864 - val_loss: 0.0258 - val_mae: 0.0702
Epoch 337/550
15/15          0s 5ms/step - loss:
0.0317 - mae: 0.0848 - val_loss: 0.0256 - val_mae: 0.0703
Epoch 338/550
15/15          0s 5ms/step - loss:
0.0331 - mae: 0.0863 - val_loss: 0.0257 - val_mae: 0.0710
Epoch 339/550
15/15          0s 5ms/step - loss:
0.0316 - mae: 0.0852 - val_loss: 0.0252 - val_mae: 0.0699
Epoch 340/550
15/15          0s 5ms/step - loss:
0.0334 - mae: 0.0862 - val_loss: 0.0254 - val_mae: 0.0709
Epoch 341/550
15/15          0s 7ms/step - loss:
0.0343 - mae: 0.0869 - val_loss: 0.0252 - val_mae: 0.0704
Epoch 342/550
15/15          0s 5ms/step - loss:
0.0315 - mae: 0.0846 - val_loss: 0.0251 - val_mae: 0.0703
Epoch 343/550
15/15          0s 5ms/step - loss:
```

```
0.0328 - mae: 0.0866 - val_loss: 0.0252 - val_mae: 0.0712
Epoch 344/550
15/15              0s 5ms/step - loss:
0.0322 - mae: 0.0848 - val_loss: 0.0252 - val_mae: 0.0708
Epoch 345/550
15/15              0s 5ms/step - loss:
0.0333 - mae: 0.0856 - val_loss: 0.0248 - val_mae: 0.0710
Epoch 346/550
15/15              0s 5ms/step - loss:
0.0311 - mae: 0.0843 - val_loss: 0.0247 - val_mae: 0.0704
Epoch 347/550
15/15              0s 5ms/step - loss:
0.0313 - mae: 0.0846 - val_loss: 0.0248 - val_mae: 0.0708
Epoch 348/550
15/15              0s 6ms/step - loss:
0.0308 - mae: 0.0847 - val_loss: 0.0246 - val_mae: 0.0712
Epoch 349/550
15/15              0s 5ms/step - loss:
0.0322 - mae: 0.0863 - val_loss: 0.0243 - val_mae: 0.0710
Epoch 350/550
15/15              0s 6ms/step - loss:
0.0307 - mae: 0.0841 - val_loss: 0.0244 - val_mae: 0.0706
Epoch 351/550
15/15              0s 5ms/step - loss:
0.0307 - mae: 0.0834 - val_loss: 0.0242 - val_mae: 0.0711
Epoch 352/550
15/15              0s 6ms/step - loss:
0.0307 - mae: 0.0835 - val_loss: 0.0243 - val_mae: 0.0708
Epoch 353/550
15/15              0s 6ms/step - loss:
0.0300 - mae: 0.0834 - val_loss: 0.0240 - val_mae: 0.0702
Epoch 354/550
15/15              0s 5ms/step - loss:
0.0289 - mae: 0.0822 - val_loss: 0.0239 - val_mae: 0.0703
Epoch 355/550
15/15              0s 5ms/step - loss:
0.0299 - mae: 0.0834 - val_loss: 0.0237 - val_mae: 0.0708
Epoch 356/550
15/15              0s 5ms/step - loss:
0.0292 - mae: 0.0831 - val_loss: 0.0236 - val_mae: 0.0709
Epoch 357/550
15/15              0s 5ms/step - loss:
0.0297 - mae: 0.0836 - val_loss: 0.0238 - val_mae: 0.0717
Epoch 358/550
15/15              0s 5ms/step - loss:
0.0310 - mae: 0.0854 - val_loss: 0.0236 - val_mae: 0.0716
Epoch 359/550
15/15              0s 5ms/step - loss:
```

```
0.0295 - mae: 0.0828 - val_loss: 0.0233 - val_mae: 0.0710
Epoch 360/550
15/15            0s 7ms/step - loss:
0.0300 - mae: 0.0847 - val_loss: 0.0234 - val_mae: 0.0715
Epoch 361/550
15/15            0s 5ms/step - loss:
0.0289 - mae: 0.0835 - val_loss: 0.0232 - val_mae: 0.0706
Epoch 362/550
15/15            0s 5ms/step - loss:
0.0301 - mae: 0.0834 - val_loss: 0.0232 - val_mae: 0.0719
Epoch 363/550
15/15            0s 5ms/step - loss:
0.0299 - mae: 0.0841 - val_loss: 0.0232 - val_mae: 0.0720
Epoch 364/550
15/15            0s 5ms/step - loss:
0.0303 - mae: 0.0849 - val_loss: 0.0228 - val_mae: 0.0704
Epoch 365/550
15/15            0s 5ms/step - loss:
0.0285 - mae: 0.0821 - val_loss: 0.0229 - val_mae: 0.0710
Epoch 366/550
15/15            0s 5ms/step - loss:
0.0301 - mae: 0.0846 - val_loss: 0.0228 - val_mae: 0.0712
Epoch 367/550
15/15            0s 5ms/step - loss:
0.0308 - mae: 0.0842 - val_loss: 0.0225 - val_mae: 0.0707
Epoch 368/550
15/15            0s 5ms/step - loss:
0.0286 - mae: 0.0829 - val_loss: 0.0227 - val_mae: 0.0703
Epoch 369/550
15/15            0s 6ms/step - loss:
0.0272 - mae: 0.0814 - val_loss: 0.0223 - val_mae: 0.0708
Epoch 370/550
15/15            0s 5ms/step - loss:
0.0300 - mae: 0.0849 - val_loss: 0.0224 - val_mae: 0.0711
Epoch 371/550
15/15            0s 5ms/step - loss:
0.0296 - mae: 0.0830 - val_loss: 0.0221 - val_mae: 0.0701
Epoch 372/550
15/15            0s 5ms/step - loss:
0.0293 - mae: 0.0844 - val_loss: 0.0222 - val_mae: 0.0710
Epoch 373/550
15/15            0s 5ms/step - loss:
0.0288 - mae: 0.0843 - val_loss: 0.0221 - val_mae: 0.0710
Epoch 374/550
15/15            0s 6ms/step - loss:
0.0276 - mae: 0.0810 - val_loss: 0.0220 - val_mae: 0.0702
Epoch 375/550
15/15            0s 5ms/step - loss:
```

```
0.0274 - mae: 0.0814 - val_loss: 0.0216 - val_mae: 0.0697
Epoch 376/550
15/15              0s 5ms/step - loss:
0.0267 - mae: 0.0822 - val_loss: 0.0218 - val_mae: 0.0712
Epoch 377/550
15/15              0s 7ms/step - loss:
0.0277 - mae: 0.0819 - val_loss: 0.0217 - val_mae: 0.0708
Epoch 378/550
15/15              0s 5ms/step - loss:
0.0278 - mae: 0.0829 - val_loss: 0.0216 - val_mae: 0.0703
Epoch 379/550
15/15              0s 5ms/step - loss:
0.0295 - mae: 0.0839 - val_loss: 0.0215 - val_mae: 0.0700
Epoch 380/550
15/15              0s 5ms/step - loss:
0.0285 - mae: 0.0847 - val_loss: 0.0216 - val_mae: 0.0708
Epoch 381/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0824 - val_loss: 0.0215 - val_mae: 0.0713
Epoch 382/550
15/15              0s 5ms/step - loss:
0.0263 - mae: 0.0806 - val_loss: 0.0219 - val_mae: 0.0724
Epoch 383/550
15/15              0s 5ms/step - loss:
0.0274 - mae: 0.0831 - val_loss: 0.0213 - val_mae: 0.0703
Epoch 384/550
15/15              0s 5ms/step - loss:
0.0265 - mae: 0.0807 - val_loss: 0.0212 - val_mae: 0.0712
Epoch 385/550
15/15              0s 5ms/step - loss:
0.0270 - mae: 0.0820 - val_loss: 0.0208 - val_mae: 0.0692
Epoch 386/550
15/15              0s 6ms/step - loss:
0.0263 - mae: 0.0820 - val_loss: 0.0209 - val_mae: 0.0706
Epoch 387/550
15/15              0s 6ms/step - loss:
0.0260 - mae: 0.0814 - val_loss: 0.0210 - val_mae: 0.0703
Epoch 388/550
15/15              0s 5ms/step - loss:
0.0268 - mae: 0.0826 - val_loss: 0.0209 - val_mae: 0.0694
Epoch 389/550
15/15              0s 6ms/step - loss:
0.0276 - mae: 0.0823 - val_loss: 0.0208 - val_mae: 0.0697
Epoch 390/550
15/15              0s 6ms/step - loss:
0.0263 - mae: 0.0804 - val_loss: 0.0207 - val_mae: 0.0701
Epoch 391/550
15/15              0s 5ms/step - loss:
```

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0.0269 - mae: 0.0824 - val_loss: 0.0207 - val_mae: 0.0720
Epoch 392/550
15/15          0s 5ms/step - loss:
0.0255 - mae: 0.0801 - val_loss: 0.0207 - val_mae: 0.0702
Epoch 393/550
15/15          0s 5ms/step - loss:
0.0263 - mae: 0.0818 - val_loss: 0.0202 - val_mae: 0.0697
Epoch 394/550
15/15          0s 5ms/step - loss:
0.0267 - mae: 0.0819 - val_loss: 0.0203 - val_mae: 0.0704
Epoch 395/550
15/15          0s 6ms/step - loss:
0.0257 - mae: 0.0810 - val_loss: 0.0201 - val_mae: 0.0703
Epoch 396/550
15/15          0s 6ms/step - loss:
0.0266 - mae: 0.0822 - val_loss: 0.0203 - val_mae: 0.0698
Epoch 397/550
15/15          0s 5ms/step - loss:
0.0262 - mae: 0.0813 - val_loss: 0.0202 - val_mae: 0.0693
Epoch 398/550
15/15          0s 5ms/step - loss:
0.0252 - mae: 0.0797 - val_loss: 0.0196 - val_mae: 0.0684
Epoch 399/550
15/15          0s 5ms/step - loss:
0.0248 - mae: 0.0800 - val_loss: 0.0197 - val_mae: 0.0701
Epoch 400/550
15/15          0s 6ms/step - loss:
0.0244 - mae: 0.0798 - val_loss: 0.0200 - val_mae: 0.0693
Epoch 401/550
15/15          0s 6ms/step - loss:
0.0269 - mae: 0.0824 - val_loss: 0.0195 - val_mae: 0.0686
Epoch 402/550
15/15          0s 7ms/step - loss:
0.0246 - mae: 0.0796 - val_loss: 0.0199 - val_mae: 0.0696
Epoch 403/550
15/15          0s 5ms/step - loss:
0.0258 - mae: 0.0812 - val_loss: 0.0197 - val_mae: 0.0691
Epoch 404/550
15/15          0s 6ms/step - loss:
0.0258 - mae: 0.0810 - val_loss: 0.0194 - val_mae: 0.0692
Epoch 405/550
15/15          0s 6ms/step - loss:
0.0255 - mae: 0.0811 - val_loss: 0.0193 - val_mae: 0.0688
Epoch 406/550
15/15          0s 6ms/step - loss:
0.0272 - mae: 0.0826 - val_loss: 0.0195 - val_mae: 0.0697
Epoch 407/550
15/15          0s 5ms/step - loss:
```

0.0229 - mae: 0.0777 - val_loss: 0.0192 - val_mae: 0.0688
Epoch 408/550
15/15   0s 5ms/step - loss:
0.0250 - mae: 0.0804 - val_loss: 0.0193 - val_mae: 0.0696
Epoch 409/550
15/15   0s 7ms/step - loss:
0.0261 - mae: 0.0813 - val_loss: 0.0193 - val_mae: 0.0694
Epoch 410/550
15/15   0s 5ms/step - loss:
0.0243 - mae: 0.0807 - val_loss: 0.0191 - val_mae: 0.0695
Epoch 411/550
15/15   0s 5ms/step - loss:
0.0235 - mae: 0.0788 - val_loss: 0.0189 - val_mae: 0.0681
Epoch 412/550
15/15   0s 5ms/step - loss:
0.0240 - mae: 0.0798 - val_loss: 0.0190 - val_mae: 0.0697
Epoch 413/550
15/15   0s 5ms/step - loss:
0.0238 - mae: 0.0796 - val_loss: 0.0189 - val_mae: 0.0695
Epoch 414/550
15/15   0s 5ms/step - loss:
0.0232 - mae: 0.0779 - val_loss: 0.0184 - val_mae: 0.0692
Epoch 415/550
15/15   0s 5ms/step - loss:
0.0243 - mae: 0.0809 - val_loss: 0.0187 - val_mae: 0.0706
Epoch 416/550
15/15   0s 5ms/step - loss:
0.0248 - mae: 0.0805 - val_loss: 0.0188 - val_mae: 0.0692
Epoch 417/550
15/15   0s 7ms/step - loss:
0.0241 - mae: 0.0805 - val_loss: 0.0185 - val_mae: 0.0677
Epoch 418/550
15/15   0s 5ms/step - loss:
0.0243 - mae: 0.0803 - val_loss: 0.0189 - val_mae: 0.0691
Epoch 419/550
15/15   0s 5ms/step - loss:
0.0237 - mae: 0.0807 - val_loss: 0.0186 - val_mae: 0.0681
Epoch 420/550
15/15   0s 5ms/step - loss:
0.0225 - mae: 0.0791 - val_loss: 0.0185 - val_mae: 0.0681
Epoch 421/550
15/15   0s 5ms/step - loss:
0.0252 - mae: 0.0813 - val_loss: 0.0188 - val_mae: 0.0684
Epoch 422/550
15/15   0s 5ms/step - loss:
0.0239 - mae: 0.0804 - val_loss: 0.0183 - val_mae: 0.0679
Epoch 423/550
15/15   0s 5ms/step - loss:

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0.0236 - mae: 0.0798 - val_loss: 0.0183 - val_mae: 0.0684
Epoch 424/550
15/15          0s 5ms/step - loss:
0.0229 - mae: 0.0796 - val_loss: 0.0182 - val_mae: 0.0678
Epoch 425/550
15/15          0s 7ms/step - loss:
0.0235 - mae: 0.0794 - val_loss: 0.0183 - val_mae: 0.0690
Epoch 426/550
15/15          0s 5ms/step - loss:
0.0240 - mae: 0.0806 - val_loss: 0.0183 - val_mae: 0.0687
Epoch 427/550
15/15          0s 5ms/step - loss:
0.0228 - mae: 0.0787 - val_loss: 0.0179 - val_mae: 0.0687
Epoch 428/550
15/15          0s 5ms/step - loss:
0.0235 - mae: 0.0798 - val_loss: 0.0179 - val_mae: 0.0689
Epoch 429/550
15/15          0s 5ms/step - loss:
0.0223 - mae: 0.0790 - val_loss: 0.0181 - val_mae: 0.0687
Epoch 430/550
15/15          0s 5ms/step - loss:
0.0229 - mae: 0.0793 - val_loss: 0.0180 - val_mae: 0.0687
Epoch 431/550
15/15          0s 6ms/step - loss:
0.0235 - mae: 0.0798 - val_loss: 0.0179 - val_mae: 0.0681
Epoch 432/550
15/15          0s 5ms/step - loss:
0.0215 - mae: 0.0777 - val_loss: 0.0178 - val_mae: 0.0676
Epoch 433/550
15/15          0s 5ms/step - loss:
0.0222 - mae: 0.0782 - val_loss: 0.0178 - val_mae: 0.0694
Epoch 434/550
15/15          0s 6ms/step - loss:
0.0224 - mae: 0.0785 - val_loss: 0.0180 - val_mae: 0.0699
Epoch 435/550
15/15          0s 5ms/step - loss:
0.0233 - mae: 0.0801 - val_loss: 0.0180 - val_mae: 0.0692
Epoch 436/550
15/15          0s 5ms/step - loss:
0.0220 - mae: 0.0791 - val_loss: 0.0182 - val_mae: 0.0698
Epoch 437/550
15/15          0s 6ms/step - loss:
0.0213 - mae: 0.0783 - val_loss: 0.0175 - val_mae: 0.0681
Epoch 438/550
15/15          0s 6ms/step - loss:
0.0230 - mae: 0.0791 - val_loss: 0.0176 - val_mae: 0.0697
Epoch 439/550
15/15          0s 5ms/step - loss:
```

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0.0225 - mae: 0.0792 - val_loss: 0.0179 - val_mae: 0.0698
Epoch 440/550
15/15          0s 7ms/step - loss:
0.0234 - mae: 0.0790 - val_loss: 0.0176 - val_mae: 0.0695
Epoch 441/550
15/15          0s 5ms/step - loss:
0.0229 - mae: 0.0787 - val_loss: 0.0175 - val_mae: 0.0698
Epoch 442/550
15/15          0s 5ms/step - loss:
0.0227 - mae: 0.0778 - val_loss: 0.0175 - val_mae: 0.0688
Epoch 443/550
15/15          0s 5ms/step - loss:
0.0228 - mae: 0.0793 - val_loss: 0.0174 - val_mae: 0.0684
Epoch 444/550
15/15          0s 5ms/step - loss:
0.0234 - mae: 0.0797 - val_loss: 0.0176 - val_mae: 0.0684
Epoch 445/550
15/15          0s 5ms/step - loss:
0.0227 - mae: 0.0789 - val_loss: 0.0173 - val_mae: 0.0684
Epoch 446/550
15/15          0s 5ms/step - loss:
0.0213 - mae: 0.0778 - val_loss: 0.0172 - val_mae: 0.0689
Epoch 447/550
15/15          0s 5ms/step - loss:
0.0223 - mae: 0.0794 - val_loss: 0.0173 - val_mae: 0.0700
Epoch 448/550
15/15          0s 5ms/step - loss:
0.0212 - mae: 0.0784 - val_loss: 0.0174 - val_mae: 0.0687
Epoch 449/550
15/15          0s 7ms/step - loss:
0.0223 - mae: 0.0793 - val_loss: 0.0175 - val_mae: 0.0685
Epoch 450/550
15/15          0s 6ms/step - loss:
0.0224 - mae: 0.0795 - val_loss: 0.0170 - val_mae: 0.0677
Epoch 451/550
15/15          0s 5ms/step - loss:
0.0229 - mae: 0.0788 - val_loss: 0.0172 - val_mae: 0.0691
Epoch 452/550
15/15          0s 5ms/step - loss:
0.0229 - mae: 0.0787 - val_loss: 0.0176 - val_mae: 0.0693
Epoch 453/550
15/15          0s 5ms/step - loss:
0.0213 - mae: 0.0777 - val_loss: 0.0170 - val_mae: 0.0675
Epoch 454/550
15/15          0s 6ms/step - loss:
0.0208 - mae: 0.0758 - val_loss: 0.0167 - val_mae: 0.0689
Epoch 455/550
15/15          0s 5ms/step - loss:
```

```
0.0229 - mae: 0.0803 - val_loss: 0.0170 - val_mae: 0.0698
Epoch 456/550
15/15          0s 6ms/step - loss:
0.0206 - mae: 0.0775 - val_loss: 0.0170 - val_mae: 0.0683
Epoch 457/550
15/15          0s 5ms/step - loss:
0.0216 - mae: 0.0783 - val_loss: 0.0173 - val_mae: 0.0692
Epoch 458/550
15/15          0s 5ms/step - loss:
0.0215 - mae: 0.0777 - val_loss: 0.0170 - val_mae: 0.0692
Epoch 459/550
15/15          0s 5ms/step - loss:
0.0221 - mae: 0.0787 - val_loss: 0.0169 - val_mae: 0.0697
Epoch 460/550
15/15          0s 5ms/step - loss:
0.0209 - mae: 0.0764 - val_loss: 0.0172 - val_mae: 0.0690
Epoch 461/550
15/15          0s 5ms/step - loss:
0.0213 - mae: 0.0774 - val_loss: 0.0169 - val_mae: 0.0683
Epoch 462/550
15/15          0s 7ms/step - loss:
0.0210 - mae: 0.0781 - val_loss: 0.0164 - val_mae: 0.0690
Epoch 463/550
15/15          0s 5ms/step - loss:
0.0217 - mae: 0.0784 - val_loss: 0.0167 - val_mae: 0.0694
Epoch 464/550
15/15          0s 5ms/step - loss:
0.0214 - mae: 0.0786 - val_loss: 0.0168 - val_mae: 0.0684
Epoch 465/550
15/15          0s 6ms/step - loss:
0.0205 - mae: 0.0770 - val_loss: 0.0170 - val_mae: 0.0687
Epoch 466/550
15/15          0s 6ms/step - loss:
0.0213 - mae: 0.0777 - val_loss: 0.0169 - val_mae: 0.0681
Epoch 467/550
15/15          0s 7ms/step - loss:
0.0205 - mae: 0.0762 - val_loss: 0.0168 - val_mae: 0.0693
Epoch 468/550
15/15          0s 5ms/step - loss:
0.0212 - mae: 0.0777 - val_loss: 0.0166 - val_mae: 0.0689
Epoch 469/550
15/15          0s 5ms/step - loss:
0.0201 - mae: 0.0768 - val_loss: 0.0160 - val_mae: 0.0678
Epoch 470/550
15/15          0s 5ms/step - loss:
0.0202 - mae: 0.0764 - val_loss: 0.0161 - val_mae: 0.0677
Epoch 471/550
15/15          0s 5ms/step - loss:
```

```
0.0190 - mae: 0.0749 - val_loss: 0.0163 - val_mae: 0.0671
Epoch 472/550
15/15          0s 5ms/step - loss:
0.0202 - mae: 0.0762 - val_loss: 0.0164 - val_mae: 0.0685
Epoch 473/550
15/15          0s 5ms/step - loss:
0.0209 - mae: 0.0779 - val_loss: 0.0168 - val_mae: 0.0689
Epoch 474/550
15/15          0s 7ms/step - loss:
0.0201 - mae: 0.0753 - val_loss: 0.0165 - val_mae: 0.0689
Epoch 475/550
15/15          0s 5ms/step - loss:
0.0198 - mae: 0.0758 - val_loss: 0.0164 - val_mae: 0.0693
Epoch 476/550
15/15          0s 5ms/step - loss:
0.0212 - mae: 0.0777 - val_loss: 0.0167 - val_mae: 0.0698
Epoch 477/550
15/15          0s 5ms/step - loss:
0.0202 - mae: 0.0761 - val_loss: 0.0165 - val_mae: 0.0693
Epoch 478/550
15/15          0s 5ms/step - loss:
0.0209 - mae: 0.0776 - val_loss: 0.0164 - val_mae: 0.0686
Epoch 479/550
15/15          0s 5ms/step - loss:
0.0204 - mae: 0.0766 - val_loss: 0.0164 - val_mae: 0.0673
Epoch 480/550
15/15          0s 6ms/step - loss:
0.0198 - mae: 0.0748 - val_loss: 0.0164 - val_mae: 0.0677
Epoch 481/550
15/15          0s 6ms/step - loss:
0.0202 - mae: 0.0771 - val_loss: 0.0167 - val_mae: 0.0692
Epoch 482/550
15/15          0s 7ms/step - loss:
0.0199 - mae: 0.0757 - val_loss: 0.0164 - val_mae: 0.0680
Epoch 483/550
15/15          0s 5ms/step - loss:
0.0201 - mae: 0.0771 - val_loss: 0.0166 - val_mae: 0.0681
Epoch 484/550
15/15          0s 5ms/step - loss:
0.0194 - mae: 0.0753 - val_loss: 0.0167 - val_mae: 0.0683
Epoch 485/550
15/15          0s 5ms/step - loss:
0.0197 - mae: 0.0766 - val_loss: 0.0164 - val_mae: 0.0691
Epoch 486/550
15/15          0s 5ms/step - loss:
0.0191 - mae: 0.0748 - val_loss: 0.0164 - val_mae: 0.0683
Epoch 487/550
15/15          0s 5ms/step - loss:
```

```
0.0198 - mae: 0.0770 - val_loss: 0.0160 - val_mae: 0.0661
Epoch 488/550
15/15          0s 5ms/step - loss:
0.0206 - mae: 0.0760 - val_loss: 0.0167 - val_mae: 0.0695
Epoch 489/550
15/15          0s 5ms/step - loss:
0.0198 - mae: 0.0771 - val_loss: 0.0166 - val_mae: 0.0695
Epoch 490/550
15/15          0s 6ms/step - loss:
0.0200 - mae: 0.0761 - val_loss: 0.0165 - val_mae: 0.0687
Epoch 491/550
15/15          0s 5ms/step - loss:
0.0201 - mae: 0.0752 - val_loss: 0.0163 - val_mae: 0.0678
Epoch 492/550
15/15          0s 5ms/step - loss:
0.0190 - mae: 0.0757 - val_loss: 0.0165 - val_mae: 0.0683
Epoch 493/550
15/15          0s 6ms/step - loss:
0.0201 - mae: 0.0763 - val_loss: 0.0162 - val_mae: 0.0680
Epoch 494/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0749 - val_loss: 0.0167 - val_mae: 0.0681
Epoch 495/550
15/15          0s 6ms/step - loss:
0.0196 - mae: 0.0765 - val_loss: 0.0167 - val_mae: 0.0690
Epoch 496/550
15/15          0s 7ms/step - loss:
0.0187 - mae: 0.0745 - val_loss: 0.0164 - val_mae: 0.0683
Epoch 497/550
15/15          0s 5ms/step - loss:
0.0199 - mae: 0.0768 - val_loss: 0.0164 - val_mae: 0.0696
Epoch 498/550
15/15          0s 5ms/step - loss:
0.0182 - mae: 0.0730 - val_loss: 0.0167 - val_mae: 0.0695
Epoch 499/550
15/15          0s 5ms/step - loss:
0.0194 - mae: 0.0763 - val_loss: 0.0164 - val_mae: 0.0686
Epoch 500/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0759 - val_loss: 0.0159 - val_mae: 0.0683
Epoch 501/550
15/15          0s 5ms/step - loss:
0.0206 - mae: 0.0765 - val_loss: 0.0160 - val_mae: 0.0684
Epoch 502/550
15/15          0s 6ms/step - loss:
0.0196 - mae: 0.0764 - val_loss: 0.0155 - val_mae: 0.0674
Epoch 503/550
15/15          0s 7ms/step - loss:
```

```
0.0188 - mae: 0.0744 - val_loss: 0.0166 - val_mae: 0.0679
Epoch 504/550
15/15              0s 5ms/step - loss:
0.0198 - mae: 0.0760 - val_loss: 0.0163 - val_mae: 0.0684
Epoch 505/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0759 - val_loss: 0.0160 - val_mae: 0.0684
Epoch 506/550
15/15              0s 5ms/step - loss:
0.0192 - mae: 0.0765 - val_loss: 0.0161 - val_mae: 0.0678
Epoch 507/550
15/15              0s 5ms/step - loss:
0.0194 - mae: 0.0763 - val_loss: 0.0165 - val_mae: 0.0691
Epoch 508/550
15/15              0s 5ms/step - loss:
0.0185 - mae: 0.0741 - val_loss: 0.0161 - val_mae: 0.0689
Epoch 509/550
15/15              0s 5ms/step - loss:
0.0199 - mae: 0.0759 - val_loss: 0.0163 - val_mae: 0.0698
Epoch 510/550
15/15              0s 6ms/step - loss:
0.0199 - mae: 0.0762 - val_loss: 0.0162 - val_mae: 0.0696
Epoch 511/550
15/15              0s 6ms/step - loss:
0.0183 - mae: 0.0744 - val_loss: 0.0161 - val_mae: 0.0684
Epoch 512/550
15/15              0s 5ms/step - loss:
0.0200 - mae: 0.0760 - val_loss: 0.0166 - val_mae: 0.0687
Epoch 513/550
15/15              0s 5ms/step - loss:
0.0202 - mae: 0.0765 - val_loss: 0.0159 - val_mae: 0.0693
Epoch 514/550
15/15              0s 6ms/step - loss:
0.0188 - mae: 0.0747 - val_loss: 0.0161 - val_mae: 0.0683
Epoch 515/550
15/15              0s 5ms/step - loss:
0.0175 - mae: 0.0726 - val_loss: 0.0159 - val_mae: 0.0695
Epoch 516/550
15/15              0s 7ms/step - loss:
0.0189 - mae: 0.0752 - val_loss: 0.0161 - val_mae: 0.0691
Epoch 517/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0750 - val_loss: 0.0161 - val_mae: 0.0690
Epoch 518/550
15/15              0s 5ms/step - loss:
0.0193 - mae: 0.0744 - val_loss: 0.0162 - val_mae: 0.0690
Epoch 519/550
15/15              0s 5ms/step - loss:
```

```
0.0180 - mae: 0.0739 - val_loss: 0.0165 - val_mae: 0.0683
Epoch 520/550
15/15          0s 5ms/step - loss:
0.0184 - mae: 0.0745 - val_loss: 0.0160 - val_mae: 0.0679
Epoch 521/550
15/15          0s 5ms/step - loss:
0.0186 - mae: 0.0743 - val_loss: 0.0158 - val_mae: 0.0680
Epoch 522/550
15/15          0s 7ms/step - loss:
0.0191 - mae: 0.0744 - val_loss: 0.0162 - val_mae: 0.0682
Epoch 523/550
15/15          0s 6ms/step - loss:
0.0199 - mae: 0.0758 - val_loss: 0.0162 - val_mae: 0.0688
Epoch 524/550
15/15          0s 5ms/step - loss:
0.0187 - mae: 0.0747 - val_loss: 0.0162 - val_mae: 0.0694
Epoch 525/550
15/15          0s 5ms/step - loss:
0.0194 - mae: 0.0746 - val_loss: 0.0159 - val_mae: 0.0682
Epoch 526/550
15/15          0s 5ms/step - loss:
0.0196 - mae: 0.0745 - val_loss: 0.0162 - val_mae: 0.0681
Epoch 527/550
15/15          0s 5ms/step - loss:
0.0186 - mae: 0.0750 - val_loss: 0.0163 - val_mae: 0.0682
```


Training and Validation Loss - Fold 9

Training and Validation MAE - Fold 9
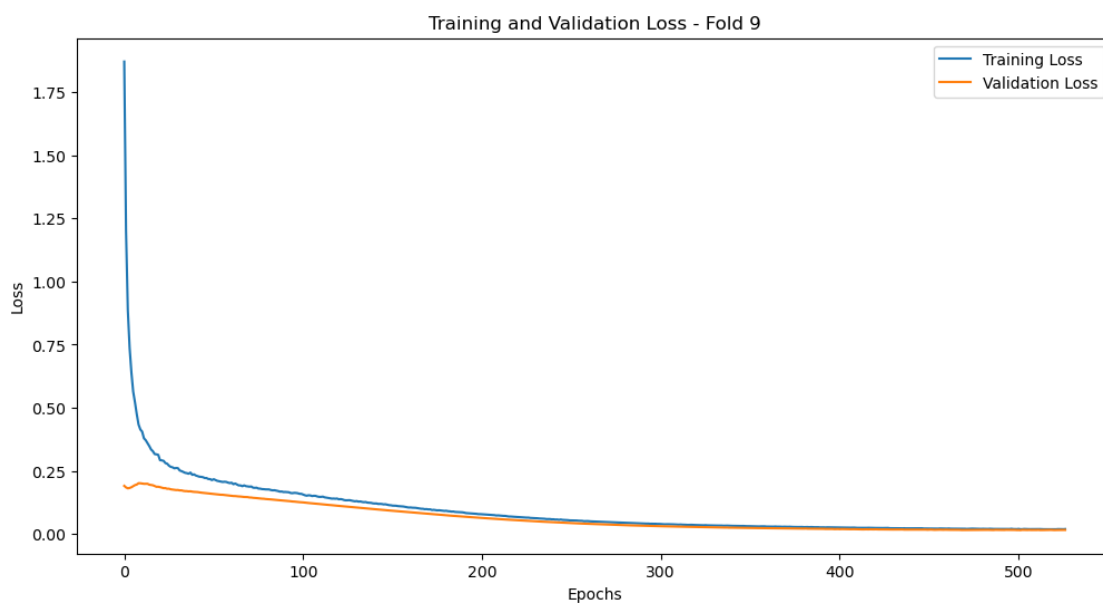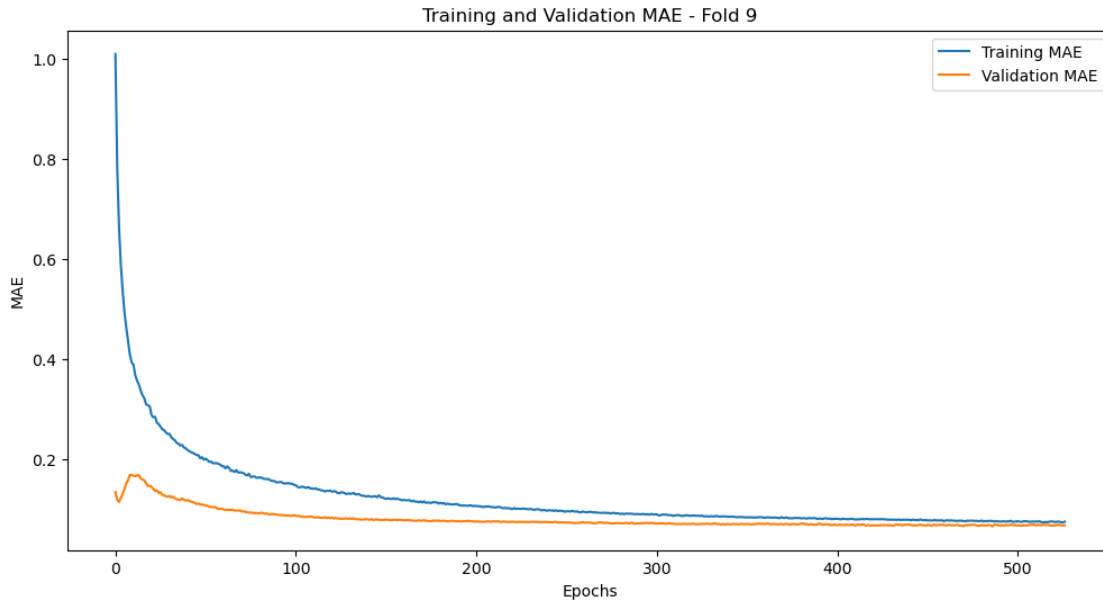
Fold Validation MAE: 0.06741931289434433
Epoch 1/550

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

15/15   2s 16ms/step -
loss: 1.6118 - mae: 0.9335 - val_loss: 0.1980 - val_mae: 0.1443
Epoch 2/550
15/15   0s 5ms/step - loss:
0.9804 - mae: 0.7073 - val_loss: 0.1870 - val_mae: 0.1195
Epoch 3/550
15/15   0s 5ms/step - loss:
0.7076 - mae: 0.5821 - val_loss: 0.1838 - val_mae: 0.1166
Epoch 4/550
15/15   0s 5ms/step - loss:
0.6020 - mae: 0.5167 - val_loss: 0.1829 - val_mae: 0.1182
Epoch 5/550
15/15   0s 5ms/step - loss:
0.5386 - mae: 0.4796 - val_loss: 0.1829 - val_mae: 0.1201
Epoch 6/550
15/15   0s 5ms/step - loss:
0.4786 - mae: 0.4411 - val_loss: 0.1828 - val_mae: 0.1226
Epoch 7/550
15/15   0s 5ms/step - loss:

```
0.4363 - mae: 0.4165 - val_loss: 0.1834 - val_mae: 0.1262
Epoch 8/550
15/15          0s 5ms/step - loss:
0.4032 - mae: 0.3913 - val_loss: 0.1842 - val_mae: 0.1299
Epoch 9/550
15/15          0s 5ms/step - loss:
0.3841 - mae: 0.3698 - val_loss: 0.1849 - val_mae: 0.1330
Epoch 10/550
15/15          0s 5ms/step - loss:
0.3546 - mae: 0.3485 - val_loss: 0.1844 - val_mae: 0.1328
Epoch 11/550
15/15          0s 5ms/step - loss:
0.3431 - mae: 0.3369 - val_loss: 0.1859 - val_mae: 0.1357
Epoch 12/550
15/15          0s 5ms/step - loss:
0.3367 - mae: 0.3274 - val_loss: 0.1851 - val_mae: 0.1352
Epoch 13/550
15/15          0s 5ms/step - loss:
0.3240 - mae: 0.3167 - val_loss: 0.1852 - val_mae: 0.1360
Epoch 14/550
15/15          0s 6ms/step - loss:
0.3083 - mae: 0.3055 - val_loss: 0.1848 - val_mae: 0.1348
Epoch 15/550
15/15          0s 6ms/step - loss:
0.3000 - mae: 0.2956 - val_loss: 0.1849 - val_mae: 0.1351
Epoch 16/550
15/15          0s 7ms/step - loss:
0.2912 - mae: 0.2885 - val_loss: 0.1847 - val_mae: 0.1345
Epoch 17/550
15/15          0s 5ms/step - loss:
0.2866 - mae: 0.2828 - val_loss: 0.1843 - val_mae: 0.1337
Epoch 18/550
15/15          0s 5ms/step - loss:
0.2840 - mae: 0.2751 - val_loss: 0.1844 - val_mae: 0.1345
Epoch 19/550
15/15          0s 5ms/step - loss:
0.2800 - mae: 0.2739 - val_loss: 0.1829 - val_mae: 0.1316
Epoch 20/550
15/15          0s 5ms/step - loss:
0.2684 - mae: 0.2654 - val_loss: 0.1822 - val_mae: 0.1305
Epoch 21/550
15/15          0s 6ms/step - loss:
0.2597 - mae: 0.2535 - val_loss: 0.1818 - val_mae: 0.1297
Epoch 22/550
15/15          0s 5ms/step - loss:
0.2637 - mae: 0.2504 - val_loss: 0.1808 - val_mae: 0.1282
Epoch 23/550
15/15          0s 5ms/step - loss:
```

```
0.2556 - mae: 0.2439 - val_loss: 0.1803 - val_mae: 0.1275
Epoch 24/550
15/15              0s 5ms/step - loss:
0.2543 - mae: 0.2444 - val_loss: 0.1799 - val_mae: 0.1273
Epoch 25/550
15/15              0s 5ms/step - loss:
0.2560 - mae: 0.2443 - val_loss: 0.1796 - val_mae: 0.1284
Epoch 26/550
15/15              0s 5ms/step - loss:
0.2438 - mae: 0.2350 - val_loss: 0.1790 - val_mae: 0.1293
Epoch 27/550
15/15              0s 5ms/step - loss:
0.2422 - mae: 0.2362 - val_loss: 0.1778 - val_mae: 0.1266
Epoch 28/550
15/15              0s 5ms/step - loss:
0.2381 - mae: 0.2276 - val_loss: 0.1771 - val_mae: 0.1269
Epoch 29/550
15/15              0s 5ms/step - loss:
0.2403 - mae: 0.2282 - val_loss: 0.1773 - val_mae: 0.1277
Epoch 30/550
15/15              0s 5ms/step - loss:
0.2341 - mae: 0.2225 - val_loss: 0.1759 - val_mae: 0.1252
Epoch 31/550
15/15              0s 5ms/step - loss:
0.2330 - mae: 0.2206 - val_loss: 0.1753 - val_mae: 0.1262
Epoch 32/550
15/15              0s 5ms/step - loss:
0.2314 - mae: 0.2177 - val_loss: 0.1743 - val_mae: 0.1243
Epoch 33/550
15/15              0s 5ms/step - loss:
0.2266 - mae: 0.2156 - val_loss: 0.1738 - val_mae: 0.1232
Epoch 34/550
15/15              0s 5ms/step - loss:
0.2232 - mae: 0.2106 - val_loss: 0.1731 - val_mae: 0.1240
Epoch 35/550
15/15              0s 5ms/step - loss:
0.2214 - mae: 0.2071 - val_loss: 0.1717 - val_mae: 0.1205
Epoch 36/550
15/15              0s 7ms/step - loss:
0.2204 - mae: 0.2074 - val_loss: 0.1714 - val_mae: 0.1209
Epoch 37/550
15/15              0s 6ms/step - loss:
0.2168 - mae: 0.2044 - val_loss: 0.1700 - val_mae: 0.1190
Epoch 38/550
15/15              0s 5ms/step - loss:
0.2161 - mae: 0.2042 - val_loss: 0.1688 - val_mae: 0.1179
Epoch 39/550
15/15              0s 5ms/step - loss:
```

```
0.2179 - mae: 0.1995 - val_loss: 0.1683 - val_mae: 0.1183
Epoch 40/550
15/15          0s 5ms/step - loss:
0.2146 - mae: 0.1988 - val_loss: 0.1675 - val_mae: 0.1175
Epoch 41/550
15/15          0s 5ms/step - loss:
0.2110 - mae: 0.1943 - val_loss: 0.1665 - val_mae: 0.1166
Epoch 42/550
15/15          0s 6ms/step - loss:
0.2092 - mae: 0.1946 - val_loss: 0.1659 - val_mae: 0.1174
Epoch 43/550
15/15          0s 5ms/step - loss:
0.2063 - mae: 0.1903 - val_loss: 0.1651 - val_mae: 0.1164
Epoch 44/550
15/15          0s 5ms/step - loss:
0.2048 - mae: 0.1891 - val_loss: 0.1645 - val_mae: 0.1157
Epoch 45/550
15/15          0s 5ms/step - loss:
0.2028 - mae: 0.1885 - val_loss: 0.1633 - val_mae: 0.1144
Epoch 46/550
15/15          0s 5ms/step - loss:
0.1999 - mae: 0.1832 - val_loss: 0.1624 - val_mae: 0.1127
Epoch 47/550
15/15          0s 5ms/step - loss:
0.1999 - mae: 0.1855 - val_loss: 0.1615 - val_mae: 0.1130
Epoch 48/550
15/15          0s 5ms/step - loss:
0.2007 - mae: 0.1849 - val_loss: 0.1608 - val_mae: 0.1114
Epoch 49/550
15/15          0s 5ms/step - loss:
0.1975 - mae: 0.1820 - val_loss: 0.1602 - val_mae: 0.1126
Epoch 50/550
15/15          0s 5ms/step - loss:
0.1950 - mae: 0.1802 - val_loss: 0.1590 - val_mae: 0.1093
Epoch 51/550
15/15          0s 5ms/step - loss:
0.1932 - mae: 0.1766 - val_loss: 0.1584 - val_mae: 0.1096
Epoch 52/550
15/15          0s 5ms/step - loss:
0.1909 - mae: 0.1759 - val_loss: 0.1575 - val_mae: 0.1091
Epoch 53/550
15/15          0s 5ms/step - loss:
0.1928 - mae: 0.1755 - val_loss: 0.1573 - val_mae: 0.1106
Epoch 54/550
15/15          0s 5ms/step - loss:
0.1943 - mae: 0.1773 - val_loss: 0.1564 - val_mae: 0.1101
Epoch 55/550
15/15          0s 6ms/step - loss:
```

```
0.1880 - mae: 0.1715 - val_loss: 0.1550 - val_mae: 0.1071
Epoch 56/550
15/15            0s 7ms/step - loss:
0.1875 - mae: 0.1691 - val_loss: 0.1543 - val_mae: 0.1077
Epoch 57/550
15/15            0s 5ms/step - loss:
0.1878 - mae: 0.1707 - val_loss: 0.1538 - val_mae: 0.1092
Epoch 58/550
15/15            0s 6ms/step - loss:
0.1815 - mae: 0.1670 - val_loss: 0.1529 - val_mae: 0.1076
Epoch 59/550
15/15            0s 5ms/step - loss:
0.1817 - mae: 0.1664 - val_loss: 0.1517 - val_mae: 0.1053
Epoch 60/550
15/15            0s 5ms/step - loss:
0.1865 - mae: 0.1719 - val_loss: 0.1510 - val_mae: 0.1052
Epoch 61/550
15/15            0s 5ms/step - loss:
0.1829 - mae: 0.1676 - val_loss: 0.1502 - val_mae: 0.1039
Epoch 62/550
15/15            0s 5ms/step - loss:
0.1794 - mae: 0.1631 - val_loss: 0.1493 - val_mae: 0.1040
Epoch 63/550
15/15            0s 6ms/step - loss:
0.1776 - mae: 0.1632 - val_loss: 0.1485 - val_mae: 0.1027
Epoch 64/550
15/15            0s 5ms/step - loss:
0.1786 - mae: 0.1637 - val_loss: 0.1479 - val_mae: 0.1025
Epoch 65/550
15/15            0s 5ms/step - loss:
0.1730 - mae: 0.1579 - val_loss: 0.1472 - val_mae: 0.1032
Epoch 66/550
15/15            0s 6ms/step - loss:
0.1738 - mae: 0.1595 - val_loss: 0.1462 - val_mae: 0.1025
Epoch 67/550
15/15            0s 5ms/step - loss:
0.1765 - mae: 0.1607 - val_loss: 0.1453 - val_mae: 0.1007
Epoch 68/550
15/15            0s 5ms/step - loss:
0.1686 - mae: 0.1542 - val_loss: 0.1445 - val_mae: 0.1004
Epoch 69/550
15/15            0s 5ms/step - loss:
0.1715 - mae: 0.1580 - val_loss: 0.1438 - val_mae: 0.1011
Epoch 70/550
15/15            0s 6ms/step - loss:
0.1679 - mae: 0.1538 - val_loss: 0.1430 - val_mae: 0.1017
Epoch 71/550
15/15            0s 6ms/step - loss:
```

```
0.1688 - mae: 0.1581 - val_loss: 0.1419 - val_mae: 0.0994
Epoch 72/550
15/15          0s 6ms/step - loss:
0.1651 - mae: 0.1497 - val_loss: 0.1416 - val_mae: 0.1013
Epoch 73/550
15/15          0s 6ms/step - loss:
0.1654 - mae: 0.1525 - val_loss: 0.1405 - val_mae: 0.0989
Epoch 74/550
15/15          0s 5ms/step - loss:
0.1650 - mae: 0.1522 - val_loss: 0.1398 - val_mae: 0.0988
Epoch 75/550
15/15          0s 5ms/step - loss:
0.1613 - mae: 0.1488 - val_loss: 0.1389 - val_mae: 0.0977
Epoch 76/550
15/15          0s 5ms/step - loss:
0.1660 - mae: 0.1521 - val_loss: 0.1383 - val_mae: 0.0990
Epoch 77/550
15/15          0s 5ms/step - loss:
0.1606 - mae: 0.1470 - val_loss: 0.1376 - val_mae: 0.0984
Epoch 78/550
15/15          0s 5ms/step - loss:
0.1591 - mae: 0.1456 - val_loss: 0.1366 - val_mae: 0.0986
Epoch 79/550
15/15          0s 6ms/step - loss:
0.1608 - mae: 0.1483 - val_loss: 0.1360 - val_mae: 0.0980
Epoch 80/550
15/15          0s 6ms/step - loss:
0.1590 - mae: 0.1493 - val_loss: 0.1353 - val_mae: 0.0988
Epoch 81/550
15/15          0s 6ms/step - loss:
0.1538 - mae: 0.1411 - val_loss: 0.1344 - val_mae: 0.0963
Epoch 82/550
15/15          0s 5ms/step - loss:
0.1565 - mae: 0.1465 - val_loss: 0.1337 - val_mae: 0.0962
Epoch 83/550
15/15          0s 5ms/step - loss:
0.1548 - mae: 0.1443 - val_loss: 0.1326 - val_mae: 0.0967
Epoch 84/550
15/15          0s 5ms/step - loss:
0.1530 - mae: 0.1434 - val_loss: 0.1317 - val_mae: 0.0963
Epoch 85/550
15/15          0s 5ms/step - loss:
0.1568 - mae: 0.1471 - val_loss: 0.1310 - val_mae: 0.0957
Epoch 86/550
15/15          0s 7ms/step - loss:
0.1520 - mae: 0.1446 - val_loss: 0.1304 - val_mae: 0.0967
Epoch 87/550
15/15          0s 5ms/step - loss:
```

```
0.1488 - mae: 0.1403 - val_loss: 0.1296 - val_mae: 0.0953
Epoch 88/550
15/15          0s 5ms/step - loss:
0.1490 - mae: 0.1406 - val_loss: 0.1289 - val_mae: 0.0958
Epoch 89/550
15/15          0s 5ms/step - loss:
0.1467 - mae: 0.1391 - val_loss: 0.1281 - val_mae: 0.0956
Epoch 90/550
15/15          0s 5ms/step - loss:
0.1481 - mae: 0.1421 - val_loss: 0.1272 - val_mae: 0.0948
Epoch 91/550
15/15          0s 5ms/step - loss:
0.1459 - mae: 0.1394 - val_loss: 0.1267 - val_mae: 0.0953
Epoch 92/550
15/15          0s 5ms/step - loss:
0.1471 - mae: 0.1405 - val_loss: 0.1259 - val_mae: 0.0947
Epoch 93/550
15/15          0s 5ms/step - loss:
0.1463 - mae: 0.1403 - val_loss: 0.1250 - val_mae: 0.0959
Epoch 94/550
15/15          0s 5ms/step - loss:
0.1453 - mae: 0.1405 - val_loss: 0.1243 - val_mae: 0.0947
Epoch 95/550
15/15          0s 5ms/step - loss:
0.1448 - mae: 0.1388 - val_loss: 0.1234 - val_mae: 0.0943
Epoch 96/550
15/15          0s 5ms/step - loss:
0.1405 - mae: 0.1333 - val_loss: 0.1227 - val_mae: 0.0936
Epoch 97/550
15/15          0s 5ms/step - loss:
0.1424 - mae: 0.1373 - val_loss: 0.1218 - val_mae: 0.0936
Epoch 98/550
15/15          0s 5ms/step - loss:
0.1411 - mae: 0.1369 - val_loss: 0.1213 - val_mae: 0.0952
Epoch 99/550
15/15          0s 5ms/step - loss:
0.1406 - mae: 0.1368 - val_loss: 0.1207 - val_mae: 0.0933
Epoch 100/550
15/15          0s 5ms/step - loss:
0.1379 - mae: 0.1347 - val_loss: 0.1195 - val_mae: 0.0934
Epoch 101/550
15/15          0s 6ms/step - loss:
0.1360 - mae: 0.1328 - val_loss: 0.1187 - val_mae: 0.0932
Epoch 102/550
15/15          0s 7ms/step - loss:
0.1384 - mae: 0.1357 - val_loss: 0.1180 - val_mae: 0.0933
Epoch 103/550
15/15          0s 5ms/step - loss:
```

```
0.1369 - mae: 0.1356 - val_loss: 0.1173 - val_mae: 0.0933
Epoch 104/550
15/15            0s 6ms/step - loss:
0.1353 - mae: 0.1326 - val_loss: 0.1165 - val_mae: 0.0930
Epoch 105/550
15/15            0s 5ms/step - loss:
0.1335 - mae: 0.1321 - val_loss: 0.1158 - val_mae: 0.0934
Epoch 106/550
15/15            0s 5ms/step - loss:
0.1337 - mae: 0.1317 - val_loss: 0.1150 - val_mae: 0.0927
Epoch 107/550
15/15            0s 5ms/step - loss:
0.1305 - mae: 0.1298 - val_loss: 0.1140 - val_mae: 0.0934
Epoch 108/550
15/15            0s 5ms/step - loss:
0.1310 - mae: 0.1312 - val_loss: 0.1134 - val_mae: 0.0928
Epoch 109/550
15/15            0s 5ms/step - loss:
0.1309 - mae: 0.1297 - val_loss: 0.1125 - val_mae: 0.0914
Epoch 110/550
15/15            0s 5ms/step - loss:
0.1304 - mae: 0.1296 - val_loss: 0.1118 - val_mae: 0.0921
Epoch 111/550
15/15            0s 5ms/step - loss:
0.1275 - mae: 0.1294 - val_loss: 0.1112 - val_mae: 0.0924
Epoch 112/550
15/15            0s 5ms/step - loss:
0.1248 - mae: 0.1265 - val_loss: 0.1105 - val_mae: 0.0916
Epoch 113/550
15/15            0s 5ms/step - loss:
0.1248 - mae: 0.1282 - val_loss: 0.1098 - val_mae: 0.0915
Epoch 114/550
15/15            0s 5ms/step - loss:
0.1270 - mae: 0.1292 - val_loss: 0.1090 - val_mae: 0.0907
Epoch 115/550
15/15            0s 5ms/step - loss:
0.1231 - mae: 0.1246 - val_loss: 0.1084 - val_mae: 0.0910
Epoch 116/550
15/15            0s 5ms/step - loss:
0.1266 - mae: 0.1314 - val_loss: 0.1077 - val_mae: 0.0913
Epoch 117/550
15/15            0s 6ms/step - loss:
0.1224 - mae: 0.1268 - val_loss: 0.1067 - val_mae: 0.0907
Epoch 118/550
15/15            0s 7ms/step - loss:
0.1232 - mae: 0.1295 - val_loss: 0.1061 - val_mae: 0.0914
Epoch 119/550
15/15            0s 5ms/step - loss:
```

```
0.1201 - mae: 0.1259 - val_loss: 0.1053 - val_mae: 0.0901
Epoch 120/550
15/15          0s 5ms/step - loss:
0.1189 - mae: 0.1265 - val_loss: 0.1046 - val_mae: 0.0905
Epoch 121/550
15/15          0s 5ms/step - loss:
0.1178 - mae: 0.1239 - val_loss: 0.1040 - val_mae: 0.0895
Epoch 122/550
15/15          0s 6ms/step - loss:
0.1151 - mae: 0.1214 - val_loss: 0.1032 - val_mae: 0.0909
Epoch 123/550
15/15          0s 6ms/step - loss:
0.1165 - mae: 0.1230 - val_loss: 0.1023 - val_mae: 0.0896
Epoch 124/550
15/15          0s 5ms/step - loss:
0.1162 - mae: 0.1214 - val_loss: 0.1018 - val_mae: 0.0896
Epoch 125/550
15/15          0s 6ms/step - loss:
0.1151 - mae: 0.1212 - val_loss: 0.1009 - val_mae: 0.0903
Epoch 126/550
15/15          0s 5ms/step - loss:
0.1143 - mae: 0.1235 - val_loss: 0.1002 - val_mae: 0.0890
Epoch 127/550
15/15          0s 5ms/step - loss:
0.1135 - mae: 0.1217 - val_loss: 0.0998 - val_mae: 0.0887
Epoch 128/550
15/15          0s 5ms/step - loss:
0.1130 - mae: 0.1214 - val_loss: 0.0991 - val_mae: 0.0893
Epoch 129/550
15/15          0s 5ms/step - loss:
0.1134 - mae: 0.1226 - val_loss: 0.0983 - val_mae: 0.0888
Epoch 130/550
15/15          0s 5ms/step - loss:
0.1081 - mae: 0.1160 - val_loss: 0.0975 - val_mae: 0.0889
Epoch 131/550
15/15          0s 5ms/step - loss:
0.1092 - mae: 0.1194 - val_loss: 0.0968 - val_mae: 0.0891
Epoch 132/550
15/15          0s 5ms/step - loss:
0.1076 - mae: 0.1189 - val_loss: 0.0962 - val_mae: 0.0892
Epoch 133/550
15/15          0s 5ms/step - loss:
0.1081 - mae: 0.1198 - val_loss: 0.0954 - val_mae: 0.0891
Epoch 134/550
15/15          0s 7ms/step - loss:
0.1054 - mae: 0.1168 - val_loss: 0.0946 - val_mae: 0.0887
Epoch 135/550
15/15          0s 5ms/step - loss:
```

```
0.1077 - mae: 0.1187 - val_loss: 0.0939 - val_mae: 0.0887
Epoch 136/550
15/15            0s 5ms/step - loss:
0.1061 - mae: 0.1208 - val_loss: 0.0932 - val_mae: 0.0886
Epoch 137/550
15/15            0s 5ms/step - loss:
0.1058 - mae: 0.1185 - val_loss: 0.0926 - val_mae: 0.0888
Epoch 138/550
15/15            0s 5ms/step - loss:
0.1050 - mae: 0.1190 - val_loss: 0.0918 - val_mae: 0.0887
Epoch 139/550
15/15            0s 5ms/step - loss:
0.1018 - mae: 0.1156 - val_loss: 0.0914 - val_mae: 0.0887
Epoch 140/550
15/15            0s 5ms/step - loss:
0.1002 - mae: 0.1148 - val_loss: 0.0906 - val_mae: 0.0884
Epoch 141/550
15/15            0s 5ms/step - loss:
0.1018 - mae: 0.1171 - val_loss: 0.0902 - val_mae: 0.0886
Epoch 142/550
15/15            0s 5ms/step - loss:
0.1000 - mae: 0.1146 - val_loss: 0.0892 - val_mae: 0.0887
Epoch 143/550
15/15            0s 5ms/step - loss:
0.0994 - mae: 0.1165 - val_loss: 0.0887 - val_mae: 0.0886
Epoch 144/550
15/15            0s 6ms/step - loss:
0.0991 - mae: 0.1144 - val_loss: 0.0878 - val_mae: 0.0886
Epoch 145/550
15/15            0s 6ms/step - loss:
0.0985 - mae: 0.1146 - val_loss: 0.0874 - val_mae: 0.0882
Epoch 146/550
15/15            0s 6ms/step - loss:
0.0976 - mae: 0.1148 - val_loss: 0.0868 - val_mae: 0.0880
Epoch 147/550
15/15            0s 6ms/step - loss:
0.0985 - mae: 0.1159 - val_loss: 0.0860 - val_mae: 0.0880
Epoch 148/550
15/15            0s 5ms/step - loss:
0.0967 - mae: 0.1155 - val_loss: 0.0855 - val_mae: 0.0882
Epoch 149/550
15/15            0s 7ms/step - loss:
0.0949 - mae: 0.1127 - val_loss: 0.0848 - val_mae: 0.0877
Epoch 150/550
15/15            0s 6ms/step - loss:
0.0937 - mae: 0.1124 - val_loss: 0.0841 - val_mae: 0.0876
Epoch 151/550
15/15            0s 6ms/step - loss:
```

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0.0930 - mae: 0.1129 - val_loss: 0.0834 - val_mae: 0.0873
Epoch 152/550
15/15          0s 5ms/step - loss:
0.0905 - mae: 0.1097 - val_loss: 0.0830 - val_mae: 0.0875
Epoch 153/550
15/15          0s 5ms/step - loss:
0.0926 - mae: 0.1130 - val_loss: 0.0823 - val_mae: 0.0878
Epoch 154/550
15/15          0s 5ms/step - loss:
0.0920 - mae: 0.1134 - val_loss: 0.0816 - val_mae: 0.0872
Epoch 155/550
15/15          0s 5ms/step - loss:
0.0908 - mae: 0.1123 - val_loss: 0.0810 - val_mae: 0.0877
Epoch 156/550
15/15          0s 5ms/step - loss:
0.0873 - mae: 0.1087 - val_loss: 0.0802 - val_mae: 0.0872
Epoch 157/550
15/15          0s 5ms/step - loss:
0.0937 - mae: 0.1158 - val_loss: 0.0797 - val_mae: 0.0875
Epoch 158/550
15/15          0s 5ms/step - loss:
0.0878 - mae: 0.1097 - val_loss: 0.0791 - val_mae: 0.0870
Epoch 159/550
15/15          0s 5ms/step - loss:
0.0882 - mae: 0.1115 - val_loss: 0.0787 - val_mae: 0.0876
Epoch 160/550
15/15          0s 5ms/step - loss:
0.0880 - mae: 0.1116 - val_loss: 0.0780 - val_mae: 0.0865
Epoch 161/550
15/15          0s 5ms/step - loss:
0.0870 - mae: 0.1105 - val_loss: 0.0775 - val_mae: 0.0869
Epoch 162/550
15/15          0s 5ms/step - loss:
0.0878 - mae: 0.1105 - val_loss: 0.0768 - val_mae: 0.0868
Epoch 163/550
15/15          0s 7ms/step - loss:
0.0842 - mae: 0.1085 - val_loss: 0.0763 - val_mae: 0.0865
Epoch 164/550
15/15          0s 5ms/step - loss:
0.0855 - mae: 0.1090 - val_loss: 0.0756 - val_mae: 0.0866
Epoch 165/550
15/15          0s 5ms/step - loss:
0.0821 - mae: 0.1079 - val_loss: 0.0753 - val_mae: 0.0867
Epoch 166/550
15/15          0s 6ms/step - loss:
0.0840 - mae: 0.1100 - val_loss: 0.0748 - val_mae: 0.0867
Epoch 167/550
15/15          0s 5ms/step - loss:
```

0.0828 - mae: 0.1100 - val_loss: 0.0739 - val_mae: 0.0868
Epoch 168/550
15/15   0s 5ms/step - loss:
0.0813 - mae: 0.1062 - val_loss: 0.0735 - val_mae: 0.0875
Epoch 169/550
15/15   0s 5ms/step - loss:
0.0808 - mae: 0.1101 - val_loss: 0.0730 - val_mae: 0.0869
Epoch 170/550
15/15   0s 5ms/step - loss:
0.0799 - mae: 0.1063 - val_loss: 0.0724 - val_mae: 0.0861
Epoch 171/550
15/15   0s 5ms/step - loss:
0.0791 - mae: 0.1053 - val_loss: 0.0717 - val_mae: 0.0862
Epoch 172/550
15/15   0s 5ms/step - loss:
0.0777 - mae: 0.1024 - val_loss: 0.0712 - val_mae: 0.0870
Epoch 173/550
15/15   0s 5ms/step - loss:
0.0780 - mae: 0.1071 - val_loss: 0.0707 - val_mae: 0.0865
Epoch 174/550
15/15   0s 5ms/step - loss:
0.0775 - mae: 0.1056 - val_loss: 0.0701 - val_mae: 0.0867
Epoch 175/550
15/15   0s 5ms/step - loss:
0.0760 - mae: 0.1042 - val_loss: 0.0697 - val_mae: 0.0862
Epoch 176/550
15/15   0s 5ms/step - loss:
0.0787 - mae: 0.1090 - val_loss: 0.0691 - val_mae: 0.0868
Epoch 177/550
15/15   0s 5ms/step - loss:
0.0756 - mae: 0.1062 - val_loss: 0.0687 - val_mae: 0.0857
Epoch 178/550
15/15   0s 7ms/step - loss:
0.0749 - mae: 0.1062 - val_loss: 0.0680 - val_mae: 0.0865
Epoch 179/550
15/15   0s 5ms/step - loss:
0.0751 - mae: 0.1047 - val_loss: 0.0677 - val_mae: 0.0863
Epoch 180/550
15/15   0s 5ms/step - loss:
0.0744 - mae: 0.1063 - val_loss: 0.0669 - val_mae: 0.0857
Epoch 181/550
15/15   0s 5ms/step - loss:
0.0730 - mae: 0.1042 - val_loss: 0.0666 - val_mae: 0.0862
Epoch 182/550
15/15   0s 5ms/step - loss:
0.0730 - mae: 0.1044 - val_loss: 0.0660 - val_mae: 0.0856
Epoch 183/550
15/15   0s 5ms/step - loss:

0.0726 - mae: 0.1046 - val_loss: 0.0656 - val_mae: 0.0862
Epoch 184/550
15/15   0s 5ms/step - loss:
0.0695 - mae: 0.1014 - val_loss: 0.0649 - val_mae: 0.0853
Epoch 185/550
15/15   0s 5ms/step - loss:
0.0712 - mae: 0.1033 - val_loss: 0.0643 - val_mae: 0.0857
Epoch 186/550
15/15   0s 5ms/step - loss:
0.0707 - mae: 0.1036 - val_loss: 0.0639 - val_mae: 0.0855
Epoch 187/550
15/15   0s 6ms/step - loss:
0.0691 - mae: 0.1020 - val_loss: 0.0634 - val_mae: 0.0855
Epoch 188/550
15/15   0s 6ms/step - loss:
0.0692 - mae: 0.1025 - val_loss: 0.0630 - val_mae: 0.0857
Epoch 189/550
15/15   0s 5ms/step - loss:
0.0685 - mae: 0.1036 - val_loss: 0.0624 - val_mae: 0.0856
Epoch 190/550
15/15   0s 5ms/step - loss:
0.0661 - mae: 0.1004 - val_loss: 0.0621 - val_mae: 0.0857
Epoch 191/550
15/15   0s 7ms/step - loss:
0.0672 - mae: 0.1007 - val_loss: 0.0617 - val_mae: 0.0855
Epoch 192/550
15/15   0s 6ms/step - loss:
0.0693 - mae: 0.1030 - val_loss: 0.0611 - val_mae: 0.0848
Epoch 193/550
15/15   0s 5ms/step - loss:
0.0654 - mae: 0.0993 - val_loss: 0.0607 - val_mae: 0.0851
Epoch 194/550
15/15   0s 5ms/step - loss:
0.0636 - mae: 0.0978 - val_loss: 0.0601 - val_mae: 0.0851
Epoch 195/550
15/15   0s 5ms/step - loss:
0.0649 - mae: 0.1009 - val_loss: 0.0597 - val_mae: 0.0849
Epoch 196/550
15/15   0s 5ms/step - loss:
0.0653 - mae: 0.1011 - val_loss: 0.0592 - val_mae: 0.0848
Epoch 197/550
15/15   0s 5ms/step - loss:
0.0638 - mae: 0.0988 - val_loss: 0.0588 - val_mae: 0.0845
Epoch 198/550
15/15   0s 5ms/step - loss:
0.0620 - mae: 0.0981 - val_loss: 0.0584 - val_mae: 0.0846
Epoch 199/550
15/15   0s 5ms/step - loss:

0.0618 - mae: 0.0991 - val_loss: 0.0580 - val_mae: 0.0846
Epoch 200/550
15/15   0s 5ms/step - loss:
0.0626 - mae: 0.1007 - val_loss: 0.0574 - val_mae: 0.0850
Epoch 201/550
15/15   0s 5ms/step - loss:
0.0623 - mae: 0.1007 - val_loss: 0.0572 - val_mae: 0.0849
Epoch 202/550
15/15   0s 5ms/step - loss:
0.0621 - mae: 0.1001 - val_loss: 0.0566 - val_mae: 0.0846
Epoch 203/550
15/15   0s 5ms/step - loss:
0.0606 - mae: 0.0982 - val_loss: 0.0564 - val_mae: 0.0843
Epoch 204/550
15/15   0s 7ms/step - loss:
0.0627 - mae: 0.1009 - val_loss: 0.0558 - val_mae: 0.0842
Epoch 205/550
15/15   0s 5ms/step - loss:
0.0583 - mae: 0.0958 - val_loss: 0.0553 - val_mae: 0.0836
Epoch 206/550
15/15   0s 5ms/step - loss:
0.0611 - mae: 0.0983 - val_loss: 0.0551 - val_mae: 0.0844
Epoch 207/550
15/15   0s 5ms/step - loss:
0.0596 - mae: 0.0983 - val_loss: 0.0546 - val_mae: 0.0838
Epoch 208/550
15/15   0s 6ms/step - loss:
0.0590 - mae: 0.0977 - val_loss: 0.0543 - val_mae: 0.0840
Epoch 209/550
15/15   0s 6ms/step - loss:
0.0584 - mae: 0.0987 - val_loss: 0.0540 - val_mae: 0.0838
Epoch 210/550
15/15   0s 5ms/step - loss:
0.0589 - mae: 0.0974 - val_loss: 0.0536 - val_mae: 0.0841
Epoch 211/550
15/15   0s 5ms/step - loss:
0.0550 - mae: 0.0948 - val_loss: 0.0532 - val_mae: 0.0839
Epoch 212/550
15/15   0s 5ms/step - loss:
0.0563 - mae: 0.0970 - val_loss: 0.0529 - val_mae: 0.0847
Epoch 213/550
15/15   0s 6ms/step - loss:
0.0562 - mae: 0.0965 - val_loss: 0.0524 - val_mae: 0.0842
Epoch 214/550
15/15   0s 5ms/step - loss:
0.0554 - mae: 0.0970 - val_loss: 0.0521 - val_mae: 0.0843
Epoch 215/550
15/15   0s 5ms/step - loss:

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0.0550 - mae: 0.0964 - val_loss: 0.0517 - val_mae: 0.0843
Epoch 216/550
15/15              0s 6ms/step - loss:
0.0536 - mae: 0.0949 - val_loss: 0.0514 - val_mae: 0.0840
Epoch 217/550
15/15              0s 5ms/step - loss:
0.0539 - mae: 0.0942 - val_loss: 0.0510 - val_mae: 0.0843
Epoch 218/550
15/15              0s 5ms/step - loss:
0.0526 - mae: 0.0938 - val_loss: 0.0506 - val_mae: 0.0842
Epoch 219/550
15/15              0s 5ms/step - loss:
0.0537 - mae: 0.0955 - val_loss: 0.0503 - val_mae: 0.0845
Epoch 220/550
15/15              0s 5ms/step - loss:
0.0546 - mae: 0.0963 - val_loss: 0.0499 - val_mae: 0.0838
Epoch 221/550
15/15              0s 5ms/step - loss:
0.0523 - mae: 0.0943 - val_loss: 0.0497 - val_mae: 0.0839
Epoch 222/550
15/15              0s 5ms/step - loss:
0.0506 - mae: 0.0922 - val_loss: 0.0493 - val_mae: 0.0842
Epoch 223/550
15/15              0s 5ms/step - loss:
0.0531 - mae: 0.0958 - val_loss: 0.0490 - val_mae: 0.0837
Epoch 224/550
15/15              0s 5ms/step - loss:
0.0519 - mae: 0.0936 - val_loss: 0.0485 - val_mae: 0.0842
Epoch 225/550
15/15              0s 5ms/step - loss:
0.0521 - mae: 0.0952 - val_loss: 0.0483 - val_mae: 0.0839
Epoch 226/550
15/15              0s 5ms/step - loss:
0.0494 - mae: 0.0933 - val_loss: 0.0479 - val_mae: 0.0835
Epoch 227/550
15/15              0s 5ms/step - loss:
0.0496 - mae: 0.0925 - val_loss: 0.0478 - val_mae: 0.0839
Epoch 228/550
15/15              0s 5ms/step - loss:
0.0513 - mae: 0.0944 - val_loss: 0.0471 - val_mae: 0.0840
Epoch 229/550
15/15              0s 6ms/step - loss:
0.0521 - mae: 0.0959 - val_loss: 0.0470 - val_mae: 0.0838
Epoch 230/550
15/15              0s 6ms/step - loss:
0.0481 - mae: 0.0921 - val_loss: 0.0466 - val_mae: 0.0831
Epoch 231/550
15/15              0s 6ms/step - loss:
```

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0.0489 - mae: 0.0939 - val_loss: 0.0463 - val_mae: 0.0833
Epoch 232/550
15/15            0s 5ms/step - loss:
0.0477 - mae: 0.0929 - val_loss: 0.0460 - val_mae: 0.0834
Epoch 233/550
15/15            0s 7ms/step - loss:
0.0494 - mae: 0.0945 - val_loss: 0.0457 - val_mae: 0.0835
Epoch 234/550
15/15            0s 5ms/step - loss:
0.0480 - mae: 0.0921 - val_loss: 0.0455 - val_mae: 0.0835
Epoch 235/550
15/15            0s 5ms/step - loss:
0.0478 - mae: 0.0933 - val_loss: 0.0451 - val_mae: 0.0833
Epoch 236/550
15/15            0s 5ms/step - loss:
0.0484 - mae: 0.0943 - val_loss: 0.0449 - val_mae: 0.0831
Epoch 237/550
15/15            0s 5ms/step - loss:
0.0480 - mae: 0.0923 - val_loss: 0.0447 - val_mae: 0.0834
Epoch 238/550
15/15            0s 5ms/step - loss:
0.0455 - mae: 0.0910 - val_loss: 0.0445 - val_mae: 0.0829
Epoch 239/550
15/15            0s 5ms/step - loss:
0.0473 - mae: 0.0925 - val_loss: 0.0441 - val_mae: 0.0831
Epoch 240/550
15/15            0s 5ms/step - loss:
0.0466 - mae: 0.0919 - val_loss: 0.0439 - val_mae: 0.0831
Epoch 241/550
15/15            0s 7ms/step - loss:
0.0465 - mae: 0.0926 - val_loss: 0.0435 - val_mae: 0.0830
Epoch 242/550
15/15            0s 5ms/step - loss:
0.0446 - mae: 0.0913 - val_loss: 0.0434 - val_mae: 0.0831
Epoch 243/550
15/15            0s 5ms/step - loss:
0.0454 - mae: 0.0911 - val_loss: 0.0432 - val_mae: 0.0832
Epoch 244/550
15/15            0s 6ms/step - loss:
0.0437 - mae: 0.0905 - val_loss: 0.0428 - val_mae: 0.0829
Epoch 245/550
15/15            0s 5ms/step - loss:
0.0443 - mae: 0.0912 - val_loss: 0.0426 - val_mae: 0.0831
Epoch 246/550
15/15            0s 5ms/step - loss:
0.0442 - mae: 0.0926 - val_loss: 0.0422 - val_mae: 0.0826
Epoch 247/550
15/15            0s 5ms/step - loss:
```

0.0444 - mae: 0.0914 - val_loss: 0.0421 - val_mae: 0.0824
Epoch 248/550
15/15   0s 5ms/step - loss:
0.0431 - mae: 0.0895 - val_loss: 0.0418 - val_mae: 0.0828
Epoch 249/550
15/15   0s 6ms/step - loss:
0.0444 - mae: 0.0912 - val_loss: 0.0416 - val_mae: 0.0827
Epoch 250/550
15/15   0s 5ms/step - loss:
0.0429 - mae: 0.0901 - val_loss: 0.0412 - val_mae: 0.0823
Epoch 251/550
15/15   0s 5ms/step - loss:
0.0417 - mae: 0.0887 - val_loss: 0.0410 - val_mae: 0.0824
Epoch 252/550
15/15   0s 6ms/step - loss:
0.0422 - mae: 0.0893 - val_loss: 0.0408 - val_mae: 0.0830
Epoch 253/550
15/15   0s 7ms/step - loss:
0.0404 - mae: 0.0878 - val_loss: 0.0406 - val_mae: 0.0828
Epoch 254/550
15/15   0s 6ms/step - loss:
0.0419 - mae: 0.0912 - val_loss: 0.0402 - val_mae: 0.0825
Epoch 255/550
15/15   0s 5ms/step - loss:
0.0418 - mae: 0.0894 - val_loss: 0.0399 - val_mae: 0.0824
Epoch 256/550
15/15   0s 5ms/step - loss:
0.0423 - mae: 0.0903 - val_loss: 0.0400 - val_mae: 0.0827
Epoch 257/550
15/15   0s 5ms/step - loss:
0.0412 - mae: 0.0897 - val_loss: 0.0397 - val_mae: 0.0823
Epoch 258/550
15/15   0s 5ms/step - loss:
0.0404 - mae: 0.0895 - val_loss: 0.0394 - val_mae: 0.0822
Epoch 259/550
15/15   0s 5ms/step - loss:
0.0399 - mae: 0.0896 - val_loss: 0.0392 - val_mae: 0.0823
Epoch 260/550
15/15   0s 5ms/step - loss:
0.0417 - mae: 0.0893 - val_loss: 0.0390 - val_mae: 0.0821
Epoch 261/550
15/15   0s 5ms/step - loss:
0.0402 - mae: 0.0892 - val_loss: 0.0387 - val_mae: 0.0818
Epoch 262/550
15/15   0s 5ms/step - loss:
0.0387 - mae: 0.0880 - val_loss: 0.0387 - val_mae: 0.0822
Epoch 263/550
15/15   0s 6ms/step - loss:

0.0408 - mae: 0.0904 - val_loss: 0.0385 - val_mae: 0.0818
Epoch 264/550
15/15   0s 7ms/step - loss:
0.0379 - mae: 0.0870 - val_loss: 0.0383 - val_mae: 0.0821
Epoch 265/550
15/15   0s 5ms/step - loss:
0.0393 - mae: 0.0885 - val_loss: 0.0379 - val_mae: 0.0820
Epoch 266/550
15/15   0s 5ms/step - loss:
0.0376 - mae: 0.0866 - val_loss: 0.0380 - val_mae: 0.0831
Epoch 267/550
15/15   0s 5ms/step - loss:
0.0370 - mae: 0.0857 - val_loss: 0.0377 - val_mae: 0.0828
Epoch 268/550
15/15   0s 5ms/step - loss:
0.0397 - mae: 0.0886 - val_loss: 0.0377 - val_mae: 0.0826
Epoch 269/550
15/15   0s 5ms/step - loss:
0.0381 - mae: 0.0882 - val_loss: 0.0373 - val_mae: 0.0821
Epoch 270/550
15/15   0s 6ms/step - loss:
0.0385 - mae: 0.0891 - val_loss: 0.0370 - val_mae: 0.0823
Epoch 271/550
15/15   0s 5ms/step - loss:
0.0373 - mae: 0.0871 - val_loss: 0.0371 - val_mae: 0.0818
Epoch 272/550
15/15   0s 5ms/step - loss:
0.0363 - mae: 0.0858 - val_loss: 0.0370 - val_mae: 0.0825
Epoch 273/550
15/15   0s 5ms/step - loss:
0.0371 - mae: 0.0875 - val_loss: 0.0365 - val_mae: 0.0816
Epoch 274/550
15/15   0s 7ms/step - loss:
0.0365 - mae: 0.0866 - val_loss: 0.0364 - val_mae: 0.0814
Epoch 275/550
15/15   0s 5ms/step - loss:
0.0364 - mae: 0.0859 - val_loss: 0.0364 - val_mae: 0.0822
Epoch 276/550
15/15   0s 5ms/step - loss:
0.0363 - mae: 0.0866 - val_loss: 0.0363 - val_mae: 0.0822
Epoch 277/550
15/15   0s 5ms/step - loss:
0.0345 - mae: 0.0846 - val_loss: 0.0360 - val_mae: 0.0819
Epoch 278/550
15/15   0s 5ms/step - loss:
0.0370 - mae: 0.0881 - val_loss: 0.0359 - val_mae: 0.0818
Epoch 279/550
15/15   0s 6ms/step - loss:

0.0354 - mae: 0.0863 - val_loss: 0.0357 - val_mae: 0.0810
Epoch 280/550
15/15   0s 5ms/step - loss:
0.0356 - mae: 0.0861 - val_loss: 0.0356 - val_mae: 0.0803
Epoch 281/550
15/15   0s 5ms/step - loss:
0.0364 - mae: 0.0875 - val_loss: 0.0349 - val_mae: 0.0802
Epoch 282/550
15/15   0s 5ms/step - loss:
0.0352 - mae: 0.0860 - val_loss: 0.0348 - val_mae: 0.0803
Epoch 283/550
15/15   0s 5ms/step - loss:
0.0350 - mae: 0.0859 - val_loss: 0.0349 - val_mae: 0.0810
Epoch 284/550
15/15   0s 5ms/step - loss:
0.0353 - mae: 0.0863 - val_loss: 0.0347 - val_mae: 0.0807
Epoch 285/550
15/15   0s 6ms/step - loss:
0.0339 - mae: 0.0855 - val_loss: 0.0346 - val_mae: 0.0813
Epoch 286/550
15/15   0s 5ms/step - loss:
0.0339 - mae: 0.0858 - val_loss: 0.0345 - val_mae: 0.0813
Epoch 287/550
15/15   0s 6ms/step - loss:
0.0357 - mae: 0.0872 - val_loss: 0.0343 - val_mae: 0.0804
Epoch 288/550
15/15   0s 5ms/step - loss:
0.0349 - mae: 0.0861 - val_loss: 0.0343 - val_mae: 0.0806
Epoch 289/550
15/15   0s 5ms/step - loss:
0.0346 - mae: 0.0866 - val_loss: 0.0342 - val_mae: 0.0810
Epoch 290/550
15/15   0s 6ms/step - loss:
0.0333 - mae: 0.0857 - val_loss: 0.0339 - val_mae: 0.0795
Epoch 291/550
15/15   0s 5ms/step - loss:
0.0347 - mae: 0.0865 - val_loss: 0.0339 - val_mae: 0.0811
Epoch 292/550
15/15   0s 5ms/step - loss:
0.0331 - mae: 0.0840 - val_loss: 0.0337 - val_mae: 0.0812
Epoch 293/550
15/15   0s 5ms/step - loss:
0.0338 - mae: 0.0854 - val_loss: 0.0338 - val_mae: 0.0811
Epoch 294/550
15/15   0s 5ms/step - loss:
0.0331 - mae: 0.0851 - val_loss: 0.0336 - val_mae: 0.0803
Epoch 295/550
15/15   0s 6ms/step - loss:

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0.0344 - mae: 0.0865 - val_loss: 0.0333 - val_mae: 0.0811
Epoch 296/550
15/15          0s 6ms/step - loss:
0.0330 - mae: 0.0851 - val_loss: 0.0330 - val_mae: 0.0805
Epoch 297/550
15/15          0s 5ms/step - loss:
0.0331 - mae: 0.0848 - val_loss: 0.0335 - val_mae: 0.0805
Epoch 298/550
15/15          0s 6ms/step - loss:
0.0326 - mae: 0.0845 - val_loss: 0.0330 - val_mae: 0.0806
Epoch 299/550
15/15          0s 5ms/step - loss:
0.0336 - mae: 0.0853 - val_loss: 0.0328 - val_mae: 0.0810
Epoch 300/550
15/15          0s 5ms/step - loss:
0.0340 - mae: 0.0861 - val_loss: 0.0328 - val_mae: 0.0800
Epoch 301/550
15/15          0s 5ms/step - loss:
0.0327 - mae: 0.0851 - val_loss: 0.0325 - val_mae: 0.0803
Epoch 302/550
15/15          0s 5ms/step - loss:
0.0316 - mae: 0.0834 - val_loss: 0.0322 - val_mae: 0.0802
Epoch 303/550
15/15          0s 5ms/step - loss:
0.0305 - mae: 0.0835 - val_loss: 0.0324 - val_mae: 0.0802
Epoch 304/550
15/15          0s 5ms/step - loss:
0.0316 - mae: 0.0836 - val_loss: 0.0321 - val_mae: 0.0790
Epoch 305/550
15/15          0s 5ms/step - loss:
0.0311 - mae: 0.0829 - val_loss: 0.0318 - val_mae: 0.0801
Epoch 306/550
15/15          0s 5ms/step - loss:
0.0315 - mae: 0.0847 - val_loss: 0.0319 - val_mae: 0.0810
Epoch 307/550
15/15          0s 5ms/step - loss:
0.0315 - mae: 0.0844 - val_loss: 0.0317 - val_mae: 0.0801
Epoch 308/550
15/15          0s 5ms/step - loss:
0.0311 - mae: 0.0844 - val_loss: 0.0316 - val_mae: 0.0795
Epoch 309/550
15/15          0s 7ms/step - loss:
0.0313 - mae: 0.0848 - val_loss: 0.0315 - val_mae: 0.0792
Epoch 310/550
15/15          0s 5ms/step - loss:
0.0309 - mae: 0.0844 - val_loss: 0.0315 - val_mae: 0.0802
Epoch 311/550
15/15          0s 5ms/step - loss:
```

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0.0305 - mae: 0.0850 - val_loss: 0.0313 - val_mae: 0.0792
Epoch 312/550
15/15          0s 5ms/step - loss:
0.0288 - mae: 0.0821 - val_loss: 0.0311 - val_mae: 0.0791
Epoch 313/550
15/15          0s 5ms/step - loss:
0.0311 - mae: 0.0839 - val_loss: 0.0314 - val_mae: 0.0805
Epoch 314/550
15/15          0s 5ms/step - loss:
0.0309 - mae: 0.0844 - val_loss: 0.0309 - val_mae: 0.0801
Epoch 315/550
15/15          0s 5ms/step - loss:
0.0297 - mae: 0.0843 - val_loss: 0.0310 - val_mae: 0.0794
Epoch 316/550
15/15          0s 5ms/step - loss:
0.0305 - mae: 0.0843 - val_loss: 0.0307 - val_mae: 0.0798
Epoch 317/550
15/15          0s 6ms/step - loss:
0.0303 - mae: 0.0836 - val_loss: 0.0307 - val_mae: 0.0802
Epoch 318/550
15/15          0s 5ms/step - loss:
0.0292 - mae: 0.0833 - val_loss: 0.0306 - val_mae: 0.0803
Epoch 319/550
15/15          0s 6ms/step - loss:
0.0293 - mae: 0.0832 - val_loss: 0.0307 - val_mae: 0.0804
Epoch 320/550
15/15          0s 6ms/step - loss:
0.0301 - mae: 0.0831 - val_loss: 0.0305 - val_mae: 0.0815
Epoch 321/550
15/15          0s 5ms/step - loss:
0.0298 - mae: 0.0835 - val_loss: 0.0303 - val_mae: 0.0803
Epoch 322/550
15/15          0s 5ms/step - loss:
0.0296 - mae: 0.0836 - val_loss: 0.0307 - val_mae: 0.0812
Epoch 323/550
15/15          0s 5ms/step - loss:
0.0279 - mae: 0.0806 - val_loss: 0.0304 - val_mae: 0.0812
Epoch 324/550
15/15          0s 5ms/step - loss:
0.0296 - mae: 0.0831 - val_loss: 0.0295 - val_mae: 0.0789
Epoch 325/550
15/15          0s 5ms/step - loss:
0.0286 - mae: 0.0821 - val_loss: 0.0296 - val_mae: 0.0790
Epoch 326/550
15/15          0s 5ms/step - loss:
0.0297 - mae: 0.0848 - val_loss: 0.0299 - val_mae: 0.0799
Epoch 327/550
15/15          0s 5ms/step - loss:
```

```
0.0282 - mae: 0.0823 - val_loss: 0.0299 - val_mae: 0.0801
Epoch 328/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0811 - val_loss: 0.0297 - val_mae: 0.0804
Epoch 329/550
15/15              0s 5ms/step - loss:
0.0299 - mae: 0.0844 - val_loss: 0.0296 - val_mae: 0.0797
Epoch 330/550
15/15              0s 7ms/step - loss:
0.0290 - mae: 0.0833 - val_loss: 0.0297 - val_mae: 0.0801
Epoch 331/550
15/15              0s 5ms/step - loss:
0.0289 - mae: 0.0832 - val_loss: 0.0292 - val_mae: 0.0792
Epoch 332/550
15/15              0s 5ms/step - loss:
0.0279 - mae: 0.0825 - val_loss: 0.0295 - val_mae: 0.0810
Epoch 333/550
15/15              0s 5ms/step - loss:
0.0275 - mae: 0.0807 - val_loss: 0.0291 - val_mae: 0.0803
Epoch 334/550
15/15              0s 5ms/step - loss:
0.0285 - mae: 0.0826 - val_loss: 0.0293 - val_mae: 0.0798
Epoch 335/550
15/15              0s 5ms/step - loss:
0.0273 - mae: 0.0822 - val_loss: 0.0291 - val_mae: 0.0791
Epoch 336/550
15/15              0s 5ms/step - loss:
0.0274 - mae: 0.0819 - val_loss: 0.0287 - val_mae: 0.0786
Epoch 337/550
15/15              0s 5ms/step - loss:
0.0266 - mae: 0.0807 - val_loss: 0.0286 - val_mae: 0.0782
Epoch 338/550
15/15              0s 5ms/step - loss:
0.0272 - mae: 0.0820 - val_loss: 0.0288 - val_mae: 0.0788
Epoch 339/550
15/15              0s 5ms/step - loss:
0.0294 - mae: 0.0849 - val_loss: 0.0286 - val_mae: 0.0776
Epoch 340/550
15/15              0s 7ms/step - loss:
0.0280 - mae: 0.0811 - val_loss: 0.0284 - val_mae: 0.0777
Epoch 341/550
15/15              0s 5ms/step - loss:
0.0280 - mae: 0.0818 - val_loss: 0.0287 - val_mae: 0.0783
Epoch 342/550
15/15              0s 5ms/step - loss:
0.0261 - mae: 0.0809 - val_loss: 0.0286 - val_mae: 0.0804
Epoch 343/550
15/15              0s 5ms/step - loss:
```

```
0.0286 - mae: 0.0830 - val_loss: 0.0283 - val_mae: 0.0787
Epoch 344/550
15/15              0s 5ms/step - loss:
0.0256 - mae: 0.0792 - val_loss: 0.0285 - val_mae: 0.0796
Epoch 345/550
15/15              0s 5ms/step - loss:
0.0264 - mae: 0.0809 - val_loss: 0.0283 - val_mae: 0.0784
Epoch 346/550
15/15              0s 5ms/step - loss:
0.0281 - mae: 0.0822 - val_loss: 0.0282 - val_mae: 0.0795
Epoch 347/550
15/15              0s 5ms/step - loss:
0.0263 - mae: 0.0802 - val_loss: 0.0281 - val_mae: 0.0786
Epoch 348/550
15/15              0s 5ms/step - loss:
0.0261 - mae: 0.0806 - val_loss: 0.0281 - val_mae: 0.0794
Epoch 349/550
15/15              0s 7ms/step - loss:
0.0266 - mae: 0.0808 - val_loss: 0.0279 - val_mae: 0.0788
Epoch 350/550
15/15              0s 6ms/step - loss:
0.0272 - mae: 0.0823 - val_loss: 0.0277 - val_mae: 0.0788
Epoch 351/550
15/15              0s 6ms/step - loss:
0.0264 - mae: 0.0813 - val_loss: 0.0279 - val_mae: 0.0780
Epoch 352/550
15/15              0s 6ms/step - loss:
0.0278 - mae: 0.0826 - val_loss: 0.0277 - val_mae: 0.0788
Epoch 353/550
15/15              0s 6ms/step - loss:
0.0262 - mae: 0.0800 - val_loss: 0.0271 - val_mae: 0.0779
Epoch 354/550
15/15              0s 6ms/step - loss:
0.0268 - mae: 0.0822 - val_loss: 0.0277 - val_mae: 0.0794
Epoch 355/550
15/15              0s 6ms/step - loss:
0.0251 - mae: 0.0802 - val_loss: 0.0276 - val_mae: 0.0796
Epoch 356/550
15/15              0s 7ms/step - loss:
0.0257 - mae: 0.0797 - val_loss: 0.0272 - val_mae: 0.0790
Epoch 357/550
15/15              0s 6ms/step - loss:
0.0252 - mae: 0.0798 - val_loss: 0.0276 - val_mae: 0.0806
Epoch 358/550
15/15              0s 6ms/step - loss:
0.0260 - mae: 0.0810 - val_loss: 0.0273 - val_mae: 0.0799
Epoch 359/550
15/15              0s 6ms/step - loss:
```

```
0.0258 - mae: 0.0806 - val_loss: 0.0274 - val_mae: 0.0796
Epoch 360/550
15/15              0s 6ms/step - loss:
0.0250 - mae: 0.0809 - val_loss: 0.0272 - val_mae: 0.0801
Epoch 361/550
15/15              0s 5ms/step - loss:
0.0265 - mae: 0.0821 - val_loss: 0.0274 - val_mae: 0.0791
Epoch 362/550
15/15              0s 5ms/step - loss:
0.0243 - mae: 0.0797 - val_loss: 0.0271 - val_mae: 0.0803
Epoch 363/550
15/15              0s 5ms/step - loss:
0.0258 - mae: 0.0817 - val_loss: 0.0269 - val_mae: 0.0787
Epoch 364/550
15/15              0s 8ms/step - loss:
0.0261 - mae: 0.0818 - val_loss: 0.0266 - val_mae: 0.0778
Epoch 365/550
15/15              0s 5ms/step - loss:
0.0248 - mae: 0.0798 - val_loss: 0.0271 - val_mae: 0.0794
Epoch 366/550
15/15              0s 6ms/step - loss:
0.0262 - mae: 0.0806 - val_loss: 0.0270 - val_mae: 0.0791
Epoch 367/550
15/15              0s 5ms/step - loss:
0.0251 - mae: 0.0798 - val_loss: 0.0270 - val_mae: 0.0804
Epoch 368/550
15/15              0s 5ms/step - loss:
0.0263 - mae: 0.0810 - val_loss: 0.0269 - val_mae: 0.0795
Epoch 369/550
15/15              0s 5ms/step - loss:
0.0236 - mae: 0.0788 - val_loss: 0.0266 - val_mae: 0.0791
Epoch 370/550
15/15              0s 5ms/step - loss:
0.0235 - mae: 0.0785 - val_loss: 0.0266 - val_mae: 0.0788
Epoch 371/550
15/15              0s 7ms/step - loss:
0.0234 - mae: 0.0783 - val_loss: 0.0263 - val_mae: 0.0793
Epoch 372/550
15/15              0s 7ms/step - loss:
0.0251 - mae: 0.0799 - val_loss: 0.0267 - val_mae: 0.0790
Epoch 373/550
15/15              0s 6ms/step - loss:
0.0254 - mae: 0.0806 - val_loss: 0.0266 - val_mae: 0.0789
Epoch 374/550
15/15              0s 6ms/step - loss:
0.0241 - mae: 0.0787 - val_loss: 0.0265 - val_mae: 0.0798
Epoch 375/550
15/15              0s 6ms/step - loss:
```

```
0.0238 - mae: 0.0792 - val_loss: 0.0266 - val_mae: 0.0789
Epoch 376/550
15/15          0s 5ms/step - loss:
0.0244 - mae: 0.0804 - val_loss: 0.0264 - val_mae: 0.0796
Epoch 377/550
15/15          0s 5ms/step - loss:
0.0250 - mae: 0.0810 - val_loss: 0.0267 - val_mae: 0.0796
Epoch 378/550
15/15          0s 5ms/step - loss:
0.0245 - mae: 0.0801 - val_loss: 0.0265 - val_mae: 0.0787
Epoch 379/550
15/15          0s 7ms/step - loss:
0.0246 - mae: 0.0793 - val_loss: 0.0263 - val_mae: 0.0772
Epoch 380/550
15/15          0s 6ms/step - loss:
0.0228 - mae: 0.0785 - val_loss: 0.0263 - val_mae: 0.0791
Epoch 381/550
15/15          0s 6ms/step - loss:
0.0231 - mae: 0.0783 - val_loss: 0.0263 - val_mae: 0.0788
Epoch 382/550
15/15          0s 5ms/step - loss:
0.0227 - mae: 0.0780 - val_loss: 0.0266 - val_mae: 0.0801
Epoch 383/550
15/15          0s 5ms/step - loss:
0.0242 - mae: 0.0799 - val_loss: 0.0264 - val_mae: 0.0797
Epoch 384/550
15/15          0s 6ms/step - loss:
0.0243 - mae: 0.0802 - val_loss: 0.0263 - val_mae: 0.0789
Epoch 385/550
15/15          0s 6ms/step - loss:
0.0225 - mae: 0.0776 - val_loss: 0.0258 - val_mae: 0.0778
Epoch 386/550
15/15          0s 6ms/step - loss:
0.0229 - mae: 0.0782 - val_loss: 0.0257 - val_mae: 0.0790
Epoch 387/550
15/15          0s 5ms/step - loss:
0.0231 - mae: 0.0782 - val_loss: 0.0261 - val_mae: 0.0807
Epoch 388/550
15/15          0s 5ms/step - loss:
0.0238 - mae: 0.0793 - val_loss: 0.0260 - val_mae: 0.0796
Epoch 389/550
15/15          0s 5ms/step - loss:
0.0229 - mae: 0.0793 - val_loss: 0.0259 - val_mae: 0.0789
Epoch 390/550
15/15          0s 5ms/step - loss:
0.0226 - mae: 0.0776 - val_loss: 0.0262 - val_mae: 0.0784
Epoch 391/550
15/15          0s 5ms/step - loss:
```

```
0.0218 - mae: 0.0769 - val_loss: 0.0259 - val_mae: 0.0802
Epoch 392/550
15/15          0s 6ms/step - loss:
0.0233 - mae: 0.0794 - val_loss: 0.0255 - val_mae: 0.0777
Epoch 393/550
15/15          0s 5ms/step - loss:
0.0224 - mae: 0.0778 - val_loss: 0.0257 - val_mae: 0.0788
Epoch 394/550
15/15          0s 7ms/step - loss:
0.0221 - mae: 0.0779 - val_loss: 0.0255 - val_mae: 0.0776
Epoch 395/550
15/15          0s 5ms/step - loss:
0.0228 - mae: 0.0772 - val_loss: 0.0255 - val_mae: 0.0783
Epoch 396/550
15/15          0s 6ms/step - loss:
0.0232 - mae: 0.0788 - val_loss: 0.0259 - val_mae: 0.0787
Epoch 397/550
15/15          0s 5ms/step - loss:
0.0237 - mae: 0.0791 - val_loss: 0.0261 - val_mae: 0.0798
Epoch 398/550
15/15          0s 5ms/step - loss:
0.0216 - mae: 0.0769 - val_loss: 0.0254 - val_mae: 0.0778
Epoch 399/550
15/15          0s 6ms/step - loss:
0.0223 - mae: 0.0771 - val_loss: 0.0253 - val_mae: 0.0783
Epoch 400/550
15/15          0s 5ms/step - loss:
0.0217 - mae: 0.0774 - val_loss: 0.0254 - val_mae: 0.0790
Epoch 401/550
15/15          0s 6ms/step - loss:
0.0214 - mae: 0.0767 - val_loss: 0.0251 - val_mae: 0.0781
Epoch 402/550
15/15          0s 7ms/step - loss:
0.0216 - mae: 0.0774 - val_loss: 0.0251 - val_mae: 0.0788
Epoch 403/550
15/15          0s 5ms/step - loss:
0.0220 - mae: 0.0780 - val_loss: 0.0251 - val_mae: 0.0775
Epoch 404/550
15/15          0s 6ms/step - loss:
0.0230 - mae: 0.0786 - val_loss: 0.0252 - val_mae: 0.0781
Epoch 405/550
15/15          0s 5ms/step - loss:
0.0216 - mae: 0.0772 - val_loss: 0.0252 - val_mae: 0.0773
Epoch 406/550
15/15          0s 5ms/step - loss:
0.0220 - mae: 0.0779 - val_loss: 0.0254 - val_mae: 0.0778
Epoch 407/550
15/15          0s 5ms/step - loss:
```

```
0.0218 - mae: 0.0766 - val_loss: 0.0252 - val_mae: 0.0779
Epoch 408/550
15/15              0s 5ms/step - loss:
0.0196 - mae: 0.0740 - val_loss: 0.0253 - val_mae: 0.0791
Epoch 409/550
15/15              0s 5ms/step - loss:
0.0222 - mae: 0.0797 - val_loss: 0.0257 - val_mae: 0.0783
Epoch 410/550
15/15              0s 7ms/step - loss:
0.0215 - mae: 0.0769 - val_loss: 0.0255 - val_mae: 0.0794
Epoch 411/550
15/15              0s 6ms/step - loss:
0.0221 - mae: 0.0782 - val_loss: 0.0249 - val_mae: 0.0789
Epoch 412/550
15/15              0s 6ms/step - loss:
0.0235 - mae: 0.0789 - val_loss: 0.0248 - val_mae: 0.0774
Epoch 413/550
15/15              0s 5ms/step - loss:
0.0221 - mae: 0.0782 - val_loss: 0.0252 - val_mae: 0.0782
Epoch 414/550
15/15              0s 5ms/step - loss:
0.0207 - mae: 0.0750 - val_loss: 0.0250 - val_mae: 0.0774
Epoch 415/550
15/15              0s 5ms/step - loss:
0.0210 - mae: 0.0773 - val_loss: 0.0258 - val_mae: 0.0804
Epoch 416/550
15/15              0s 6ms/step - loss:
0.0211 - mae: 0.0770 - val_loss: 0.0248 - val_mae: 0.0786
Epoch 417/550
15/15              0s 6ms/step - loss:
0.0201 - mae: 0.0759 - val_loss: 0.0249 - val_mae: 0.0800
Epoch 418/550
15/15              0s 6ms/step - loss:
0.0206 - mae: 0.0767 - val_loss: 0.0247 - val_mae: 0.0781
Epoch 419/550
15/15              0s 5ms/step - loss:
0.0231 - mae: 0.0786 - val_loss: 0.0250 - val_mae: 0.0789
Epoch 420/550
15/15              0s 6ms/step - loss:
0.0215 - mae: 0.0777 - val_loss: 0.0246 - val_mae: 0.0788
Epoch 421/550
15/15              0s 6ms/step - loss:
0.0213 - mae: 0.0774 - val_loss: 0.0248 - val_mae: 0.0776
Epoch 422/550
15/15              0s 7ms/step - loss:
0.0200 - mae: 0.0750 - val_loss: 0.0248 - val_mae: 0.0775
Epoch 423/550
15/15              0s 5ms/step - loss:
```

```
0.0199 - mae: 0.0749 - val_loss: 0.0252 - val_mae: 0.0789
Epoch 424/550
15/15          0s 6ms/step - loss:
0.0207 - mae: 0.0770 - val_loss: 0.0252 - val_mae: 0.0785
Epoch 425/550
15/15          0s 6ms/step - loss:
0.0201 - mae: 0.0745 - val_loss: 0.0249 - val_mae: 0.0792
Epoch 426/550
15/15          0s 6ms/step - loss:
0.0213 - mae: 0.0768 - val_loss: 0.0251 - val_mae: 0.0773
Epoch 427/550
15/15          0s 5ms/step - loss:
0.0193 - mae: 0.0759 - val_loss: 0.0244 - val_mae: 0.0770
Epoch 428/550
15/15          0s 5ms/step - loss:
0.0198 - mae: 0.0758 - val_loss: 0.0245 - val_mae: 0.0776
Epoch 429/550
15/15          0s 5ms/step - loss:
0.0209 - mae: 0.0770 - val_loss: 0.0252 - val_mae: 0.0780
Epoch 430/550
15/15          0s 8ms/step - loss:
0.0208 - mae: 0.0766 - val_loss: 0.0246 - val_mae: 0.0776
Epoch 431/550
15/15          0s 6ms/step - loss:
0.0194 - mae: 0.0755 - val_loss: 0.0255 - val_mae: 0.0798
Epoch 432/550
15/15          0s 7ms/step - loss:
0.0195 - mae: 0.0749 - val_loss: 0.0245 - val_mae: 0.0794
Epoch 433/550
15/15          0s 5ms/step - loss:
0.0201 - mae: 0.0753 - val_loss: 0.0255 - val_mae: 0.0800
Epoch 434/550
15/15          0s 6ms/step - loss:
0.0201 - mae: 0.0760 - val_loss: 0.0246 - val_mae: 0.0783
Epoch 435/550
15/15          0s 5ms/step - loss:
0.0205 - mae: 0.0759 - val_loss: 0.0247 - val_mae: 0.0785
Epoch 436/550
15/15          0s 7ms/step - loss:
0.0189 - mae: 0.0736 - val_loss: 0.0245 - val_mae: 0.0794
Epoch 437/550
15/15          0s 6ms/step - loss:
0.0196 - mae: 0.0752 - val_loss: 0.0252 - val_mae: 0.0797
Epoch 438/550
15/15          0s 5ms/step - loss:
0.0192 - mae: 0.0748 - val_loss: 0.0251 - val_mae: 0.0791
Epoch 439/550
15/15          0s 5ms/step - loss:
```

```
0.0199 - mae: 0.0763 - val_loss: 0.0246 - val_mae: 0.0784
Epoch 440/550
15/15          0s 6ms/step - loss:
0.0198 - mae: 0.0754 - val_loss: 0.0253 - val_mae: 0.0797
Epoch 441/550
15/15          0s 6ms/step - loss:
0.0191 - mae: 0.0756 - val_loss: 0.0248 - val_mae: 0.0790
Epoch 442/550
15/15          0s 7ms/step - loss:
0.0185 - mae: 0.0750 - val_loss: 0.0243 - val_mae: 0.0780
Epoch 443/550
15/15          0s 6ms/step - loss:
0.0191 - mae: 0.0746 - val_loss: 0.0244 - val_mae: 0.0782
Epoch 444/550
15/15          0s 7ms/step - loss:
0.0205 - mae: 0.0750 - val_loss: 0.0245 - val_mae: 0.0776
Epoch 445/550
15/15          0s 5ms/step - loss:
0.0186 - mae: 0.0738 - val_loss: 0.0246 - val_mae: 0.0786
Epoch 446/550
15/15          0s 6ms/step - loss:
0.0186 - mae: 0.0749 - val_loss: 0.0249 - val_mae: 0.0779
Epoch 447/550
15/15          0s 6ms/step - loss:
0.0193 - mae: 0.0756 - val_loss: 0.0252 - val_mae: 0.0793
Epoch 448/550
15/15          0s 5ms/step - loss:
0.0195 - mae: 0.0747 - val_loss: 0.0246 - val_mae: 0.0776
Epoch 449/550
15/15          0s 5ms/step - loss:
0.0191 - mae: 0.0753 - val_loss: 0.0251 - val_mae: 0.0790
Epoch 450/550
15/15          0s 5ms/step - loss:
0.0202 - mae: 0.0755 - val_loss: 0.0246 - val_mae: 0.0784
Epoch 451/550
15/15          0s 6ms/step - loss:
0.0180 - mae: 0.0727 - val_loss: 0.0245 - val_mae: 0.0793
Epoch 452/550
15/15          0s 5ms/step - loss:
0.0188 - mae: 0.0738 - val_loss: 0.0249 - val_mae: 0.0792
Epoch 453/550
15/15          0s 5ms/step - loss:
0.0198 - mae: 0.0745 - val_loss: 0.0245 - val_mae: 0.0785
Epoch 454/550
15/15          0s 5ms/step - loss:
0.0200 - mae: 0.0757 - val_loss: 0.0252 - val_mae: 0.0795
Epoch 455/550
15/15          0s 5ms/step - loss:
```

```
0.0195 - mae: 0.0743 - val_loss: 0.0245 - val_mae: 0.0785
Epoch 456/550
15/15              0s 5ms/step - loss:
0.0177 - mae: 0.0724 - val_loss: 0.0247 - val_mae: 0.0788
Epoch 457/550
15/15              0s 6ms/step - loss:
0.0185 - mae: 0.0738 - val_loss: 0.0249 - val_mae: 0.0788
Epoch 458/550
15/15              0s 6ms/step - loss:
0.0194 - mae: 0.0755 - val_loss: 0.0243 - val_mae: 0.0778
Epoch 459/550
15/15              0s 6ms/step - loss:
0.0189 - mae: 0.0742 - val_loss: 0.0240 - val_mae: 0.0780
Epoch 460/550
15/15              0s 5ms/step - loss:
0.0184 - mae: 0.0740 - val_loss: 0.0249 - val_mae: 0.0792
Epoch 461/550
15/15              0s 5ms/step - loss:
0.0196 - mae: 0.0747 - val_loss: 0.0248 - val_mae: 0.0782
Epoch 462/550
15/15              0s 6ms/step - loss:
0.0189 - mae: 0.0750 - val_loss: 0.0240 - val_mae: 0.0787
Epoch 463/550
15/15              0s 6ms/step - loss:
0.0185 - mae: 0.0730 - val_loss: 0.0240 - val_mae: 0.0792
Epoch 464/550
15/15              0s 8ms/step - loss:
0.0202 - mae: 0.0759 - val_loss: 0.0254 - val_mae: 0.0814
Epoch 465/550
15/15              0s 6ms/step - loss:
0.0187 - mae: 0.0746 - val_loss: 0.0236 - val_mae: 0.0783
Epoch 466/550
15/15              0s 5ms/step - loss:
0.0203 - mae: 0.0759 - val_loss: 0.0247 - val_mae: 0.0793
Epoch 467/550
15/15              0s 6ms/step - loss:
0.0192 - mae: 0.0751 - val_loss: 0.0244 - val_mae: 0.0781
Epoch 468/550
15/15              0s 5ms/step - loss:
0.0188 - mae: 0.0744 - val_loss: 0.0244 - val_mae: 0.0784
Epoch 469/550
15/15              0s 6ms/step - loss:
0.0186 - mae: 0.0741 - val_loss: 0.0243 - val_mae: 0.0789
Epoch 470/550
15/15              0s 7ms/step - loss:
0.0184 - mae: 0.0741 - val_loss: 0.0238 - val_mae: 0.0784
Epoch 471/550
15/15              0s 6ms/step - loss:
```

0.0190 - mae: 0.0747 - val_loss: 0.0248 - val_mae: 0.0792
Epoch 472/550
15/15   0s 5ms/step - loss:
0.0194 - mae: 0.0747 - val_loss: 0.0241 - val_mae: 0.0795
Epoch 473/550
15/15   0s 6ms/step - loss:
0.0181 - mae: 0.0739 - val_loss: 0.0242 - val_mae: 0.0778
Epoch 474/550
15/15   0s 6ms/step - loss:
0.0188 - mae: 0.0735 - val_loss: 0.0253 - val_mae: 0.0800
Epoch 475/550
15/15   0s 5ms/step - loss:
0.0177 - mae: 0.0725 - val_loss: 0.0244 - val_mae: 0.0772
Epoch 476/550
15/15   0s 5ms/step - loss:
0.0187 - mae: 0.0738 - val_loss: 0.0241 - val_mae: 0.0769
Epoch 477/550
15/15   0s 6ms/step - loss:
0.0191 - mae: 0.0754 - val_loss: 0.0247 - val_mae: 0.0779
Epoch 478/550
15/15   0s 6ms/step - loss:
0.0183 - mae: 0.0722 - val_loss: 0.0236 - val_mae: 0.0762
Epoch 479/550
15/15   0s 6ms/step - loss:
0.0173 - mae: 0.0720 - val_loss: 0.0244 - val_mae: 0.0781
Epoch 480/550
15/15   0s 6ms/step - loss:
0.0184 - mae: 0.0734 - val_loss: 0.0244 - val_mae: 0.0787
Epoch 481/550
15/15   0s 5ms/step - loss:
0.0186 - mae: 0.0726 - val_loss: 0.0240 - val_mae: 0.0778
Epoch 482/550
15/15   0s 6ms/step - loss:
0.0182 - mae: 0.0733 - val_loss: 0.0242 - val_mae: 0.0777
Epoch 483/550
15/15   0s 7ms/step - loss:
0.0184 - mae: 0.0735 - val_loss: 0.0240 - val_mae: 0.0773
Epoch 484/550
15/15   0s 5ms/step - loss:
0.0185 - mae: 0.0747 - val_loss: 0.0237 - val_mae: 0.0771
Epoch 485/550
15/15   0s 6ms/step - loss:
0.0183 - mae: 0.0742 - val_loss: 0.0235 - val_mae: 0.0778
Epoch 486/550
15/15   0s 6ms/step - loss:
0.0187 - mae: 0.0736 - val_loss: 0.0239 - val_mae: 0.0775
Epoch 487/550
15/15   0s 5ms/step - loss:

0.0184 - mae: 0.0723 - val_loss: 0.0241 - val_mae: 0.0787
Epoch 488/550
15/15   0s 5ms/step - loss:
0.0170 - mae: 0.0717 - val_loss: 0.0236 - val_mae: 0.0767
Epoch 489/550
15/15   0s 6ms/step - loss:
0.0174 - mae: 0.0724 - val_loss: 0.0243 - val_mae: 0.0772
Epoch 490/550
15/15   0s 7ms/step - loss:
0.0173 - mae: 0.0727 - val_loss: 0.0241 - val_mae: 0.0768
Epoch 491/550
15/15   0s 6ms/step - loss:
0.0183 - mae: 0.0742 - val_loss: 0.0238 - val_mae: 0.0767
Epoch 492/550
15/15   0s 5ms/step - loss:
0.0171 - mae: 0.0710 - val_loss: 0.0242 - val_mae: 0.0779
Epoch 493/550
15/15   0s 6ms/step - loss:
0.0180 - mae: 0.0723 - val_loss: 0.0237 - val_mae: 0.0773
Epoch 494/550
15/15   0s 6ms/step - loss:
0.0182 - mae: 0.0736 - val_loss: 0.0237 - val_mae: 0.0771
Epoch 495/550
15/15   0s 6ms/step - loss:
0.0182 - mae: 0.0737 - val_loss: 0.0238 - val_mae: 0.0773
Epoch 496/550
15/15   0s 6ms/step - loss:
0.0174 - mae: 0.0718 - val_loss: 0.0239 - val_mae: 0.0777
Epoch 497/550
15/15   0s 6ms/step - loss:
0.0178 - mae: 0.0729 - val_loss: 0.0241 - val_mae: 0.0781
Epoch 498/550
15/15   0s 5ms/step - loss:
0.0174 - mae: 0.0716 - val_loss: 0.0242 - val_mae: 0.0767
Epoch 499/550
15/15   0s 6ms/step - loss:
0.0180 - mae: 0.0734 - val_loss: 0.0243 - val_mae: 0.0783
Epoch 500/550
15/15   0s 6ms/step - loss:
0.0183 - mae: 0.0732 - val_loss: 0.0238 - val_mae: 0.0773
Epoch 501/550
15/15   0s 5ms/step - loss:
0.0178 - mae: 0.0733 - val_loss: 0.0237 - val_mae: 0.0775
Epoch 502/550
15/15   0s 8ms/step - loss:
0.0182 - mae: 0.0732 - val_loss: 0.0234 - val_mae: 0.0764
Epoch 503/550
15/15   0s 6ms/step - loss:

```
0.0185 - mae: 0.0733 - val_loss: 0.0232 - val_mae: 0.0762
Epoch 504/550
15/15            0s 6ms/step - loss:
0.0170 - mae: 0.0715 - val_loss: 0.0230 - val_mae: 0.0754
Epoch 505/550
15/15            0s 5ms/step - loss:
0.0187 - mae: 0.0742 - val_loss: 0.0243 - val_mae: 0.0774
Epoch 506/550
15/15            0s 5ms/step - loss:
0.0185 - mae: 0.0738 - val_loss: 0.0238 - val_mae: 0.0770
Epoch 507/550
15/15            0s 6ms/step - loss:
0.0175 - mae: 0.0703 - val_loss: 0.0243 - val_mae: 0.0779
Epoch 508/550
15/15            0s 8ms/step - loss:
0.0176 - mae: 0.0719 - val_loss: 0.0242 - val_mae: 0.0770
Epoch 509/550
15/15            0s 5ms/step - loss:
0.0171 - mae: 0.0719 - val_loss: 0.0237 - val_mae: 0.0767
Epoch 510/550
15/15            0s 5ms/step - loss:
0.0177 - mae: 0.0720 - val_loss: 0.0237 - val_mae: 0.0765
Epoch 511/550
15/15            0s 5ms/step - loss:
0.0176 - mae: 0.0722 - val_loss: 0.0238 - val_mae: 0.0776
Epoch 512/550
15/15            0s 5ms/step - loss:
0.0165 - mae: 0.0694 - val_loss: 0.0241 - val_mae: 0.0785
Epoch 513/550
15/15            0s 6ms/step - loss:
0.0174 - mae: 0.0724 - val_loss: 0.0236 - val_mae: 0.0782
Epoch 514/550
15/15            0s 7ms/step - loss:
0.0172 - mae: 0.0723 - val_loss: 0.0245 - val_mae: 0.0774
Epoch 515/550
15/15            0s 6ms/step - loss:
0.0174 - mae: 0.0726 - val_loss: 0.0246 - val_mae: 0.0788
Epoch 516/550
15/15            0s 6ms/step - loss:
0.0165 - mae: 0.0707 - val_loss: 0.0242 - val_mae: 0.0768
Epoch 517/550
15/15            0s 5ms/step - loss:
0.0177 - mae: 0.0724 - val_loss: 0.0241 - val_mae: 0.0788
Epoch 518/550
15/15            0s 5ms/step - loss:
0.0176 - mae: 0.0711 - val_loss: 0.0243 - val_mae: 0.0786
Epoch 519/550
15/15            0s 5ms/step - loss:
```

```
0.0185 - mae: 0.0725 - val_loss: 0.0249 - val_mae: 0.0791
Epoch 520/550
15/15          0s 7ms/step - loss:
0.0182 - mae: 0.0717 - val_loss: 0.0236 - val_mae: 0.0764
Epoch 521/550
15/15          0s 5ms/step - loss:
0.0171 - mae: 0.0717 - val_loss: 0.0238 - val_mae: 0.0774
Epoch 522/550
15/15          0s 5ms/step - loss:
0.0167 - mae: 0.0707 - val_loss: 0.0240 - val_mae: 0.0773
Epoch 523/550
15/15          0s 6ms/step - loss:
0.0174 - mae: 0.0712 - val_loss: 0.0240 - val_mae: 0.0777
Epoch 524/550
15/15          0s 5ms/step - loss:
0.0166 - mae: 0.0709 - val_loss: 0.0250 - val_mae: 0.0782
Epoch 525/550
15/15          0s 5ms/step - loss:
0.0179 - mae: 0.0728 - val_loss: 0.0241 - val_mae: 0.0771
Epoch 526/550
15/15          0s 7ms/step - loss:
0.0168 - mae: 0.0714 - val_loss: 0.0247 - val_mae: 0.0798
Epoch 527/550
15/15          0s 5ms/step - loss:
0.0178 - mae: 0.0723 - val_loss: 0.0231 - val_mae: 0.0768
Epoch 528/550
15/15          0s 6ms/step - loss:
0.0167 - mae: 0.0699 - val_loss: 0.0234 - val_mae: 0.0763
Epoch 529/550
15/15          0s 5ms/step - loss:
0.0178 - mae: 0.0718 - val_loss: 0.0238 - val_mae: 0.0774
```

Training and Validation Loss - Fold 10

Training and Validation MAE - Fold 10
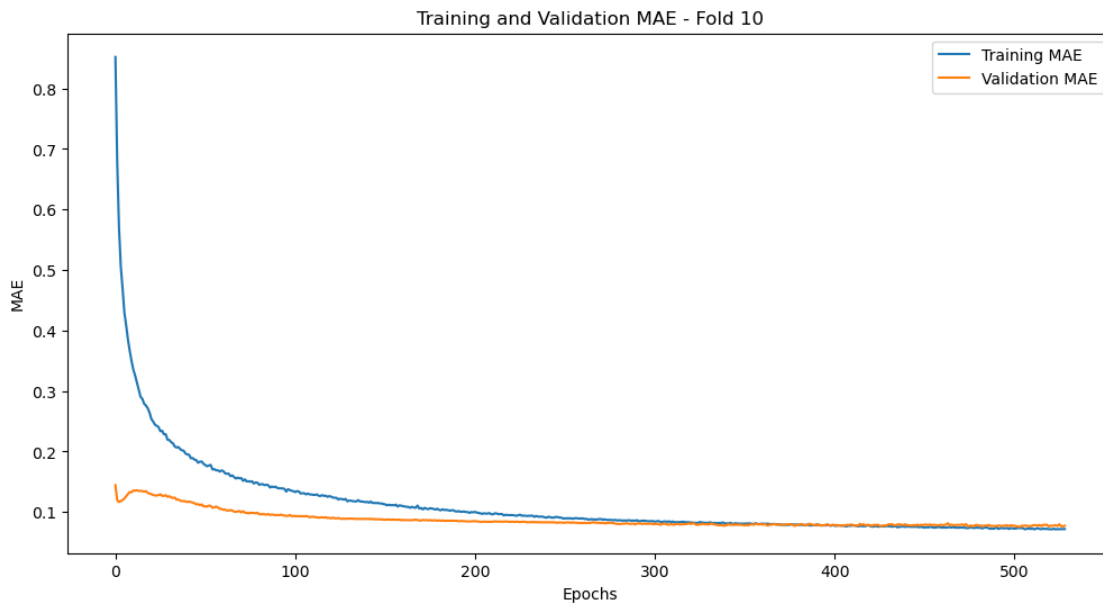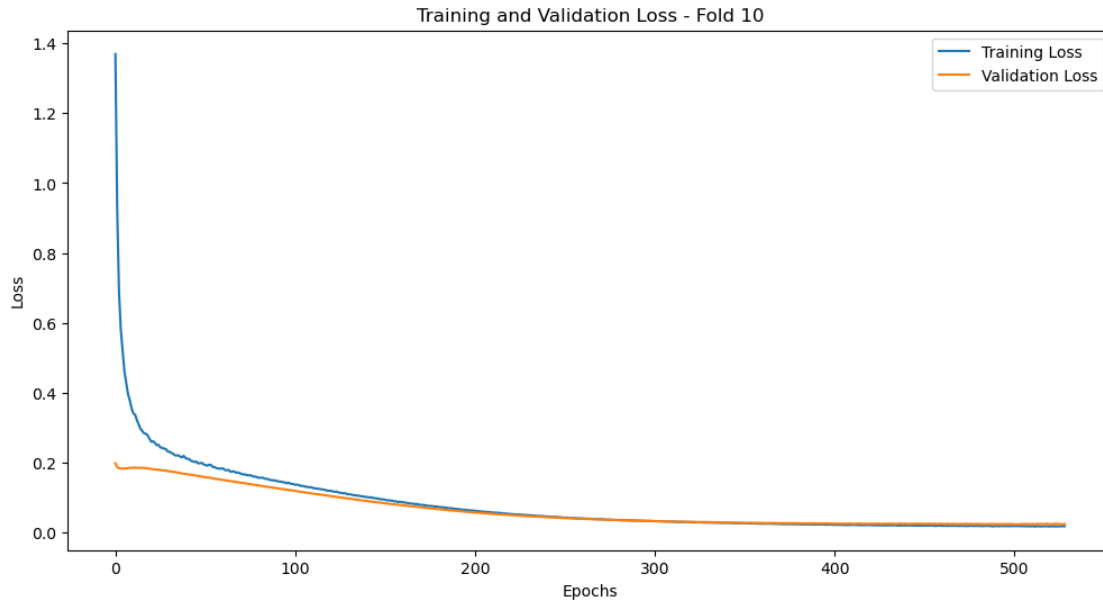
Fold Validation MAE: 0.07538031041622162

Mean Validation MAE: 0.07412100732326507
Standard Deviation of Validation MAE: 0.003254791746107604

[ ]: 4.1 Identificação, descrição e desempenho dos dois melhores modelos

Modelo com KFold Cross Validation:

   Houve uma continuação da estrutura simplificada de 3 camadas densas (200, ↪100, 50) com regularização l1 e l2, e dropout decrescente (0.3, 0.156, 0. ↪025) para prevenir overfitting, intoduzindo a inicialização glorot_uniform ↪para tentar melhorar a estabilidade do modelo.

A arquitetura do modelo nesta iteração é a seguinte:

   Camadas: Reduzido para 3 camadas densas (200, 100, 50) para simplificar a ↪arquitetura
   Regularização: l1 e l2 aplicadas de maneira semelhante aos modelos ↪anteriores testando varaiaçoes
   Dropout: Mantido o padrão decrescente (0.3, 0.156, 0.025) para prevenir ↪overfitting
   Ativação: LeakyReLU nas primeiras camadas, ReLU na última camada densa, ↪revelou ser uma boa combinação
   Otimização: Adam com taxa de aprendizagem a 0.0003 e EarlyStopping com ↪paciencia de 25 epochs

Talvez pela simplicidade da arquitetura, o modelo não conseguiu melhorar o MAE, ↪mas manteve-se estável e com um MAE médio de 0.0739, com um desvio padrão de ↪0.0035, levando a testes de utilização de diferentes features e diferentes ↪organizações de dados para tentar extrair um melhor MAE, mas com grande ↪dificuldade

[12]:
```python
# Criação do modelo com da dados completos - MAE de 0.0722

def create_model(input_shape):
    model = Sequential([
        Dense(200, activation=LeakyReLU(negative_slope=0.01),
 ↪kernel_regularizer=l1(0.0001), input_shape=input_shape,
 ↪kernel_initializer='glorot_uniform'),
        BatchNormalization(),
        Dropout(0.3),
        Dense(100, activation=LeakyReLU(negative_slope=0.01),
 ↪kernel_regularizer=l2(0.001)),
        BatchNormalization(),
        Dropout(0.156),
        Dense(50, activation='relu'),
        BatchNormalization(),
        Dropout(0.025),
        Dense(1)
    ])

    optimizer = Adam(learning_rate=0.0001)
```

```python
    model.compile(optimizer=optimizer, loss='mean_squared_error',␣
 ↪metrics=['mae'])

    return model

# Criar o modelo final
final_model = create_model((X_scaled.shape[1],))

# Early stopping callback
early_stopping = EarlyStopping(monitor='loss', patience=35,␣
 ↪restore_best_weights=True)

# Treinar o modelo final em todos os dados disponíveis
history = final_model.fit(X_scaled, y, epochs=2000, batch_size=1024,␣
 ↪callbacks=[early_stopping], verbose=1)

# Plotting do training loss
plt.figure(figsize=(12, 6))
plt.plot(history.history['loss'], label='Training Loss')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.title('Training Loss - Full Data')
plt.legend()
plt.show()

# Plotting do training MAE
plt.figure(figsize=(12, 6))
plt.plot(history.history['mae'], label='Training MAE')
plt.xlabel('Epochs')
plt.ylabel('MAE')
plt.title('Training MAE - Full Data')
plt.legend()
plt.show()
```

Epoch 1/2000

C:\Users\Jojo\AppData\Roaming\Python\Python311\site-
packages\keras\src\layers\core\dense.py:87: UserWarning: Do not pass an
`input_shape`/`input_dim` argument to a layer. When using Sequential models,
prefer using an `Input(shape)` object as the first layer in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)

11/11   2s 6ms/step - loss:
1.8794 - mae: 1.0136
Epoch 2/2000
11/11   0s 6ms/step - loss:
1.4902 - mae: 0.8910
Epoch 3/2000

```
11/11                0s 6ms/step - loss:
1.2744 - mae: 0.8236
Epoch 4/2000
11/11                0s 6ms/step - loss:
1.1406 - mae: 0.7594
Epoch 5/2000
11/11                0s 6ms/step - loss:
1.0340 - mae: 0.7256
Epoch 6/2000
11/11                0s 6ms/step - loss:
0.9655 - mae: 0.6937
Epoch 7/2000
11/11                0s 5ms/step - loss:
0.9128 - mae: 0.6714
Epoch 8/2000
11/11                0s 6ms/step - loss:
0.8569 - mae: 0.6469
Epoch 9/2000
11/11                0s 5ms/step - loss:
0.8025 - mae: 0.6230
Epoch 10/2000
11/11                0s 5ms/step - loss:
0.7472 - mae: 0.5964
Epoch 11/2000
11/11                0s 6ms/step - loss:
0.7324 - mae: 0.5858
Epoch 12/2000
11/11                0s 6ms/step - loss:
0.7009 - mae: 0.5641
Epoch 13/2000
11/11                0s 5ms/step - loss:
0.6528 - mae: 0.5383
Epoch 14/2000
11/11                0s 5ms/step - loss:
0.6341 - mae: 0.5324
Epoch 15/2000
11/11                0s 6ms/step - loss:
0.6182 - mae: 0.5152
Epoch 16/2000
11/11                0s 6ms/step - loss:
0.5830 - mae: 0.5047
Epoch 17/2000
11/11                0s 6ms/step - loss:
0.5667 - mae: 0.4955
Epoch 18/2000
11/11                0s 6ms/step - loss:
0.5393 - mae: 0.4792
Epoch 19/2000
```

```
11/11              0s 6ms/step - loss:
0.5394 - mae: 0.4780
Epoch 20/2000
11/11              0s 6ms/step - loss:
0.5095 - mae: 0.4613
Epoch 21/2000
11/11              0s 5ms/step - loss:
0.5104 - mae: 0.4536
Epoch 22/2000
11/11              0s 5ms/step - loss:
0.5081 - mae: 0.4545
Epoch 23/2000
11/11              0s 5ms/step - loss:
0.4819 - mae: 0.4397
Epoch 24/2000
11/11              0s 6ms/step - loss:
0.4775 - mae: 0.4354
Epoch 25/2000
11/11              0s 5ms/step - loss:
0.4567 - mae: 0.4219
Epoch 26/2000
11/11              0s 6ms/step - loss:
0.4602 - mae: 0.4228
Epoch 27/2000
11/11              0s 6ms/step - loss:
0.4334 - mae: 0.4075
Epoch 28/2000
11/11              0s 5ms/step - loss:
0.4282 - mae: 0.4071
Epoch 29/2000
11/11              0s 6ms/step - loss:
0.4332 - mae: 0.4064
Epoch 30/2000
11/11              0s 6ms/step - loss:
0.4297 - mae: 0.4014
Epoch 31/2000
11/11              0s 6ms/step - loss:
0.4109 - mae: 0.3883
Epoch 32/2000
11/11              0s 5ms/step - loss:
0.4056 - mae: 0.3856
Epoch 33/2000
11/11              0s 5ms/step - loss:
0.4032 - mae: 0.3832
Epoch 34/2000
11/11              0s 5ms/step - loss:
0.3881 - mae: 0.3721
Epoch 35/2000
```

```
11/11              0s 5ms/step - loss:
0.3947 - mae: 0.3745
Epoch 36/2000
11/11              0s 6ms/step - loss:
0.3884 - mae: 0.3723
Epoch 37/2000
11/11              0s 6ms/step - loss:
0.3739 - mae: 0.3600
Epoch 38/2000
11/11              0s 5ms/step - loss:
0.3695 - mae: 0.3534
Epoch 39/2000
11/11              0s 5ms/step - loss:
0.3710 - mae: 0.3564
Epoch 40/2000
11/11              0s 6ms/step - loss:
0.3555 - mae: 0.3444
Epoch 41/2000
11/11              0s 6ms/step - loss:
0.3536 - mae: 0.3435
Epoch 42/2000
11/11              0s 6ms/step - loss:
0.3514 - mae: 0.3382
Epoch 43/2000
11/11              0s 5ms/step - loss:
0.3597 - mae: 0.3414
Epoch 44/2000
11/11              0s 5ms/step - loss:
0.3532 - mae: 0.3392
Epoch 45/2000
11/11              0s 5ms/step - loss:
0.3399 - mae: 0.3316
Epoch 46/2000
11/11              0s 6ms/step - loss:
0.3354 - mae: 0.3257
Epoch 47/2000
11/11              0s 5ms/step - loss:
0.3330 - mae: 0.3260
Epoch 48/2000
11/11              0s 5ms/step - loss:
0.3357 - mae: 0.3273
Epoch 49/2000
11/11              0s 5ms/step - loss:
0.3264 - mae: 0.3184
Epoch 50/2000
11/11              0s 5ms/step - loss:
0.3238 - mae: 0.3166
Epoch 51/2000
```

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11/11                0s 5ms/step - loss:
0.3151 - mae: 0.3113
Epoch 52/2000
11/11                0s 5ms/step - loss:
0.3202 - mae: 0.3120
Epoch 53/2000
11/11                0s 5ms/step - loss:
0.3192 - mae: 0.3098
Epoch 54/2000
11/11                0s 6ms/step - loss:
0.3174 - mae: 0.3080
Epoch 55/2000
11/11                0s 6ms/step - loss:
0.3168 - mae: 0.3068
Epoch 56/2000
11/11                0s 6ms/step - loss:
0.3119 - mae: 0.3053
Epoch 57/2000
11/11                0s 6ms/step - loss:
0.3068 - mae: 0.2991
Epoch 58/2000
11/11                0s 6ms/step - loss:
0.3078 - mae: 0.2999
Epoch 59/2000
11/11                0s 6ms/step - loss:
0.3012 - mae: 0.2978
Epoch 60/2000
11/11                0s 6ms/step - loss:
0.3070 - mae: 0.2936
Epoch 61/2000
11/11                0s 8ms/step - loss:
0.3003 - mae: 0.2918
Epoch 62/2000
11/11                0s 6ms/step - loss:
0.2978 - mae: 0.2925
Epoch 63/2000
11/11                0s 5ms/step - loss:
0.3072 - mae: 0.2945
Epoch 64/2000
11/11                0s 6ms/step - loss:
0.2958 - mae: 0.2872
Epoch 65/2000
11/11                0s 6ms/step - loss:
0.2909 - mae: 0.2825
Epoch 66/2000
11/11                0s 6ms/step - loss:
0.2906 - mae: 0.2817
Epoch 67/2000
```

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11/11              0s 6ms/step - loss:
0.2842 - mae: 0.2756
Epoch 68/2000
11/11              0s 6ms/step - loss:
0.2788 - mae: 0.2717
Epoch 69/2000
11/11              0s 5ms/step - loss:
0.2891 - mae: 0.2763
Epoch 70/2000
11/11              0s 5ms/step - loss:
0.2829 - mae: 0.2727
Epoch 71/2000
11/11              0s 6ms/step - loss:
0.2822 - mae: 0.2762
Epoch 72/2000
11/11              0s 6ms/step - loss:
0.2763 - mae: 0.2702
Epoch 73/2000
11/11              0s 6ms/step - loss:
0.2735 - mae: 0.2643
Epoch 74/2000
11/11              0s 6ms/step - loss:
0.2801 - mae: 0.2657
Epoch 75/2000
11/11              0s 6ms/step - loss:
0.2730 - mae: 0.2643
Epoch 76/2000
11/11              0s 8ms/step - loss:
0.2669 - mae: 0.2584
Epoch 77/2000
11/11              0s 5ms/step - loss:
0.2736 - mae: 0.2630
Epoch 78/2000
11/11              0s 5ms/step - loss:
0.2735 - mae: 0.2642
Epoch 79/2000
11/11              0s 6ms/step - loss:
0.2670 - mae: 0.2611
Epoch 80/2000
11/11              0s 6ms/step - loss:
0.2624 - mae: 0.2565
Epoch 81/2000
11/11              0s 5ms/step - loss:
0.2655 - mae: 0.2561
Epoch 82/2000
11/11              0s 5ms/step - loss:
0.2629 - mae: 0.2525
Epoch 83/2000
```

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11/11              0s 6ms/step - loss:
0.2574 - mae: 0.2514
Epoch 84/2000
11/11              0s 5ms/step - loss:
0.2654 - mae: 0.2546
Epoch 85/2000
11/11              0s 6ms/step - loss:
0.2617 - mae: 0.2514
Epoch 86/2000
11/11              0s 5ms/step - loss:
0.2562 - mae: 0.2479
Epoch 87/2000
11/11              0s 6ms/step - loss:
0.2510 - mae: 0.2450
Epoch 88/2000
11/11              0s 5ms/step - loss:
0.2564 - mae: 0.2467
Epoch 89/2000
11/11              0s 5ms/step - loss:
0.2555 - mae: 0.2450
Epoch 90/2000
11/11              0s 6ms/step - loss:
0.2560 - mae: 0.2448
Epoch 91/2000
11/11              0s 8ms/step - loss:
0.2524 - mae: 0.2407
Epoch 92/2000
11/11              0s 6ms/step - loss:
0.2540 - mae: 0.2437
Epoch 93/2000
11/11              0s 6ms/step - loss:
0.2550 - mae: 0.2425
Epoch 94/2000
11/11              0s 6ms/step - loss:
0.2477 - mae: 0.2361
Epoch 95/2000
11/11              0s 6ms/step - loss:
0.2476 - mae: 0.2370
Epoch 96/2000
11/11              0s 5ms/step - loss:
0.2495 - mae: 0.2368
Epoch 97/2000
11/11              0s 5ms/step - loss:
0.2521 - mae: 0.2399
Epoch 98/2000
11/11              0s 6ms/step - loss:
0.2440 - mae: 0.2330
Epoch 99/2000
```

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11/11                0s 5ms/step - loss:
0.2489 - mae: 0.2375
Epoch 100/2000
11/11                0s 6ms/step - loss:
0.2514 - mae: 0.2377
Epoch 101/2000
11/11                0s 6ms/step - loss:
0.2416 - mae: 0.2298
Epoch 102/2000
11/11                0s 6ms/step - loss:
0.2439 - mae: 0.2298
Epoch 103/2000
11/11                0s 6ms/step - loss:
0.2394 - mae: 0.2290
Epoch 104/2000
11/11                0s 8ms/step - loss:
0.2440 - mae: 0.2299
Epoch 105/2000
11/11                0s 5ms/step - loss:
0.2425 - mae: 0.2304
Epoch 106/2000
11/11                0s 6ms/step - loss:
0.2394 - mae: 0.2274
Epoch 107/2000
11/11                0s 5ms/step - loss:
0.2397 - mae: 0.2275
Epoch 108/2000
11/11                0s 6ms/step - loss:
0.2379 - mae: 0.2252
Epoch 109/2000
11/11                0s 5ms/step - loss:
0.2395 - mae: 0.2270
Epoch 110/2000
11/11                0s 6ms/step - loss:
0.2343 - mae: 0.2223
Epoch 111/2000
11/11                0s 6ms/step - loss:
0.2321 - mae: 0.2194
Epoch 112/2000
11/11                0s 5ms/step - loss:
0.2352 - mae: 0.2222
Epoch 113/2000
11/11                0s 5ms/step - loss:
0.2333 - mae: 0.2186
Epoch 114/2000
11/11                0s 6ms/step - loss:
0.2318 - mae: 0.2196
Epoch 115/2000
```

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11/11              0s 6ms/step - loss:
0.2342 - mae: 0.2199
Epoch 116/2000
11/11              0s 5ms/step - loss:
0.2300 - mae: 0.2193
Epoch 117/2000
11/11              0s 6ms/step - loss:
0.2288 - mae: 0.2181
Epoch 118/2000
11/11              0s 5ms/step - loss:
0.2321 - mae: 0.2167
Epoch 119/2000
11/11              0s 8ms/step - loss:
0.2268 - mae: 0.2127
Epoch 120/2000
11/11              0s 6ms/step - loss:
0.2254 - mae: 0.2144
Epoch 121/2000
11/11              0s 5ms/step - loss:
0.2276 - mae: 0.2138
Epoch 122/2000
11/11              0s 6ms/step - loss:
0.2241 - mae: 0.2101
Epoch 123/2000
11/11              0s 6ms/step - loss:
0.2242 - mae: 0.2114
Epoch 124/2000
11/11              0s 6ms/step - loss:
0.2260 - mae: 0.2102
Epoch 125/2000
11/11              0s 6ms/step - loss:
0.2290 - mae: 0.2116
Epoch 126/2000
11/11              0s 6ms/step - loss:
0.2266 - mae: 0.2092
Epoch 127/2000
11/11              0s 6ms/step - loss:
0.2252 - mae: 0.2099
Epoch 128/2000
11/11              0s 6ms/step - loss:
0.2214 - mae: 0.2089
Epoch 129/2000
11/11              0s 6ms/step - loss:
0.2211 - mae: 0.2084
Epoch 130/2000
11/11              0s 6ms/step - loss:
0.2260 - mae: 0.2090
Epoch 131/2000
```

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11/11              0s 6ms/step - loss:
0.2270 - mae: 0.2089
Epoch 132/2000
11/11              0s 8ms/step - loss:
0.2236 - mae: 0.2085
Epoch 133/2000
11/11              0s 6ms/step - loss:
0.2188 - mae: 0.2050
Epoch 134/2000
11/11              0s 6ms/step - loss:
0.2226 - mae: 0.2061
Epoch 135/2000
11/11              0s 6ms/step - loss:
0.2232 - mae: 0.2079
Epoch 136/2000
11/11              0s 6ms/step - loss:
0.2155 - mae: 0.1991
Epoch 137/2000
11/11              0s 6ms/step - loss:
0.2197 - mae: 0.2042
Epoch 138/2000
11/11              0s 6ms/step - loss:
0.2234 - mae: 0.2060
Epoch 139/2000
11/11              0s 5ms/step - loss:
0.2150 - mae: 0.2020
Epoch 140/2000
11/11              0s 6ms/step - loss:
0.2187 - mae: 0.2029
Epoch 141/2000
11/11              0s 6ms/step - loss:
0.2110 - mae: 0.1963
Epoch 142/2000
11/11              0s 6ms/step - loss:
0.2136 - mae: 0.1982
Epoch 143/2000
11/11              0s 6ms/step - loss:
0.2135 - mae: 0.1973
Epoch 144/2000
11/11              0s 6ms/step - loss:
0.2140 - mae: 0.2004
Epoch 145/2000
11/11              0s 7ms/step - loss:
0.2161 - mae: 0.1974
Epoch 146/2000
11/11              0s 8ms/step - loss:
0.2111 - mae: 0.1955
Epoch 147/2000
```

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11/11                0s 6ms/step - loss:
0.2139 - mae: 0.1980
Epoch 148/2000
11/11                0s 6ms/step - loss:
0.2104 - mae: 0.1939
Epoch 149/2000
11/11                0s 6ms/step - loss:
0.2077 - mae: 0.1909
Epoch 150/2000
11/11                0s 6ms/step - loss:
0.2054 - mae: 0.1922
Epoch 151/2000
11/11                0s 6ms/step - loss:
0.2085 - mae: 0.1911
Epoch 152/2000
11/11                0s 6ms/step - loss:
0.2082 - mae: 0.1910
Epoch 153/2000
11/11                0s 6ms/step - loss:
0.2026 - mae: 0.1870
Epoch 154/2000
11/11                0s 6ms/step - loss:
0.2049 - mae: 0.1890
Epoch 155/2000
11/11                0s 6ms/step - loss:
0.2107 - mae: 0.1948
Epoch 156/2000
11/11                0s 5ms/step - loss:
0.2061 - mae: 0.1891
Epoch 157/2000
11/11                0s 6ms/step - loss:
0.2025 - mae: 0.1868
Epoch 158/2000
11/11                0s 6ms/step - loss:
0.2044 - mae: 0.1904
Epoch 159/2000
11/11                0s 8ms/step - loss:
0.2041 - mae: 0.1877
Epoch 160/2000
11/11                0s 6ms/step - loss:
0.2025 - mae: 0.1845
Epoch 161/2000
11/11                0s 6ms/step - loss:
0.2077 - mae: 0.1926
Epoch 162/2000
11/11                0s 6ms/step - loss:
0.2024 - mae: 0.1829
Epoch 163/2000
```

```
11/11                0s 5ms/step - loss:
0.2013 - mae: 0.1869
Epoch 164/2000
11/11                0s 6ms/step - loss:
0.2023 - mae: 0.1849
Epoch 165/2000
11/11                0s 6ms/step - loss:
0.2021 - mae: 0.1859
Epoch 166/2000
11/11                0s 6ms/step - loss:
0.2019 - mae: 0.1868
Epoch 167/2000
11/11                0s 6ms/step - loss:
0.2033 - mae: 0.1886
Epoch 168/2000
11/11                0s 5ms/step - loss:
0.2021 - mae: 0.1854
Epoch 169/2000
11/11                0s 6ms/step - loss:
0.2005 - mae: 0.1868
Epoch 170/2000
11/11                0s 6ms/step - loss:
0.2016 - mae: 0.1839
Epoch 171/2000
11/11                0s 6ms/step - loss:
0.1971 - mae: 0.1799
Epoch 172/2000
11/11                0s 6ms/step - loss:
0.1963 - mae: 0.1820
Epoch 173/2000
11/11                0s 6ms/step - loss:
0.1978 - mae: 0.1828
Epoch 174/2000
11/11                0s 6ms/step - loss:
0.1964 - mae: 0.1792
Epoch 175/2000
11/11                0s 6ms/step - loss:
0.1984 - mae: 0.1835
Epoch 176/2000
11/11                0s 6ms/step - loss:
0.1958 - mae: 0.1818
Epoch 177/2000
11/11                0s 6ms/step - loss:
0.1943 - mae: 0.1799
Epoch 178/2000
11/11                0s 6ms/step - loss:
0.1949 - mae: 0.1793
Epoch 179/2000
```

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11/11              0s 6ms/step - loss:
0.1959 - mae: 0.1788
Epoch 180/2000
11/11              0s 6ms/step - loss:
0.1968 - mae: 0.1806
Epoch 181/2000
11/11              0s 6ms/step - loss:
0.1933 - mae: 0.1773
Epoch 182/2000
11/11              0s 6ms/step - loss:
0.1877 - mae: 0.1713
Epoch 183/2000
11/11              0s 5ms/step - loss:
0.1965 - mae: 0.1805
Epoch 184/2000
11/11              0s 8ms/step - loss:
0.1909 - mae: 0.1760
Epoch 185/2000
11/11              0s 6ms/step - loss:
0.1927 - mae: 0.1773
Epoch 186/2000
11/11              0s 5ms/step - loss:
0.1896 - mae: 0.1756
Epoch 187/2000
11/11              0s 6ms/step - loss:
0.1918 - mae: 0.1769
Epoch 188/2000
11/11              0s 5ms/step - loss:
0.1895 - mae: 0.1727
Epoch 189/2000
11/11              0s 5ms/step - loss:
0.1889 - mae: 0.1737
Epoch 190/2000
11/11              0s 6ms/step - loss:
0.1884 - mae: 0.1741
Epoch 191/2000
11/11              0s 6ms/step - loss:
0.1879 - mae: 0.1756
Epoch 192/2000
11/11              0s 5ms/step - loss:
0.1882 - mae: 0.1725
Epoch 193/2000
11/11              0s 6ms/step - loss:
0.1873 - mae: 0.1713
Epoch 194/2000
11/11              0s 6ms/step - loss:
0.1848 - mae: 0.1708
Epoch 195/2000
```

```
11/11              0s 5ms/step - loss:
0.1863 - mae: 0.1705
Epoch 196/2000
11/11              0s 8ms/step - loss:
0.1851 - mae: 0.1704
Epoch 197/2000
11/11              0s 6ms/step - loss:
0.1843 - mae: 0.1720
Epoch 198/2000
11/11              0s 5ms/step - loss:
0.1863 - mae: 0.1708
Epoch 199/2000
11/11              0s 6ms/step - loss:
0.1836 - mae: 0.1694
Epoch 200/2000
11/11              0s 6ms/step - loss:
0.1842 - mae: 0.1692
Epoch 201/2000
11/11              0s 5ms/step - loss:
0.1844 - mae: 0.1696
Epoch 202/2000
11/11              0s 5ms/step - loss:
0.1849 - mae: 0.1683
Epoch 203/2000
11/11              0s 5ms/step - loss:
0.1842 - mae: 0.1690
Epoch 204/2000
11/11              0s 5ms/step - loss:
0.1841 - mae: 0.1698
Epoch 205/2000
11/11              0s 6ms/step - loss:
0.1810 - mae: 0.1671
Epoch 206/2000
11/11              0s 5ms/step - loss:
0.1824 - mae: 0.1664
Epoch 207/2000
11/11              0s 6ms/step - loss:
0.1795 - mae: 0.1653
Epoch 208/2000
11/11              0s 7ms/step - loss:
0.1807 - mae: 0.1680
Epoch 209/2000
11/11              0s 6ms/step - loss:
0.1818 - mae: 0.1674
Epoch 210/2000
11/11              0s 6ms/step - loss:
0.1816 - mae: 0.1667
Epoch 211/2000
```

```
11/11               0s 6ms/step - loss:
0.1813 - mae: 0.1678
Epoch 212/2000
11/11               0s 6ms/step - loss:
0.1780 - mae: 0.1635
Epoch 213/2000
11/11               0s 5ms/step - loss:
0.1807 - mae: 0.1678
Epoch 214/2000
11/11               0s 5ms/step - loss:
0.1821 - mae: 0.1677
Epoch 215/2000
11/11               0s 6ms/step - loss:
0.1759 - mae: 0.1623
Epoch 216/2000
11/11               0s 8ms/step - loss:
0.1803 - mae: 0.1648
Epoch 217/2000
11/11               0s 6ms/step - loss:
0.1770 - mae: 0.1617
Epoch 218/2000
11/11               0s 6ms/step - loss:
0.1761 - mae: 0.1616
Epoch 219/2000
11/11               0s 6ms/step - loss:
0.1750 - mae: 0.1590
Epoch 220/2000
11/11               0s 6ms/step - loss:
0.1754 - mae: 0.1623
Epoch 221/2000
11/11               0s 6ms/step - loss:
0.1775 - mae: 0.1627
Epoch 222/2000
11/11               0s 6ms/step - loss:
0.1797 - mae: 0.1606
Epoch 223/2000
11/11               0s 6ms/step - loss:
0.1749 - mae: 0.1616
Epoch 224/2000
11/11               0s 6ms/step - loss:
0.1734 - mae: 0.1599
Epoch 225/2000
11/11               0s 6ms/step - loss:
0.1739 - mae: 0.1606
Epoch 226/2000
11/11               0s 5ms/step - loss:
0.1731 - mae: 0.1600
Epoch 227/2000
```

```
11/11              0s 8ms/step - loss:
0.1727 - mae: 0.1596
Epoch 228/2000
11/11              0s 5ms/step - loss:
0.1765 - mae: 0.1614
Epoch 229/2000
11/11              0s 6ms/step - loss:
0.1725 - mae: 0.1587
Epoch 230/2000
11/11              0s 6ms/step - loss:
0.1735 - mae: 0.1585
Epoch 231/2000
11/11              0s 6ms/step - loss:
0.1719 - mae: 0.1579
Epoch 232/2000
11/11              0s 6ms/step - loss:
0.1714 - mae: 0.1591
Epoch 233/2000
11/11              0s 6ms/step - loss:
0.1694 - mae: 0.1579
Epoch 234/2000
11/11              0s 6ms/step - loss:
0.1699 - mae: 0.1574
Epoch 235/2000
11/11              0s 5ms/step - loss:
0.1700 - mae: 0.1573
Epoch 236/2000
11/11              0s 6ms/step - loss:
0.1730 - mae: 0.1563
Epoch 237/2000
11/11              0s 6ms/step - loss:
0.1660 - mae: 0.1538
Epoch 238/2000
11/11              0s 6ms/step - loss:
0.1685 - mae: 0.1573
Epoch 239/2000
11/11              0s 5ms/step - loss:
0.1687 - mae: 0.1560
Epoch 240/2000
11/11              0s 5ms/step - loss:
0.1704 - mae: 0.1568
Epoch 241/2000
11/11              0s 5ms/step - loss:
0.1731 - mae: 0.1573
Epoch 242/2000
11/11              0s 6ms/step - loss:
0.1660 - mae: 0.1537
Epoch 243/2000
```

```
11/11              0s 7ms/step - loss:
0.1669 - mae: 0.1564
Epoch 244/2000
11/11              0s 6ms/step - loss:
0.1653 - mae: 0.1555
Epoch 245/2000
11/11              0s 6ms/step - loss:
0.1690 - mae: 0.1549
Epoch 246/2000
11/11              0s 6ms/step - loss:
0.1650 - mae: 0.1544
Epoch 247/2000
11/11              0s 6ms/step - loss:
0.1662 - mae: 0.1551
Epoch 248/2000
11/11              0s 6ms/step - loss:
0.1655 - mae: 0.1550
Epoch 249/2000
11/11              0s 6ms/step - loss:
0.1667 - mae: 0.1561
Epoch 250/2000
11/11              0s 6ms/step - loss:
0.1611 - mae: 0.1511
Epoch 251/2000
11/11              0s 6ms/step - loss:
0.1610 - mae: 0.1511
Epoch 252/2000
11/11              0s 6ms/step - loss:
0.1606 - mae: 0.1506
Epoch 253/2000
11/11              0s 6ms/step - loss:
0.1637 - mae: 0.1553
Epoch 254/2000
11/11              0s 6ms/step - loss:
0.1608 - mae: 0.1519
Epoch 255/2000
11/11              0s 6ms/step - loss:
0.1609 - mae: 0.1488
Epoch 256/2000
11/11              0s 6ms/step - loss:
0.1612 - mae: 0.1515
Epoch 257/2000
11/11              0s 7ms/step - loss:
0.1640 - mae: 0.1518
Epoch 258/2000
11/11              0s 6ms/step - loss:
0.1578 - mae: 0.1491
Epoch 259/2000
```

```
11/11              0s 5ms/step - loss:
0.1628 - mae: 0.1521
Epoch 260/2000
11/11              0s 6ms/step - loss:
0.1614 - mae: 0.1515
Epoch 261/2000
11/11              0s 6ms/step - loss:
0.1593 - mae: 0.1500
Epoch 262/2000
11/11              0s 6ms/step - loss:
0.1578 - mae: 0.1486
Epoch 263/2000
11/11              0s 6ms/step - loss:
0.1616 - mae: 0.1520
Epoch 264/2000
11/11              0s 6ms/step - loss:
0.1569 - mae: 0.1475
Epoch 265/2000
11/11              0s 6ms/step - loss:
0.1595 - mae: 0.1509
Epoch 266/2000
11/11              0s 6ms/step - loss:
0.1562 - mae: 0.1470
Epoch 267/2000
11/11              0s 6ms/step - loss:
0.1589 - mae: 0.1493
Epoch 268/2000
11/11              0s 6ms/step - loss:
0.1582 - mae: 0.1485
Epoch 269/2000
11/11              0s 5ms/step - loss:
0.1566 - mae: 0.1492
Epoch 270/2000
11/11              0s 6ms/step - loss:
0.1561 - mae: 0.1459
Epoch 271/2000
11/11              0s 6ms/step - loss:
0.1585 - mae: 0.1467
Epoch 272/2000
11/11              0s 6ms/step - loss:
0.1543 - mae: 0.1467
Epoch 273/2000
11/11              0s 6ms/step - loss:
0.1547 - mae: 0.1459
Epoch 274/2000
11/11              0s 6ms/step - loss:
0.1556 - mae: 0.1495
Epoch 275/2000
```

```
11/11              0s 6ms/step - loss:
0.1524 - mae: 0.1463
Epoch 276/2000
11/11              0s 6ms/step - loss:
0.1593 - mae: 0.1491
Epoch 277/2000
11/11              0s 8ms/step - loss:
0.1601 - mae: 0.1497
Epoch 278/2000
11/11              0s 5ms/step - loss:
0.1547 - mae: 0.1477
Epoch 279/2000
11/11              0s 6ms/step - loss:
0.1507 - mae: 0.1444
Epoch 280/2000
11/11              0s 6ms/step - loss:
0.1553 - mae: 0.1493
Epoch 281/2000
11/11              0s 6ms/step - loss:
0.1496 - mae: 0.1442
Epoch 282/2000
11/11              0s 6ms/step - loss:
0.1521 - mae: 0.1457
Epoch 283/2000
11/11              0s 6ms/step - loss:
0.1473 - mae: 0.1412
Epoch 284/2000
11/11              0s 5ms/step - loss:
0.1558 - mae: 0.1490
Epoch 285/2000
11/11              0s 6ms/step - loss:
0.1551 - mae: 0.1456
Epoch 286/2000
11/11              0s 6ms/step - loss:
0.1506 - mae: 0.1445
Epoch 287/2000
11/11              0s 6ms/step - loss:
0.1541 - mae: 0.1492
Epoch 288/2000
11/11              0s 6ms/step - loss:
0.1491 - mae: 0.1414
Epoch 289/2000
11/11              0s 6ms/step - loss:
0.1465 - mae: 0.1413
Epoch 290/2000
11/11              0s 6ms/step - loss:
0.1489 - mae: 0.1426
Epoch 291/2000
```

```
11/11              0s 6ms/step - loss:
0.1493 - mae: 0.1421
Epoch 292/2000
11/11              0s 6ms/step - loss:
0.1462 - mae: 0.1425
Epoch 293/2000
11/11              0s 6ms/step - loss:
0.1474 - mae: 0.1440
Epoch 294/2000
11/11              0s 6ms/step - loss:
0.1471 - mae: 0.1429
Epoch 295/2000
11/11              0s 5ms/step - loss:
0.1493 - mae: 0.1440
Epoch 296/2000
11/11              0s 6ms/step - loss:
0.1436 - mae: 0.1419
Epoch 297/2000
11/11              0s 6ms/step - loss:
0.1430 - mae: 0.1406
Epoch 298/2000
11/11              0s 6ms/step - loss:
0.1449 - mae: 0.1420
Epoch 299/2000
11/11              0s 6ms/step - loss:
0.1458 - mae: 0.1434
Epoch 300/2000
11/11              0s 6ms/step - loss:
0.1445 - mae: 0.1404
Epoch 301/2000
11/11              0s 6ms/step - loss:
0.1452 - mae: 0.1419
Epoch 302/2000
11/11              0s 6ms/step - loss:
0.1450 - mae: 0.1417
Epoch 303/2000
11/11              0s 6ms/step - loss:
0.1428 - mae: 0.1404
Epoch 304/2000
11/11              0s 5ms/step - loss:
0.1415 - mae: 0.1380
Epoch 305/2000
11/11              0s 6ms/step - loss:
0.1416 - mae: 0.1394
Epoch 306/2000
11/11              0s 6ms/step - loss:
0.1388 - mae: 0.1373
Epoch 307/2000
```

```
11/11              0s 7ms/step - loss:
0.1419 - mae: 0.1403
Epoch 308/2000
11/11              0s 5ms/step - loss:
0.1417 - mae: 0.1375
Epoch 309/2000
11/11              0s 5ms/step - loss:
0.1413 - mae: 0.1409
Epoch 310/2000
11/11              0s 6ms/step - loss:
0.1424 - mae: 0.1409
Epoch 311/2000
11/11              0s 6ms/step - loss:
0.1451 - mae: 0.1390
Epoch 312/2000
11/11              0s 6ms/step - loss:
0.1420 - mae: 0.1424
Epoch 313/2000
11/11              0s 6ms/step - loss:
0.1396 - mae: 0.1384
Epoch 314/2000
11/11              0s 6ms/step - loss:
0.1404 - mae: 0.1387
Epoch 315/2000
11/11              0s 6ms/step - loss:
0.1364 - mae: 0.1363
Epoch 316/2000
11/11              0s 5ms/step - loss:
0.1379 - mae: 0.1391
Epoch 317/2000
11/11              0s 8ms/step - loss:
0.1350 - mae: 0.1340
Epoch 318/2000
11/11              0s 6ms/step - loss:
0.1358 - mae: 0.1355
Epoch 319/2000
11/11              0s 6ms/step - loss:
0.1372 - mae: 0.1368
Epoch 320/2000
11/11              0s 6ms/step - loss:
0.1337 - mae: 0.1341
Epoch 321/2000
11/11              0s 5ms/step - loss:
0.1357 - mae: 0.1367
Epoch 322/2000
11/11              0s 5ms/step - loss:
0.1353 - mae: 0.1361
Epoch 323/2000
```

```
11/11              0s 6ms/step - loss:
0.1354 - mae: 0.1370
Epoch 324/2000
11/11              0s 6ms/step - loss:
0.1331 - mae: 0.1353
Epoch 325/2000
11/11              0s 6ms/step - loss:
0.1364 - mae: 0.1373
Epoch 326/2000
11/11              0s 8ms/step - loss:
0.1309 - mae: 0.1337
Epoch 327/2000
11/11              0s 6ms/step - loss:
0.1318 - mae: 0.1328
Epoch 328/2000
11/11              0s 6ms/step - loss:
0.1293 - mae: 0.1324
Epoch 329/2000
11/11              0s 6ms/step - loss:
0.1335 - mae: 0.1330
Epoch 330/2000
11/11              0s 6ms/step - loss:
0.1312 - mae: 0.1331
Epoch 331/2000
11/11              0s 6ms/step - loss:
0.1330 - mae: 0.1348
Epoch 332/2000
11/11              0s 6ms/step - loss:
0.1321 - mae: 0.1340
Epoch 333/2000
11/11              0s 6ms/step - loss:
0.1289 - mae: 0.1330
Epoch 334/2000
11/11              0s 5ms/step - loss:
0.1293 - mae: 0.1318
Epoch 335/2000
11/11              0s 6ms/step - loss:
0.1296 - mae: 0.1332
Epoch 336/2000
11/11              0s 8ms/step - loss:
0.1283 - mae: 0.1330
Epoch 337/2000
11/11              0s 6ms/step - loss:
0.1281 - mae: 0.1317
Epoch 338/2000
11/11              0s 6ms/step - loss:
0.1291 - mae: 0.1348
Epoch 339/2000
```

```
11/11                0s 6ms/step - loss:
0.1296 - mae: 0.1337
Epoch 340/2000
11/11                0s 6ms/step - loss:
0.1281 - mae: 0.1309
Epoch 341/2000
11/11                0s 6ms/step - loss:
0.1283 - mae: 0.1325
Epoch 342/2000
11/11                0s 6ms/step - loss:
0.1280 - mae: 0.1334
Epoch 343/2000
11/11                0s 5ms/step - loss:
0.1293 - mae: 0.1328
Epoch 344/2000
11/11                0s 6ms/step - loss:
0.1282 - mae: 0.1330
Epoch 345/2000
11/11                0s 5ms/step - loss:
0.1262 - mae: 0.1314
Epoch 346/2000
11/11                0s 8ms/step - loss:
0.1254 - mae: 0.1312
Epoch 347/2000
11/11                0s 5ms/step - loss:
0.1274 - mae: 0.1321
Epoch 348/2000
11/11                0s 6ms/step - loss:
0.1235 - mae: 0.1304
Epoch 349/2000
11/11                0s 6ms/step - loss:
0.1255 - mae: 0.1319
Epoch 350/2000
11/11                0s 6ms/step - loss:
0.1219 - mae: 0.1280
Epoch 351/2000
11/11                0s 5ms/step - loss:
0.1279 - mae: 0.1310
Epoch 352/2000
11/11                0s 5ms/step - loss:
0.1244 - mae: 0.1313
Epoch 353/2000
11/11                0s 5ms/step - loss:
0.1215 - mae: 0.1287
Epoch 354/2000
11/11                0s 5ms/step - loss:
0.1218 - mae: 0.1270
Epoch 355/2000
```

```
11/11              0s 6ms/step - loss:
0.1220 - mae: 0.1304
Epoch 356/2000
11/11              0s 6ms/step - loss:
0.1235 - mae: 0.1311
Epoch 357/2000
11/11              0s 6ms/step - loss:
0.1191 - mae: 0.1271
Epoch 358/2000
11/11              0s 5ms/step - loss:
0.1243 - mae: 0.1321
Epoch 359/2000
11/11              0s 6ms/step - loss:
0.1213 - mae: 0.1286
Epoch 360/2000
11/11              0s 6ms/step - loss:
0.1201 - mae: 0.1300
Epoch 361/2000
11/11              0s 6ms/step - loss:
0.1206 - mae: 0.1270
Epoch 362/2000
11/11              0s 6ms/step - loss:
0.1223 - mae: 0.1300
Epoch 363/2000
11/11              0s 8ms/step - loss:
0.1193 - mae: 0.1291
Epoch 364/2000
11/11              0s 6ms/step - loss:
0.1178 - mae: 0.1271
Epoch 365/2000
11/11              0s 6ms/step - loss:
0.1179 - mae: 0.1266
Epoch 366/2000
11/11              0s 6ms/step - loss:
0.1188 - mae: 0.1290
Epoch 367/2000
11/11              0s 6ms/step - loss:
0.1193 - mae: 0.1271
Epoch 368/2000
11/11              0s 6ms/step - loss:
0.1183 - mae: 0.1265
Epoch 369/2000
11/11              0s 6ms/step - loss:
0.1188 - mae: 0.1291
Epoch 370/2000
11/11              0s 6ms/step - loss:
0.1182 - mae: 0.1292
Epoch 371/2000
```

```
11/11              0s 6ms/step - loss:
0.1188 - mae: 0.1287
Epoch 372/2000
11/11              0s 6ms/step - loss:
0.1182 - mae: 0.1278
Epoch 373/2000
11/11              0s 6ms/step - loss:
0.1155 - mae: 0.1263
Epoch 374/2000
11/11              0s 6ms/step - loss:
0.1197 - mae: 0.1251
Epoch 375/2000
11/11              0s 6ms/step - loss:
0.1156 - mae: 0.1261
Epoch 376/2000
11/11              0s 6ms/step - loss:
0.1147 - mae: 0.1248
Epoch 377/2000
11/11              0s 6ms/step - loss:
0.1122 - mae: 0.1256
Epoch 378/2000
11/11              0s 6ms/step - loss:
0.1104 - mae: 0.1235
Epoch 379/2000
11/11              0s 6ms/step - loss:
0.1135 - mae: 0.1245
Epoch 380/2000
11/11              0s 9ms/step - loss:
0.1110 - mae: 0.1237
Epoch 381/2000
11/11              0s 6ms/step - loss:
0.1146 - mae: 0.1249
Epoch 382/2000
11/11              0s 6ms/step - loss:
0.1131 - mae: 0.1263
Epoch 383/2000
11/11              0s 6ms/step - loss:
0.1141 - mae: 0.1266
Epoch 384/2000
11/11              0s 6ms/step - loss:
0.1106 - mae: 0.1247
Epoch 385/2000
11/11              0s 6ms/step - loss:
0.1106 - mae: 0.1248
Epoch 386/2000
11/11              0s 6ms/step - loss:
0.1104 - mae: 0.1241
Epoch 387/2000
```

```
11/11              0s 9ms/step - loss:
0.1101 - mae: 0.1256
Epoch 388/2000
11/11              0s 6ms/step - loss:
0.1094 - mae: 0.1228
Epoch 389/2000
11/11              0s 6ms/step - loss:
0.1089 - mae: 0.1193
Epoch 390/2000
11/11              0s 5ms/step - loss:
0.1090 - mae: 0.1225
Epoch 391/2000
11/11              0s 6ms/step - loss:
0.1116 - mae: 0.1226
Epoch 392/2000
11/11              0s 6ms/step - loss:
0.1098 - mae: 0.1246
Epoch 393/2000
11/11              0s 6ms/step - loss:
0.1059 - mae: 0.1213
Epoch 394/2000
11/11              0s 6ms/step - loss:
0.1074 - mae: 0.1212
Epoch 395/2000
11/11              0s 6ms/step - loss:
0.1069 - mae: 0.1226
Epoch 396/2000
11/11              0s 6ms/step - loss:
0.1054 - mae: 0.1219
Epoch 397/2000
11/11              0s 6ms/step - loss:
0.1069 - mae: 0.1235
Epoch 398/2000
11/11              0s 6ms/step - loss:
0.1089 - mae: 0.1252
Epoch 399/2000
11/11              0s 6ms/step - loss:
0.1096 - mae: 0.1241
Epoch 400/2000
11/11              0s 5ms/step - loss:
0.1074 - mae: 0.1224
Epoch 401/2000
11/11              0s 5ms/step - loss:
0.1052 - mae: 0.1207
Epoch 402/2000
11/11              0s 5ms/step - loss:
0.1064 - mae: 0.1216
Epoch 403/2000
```

```
11/11              0s 5ms/step - loss:
0.1039 - mae: 0.1222
Epoch 404/2000
11/11              0s 8ms/step - loss:
0.1043 - mae: 0.1212
Epoch 405/2000
11/11              0s 6ms/step - loss:
0.1025 - mae: 0.1196
Epoch 406/2000
11/11              0s 6ms/step - loss:
0.1036 - mae: 0.1211
Epoch 407/2000
11/11              0s 6ms/step - loss:
0.1017 - mae: 0.1191
Epoch 408/2000
11/11              0s 6ms/step - loss:
0.1045 - mae: 0.1209
Epoch 409/2000
11/11              0s 6ms/step - loss:
0.1010 - mae: 0.1199
Epoch 410/2000
11/11              0s 9ms/step - loss:
0.1015 - mae: 0.1212
Epoch 411/2000
11/11              0s 6ms/step - loss:
0.1007 - mae: 0.1182
Epoch 412/2000
11/11              0s 6ms/step - loss:
0.1006 - mae: 0.1193
Epoch 413/2000
11/11              0s 6ms/step - loss:
0.1006 - mae: 0.1213
Epoch 414/2000
11/11              0s 6ms/step - loss:
0.1026 - mae: 0.1219
Epoch 415/2000
11/11              0s 6ms/step - loss:
0.0995 - mae: 0.1176
Epoch 416/2000
11/11              0s 6ms/step - loss:
0.0990 - mae: 0.1187
Epoch 417/2000
11/11              0s 6ms/step - loss:
0.1008 - mae: 0.1203
Epoch 418/2000
11/11              0s 6ms/step - loss:
0.0974 - mae: 0.1160
Epoch 419/2000
```

```
11/11              0s 6ms/step - loss:
0.0971 - mae: 0.1174
Epoch 420/2000
11/11              0s 8ms/step - loss:
0.1001 - mae: 0.1200
Epoch 421/2000
11/11              0s 5ms/step - loss:
0.0977 - mae: 0.1193
Epoch 422/2000
11/11              0s 5ms/step - loss:
0.0975 - mae: 0.1176
Epoch 423/2000
11/11              0s 6ms/step - loss:
0.0967 - mae: 0.1170
Epoch 424/2000
11/11              0s 6ms/step - loss:
0.0968 - mae: 0.1189
Epoch 425/2000
11/11              0s 6ms/step - loss:
0.0988 - mae: 0.1183
Epoch 426/2000
11/11              0s 6ms/step - loss:
0.0979 - mae: 0.1193
Epoch 427/2000
11/11              0s 6ms/step - loss:
0.0958 - mae: 0.1186
Epoch 428/2000
11/11              0s 6ms/step - loss:
0.0969 - mae: 0.1198
Epoch 429/2000
11/11              0s 6ms/step - loss:
0.0947 - mae: 0.1159
Epoch 430/2000
11/11              0s 6ms/step - loss:
0.0950 - mae: 0.1179
Epoch 431/2000
11/11              0s 8ms/step - loss:
0.0961 - mae: 0.1196
Epoch 432/2000
11/11              0s 6ms/step - loss:
0.0935 - mae: 0.1167
Epoch 433/2000
11/11              0s 6ms/step - loss:
0.0938 - mae: 0.1172
Epoch 434/2000
11/11              0s 6ms/step - loss:
0.0944 - mae: 0.1184
Epoch 435/2000
```

```
11/11              0s 6ms/step - loss:
0.0926 - mae: 0.1174
Epoch 436/2000
11/11              0s 6ms/step - loss:
0.0930 - mae: 0.1174
Epoch 437/2000
11/11              0s 5ms/step - loss:
0.0923 - mae: 0.1151
Epoch 438/2000
11/11              0s 6ms/step - loss:
0.0922 - mae: 0.1154
Epoch 439/2000
11/11              0s 6ms/step - loss:
0.0942 - mae: 0.1174
Epoch 440/2000
11/11              0s 6ms/step - loss:
0.0934 - mae: 0.1182
Epoch 441/2000
11/11              0s 5ms/step - loss:
0.0919 - mae: 0.1150
Epoch 442/2000
11/11              0s 6ms/step - loss:
0.0905 - mae: 0.1150
Epoch 443/2000
11/11              0s 6ms/step - loss:
0.0883 - mae: 0.1137
Epoch 444/2000
11/11              0s 5ms/step - loss:
0.0921 - mae: 0.1177
Epoch 445/2000
11/11              0s 6ms/step - loss:
0.0885 - mae: 0.1146
Epoch 446/2000
11/11              0s 6ms/step - loss:
0.0905 - mae: 0.1166
Epoch 447/2000
11/11              0s 7ms/step - loss:
0.0890 - mae: 0.1161
Epoch 448/2000
11/11              0s 6ms/step - loss:
0.0899 - mae: 0.1149
Epoch 449/2000
11/11              0s 6ms/step - loss:
0.0896 - mae: 0.1157
Epoch 450/2000
11/11              0s 6ms/step - loss:
0.0900 - mae: 0.1176
Epoch 451/2000
```

```
11/11              0s 6ms/step - loss:
0.0876 - mae: 0.1138
Epoch 452/2000
11/11              0s 6ms/step - loss:
0.0891 - mae: 0.1165
Epoch 453/2000
11/11              0s 6ms/step - loss:
0.0885 - mae: 0.1146
Epoch 454/2000
11/11              0s 5ms/step - loss:
0.0888 - mae: 0.1153
Epoch 455/2000
11/11              0s 8ms/step - loss:
0.0858 - mae: 0.1138
Epoch 456/2000
11/11              0s 6ms/step - loss:
0.0883 - mae: 0.1161
Epoch 457/2000
11/11              0s 5ms/step - loss:
0.0858 - mae: 0.1133
Epoch 458/2000
11/11              0s 6ms/step - loss:
0.0871 - mae: 0.1128
Epoch 459/2000
11/11              0s 6ms/step - loss:
0.0840 - mae: 0.1134
Epoch 460/2000
11/11              0s 6ms/step - loss:
0.0842 - mae: 0.1127
Epoch 461/2000
11/11              0s 5ms/step - loss:
0.0857 - mae: 0.1141
Epoch 462/2000
11/11              0s 5ms/step - loss:
0.0849 - mae: 0.1117
Epoch 463/2000
11/11              0s 6ms/step - loss:
0.0825 - mae: 0.1114
Epoch 464/2000
11/11              0s 5ms/step - loss:
0.0866 - mae: 0.1160
Epoch 465/2000
11/11              0s 5ms/step - loss:
0.0824 - mae: 0.1119
Epoch 466/2000
11/11              0s 6ms/step - loss:
0.0837 - mae: 0.1127
Epoch 467/2000
```

```
11/11              0s 6ms/step - loss:
0.0829 - mae: 0.1132
Epoch 468/2000
11/11              0s 6ms/step - loss:
0.0826 - mae: 0.1138
Epoch 469/2000
11/11              0s 6ms/step - loss:
0.0800 - mae: 0.1099
Epoch 470/2000
11/11              0s 5ms/step - loss:
0.0818 - mae: 0.1137
Epoch 471/2000
11/11              0s 9ms/step - loss:
0.0823 - mae: 0.1150
Epoch 472/2000
11/11              0s 5ms/step - loss:
0.0834 - mae: 0.1127
Epoch 473/2000
11/11              0s 6ms/step - loss:
0.0800 - mae: 0.1112
Epoch 474/2000
11/11              0s 6ms/step - loss:
0.0808 - mae: 0.1121
Epoch 475/2000
11/11              0s 6ms/step - loss:
0.0800 - mae: 0.1106
Epoch 476/2000
11/11              0s 6ms/step - loss:
0.0790 - mae: 0.1109
Epoch 477/2000
11/11              0s 6ms/step - loss:
0.0799 - mae: 0.1124
Epoch 478/2000
11/11              0s 6ms/step - loss:
0.0815 - mae: 0.1118
Epoch 479/2000
11/11              0s 8ms/step - loss:
0.0794 - mae: 0.1117
Epoch 480/2000
11/11              0s 6ms/step - loss:
0.0828 - mae: 0.1125
Epoch 481/2000
11/11              0s 6ms/step - loss:
0.0781 - mae: 0.1097
Epoch 482/2000
11/11              0s 6ms/step - loss:
0.0809 - mae: 0.1132
Epoch 483/2000
```

```
11/11              0s 6ms/step - loss:
0.0770 - mae: 0.1108
Epoch 484/2000
11/11              0s 6ms/step - loss:
0.0766 - mae: 0.1092
Epoch 485/2000
11/11              0s 6ms/step - loss:
0.0780 - mae: 0.1115
Epoch 486/2000
11/11              0s 7ms/step - loss:
0.0768 - mae: 0.1108
Epoch 487/2000
11/11              0s 6ms/step - loss:
0.0758 - mae: 0.1090
Epoch 488/2000
11/11              0s 5ms/step - loss:
0.0770 - mae: 0.1104
Epoch 489/2000
11/11              0s 6ms/step - loss:
0.0753 - mae: 0.1108
Epoch 490/2000
11/11              0s 6ms/step - loss:
0.0748 - mae: 0.1087
Epoch 491/2000
11/11              0s 6ms/step - loss:
0.0775 - mae: 0.1113
Epoch 492/2000
11/11              0s 6ms/step - loss:
0.0753 - mae: 0.1100
Epoch 493/2000
11/11              0s 5ms/step - loss:
0.0751 - mae: 0.1092
Epoch 494/2000
11/11              0s 5ms/step - loss:
0.0750 - mae: 0.1093
Epoch 495/2000
11/11              0s 5ms/step - loss:
0.0745 - mae: 0.1087
Epoch 496/2000
11/11              0s 5ms/step - loss:
0.0767 - mae: 0.1115
Epoch 497/2000
11/11              0s 6ms/step - loss:
0.0727 - mae: 0.1090
Epoch 498/2000
11/11              0s 6ms/step - loss:
0.0728 - mae: 0.1093
Epoch 499/2000
```

```
11/11                0s 9ms/step - loss:
0.0728 - mae: 0.1088
Epoch 500/2000
11/11                0s 5ms/step - loss:
0.0740 - mae: 0.1093
Epoch 501/2000
11/11                0s 6ms/step - loss:
0.0713 - mae: 0.1093
Epoch 502/2000
11/11                0s 5ms/step - loss:
0.0741 - mae: 0.1095
Epoch 503/2000
11/11                0s 6ms/step - loss:
0.0713 - mae: 0.1083
Epoch 504/2000
11/11                0s 6ms/step - loss:
0.0715 - mae: 0.1078
Epoch 505/2000
11/11                0s 5ms/step - loss:
0.0712 - mae: 0.1073
Epoch 506/2000
11/11                0s 7ms/step - loss:
0.0743 - mae: 0.1106
Epoch 507/2000
11/11                0s 6ms/step - loss:
0.0701 - mae: 0.1063
Epoch 508/2000
11/11                0s 5ms/step - loss:
0.0727 - mae: 0.1100
Epoch 509/2000
11/11                0s 6ms/step - loss:
0.0711 - mae: 0.1084
Epoch 510/2000
11/11                0s 5ms/step - loss:
0.0693 - mae: 0.1071
Epoch 511/2000
11/11                0s 5ms/step - loss:
0.0717 - mae: 0.1078
Epoch 512/2000
11/11                0s 6ms/step - loss:
0.0689 - mae: 0.1090
Epoch 513/2000
11/11                0s 6ms/step - loss:
0.0699 - mae: 0.1080
Epoch 514/2000
11/11                0s 6ms/step - loss:
0.0690 - mae: 0.1059
Epoch 515/2000
```

```
11/11              0s 6ms/step - loss:
0.0684 - mae: 0.1073
Epoch 516/2000
11/11              0s 6ms/step - loss:
0.0688 - mae: 0.1085
Epoch 517/2000
11/11              0s 5ms/step - loss:
0.0683 - mae: 0.1073
Epoch 518/2000
11/11              0s 6ms/step - loss:
0.0711 - mae: 0.1090
Epoch 519/2000
11/11              0s 6ms/step - loss:
0.0684 - mae: 0.1067
Epoch 520/2000
11/11              0s 9ms/step - loss:
0.0677 - mae: 0.1075
Epoch 521/2000
11/11              0s 6ms/step - loss:
0.0662 - mae: 0.1055
Epoch 522/2000
11/11              0s 6ms/step - loss:
0.0671 - mae: 0.1059
Epoch 523/2000
11/11              0s 6ms/step - loss:
0.0669 - mae: 0.1062
Epoch 524/2000
11/11              0s 6ms/step - loss:
0.0660 - mae: 0.1061
Epoch 525/2000
11/11              0s 6ms/step - loss:
0.0663 - mae: 0.1063
Epoch 526/2000
11/11              0s 6ms/step - loss:
0.0681 - mae: 0.1069
Epoch 527/2000
11/11              0s 5ms/step - loss:
0.0665 - mae: 0.1070
Epoch 528/2000
11/11              0s 6ms/step - loss:
0.0658 - mae: 0.1074
Epoch 529/2000
11/11              0s 6ms/step - loss:
0.0664 - mae: 0.1065
Epoch 530/2000
11/11              0s 6ms/step - loss:
0.0664 - mae: 0.1072
Epoch 531/2000
```

```
11/11              0s 6ms/step - loss:
0.0646 - mae: 0.1056
Epoch 532/2000
11/11              0s 6ms/step - loss:
0.0656 - mae: 0.1065
Epoch 533/2000
11/11              0s 8ms/step - loss:
0.0649 - mae: 0.1056
Epoch 534/2000
11/11              0s 6ms/step - loss:
0.0626 - mae: 0.1039
Epoch 535/2000
11/11              0s 5ms/step - loss:
0.0635 - mae: 0.1031
Epoch 536/2000
11/11              0s 6ms/step - loss:
0.0630 - mae: 0.1046
Epoch 537/2000
11/11              0s 5ms/step - loss:
0.0635 - mae: 0.1047
Epoch 538/2000
11/11              0s 5ms/step - loss:
0.0644 - mae: 0.1047
Epoch 539/2000
11/11              0s 5ms/step - loss:
0.0628 - mae: 0.1049
Epoch 540/2000
11/11              0s 6ms/step - loss:
0.0607 - mae: 0.1020
Epoch 541/2000
11/11              0s 6ms/step - loss:
0.0635 - mae: 0.1060
Epoch 542/2000
11/11              0s 5ms/step - loss:
0.0640 - mae: 0.1050
Epoch 543/2000
11/11              0s 6ms/step - loss:
0.0620 - mae: 0.1058
Epoch 544/2000
11/11              0s 5ms/step - loss:
0.0615 - mae: 0.1039
Epoch 545/2000
11/11              0s 5ms/step - loss:
0.0614 - mae: 0.1027
Epoch 546/2000
11/11              0s 5ms/step - loss:
0.0615 - mae: 0.1031
Epoch 547/2000
```

```
11/11                0s 6ms/step - loss:
0.0599 - mae: 0.1018
Epoch 548/2000
11/11                0s 6ms/step - loss:
0.0630 - mae: 0.1056
Epoch 549/2000
11/11                0s 7ms/step - loss:
0.0625 - mae: 0.1050
Epoch 550/2000
11/11                0s 6ms/step - loss:
0.0614 - mae: 0.1040
Epoch 551/2000
11/11                0s 6ms/step - loss:
0.0617 - mae: 0.1036
Epoch 552/2000
11/11                0s 6ms/step - loss:
0.0615 - mae: 0.1038
Epoch 553/2000
11/11                0s 5ms/step - loss:
0.0609 - mae: 0.1037
Epoch 554/2000
11/11                0s 5ms/step - loss:
0.0608 - mae: 0.1031
Epoch 555/2000
11/11                0s 6ms/step - loss:
0.0586 - mae: 0.1019
Epoch 556/2000
11/11                0s 6ms/step - loss:
0.0589 - mae: 0.1029
Epoch 557/2000
11/11                0s 6ms/step - loss:
0.0598 - mae: 0.1049
Epoch 558/2000
11/11                0s 5ms/step - loss:
0.0608 - mae: 0.1048
Epoch 559/2000
11/11                0s 5ms/step - loss:
0.0590 - mae: 0.1033
Epoch 560/2000
11/11                0s 5ms/step - loss:
0.0596 - mae: 0.1039
Epoch 561/2000
11/11                0s 6ms/step - loss:
0.0573 - mae: 0.1025
Epoch 562/2000
11/11                0s 6ms/step - loss:
0.0603 - mae: 0.1049
Epoch 563/2000
```

```
11/11              0s 6ms/step - loss:
0.0564 - mae: 0.1016
Epoch 564/2000
11/11              0s 6ms/step - loss:
0.0564 - mae: 0.1008
Epoch 565/2000
11/11              0s 6ms/step - loss:
0.0568 - mae: 0.1009
Epoch 566/2000
11/11              0s 5ms/step - loss:
0.0578 - mae: 0.1046
Epoch 567/2000
11/11              0s 5ms/step - loss:
0.0572 - mae: 0.1019
Epoch 568/2000
11/11              0s 5ms/step - loss:
0.0568 - mae: 0.1032
Epoch 569/2000
11/11              0s 6ms/step - loss:
0.0571 - mae: 0.1025
Epoch 570/2000
11/11              0s 5ms/step - loss:
0.0562 - mae: 0.1020
Epoch 571/2000
11/11              0s 5ms/step - loss:
0.0578 - mae: 0.1035
Epoch 572/2000
11/11              0s 5ms/step - loss:
0.0569 - mae: 0.1034
Epoch 573/2000
11/11              0s 5ms/step - loss:
0.0559 - mae: 0.1021
Epoch 574/2000
11/11              0s 6ms/step - loss:
0.0549 - mae: 0.1005
Epoch 575/2000
11/11              0s 6ms/step - loss:
0.0578 - mae: 0.1024
Epoch 576/2000
11/11              0s 6ms/step - loss:
0.0555 - mae: 0.1019
Epoch 577/2000
11/11              0s 6ms/step - loss:
0.0541 - mae: 0.0998
Epoch 578/2000
11/11              0s 5ms/step - loss:
0.0544 - mae: 0.1003
Epoch 579/2000
```

```
11/11              0s 5ms/step - loss:
0.0549 - mae: 0.0998
Epoch 580/2000
11/11              0s 6ms/step - loss:
0.0551 - mae: 0.1019
Epoch 581/2000
11/11              0s 6ms/step - loss:
0.0532 - mae: 0.1004
Epoch 582/2000
11/11              0s 6ms/step - loss:
0.0538 - mae: 0.1010
Epoch 583/2000
11/11              0s 7ms/step - loss:
0.0541 - mae: 0.1012
Epoch 584/2000
11/11              0s 5ms/step - loss:
0.0553 - mae: 0.1024
Epoch 585/2000
11/11              0s 6ms/step - loss:
0.0532 - mae: 0.0994
Epoch 586/2000
11/11              0s 5ms/step - loss:
0.0525 - mae: 0.0995
Epoch 587/2000
11/11              0s 6ms/step - loss:
0.0535 - mae: 0.0999
Epoch 588/2000
11/11              0s 5ms/step - loss:
0.0555 - mae: 0.1025
Epoch 589/2000
11/11              0s 6ms/step - loss:
0.0544 - mae: 0.1017
Epoch 590/2000
11/11              0s 9ms/step - loss:
0.0516 - mae: 0.0999
Epoch 591/2000
11/11              0s 6ms/step - loss:
0.0519 - mae: 0.1006
Epoch 592/2000
11/11              0s 6ms/step - loss:
0.0509 - mae: 0.0995
Epoch 593/2000
11/11              0s 5ms/step - loss:
0.0538 - mae: 0.0998
Epoch 594/2000
11/11              0s 6ms/step - loss:
0.0503 - mae: 0.0975
Epoch 595/2000
```

```
11/11              0s 6ms/step - loss:
0.0502 - mae: 0.0983
Epoch 596/2000
11/11              0s 6ms/step - loss:
0.0501 - mae: 0.0990
Epoch 597/2000
11/11              0s 6ms/step - loss:
0.0512 - mae: 0.0994
Epoch 598/2000
11/11              0s 5ms/step - loss:
0.0519 - mae: 0.1006
Epoch 599/2000
11/11              0s 5ms/step - loss:
0.0506 - mae: 0.0993
Epoch 600/2000
11/11              0s 6ms/step - loss:
0.0502 - mae: 0.0984
Epoch 601/2000
11/11              0s 7ms/step - loss:
0.0506 - mae: 0.0998
Epoch 602/2000
11/11              0s 6ms/step - loss:
0.0513 - mae: 0.0996
Epoch 603/2000
11/11              0s 8ms/step - loss:
0.0493 - mae: 0.0982
Epoch 604/2000
11/11              0s 7ms/step - loss:
0.0501 - mae: 0.0995
Epoch 605/2000
11/11              0s 6ms/step - loss:
0.0485 - mae: 0.0985
Epoch 606/2000
11/11              0s 6ms/step - loss:
0.0492 - mae: 0.0985
Epoch 607/2000
11/11              0s 6ms/step - loss:
0.0496 - mae: 0.0983
Epoch 608/2000
11/11              0s 5ms/step - loss:
0.0486 - mae: 0.0969
Epoch 609/2000
11/11              0s 6ms/step - loss:
0.0486 - mae: 0.0979
Epoch 610/2000
11/11              0s 9ms/step - loss:
0.0488 - mae: 0.0975
Epoch 611/2000
```

```
11/11              0s 6ms/step - loss:
0.0484 - mae: 0.0991
Epoch 612/2000
11/11              0s 6ms/step - loss:
0.0486 - mae: 0.0977
Epoch 613/2000
11/11              0s 6ms/step - loss:
0.0493 - mae: 0.0993
Epoch 614/2000
11/11              0s 5ms/step - loss:
0.0487 - mae: 0.0989
Epoch 615/2000
11/11              0s 5ms/step - loss:
0.0492 - mae: 0.0986
Epoch 616/2000
11/11              0s 9ms/step - loss:
0.0476 - mae: 0.0975
Epoch 617/2000
11/11              0s 6ms/step - loss:
0.0470 - mae: 0.0972
Epoch 618/2000
11/11              0s 6ms/step - loss:
0.0469 - mae: 0.0958
Epoch 619/2000
11/11              0s 6ms/step - loss:
0.0475 - mae: 0.0974
Epoch 620/2000
11/11              0s 5ms/step - loss:
0.0517 - mae: 0.0999
Epoch 621/2000
11/11              0s 6ms/step - loss:
0.0489 - mae: 0.0978
Epoch 622/2000
11/11              0s 11ms/step -
loss: 0.0479 - mae: 0.0975
Epoch 623/2000
11/11              0s 6ms/step - loss:
0.0478 - mae: 0.0981
Epoch 624/2000
11/11              0s 6ms/step - loss:
0.0485 - mae: 0.0991
Epoch 625/2000
11/11              0s 6ms/step - loss:
0.0472 - mae: 0.0986
Epoch 626/2000
11/11              0s 6ms/step - loss:
0.0462 - mae: 0.0966
Epoch 627/2000
```

```
11/11              0s 7ms/step - loss:
0.0465 - mae: 0.0973
Epoch 628/2000
11/11              0s 6ms/step - loss:
0.0461 - mae: 0.0971
Epoch 629/2000
11/11              0s 6ms/step - loss:
0.0463 - mae: 0.0970
Epoch 630/2000
11/11              0s 6ms/step - loss:
0.0457 - mae: 0.0976
Epoch 631/2000
11/11              0s 6ms/step - loss:
0.0468 - mae: 0.0976
Epoch 632/2000
11/11              0s 6ms/step - loss:
0.0455 - mae: 0.0966
Epoch 633/2000
11/11              0s 7ms/step - loss:
0.0464 - mae: 0.0980
Epoch 634/2000
11/11              0s 6ms/step - loss:
0.0454 - mae: 0.0979
Epoch 635/2000
11/11              0s 6ms/step - loss:
0.0466 - mae: 0.0979
Epoch 636/2000
11/11              0s 6ms/step - loss:
0.0484 - mae: 0.0987
Epoch 637/2000
11/11              0s 6ms/step - loss:
0.0447 - mae: 0.0956
Epoch 638/2000
11/11              0s 6ms/step - loss:
0.0456 - mae: 0.0970
Epoch 639/2000
11/11              0s 6ms/step - loss:
0.0431 - mae: 0.0951
Epoch 640/2000
11/11              0s 6ms/step - loss:
0.0445 - mae: 0.0963
Epoch 641/2000
11/11              0s 6ms/step - loss:
0.0462 - mae: 0.0962
Epoch 642/2000
11/11              0s 5ms/step - loss:
0.0445 - mae: 0.0962
Epoch 643/2000
```

```
11/11              0s 6ms/step - loss:
0.0440 - mae: 0.0960
Epoch 644/2000
11/11              0s 5ms/step - loss:
0.0432 - mae: 0.0942
Epoch 645/2000
11/11              0s 6ms/step - loss:
0.0430 - mae: 0.0963
Epoch 646/2000
11/11              0s 8ms/step - loss:
0.0436 - mae: 0.0967
Epoch 647/2000
11/11              0s 6ms/step - loss:
0.0428 - mae: 0.0946
Epoch 648/2000
11/11              0s 5ms/step - loss:
0.0437 - mae: 0.0967
Epoch 649/2000
11/11              0s 6ms/step - loss:
0.0435 - mae: 0.0954
Epoch 650/2000
11/11              0s 6ms/step - loss:
0.0432 - mae: 0.0956
Epoch 651/2000
11/11              0s 6ms/step - loss:
0.0419 - mae: 0.0952
Epoch 652/2000
11/11              0s 6ms/step - loss:
0.0421 - mae: 0.0955
Epoch 653/2000
11/11              0s 6ms/step - loss:
0.0429 - mae: 0.0953
Epoch 654/2000
11/11              0s 5ms/step - loss:
0.0420 - mae: 0.0962
Epoch 655/2000
11/11              0s 6ms/step - loss:
0.0422 - mae: 0.0962
Epoch 656/2000
11/11              0s 5ms/step - loss:
0.0436 - mae: 0.0974
Epoch 657/2000
11/11              0s 5ms/step - loss:
0.0432 - mae: 0.0972
Epoch 658/2000
11/11              0s 6ms/step - loss:
0.0413 - mae: 0.0945
Epoch 659/2000
```

```
11/11              0s 6ms/step - loss:
0.0397 - mae: 0.0925
Epoch 660/2000
11/11              0s 6ms/step - loss:
0.0421 - mae: 0.0959
Epoch 661/2000
11/11              0s 5ms/step - loss:
0.0425 - mae: 0.0955
Epoch 662/2000
11/11              0s 6ms/step - loss:
0.0411 - mae: 0.0947
Epoch 663/2000
11/11              0s 5ms/step - loss:
0.0409 - mae: 0.0955
Epoch 664/2000
11/11              0s 5ms/step - loss:
0.0420 - mae: 0.0947
Epoch 665/2000
11/11              0s 6ms/step - loss:
0.0416 - mae: 0.0957
Epoch 666/2000
11/11              0s 9ms/step - loss:
0.0413 - mae: 0.0945
Epoch 667/2000
11/11              0s 5ms/step - loss:
0.0413 - mae: 0.0948
Epoch 668/2000
11/11              0s 5ms/step - loss:
0.0412 - mae: 0.0947
Epoch 669/2000
11/11              0s 6ms/step - loss:
0.0400 - mae: 0.0929
Epoch 670/2000
11/11              0s 6ms/step - loss:
0.0389 - mae: 0.0930
Epoch 671/2000
11/11              0s 6ms/step - loss:
0.0400 - mae: 0.0934
Epoch 672/2000
11/11              0s 8ms/step - loss:
0.0396 - mae: 0.0934
Epoch 673/2000
11/11              0s 5ms/step - loss:
0.0399 - mae: 0.0939
Epoch 674/2000
11/11              0s 5ms/step - loss:
0.0415 - mae: 0.0941
Epoch 675/2000
```

```
11/11              0s 6ms/step - loss:
0.0398 - mae: 0.0937
Epoch 676/2000
11/11              0s 6ms/step - loss:
0.0391 - mae: 0.0934
Epoch 677/2000
11/11              0s 5ms/step - loss:
0.0410 - mae: 0.0952
Epoch 678/2000
11/11              0s 5ms/step - loss:
0.0400 - mae: 0.0935
Epoch 679/2000
11/11              0s 6ms/step - loss:
0.0394 - mae: 0.0941
Epoch 680/2000
11/11              0s 6ms/step - loss:
0.0401 - mae: 0.0945
Epoch 681/2000
11/11              0s 5ms/step - loss:
0.0401 - mae: 0.0956
Epoch 682/2000
11/11              0s 6ms/step - loss:
0.0390 - mae: 0.0936
Epoch 683/2000
11/11              0s 6ms/step - loss:
0.0418 - mae: 0.0959
Epoch 684/2000
11/11              0s 6ms/step - loss:
0.0385 - mae: 0.0937
Epoch 685/2000
11/11              0s 5ms/step - loss:
0.0390 - mae: 0.0945
Epoch 686/2000
11/11              0s 5ms/step - loss:
0.0394 - mae: 0.0939
Epoch 687/2000
11/11              0s 6ms/step - loss:
0.0395 - mae: 0.0950
Epoch 688/2000
11/11              0s 5ms/step - loss:
0.0401 - mae: 0.0953
Epoch 689/2000
11/11              0s 6ms/step - loss:
0.0363 - mae: 0.0904
Epoch 690/2000
11/11              0s 5ms/step - loss:
0.0393 - mae: 0.0944
Epoch 691/2000
```

```
11/11              0s 6ms/step - loss:
0.0373 - mae: 0.0919
Epoch 692/2000
11/11              0s 5ms/step - loss:
0.0387 - mae: 0.0933
Epoch 693/2000
11/11              0s 6ms/step - loss:
0.0385 - mae: 0.0936
Epoch 694/2000
11/11              0s 7ms/step - loss:
0.0376 - mae: 0.0930
Epoch 695/2000
11/11              0s 5ms/step - loss:
0.0374 - mae: 0.0933
Epoch 696/2000
11/11              0s 5ms/step - loss:
0.0376 - mae: 0.0931
Epoch 697/2000
11/11              0s 6ms/step - loss:
0.0380 - mae: 0.0928
Epoch 698/2000
11/11              0s 5ms/step - loss:
0.0368 - mae: 0.0928
Epoch 699/2000
11/11              0s 5ms/step - loss:
0.0373 - mae: 0.0932
Epoch 700/2000
11/11              0s 6ms/step - loss:
0.0370 - mae: 0.0925
Epoch 701/2000
11/11              0s 8ms/step - loss:
0.0351 - mae: 0.0912
Epoch 702/2000
11/11              0s 6ms/step - loss:
0.0367 - mae: 0.0928
Epoch 703/2000
11/11              0s 6ms/step - loss:
0.0365 - mae: 0.0925
Epoch 704/2000
11/11              0s 6ms/step - loss:
0.0392 - mae: 0.0948
Epoch 705/2000
11/11              0s 5ms/step - loss:
0.0382 - mae: 0.0933
Epoch 706/2000
11/11              0s 6ms/step - loss:
0.0363 - mae: 0.0923
Epoch 707/2000
```

```
11/11              0s 6ms/step - loss:
0.0353 - mae: 0.0910
Epoch 708/2000
11/11              0s 6ms/step - loss:
0.0351 - mae: 0.0901
Epoch 709/2000
11/11              0s 5ms/step - loss:
0.0372 - mae: 0.0933
Epoch 710/2000
11/11              0s 5ms/step - loss:
0.0362 - mae: 0.0929
Epoch 711/2000
11/11              0s 6ms/step - loss:
0.0379 - mae: 0.0939
Epoch 712/2000
11/11              0s 6ms/step - loss:
0.0365 - mae: 0.0922
Epoch 713/2000
11/11              0s 6ms/step - loss:
0.0387 - mae: 0.0941
Epoch 714/2000
11/11              0s 5ms/step - loss:
0.0368 - mae: 0.0938
Epoch 715/2000
11/11              0s 6ms/step - loss:
0.0360 - mae: 0.0904
Epoch 716/2000
11/11              0s 6ms/step - loss:
0.0350 - mae: 0.0895
Epoch 717/2000
11/11              0s 6ms/step - loss:
0.0345 - mae: 0.0905
Epoch 718/2000
11/11              0s 8ms/step - loss:
0.0358 - mae: 0.0919
Epoch 719/2000
11/11              0s 6ms/step - loss:
0.0355 - mae: 0.0913
Epoch 720/2000
11/11              0s 6ms/step - loss:
0.0343 - mae: 0.0911
Epoch 721/2000
11/11              0s 6ms/step - loss:
0.0348 - mae: 0.0911
Epoch 722/2000
11/11              0s 6ms/step - loss:
0.0363 - mae: 0.0921
Epoch 723/2000
```

```
11/11              0s 6ms/step - loss:
0.0351 - mae: 0.0914
Epoch 724/2000
11/11              0s 6ms/step - loss:
0.0356 - mae: 0.0914
Epoch 725/2000
11/11              0s 6ms/step - loss:
0.0369 - mae: 0.0929
Epoch 726/2000
11/11              0s 7ms/step - loss:
0.0350 - mae: 0.0910
Epoch 727/2000
11/11              0s 6ms/step - loss:
0.0343 - mae: 0.0918
Epoch 728/2000
11/11              0s 6ms/step - loss:
0.0349 - mae: 0.0914
Epoch 729/2000
11/11              0s 6ms/step - loss:
0.0350 - mae: 0.0902
Epoch 730/2000
11/11              0s 6ms/step - loss:
0.0343 - mae: 0.0906
Epoch 731/2000
11/11              0s 10ms/step -
loss: 0.0355 - mae: 0.0924
Epoch 732/2000
11/11              0s 6ms/step - loss:
0.0385 - mae: 0.0933
Epoch 733/2000
11/11              0s 5ms/step - loss:
0.0361 - mae: 0.0931
Epoch 734/2000
11/11              0s 6ms/step - loss:
0.0332 - mae: 0.0907
Epoch 735/2000
11/11              0s 6ms/step - loss:
0.0329 - mae: 0.0886
Epoch 736/2000
11/11              0s 5ms/step - loss:
0.0340 - mae: 0.0905
Epoch 737/2000
11/11              0s 5ms/step - loss:
0.0331 - mae: 0.0895
Epoch 738/2000
11/11              0s 6ms/step - loss:
0.0339 - mae: 0.0902
Epoch 739/2000
```

```
11/11              0s 6ms/step - loss:
0.0352 - mae: 0.0908
Epoch 740/2000
11/11              0s 6ms/step - loss:
0.0330 - mae: 0.0903
Epoch 741/2000
11/11              0s 6ms/step - loss:
0.0334 - mae: 0.0894
Epoch 742/2000
11/11              0s 6ms/step - loss:
0.0333 - mae: 0.0902
Epoch 743/2000
11/11              0s 6ms/step - loss:
0.0343 - mae: 0.0910
Epoch 744/2000
11/11              0s 6ms/step - loss:
0.0334 - mae: 0.0899
Epoch 745/2000
11/11              0s 6ms/step - loss:
0.0328 - mae: 0.0895
Epoch 746/2000
11/11              0s 6ms/step - loss:
0.0324 - mae: 0.0891
Epoch 747/2000
11/11              0s 6ms/step - loss:
0.0329 - mae: 0.0900
Epoch 748/2000
11/11              0s 6ms/step - loss:
0.0331 - mae: 0.0895
Epoch 749/2000
11/11              0s 6ms/step - loss:
0.0337 - mae: 0.0907
Epoch 750/2000
11/11              0s 5ms/step - loss:
0.0323 - mae: 0.0896
Epoch 751/2000
11/11              0s 7ms/step - loss:
0.0330 - mae: 0.0903
Epoch 752/2000
11/11              0s 6ms/step - loss:
0.0327 - mae: 0.0898
Epoch 753/2000
11/11              0s 7ms/step - loss:
0.0319 - mae: 0.0885
Epoch 754/2000
11/11              0s 6ms/step - loss:
0.0325 - mae: 0.0893
Epoch 755/2000
```

```
11/11              0s 6ms/step - loss:
0.0330 - mae: 0.0904
Epoch 756/2000
11/11              0s 6ms/step - loss:
0.0317 - mae: 0.0891
Epoch 757/2000
11/11              0s 6ms/step - loss:
0.0325 - mae: 0.0902
Epoch 758/2000
11/11              0s 6ms/step - loss:
0.0323 - mae: 0.0897
Epoch 759/2000
11/11              0s 6ms/step - loss:
0.0307 - mae: 0.0870
Epoch 760/2000
11/11              0s 5ms/step - loss:
0.0322 - mae: 0.0898
Epoch 761/2000
11/11              0s 6ms/step - loss:
0.0321 - mae: 0.0907
Epoch 762/2000
11/11              0s 6ms/step - loss:
0.0305 - mae: 0.0870
Epoch 763/2000
11/11              0s 6ms/step - loss:
0.0331 - mae: 0.0896
Epoch 764/2000
11/11              0s 5ms/step - loss:
0.0328 - mae: 0.0898
Epoch 765/2000
11/11              0s 6ms/step - loss:
0.0318 - mae: 0.0885
Epoch 766/2000
11/11              0s 6ms/step - loss:
0.0321 - mae: 0.0884
Epoch 767/2000
11/11              0s 6ms/step - loss:
0.0314 - mae: 0.0887
Epoch 768/2000
11/11              0s 5ms/step - loss:
0.0311 - mae: 0.0886
Epoch 769/2000
11/11              0s 5ms/step - loss:
0.0301 - mae: 0.0877
Epoch 770/2000
11/11              0s 7ms/step - loss:
0.0308 - mae: 0.0883
Epoch 771/2000
```

```
11/11              0s 6ms/step - loss:
0.0330 - mae: 0.0894
Epoch 772/2000
11/11              0s 6ms/step - loss:
0.0316 - mae: 0.0893
Epoch 773/2000
11/11              0s 6ms/step - loss:
0.0311 - mae: 0.0889
Epoch 774/2000
11/11              0s 8ms/step - loss:
0.0300 - mae: 0.0866
Epoch 775/2000
11/11              0s 5ms/step - loss:
0.0309 - mae: 0.0873
Epoch 776/2000
11/11              0s 6ms/step - loss:
0.0310 - mae: 0.0892
Epoch 777/2000
11/11              0s 6ms/step - loss:
0.0318 - mae: 0.0894
Epoch 778/2000
11/11              0s 6ms/step - loss:
0.0327 - mae: 0.0885
Epoch 779/2000
11/11              0s 6ms/step - loss:
0.0313 - mae: 0.0890
Epoch 780/2000
11/11              0s 8ms/step - loss:
0.0311 - mae: 0.0894
Epoch 781/2000
11/11              0s 6ms/step - loss:
0.0312 - mae: 0.0889
Epoch 782/2000
11/11              0s 6ms/step - loss:
0.0307 - mae: 0.0886
Epoch 783/2000
11/11              0s 6ms/step - loss:
0.0315 - mae: 0.0898
Epoch 784/2000
11/11              0s 6ms/step - loss:
0.0299 - mae: 0.0876
Epoch 785/2000
11/11              0s 9ms/step - loss:
0.0312 - mae: 0.0892
Epoch 786/2000
11/11              0s 6ms/step - loss:
0.0302 - mae: 0.0887
Epoch 787/2000
```

```
11/11              0s 5ms/step - loss:
0.0302 - mae: 0.0876
Epoch 788/2000
11/11              0s 6ms/step - loss:
0.0295 - mae: 0.0863
Epoch 789/2000
11/11              0s 5ms/step - loss:
0.0298 - mae: 0.0871
Epoch 790/2000
11/11              0s 8ms/step - loss:
0.0302 - mae: 0.0876
Epoch 791/2000
11/11              0s 6ms/step - loss:
0.0295 - mae: 0.0865
Epoch 792/2000
11/11              0s 6ms/step - loss:
0.0293 - mae: 0.0869
Epoch 793/2000
11/11              0s 6ms/step - loss:
0.0309 - mae: 0.0895
Epoch 794/2000
11/11              0s 9ms/step - loss:
0.0297 - mae: 0.0877
Epoch 795/2000
11/11              0s 6ms/step - loss:
0.0295 - mae: 0.0885
Epoch 796/2000
11/11              0s 6ms/step - loss:
0.0282 - mae: 0.0862
Epoch 797/2000
11/11              0s 5ms/step - loss:
0.0303 - mae: 0.0892
Epoch 798/2000
11/11              0s 6ms/step - loss:
0.0291 - mae: 0.0873
Epoch 799/2000
11/11              0s 5ms/step - loss:
0.0303 - mae: 0.0877
Epoch 800/2000
11/11              0s 6ms/step - loss:
0.0292 - mae: 0.0863
Epoch 801/2000
11/11              0s 8ms/step - loss:
0.0296 - mae: 0.0879
Epoch 802/2000
11/11              0s 6ms/step - loss:
0.0295 - mae: 0.0877
Epoch 803/2000
```

```
11/11              0s 6ms/step - loss:
0.0285 - mae: 0.0864
Epoch 804/2000
11/11              0s 5ms/step - loss:
0.0307 - mae: 0.0898
Epoch 805/2000
11/11              0s 6ms/step - loss:
0.0275 - mae: 0.0856
Epoch 806/2000
11/11              0s 6ms/step - loss:
0.0298 - mae: 0.0885
Epoch 807/2000
11/11              0s 5ms/step - loss:
0.0301 - mae: 0.0881
Epoch 808/2000
11/11              0s 6ms/step - loss:
0.0291 - mae: 0.0872
Epoch 809/2000
11/11              0s 5ms/step - loss:
0.0297 - mae: 0.0867
Epoch 810/2000
11/11              0s 6ms/step - loss:
0.0295 - mae: 0.0871
Epoch 811/2000
11/11              0s 6ms/step - loss:
0.0301 - mae: 0.0880
Epoch 812/2000
11/11              0s 5ms/step - loss:
0.0297 - mae: 0.0880
Epoch 813/2000
11/11              0s 6ms/step - loss:
0.0281 - mae: 0.0874
Epoch 814/2000
11/11              0s 6ms/step - loss:
0.0287 - mae: 0.0874
Epoch 815/2000
11/11              0s 5ms/step - loss:
0.0284 - mae: 0.0871
Epoch 816/2000
11/11              0s 6ms/step - loss:
0.0284 - mae: 0.0863
Epoch 817/2000
11/11              0s 5ms/step - loss:
0.0274 - mae: 0.0854
Epoch 818/2000
11/11              0s 5ms/step - loss:
0.0288 - mae: 0.0867
Epoch 819/2000
```

```
11/11              0s 6ms/step - loss:
0.0297 - mae: 0.0882
Epoch 820/2000
11/11              0s 6ms/step - loss:
0.0279 - mae: 0.0862
Epoch 821/2000
11/11              0s 6ms/step - loss:
0.0278 - mae: 0.0860
Epoch 822/2000
11/11              0s 6ms/step - loss:
0.0283 - mae: 0.0865
Epoch 823/2000
11/11              0s 6ms/step - loss:
0.0284 - mae: 0.0868
Epoch 824/2000
11/11              0s 6ms/step - loss:
0.0282 - mae: 0.0861
Epoch 825/2000
11/11              0s 5ms/step - loss:
0.0281 - mae: 0.0872
Epoch 826/2000
11/11              0s 6ms/step - loss:
0.0264 - mae: 0.0852
Epoch 827/2000
11/11              0s 6ms/step - loss:
0.0275 - mae: 0.0871
Epoch 828/2000
11/11              0s 6ms/step - loss:
0.0271 - mae: 0.0859
Epoch 829/2000
11/11              0s 5ms/step - loss:
0.0276 - mae: 0.0857
Epoch 830/2000
11/11              0s 9ms/step - loss:
0.0278 - mae: 0.0854
Epoch 831/2000
11/11              0s 6ms/step - loss:
0.0278 - mae: 0.0862
Epoch 832/2000
11/11              0s 6ms/step - loss:
0.0271 - mae: 0.0858
Epoch 833/2000
11/11              0s 6ms/step - loss:
0.0279 - mae: 0.0859
Epoch 834/2000
11/11              0s 6ms/step - loss:
0.0276 - mae: 0.0858
Epoch 835/2000
```

```
11/11              0s 6ms/step - loss:
0.0272 - mae: 0.0854
Epoch 836/2000
11/11              0s 6ms/step - loss:
0.0254 - mae: 0.0838
Epoch 837/2000
11/11              0s 6ms/step - loss:
0.0290 - mae: 0.0879
Epoch 838/2000
11/11              0s 8ms/step - loss:
0.0281 - mae: 0.0873
Epoch 839/2000
11/11              0s 6ms/step - loss:
0.0259 - mae: 0.0850
Epoch 840/2000
11/11              0s 6ms/step - loss:
0.0269 - mae: 0.0849
Epoch 841/2000
11/11              0s 6ms/step - loss:
0.0267 - mae: 0.0858
Epoch 842/2000
11/11              0s 6ms/step - loss:
0.0259 - mae: 0.0845
Epoch 843/2000
11/11              0s 6ms/step - loss:
0.0280 - mae: 0.0859
Epoch 844/2000
11/11              0s 5ms/step - loss:
0.0282 - mae: 0.0861
Epoch 845/2000
11/11              0s 6ms/step - loss:
0.0256 - mae: 0.0837
Epoch 846/2000
11/11              0s 6ms/step - loss:
0.0267 - mae: 0.0846
Epoch 847/2000
11/11              0s 6ms/step - loss:
0.0273 - mae: 0.0855
Epoch 848/2000
11/11              0s 6ms/step - loss:
0.0259 - mae: 0.0851
Epoch 849/2000
11/11              0s 5ms/step - loss:
0.0272 - mae: 0.0868
Epoch 850/2000
11/11              0s 5ms/step - loss:
0.0263 - mae: 0.0846
Epoch 851/2000
```

```
11/11              0s 6ms/step - loss:
0.0270 - mae: 0.0855
Epoch 852/2000
11/11              0s 6ms/step - loss:
0.0267 - mae: 0.0848
Epoch 853/2000
11/11              0s 6ms/step - loss:
0.0258 - mae: 0.0844
Epoch 854/2000
11/11              0s 6ms/step - loss:
0.0272 - mae: 0.0862
Epoch 855/2000
11/11              0s 5ms/step - loss:
0.0271 - mae: 0.0854
Epoch 856/2000
11/11              0s 6ms/step - loss:
0.0267 - mae: 0.0862
Epoch 857/2000
11/11              0s 6ms/step - loss:
0.0255 - mae: 0.0847
Epoch 858/2000
11/11              0s 6ms/step - loss:
0.0265 - mae: 0.0852
Epoch 859/2000
11/11              0s 6ms/step - loss:
0.0252 - mae: 0.0840
Epoch 860/2000
11/11              0s 9ms/step - loss:
0.0259 - mae: 0.0845
Epoch 861/2000
11/11              0s 6ms/step - loss:
0.0271 - mae: 0.0851
Epoch 862/2000
11/11              0s 5ms/step - loss:
0.0269 - mae: 0.0875
Epoch 863/2000
11/11              0s 5ms/step - loss:
0.0269 - mae: 0.0847
Epoch 864/2000
11/11              0s 6ms/step - loss:
0.0266 - mae: 0.0847
Epoch 865/2000
11/11              0s 6ms/step - loss:
0.0265 - mae: 0.0853
Epoch 866/2000
11/11              0s 6ms/step - loss:
0.0258 - mae: 0.0849
Epoch 867/2000
```

```
11/11              0s 6ms/step - loss:
0.0260 - mae: 0.0862
Epoch 868/2000
11/11              0s 6ms/step - loss:
0.0260 - mae: 0.0851
Epoch 869/2000
11/11              0s 5ms/step - loss:
0.0255 - mae: 0.0843
Epoch 870/2000
11/11              0s 6ms/step - loss:
0.0258 - mae: 0.0846
Epoch 871/2000
11/11              0s 6ms/step - loss:
0.0271 - mae: 0.0864
Epoch 872/2000
11/11              0s 7ms/step - loss:
0.0252 - mae: 0.0844
Epoch 873/2000
11/11              0s 5ms/step - loss:
0.0265 - mae: 0.0854
Epoch 874/2000
11/11              0s 6ms/step - loss:
0.0257 - mae: 0.0849
Epoch 875/2000
11/11              0s 6ms/step - loss:
0.0255 - mae: 0.0849
Epoch 876/2000
11/11              0s 6ms/step - loss:
0.0250 - mae: 0.0848
Epoch 877/2000
11/11              0s 6ms/step - loss:
0.0251 - mae: 0.0849
Epoch 878/2000
11/11              0s 6ms/step - loss:
0.0253 - mae: 0.0849
Epoch 879/2000
11/11              0s 6ms/step - loss:
0.0255 - mae: 0.0844
Epoch 880/2000
11/11              0s 9ms/step - loss:
0.0242 - mae: 0.0829
Epoch 881/2000
11/11              0s 6ms/step - loss:
0.0244 - mae: 0.0836
Epoch 882/2000
11/11              0s 5ms/step - loss:
0.0261 - mae: 0.0844
Epoch 883/2000
```

```
11/11              0s 6ms/step - loss:
0.0261 - mae: 0.0842
Epoch 884/2000
11/11              0s 5ms/step - loss:
0.0250 - mae: 0.0831
Epoch 885/2000
11/11              0s 5ms/step - loss:
0.0257 - mae: 0.0839
Epoch 886/2000
11/11              0s 8ms/step - loss:
0.0258 - mae: 0.0845
Epoch 887/2000
11/11              0s 5ms/step - loss:
0.0247 - mae: 0.0841
Epoch 888/2000
11/11              0s 6ms/step - loss:
0.0249 - mae: 0.0843
Epoch 889/2000
11/11              0s 5ms/step - loss:
0.0251 - mae: 0.0838
Epoch 890/2000
11/11              0s 5ms/step - loss:
0.0254 - mae: 0.0844
Epoch 891/2000
11/11              0s 6ms/step - loss:
0.0257 - mae: 0.0847
Epoch 892/2000
11/11              0s 6ms/step - loss:
0.0249 - mae: 0.0845
Epoch 893/2000
11/11              0s 6ms/step - loss:
0.0259 - mae: 0.0837
Epoch 894/2000
11/11              0s 8ms/step - loss:
0.0241 - mae: 0.0829
Epoch 895/2000
11/11              0s 5ms/step - loss:
0.0250 - mae: 0.0841
Epoch 896/2000
11/11              0s 5ms/step - loss:
0.0252 - mae: 0.0837
Epoch 897/2000
11/11              0s 6ms/step - loss:
0.0241 - mae: 0.0839
Epoch 898/2000
11/11              0s 5ms/step - loss:
0.0241 - mae: 0.0833
Epoch 899/2000
```

```
11/11                0s 6ms/step - loss:
0.0248 - mae: 0.0845
Epoch 900/2000
11/11                0s 6ms/step - loss:
0.0248 - mae: 0.0836
Epoch 901/2000
11/11                0s 5ms/step - loss:
0.0245 - mae: 0.0827
Epoch 902/2000
11/11                0s 5ms/step - loss:
0.0248 - mae: 0.0854
Epoch 903/2000
11/11                0s 9ms/step - loss:
0.0249 - mae: 0.0842
Epoch 904/2000
11/11                0s 6ms/step - loss:
0.0248 - mae: 0.0842
Epoch 905/2000
11/11                0s 5ms/step - loss:
0.0247 - mae: 0.0836
Epoch 906/2000
11/11                0s 5ms/step - loss:
0.0231 - mae: 0.0825
Epoch 907/2000
11/11                0s 5ms/step - loss:
0.0243 - mae: 0.0839
Epoch 908/2000
11/11                0s 9ms/step - loss:
0.0233 - mae: 0.0821
Epoch 909/2000
11/11                0s 6ms/step - loss:
0.0244 - mae: 0.0843
Epoch 910/2000
11/11                0s 5ms/step - loss:
0.0238 - mae: 0.0827
Epoch 911/2000
11/11                0s 5ms/step - loss:
0.0232 - mae: 0.0829
Epoch 912/2000
11/11                0s 6ms/step - loss:
0.0255 - mae: 0.0845
Epoch 913/2000
11/11                0s 5ms/step - loss:
0.0240 - mae: 0.0826
Epoch 914/2000
11/11                0s 8ms/step - loss:
0.0248 - mae: 0.0843
Epoch 915/2000
```

```
11/11              0s 6ms/step - loss:
0.0246 - mae: 0.0833
Epoch 916/2000
11/11              0s 5ms/step - loss:
0.0239 - mae: 0.0826
Epoch 917/2000
11/11              0s 6ms/step - loss:
0.0234 - mae: 0.0826
Epoch 918/2000
11/11              0s 6ms/step - loss:
0.0231 - mae: 0.0822
Epoch 919/2000
11/11              0s 8ms/step - loss:
0.0255 - mae: 0.0848
Epoch 920/2000
11/11              0s 5ms/step - loss:
0.0236 - mae: 0.0822
Epoch 921/2000
11/11              0s 5ms/step - loss:
0.0248 - mae: 0.0833
Epoch 922/2000
11/11              0s 5ms/step - loss:
0.0241 - mae: 0.0834
Epoch 923/2000
11/11              0s 6ms/step - loss:
0.0246 - mae: 0.0845
Epoch 924/2000
11/11              0s 8ms/step - loss:
0.0234 - mae: 0.0825
Epoch 925/2000
11/11              0s 5ms/step - loss:
0.0243 - mae: 0.0823
Epoch 926/2000
11/11              0s 5ms/step - loss:
0.0237 - mae: 0.0820
Epoch 927/2000
11/11              0s 6ms/step - loss:
0.0237 - mae: 0.0828
Epoch 928/2000
11/11              0s 6ms/step - loss:
0.0237 - mae: 0.0825
Epoch 929/2000
11/11              0s 6ms/step - loss:
0.0230 - mae: 0.0824
Epoch 930/2000
11/11              0s 8ms/step - loss:
0.0240 - mae: 0.0835
Epoch 931/2000
```

```
11/11               0s 5ms/step - loss:
0.0234 - mae: 0.0821
Epoch 932/2000
11/11               0s 5ms/step - loss:
0.0239 - mae: 0.0834
Epoch 933/2000
11/11               0s 6ms/step - loss:
0.0237 - mae: 0.0825
Epoch 934/2000
11/11               0s 6ms/step - loss:
0.0237 - mae: 0.0828
Epoch 935/2000
11/11               0s 5ms/step - loss:
0.0239 - mae: 0.0839
Epoch 936/2000
11/11               0s 6ms/step - loss:
0.0229 - mae: 0.0818
Epoch 937/2000
11/11               0s 5ms/step - loss:
0.0230 - mae: 0.0823
Epoch 938/2000
11/11               0s 8ms/step - loss:
0.0228 - mae: 0.0816
Epoch 939/2000
11/11               0s 6ms/step - loss:
0.0235 - mae: 0.0818
Epoch 940/2000
11/11               0s 5ms/step - loss:
0.0237 - mae: 0.0825
Epoch 941/2000
11/11               0s 5ms/step - loss:
0.0236 - mae: 0.0826
Epoch 942/2000
11/11               0s 5ms/step - loss:
0.0235 - mae: 0.0824
Epoch 943/2000
11/11               0s 6ms/step - loss:
0.0247 - mae: 0.0825
Epoch 944/2000
11/11               0s 6ms/step - loss:
0.0231 - mae: 0.0819
Epoch 945/2000
11/11               0s 6ms/step - loss:
0.0234 - mae: 0.0817
Epoch 946/2000
11/11               0s 5ms/step - loss:
0.0226 - mae: 0.0814
Epoch 947/2000
```

```
11/11              0s 6ms/step - loss:
0.0238 - mae: 0.0823
Epoch 948/2000
11/11              0s 6ms/step - loss:
0.0232 - mae: 0.0829
Epoch 949/2000
11/11              0s 6ms/step - loss:
0.0223 - mae: 0.0813
Epoch 950/2000
11/11              0s 6ms/step - loss:
0.0222 - mae: 0.0806
Epoch 951/2000
11/11              0s 6ms/step - loss:
0.0239 - mae: 0.0840
Epoch 952/2000
11/11              0s 6ms/step - loss:
0.0229 - mae: 0.0810
Epoch 953/2000
11/11              0s 7ms/step - loss:
0.0239 - mae: 0.0831
Epoch 954/2000
11/11              0s 6ms/step - loss:
0.0222 - mae: 0.0802
Epoch 955/2000
11/11              0s 5ms/step - loss:
0.0229 - mae: 0.0813
Epoch 956/2000
11/11              0s 5ms/step - loss:
0.0226 - mae: 0.0815
Epoch 957/2000
11/11              0s 6ms/step - loss:
0.0215 - mae: 0.0811
Epoch 958/2000
11/11              0s 6ms/step - loss:
0.0224 - mae: 0.0805
Epoch 959/2000
11/11              0s 6ms/step - loss:
0.0216 - mae: 0.0795
Epoch 960/2000
11/11              0s 5ms/step - loss:
0.0235 - mae: 0.0831
Epoch 961/2000
11/11              0s 6ms/step - loss:
0.0233 - mae: 0.0817
Epoch 962/2000
11/11              0s 6ms/step - loss:
0.0219 - mae: 0.0804
Epoch 963/2000
```

```
11/11              0s 6ms/step - loss:
0.0231 - mae: 0.0821
Epoch 964/2000
11/11              0s 6ms/step - loss:
0.0229 - mae: 0.0824
Epoch 965/2000
11/11              0s 6ms/step - loss:
0.0216 - mae: 0.0804
Epoch 966/2000
11/11              0s 6ms/step - loss:
0.0218 - mae: 0.0807
Epoch 967/2000
11/11              0s 5ms/step - loss:
0.0233 - mae: 0.0823
Epoch 968/2000
11/11              0s 6ms/step - loss:
0.0223 - mae: 0.0817
Epoch 969/2000
11/11              0s 5ms/step - loss:
0.0227 - mae: 0.0818
Epoch 970/2000
11/11              0s 5ms/step - loss:
0.0217 - mae: 0.0809
Epoch 971/2000
11/11              0s 6ms/step - loss:
0.0209 - mae: 0.0802
Epoch 972/2000
11/11              0s 9ms/step - loss:
0.0213 - mae: 0.0804
Epoch 973/2000
11/11              0s 6ms/step - loss:
0.0225 - mae: 0.0812
Epoch 974/2000
11/11              0s 6ms/step - loss:
0.0221 - mae: 0.0817
Epoch 975/2000
11/11              0s 6ms/step - loss:
0.0221 - mae: 0.0814
Epoch 976/2000
11/11              0s 6ms/step - loss:
0.0223 - mae: 0.0816
Epoch 977/2000
11/11              0s 6ms/step - loss:
0.0227 - mae: 0.0821
Epoch 978/2000
11/11              0s 6ms/step - loss:
0.0218 - mae: 0.0803
Epoch 979/2000
```

```
11/11              0s 6ms/step - loss:
0.0233 - mae: 0.0831
Epoch 980/2000
11/11              0s 6ms/step - loss:
0.0228 - mae: 0.0821
Epoch 981/2000
11/11              0s 5ms/step - loss:
0.0212 - mae: 0.0797
Epoch 982/2000
11/11              0s 6ms/step - loss:
0.0218 - mae: 0.0807
Epoch 983/2000
11/11              0s 5ms/step - loss:
0.0225 - mae: 0.0816
Epoch 984/2000
11/11              0s 6ms/step - loss:
0.0214 - mae: 0.0803
Epoch 985/2000
11/11              0s 6ms/step - loss:
0.0228 - mae: 0.0814
Epoch 986/2000
11/11              0s 6ms/step - loss:
0.0237 - mae: 0.0820
Epoch 987/2000
11/11              0s 6ms/step - loss:
0.0207 - mae: 0.0802
Epoch 988/2000
11/11              0s 5ms/step - loss:
0.0216 - mae: 0.0799
Epoch 989/2000
11/11              0s 8ms/step - loss:
0.0220 - mae: 0.0808
Epoch 990/2000
11/11              0s 6ms/step - loss:
0.0226 - mae: 0.0823
Epoch 991/2000
11/11              0s 6ms/step - loss:
0.0218 - mae: 0.0807
Epoch 992/2000
11/11              0s 6ms/step - loss:
0.0221 - mae: 0.0817
Epoch 993/2000
11/11              0s 6ms/step - loss:
0.0219 - mae: 0.0813
Epoch 994/2000
11/11              0s 6ms/step - loss:
0.0213 - mae: 0.0806
Epoch 995/2000
```

```
11/11              0s 6ms/step - loss:
0.0213 - mae: 0.0799
Epoch 996/2000
11/11              0s 9ms/step - loss:
0.0220 - mae: 0.0802
Epoch 997/2000
11/11              0s 6ms/step - loss:
0.0213 - mae: 0.0805
Epoch 998/2000
11/11              0s 6ms/step - loss:
0.0216 - mae: 0.0804
Epoch 999/2000
11/11              0s 6ms/step - loss:
0.0219 - mae: 0.0808
Epoch 1000/2000
11/11              0s 6ms/step - loss:
0.0224 - mae: 0.0822
Epoch 1001/2000
11/11              0s 5ms/step - loss:
0.0211 - mae: 0.0792
Epoch 1002/2000
11/11              0s 6ms/step - loss:
0.0217 - mae: 0.0810
Epoch 1003/2000
11/11              0s 6ms/step - loss:
0.0224 - mae: 0.0821
Epoch 1004/2000
11/11              0s 6ms/step - loss:
0.0218 - mae: 0.0811
Epoch 1005/2000
11/11              0s 5ms/step - loss:
0.0217 - mae: 0.0820
Epoch 1006/2000
11/11              0s 5ms/step - loss:
0.0216 - mae: 0.0812
Epoch 1007/2000
11/11              0s 6ms/step - loss:
0.0211 - mae: 0.0796
Epoch 1008/2000
11/11              0s 5ms/step - loss:
0.0210 - mae: 0.0802
Epoch 1009/2000
11/11              0s 6ms/step - loss:
0.0205 - mae: 0.0796
Epoch 1010/2000
11/11              0s 6ms/step - loss:
0.0204 - mae: 0.0792
Epoch 1011/2000
```

```
11/11              0s 7ms/step - loss:
0.0209 - mae: 0.0801
Epoch 1012/2000
11/11              0s 5ms/step - loss:
0.0206 - mae: 0.0792
Epoch 1013/2000
11/11              0s 5ms/step - loss:
0.0214 - mae: 0.0807
Epoch 1014/2000
11/11              0s 5ms/step - loss:
0.0216 - mae: 0.0811
Epoch 1015/2000
11/11              0s 5ms/step - loss:
0.0223 - mae: 0.0809
Epoch 1016/2000
11/11              0s 6ms/step - loss:
0.0214 - mae: 0.0799
Epoch 1017/2000
11/11              0s 6ms/step - loss:
0.0218 - mae: 0.0804
Epoch 1018/2000
11/11              0s 6ms/step - loss:
0.0204 - mae: 0.0790
Epoch 1019/2000
11/11              0s 5ms/step - loss:
0.0219 - mae: 0.0808
Epoch 1020/2000
11/11              0s 5ms/step - loss:
0.0209 - mae: 0.0801
Epoch 1021/2000
11/11              0s 7ms/step - loss:
0.0219 - mae: 0.0812
Epoch 1022/2000
11/11              0s 6ms/step - loss:
0.0205 - mae: 0.0790
Epoch 1023/2000
11/11              0s 5ms/step - loss:
0.0200 - mae: 0.0788
Epoch 1024/2000
11/11              0s 5ms/step - loss:
0.0201 - mae: 0.0785
Epoch 1025/2000
11/11              0s 5ms/step - loss:
0.0204 - mae: 0.0791
Epoch 1026/2000
11/11              0s 6ms/step - loss:
0.0201 - mae: 0.0784
Epoch 1027/2000
```

```
11/11              0s 6ms/step - loss:
0.0214 - mae: 0.0807
Epoch 1028/2000
11/11              0s 7ms/step - loss:
0.0209 - mae: 0.0802
Epoch 1029/2000
11/11              0s 6ms/step - loss:
0.0193 - mae: 0.0782
Epoch 1030/2000
11/11              0s 6ms/step - loss:
0.0204 - mae: 0.0793
Epoch 1031/2000
11/11              0s 5ms/step - loss:
0.0203 - mae: 0.0794
Epoch 1032/2000
11/11              0s 5ms/step - loss:
0.0205 - mae: 0.0796
Epoch 1033/2000
11/11              0s 5ms/step - loss:
0.0195 - mae: 0.0787
Epoch 1034/2000
11/11              0s 6ms/step - loss:
0.0210 - mae: 0.0793
Epoch 1035/2000
11/11              0s 6ms/step - loss:
0.0200 - mae: 0.0793
Epoch 1036/2000
11/11              0s 8ms/step - loss:
0.0211 - mae: 0.0795
Epoch 1037/2000
11/11              0s 5ms/step - loss:
0.0206 - mae: 0.0795
Epoch 1038/2000
11/11              0s 5ms/step - loss:
0.0205 - mae: 0.0807
Epoch 1039/2000
11/11              0s 5ms/step - loss:
0.0212 - mae: 0.0803
Epoch 1040/2000
11/11              0s 6ms/step - loss:
0.0196 - mae: 0.0790
Epoch 1041/2000
11/11              0s 6ms/step - loss:
0.0198 - mae: 0.0787
Epoch 1042/2000
11/11              0s 5ms/step - loss:
0.0200 - mae: 0.0795
Epoch 1043/2000
```

```
11/11              0s 5ms/step - loss:
0.0199 - mae: 0.0781
Epoch 1044/2000
11/11              0s 5ms/step - loss:
0.0220 - mae: 0.0804
Epoch 1045/2000
11/11              0s 7ms/step - loss:
0.0206 - mae: 0.0801
Epoch 1046/2000
11/11              0s 6ms/step - loss:
0.0206 - mae: 0.0795
Epoch 1047/2000
11/11              0s 5ms/step - loss:
0.0216 - mae: 0.0807
Epoch 1048/2000
11/11              0s 5ms/step - loss:
0.0208 - mae: 0.0800
Epoch 1049/2000
11/11              0s 6ms/step - loss:
0.0195 - mae: 0.0775
Epoch 1050/2000
11/11              0s 5ms/step - loss:
0.0207 - mae: 0.0797
Epoch 1051/2000
11/11              0s 5ms/step - loss:
0.0200 - mae: 0.0781
Epoch 1052/2000
11/11              0s 7ms/step - loss:
0.0206 - mae: 0.0793
Epoch 1053/2000
11/11              0s 5ms/step - loss:
0.0206 - mae: 0.0790
Epoch 1054/2000
11/11              0s 6ms/step - loss:
0.0205 - mae: 0.0791
Epoch 1055/2000
11/11              0s 6ms/step - loss:
0.0197 - mae: 0.0785
Epoch 1056/2000
11/11              0s 6ms/step - loss:
0.0208 - mae: 0.0794
Epoch 1057/2000
11/11              0s 5ms/step - loss:
0.0209 - mae: 0.0797
Epoch 1058/2000
11/11              0s 5ms/step - loss:
0.0209 - mae: 0.0795
Epoch 1059/2000
```

```
11/11              0s 6ms/step - loss:
0.0200 - mae: 0.0783
Epoch 1060/2000
11/11              0s 5ms/step - loss:
0.0200 - mae: 0.0781
Epoch 1061/2000
11/11              0s 6ms/step - loss:
0.0200 - mae: 0.0787
Epoch 1062/2000
11/11              0s 6ms/step - loss:
0.0198 - mae: 0.0780
Epoch 1063/2000
11/11              0s 6ms/step - loss:
0.0200 - mae: 0.0788
Epoch 1064/2000
11/11              0s 8ms/step - loss:
0.0202 - mae: 0.0777
Epoch 1065/2000
11/11              0s 5ms/step - loss:
0.0222 - mae: 0.0792
Epoch 1066/2000
11/11              0s 6ms/step - loss:
0.0200 - mae: 0.0786
Epoch 1067/2000
11/11              0s 6ms/step - loss:
0.0201 - mae: 0.0792
Epoch 1068/2000
11/11              0s 8ms/step - loss:
0.0197 - mae: 0.0780
Epoch 1069/2000
11/11              0s 6ms/step - loss:
0.0205 - mae: 0.0788
Epoch 1070/2000
11/11              0s 6ms/step - loss:
0.0198 - mae: 0.0786
Epoch 1071/2000
11/11              0s 6ms/step - loss:
0.0201 - mae: 0.0792
Epoch 1072/2000
11/11              0s 5ms/step - loss:
0.0193 - mae: 0.0781
Epoch 1073/2000
11/11              0s 6ms/step - loss:
0.0199 - mae: 0.0786
Epoch 1074/2000
11/11              0s 6ms/step - loss:
0.0197 - mae: 0.0782
Epoch 1075/2000
```

```
11/11              0s 7ms/step - loss:
0.0193 - mae: 0.0780
Epoch 1076/2000
11/11              0s 6ms/step - loss:
0.0204 - mae: 0.0792
Epoch 1077/2000
11/11              0s 8ms/step - loss:
0.0199 - mae: 0.0787
Epoch 1078/2000
11/11              0s 6ms/step - loss:
0.0196 - mae: 0.0777
Epoch 1079/2000
11/11              0s 6ms/step - loss:
0.0198 - mae: 0.0781
Epoch 1080/2000
11/11              0s 6ms/step - loss:
0.0189 - mae: 0.0779
Epoch 1081/2000
11/11              0s 6ms/step - loss:
0.0199 - mae: 0.0779
Epoch 1082/2000
11/11              0s 6ms/step - loss:
0.0195 - mae: 0.0779
Epoch 1083/2000
11/11              0s 5ms/step - loss:
0.0197 - mae: 0.0785
Epoch 1084/2000
11/11              0s 6ms/step - loss:
0.0201 - mae: 0.0786
Epoch 1085/2000
11/11              0s 6ms/step - loss:
0.0203 - mae: 0.0791
Epoch 1086/2000
11/11              0s 6ms/step - loss:
0.0196 - mae: 0.0775
Epoch 1087/2000
11/11              0s 5ms/step - loss:
0.0201 - mae: 0.0792
Epoch 1088/2000
11/11              0s 6ms/step - loss:
0.0191 - mae: 0.0768
Epoch 1089/2000
11/11              0s 6ms/step - loss:
0.0197 - mae: 0.0773
Epoch 1090/2000
11/11              0s 6ms/step - loss:
0.0189 - mae: 0.0765
Epoch 1091/2000
```

```
11/11              0s 6ms/step - loss:
0.0196 - mae: 0.0784
Epoch 1092/2000
11/11              0s 6ms/step - loss:
0.0203 - mae: 0.0794
Epoch 1093/2000
11/11              0s 6ms/step - loss:
0.0200 - mae: 0.0787
Epoch 1094/2000
11/11              0s 6ms/step - loss:
0.0200 - mae: 0.0787
Epoch 1095/2000
11/11              0s 8ms/step - loss:
0.0188 - mae: 0.0768
Epoch 1096/2000
11/11              0s 6ms/step - loss:
0.0187 - mae: 0.0773
Epoch 1097/2000
11/11              0s 6ms/step - loss:
0.0181 - mae: 0.0767
Epoch 1098/2000
11/11              0s 5ms/step - loss:
0.0181 - mae: 0.0755
Epoch 1099/2000
11/11              0s 5ms/step - loss:
0.0190 - mae: 0.0772
Epoch 1100/2000
11/11              0s 6ms/step - loss:
0.0197 - mae: 0.0774
Epoch 1101/2000
11/11              0s 6ms/step - loss:
0.0190 - mae: 0.0778
Epoch 1102/2000
11/11              0s 6ms/step - loss:
0.0186 - mae: 0.0757
Epoch 1103/2000
11/11              0s 6ms/step - loss:
0.0185 - mae: 0.0756
Epoch 1104/2000
11/11              0s 6ms/step - loss:
0.0187 - mae: 0.0773
Epoch 1105/2000
11/11              0s 6ms/step - loss:
0.0193 - mae: 0.0777
Epoch 1106/2000
11/11              0s 6ms/step - loss:
0.0193 - mae: 0.0770
Epoch 1107/2000
```

```
11/11              0s 5ms/step - loss:
0.0196 - mae: 0.0779
Epoch 1108/2000
11/11              0s 6ms/step - loss:
0.0185 - mae: 0.0767
Epoch 1109/2000
11/11              0s 6ms/step - loss:
0.0193 - mae: 0.0773
Epoch 1110/2000
11/11              0s 6ms/step - loss:
0.0186 - mae: 0.0768
Epoch 1111/2000
11/11              0s 6ms/step - loss:
0.0202 - mae: 0.0790
Epoch 1112/2000
11/11              0s 6ms/step - loss:
0.0194 - mae: 0.0779
Epoch 1113/2000
11/11              0s 5ms/step - loss:
0.0188 - mae: 0.0780
Epoch 1114/2000
11/11              0s 8ms/step - loss:
0.0191 - mae: 0.0786
Epoch 1115/2000
11/11              0s 6ms/step - loss:
0.0188 - mae: 0.0770
Epoch 1116/2000
11/11              0s 6ms/step - loss:
0.0186 - mae: 0.0772
Epoch 1117/2000
11/11              0s 6ms/step - loss:
0.0192 - mae: 0.0777
Epoch 1118/2000
11/11              0s 6ms/step - loss:
0.0188 - mae: 0.0767
Epoch 1119/2000
11/11              0s 8ms/step - loss:
0.0177 - mae: 0.0749
Epoch 1120/2000
11/11              0s 5ms/step - loss:
0.0192 - mae: 0.0774
Epoch 1121/2000
11/11              0s 6ms/step - loss:
0.0199 - mae: 0.0778
Epoch 1122/2000
11/11              0s 5ms/step - loss:
0.0180 - mae: 0.0752
Epoch 1123/2000
```

```
11/11              0s 5ms/step - loss:
0.0194 - mae: 0.0765
Epoch 1124/2000
11/11              0s 5ms/step - loss:
0.0193 - mae: 0.0768
Epoch 1125/2000
11/11              0s 5ms/step - loss:
0.0191 - mae: 0.0777
Epoch 1126/2000
11/11              0s 6ms/step - loss:
0.0203 - mae: 0.0788
Epoch 1127/2000
11/11              0s 7ms/step - loss:
0.0175 - mae: 0.0749
Epoch 1128/2000
11/11              0s 5ms/step - loss:
0.0193 - mae: 0.0771
Epoch 1129/2000
11/11              0s 6ms/step - loss:
0.0187 - mae: 0.0761
Epoch 1130/2000
11/11              0s 6ms/step - loss:
0.0186 - mae: 0.0763
Epoch 1131/2000
11/11              0s 6ms/step - loss:
0.0188 - mae: 0.0768
Epoch 1132/2000
11/11              0s 6ms/step - loss:
0.0187 - mae: 0.0768
Epoch 1133/2000
11/11              0s 5ms/step - loss:
0.0188 - mae: 0.0767
Epoch 1134/2000
11/11              0s 6ms/step - loss:
0.0194 - mae: 0.0775
Epoch 1135/2000
11/11              0s 6ms/step - loss:
0.0189 - mae: 0.0771
Epoch 1136/2000
11/11              0s 6ms/step - loss:
0.0191 - mae: 0.0770
Epoch 1137/2000
11/11              0s 8ms/step - loss:
0.0181 - mae: 0.0764
Epoch 1138/2000
11/11              0s 6ms/step - loss:
0.0186 - mae: 0.0761
Epoch 1139/2000
```

```
11/11              0s 5ms/step - loss:
0.0186 - mae: 0.0760
Epoch 1140/2000
11/11              0s 5ms/step - loss:
0.0189 - mae: 0.0772
Epoch 1141/2000
11/11              0s 6ms/step - loss:
0.0175 - mae: 0.0749
Epoch 1142/2000
11/11              0s 5ms/step - loss:
0.0180 - mae: 0.0765
Epoch 1143/2000
11/11              0s 7ms/step - loss:
0.0182 - mae: 0.0763
Epoch 1144/2000
11/11              0s 5ms/step - loss:
0.0183 - mae: 0.0760
Epoch 1145/2000
11/11              0s 6ms/step - loss:
0.0182 - mae: 0.0762
Epoch 1146/2000
11/11              0s 6ms/step - loss:
0.0183 - mae: 0.0751
Epoch 1147/2000
11/11              0s 6ms/step - loss:
0.0181 - mae: 0.0755
Epoch 1148/2000
11/11              0s 8ms/step - loss:
0.0184 - mae: 0.0768
Epoch 1149/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0765
Epoch 1150/2000
11/11              0s 5ms/step - loss:
0.0178 - mae: 0.0764
Epoch 1151/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0762
Epoch 1152/2000
11/11              0s 7ms/step - loss:
0.0183 - mae: 0.0760
Epoch 1153/2000
11/11              0s 6ms/step - loss:
0.0182 - mae: 0.0762
Epoch 1154/2000
11/11              0s 6ms/step - loss:
0.0180 - mae: 0.0762
Epoch 1155/2000
```

```
11/11            0s 6ms/step - loss:
0.0188 - mae: 0.0765
Epoch 1156/2000
11/11            0s 6ms/step - loss:
0.0173 - mae: 0.0748
Epoch 1157/2000
11/11            0s 8ms/step - loss:
0.0180 - mae: 0.0759
Epoch 1158/2000
11/11            0s 5ms/step - loss:
0.0180 - mae: 0.0749
Epoch 1159/2000
11/11            0s 6ms/step - loss:
0.0182 - mae: 0.0761
Epoch 1160/2000
11/11            0s 5ms/step - loss:
0.0185 - mae: 0.0769
Epoch 1161/2000
11/11            0s 6ms/step - loss:
0.0178 - mae: 0.0755
Epoch 1162/2000
11/11            0s 8ms/step - loss:
0.0181 - mae: 0.0756
Epoch 1163/2000
11/11            0s 6ms/step - loss:
0.0181 - mae: 0.0761
Epoch 1164/2000
11/11            0s 5ms/step - loss:
0.0184 - mae: 0.0765
Epoch 1165/2000
11/11            0s 5ms/step - loss:
0.0190 - mae: 0.0773
Epoch 1166/2000
11/11            0s 7ms/step - loss:
0.0181 - mae: 0.0762
Epoch 1167/2000
11/11            0s 6ms/step - loss:
0.0196 - mae: 0.0767
Epoch 1168/2000
11/11            0s 5ms/step - loss:
0.0170 - mae: 0.0741
Epoch 1169/2000
11/11            0s 6ms/step - loss:
0.0185 - mae: 0.0764
Epoch 1170/2000
11/11            0s 7ms/step - loss:
0.0185 - mae: 0.0764
Epoch 1171/2000
```

```
11/11              0s 6ms/step - loss:
0.0186 - mae: 0.0762
Epoch 1172/2000
11/11              0s 5ms/step - loss:
0.0182 - mae: 0.0758
Epoch 1173/2000
11/11              0s 5ms/step - loss:
0.0176 - mae: 0.0745
Epoch 1174/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0742
Epoch 1175/2000
11/11              0s 8ms/step - loss:
0.0175 - mae: 0.0759
Epoch 1176/2000
11/11              0s 5ms/step - loss:
0.0178 - mae: 0.0760
Epoch 1177/2000
11/11              0s 6ms/step - loss:
0.0184 - mae: 0.0771
Epoch 1178/2000
11/11              0s 5ms/step - loss:
0.0185 - mae: 0.0756
Epoch 1179/2000
11/11              0s 6ms/step - loss:
0.0177 - mae: 0.0745
Epoch 1180/2000
11/11              0s 6ms/step - loss:
0.0171 - mae: 0.0739
Epoch 1181/2000
11/11              0s 6ms/step - loss:
0.0184 - mae: 0.0760
Epoch 1182/2000
11/11              0s 6ms/step - loss:
0.0178 - mae: 0.0748
Epoch 1183/2000
11/11              0s 6ms/step - loss:
0.0183 - mae: 0.0755
Epoch 1184/2000
11/11              0s 6ms/step - loss:
0.0181 - mae: 0.0749
Epoch 1185/2000
11/11              0s 6ms/step - loss:
0.0177 - mae: 0.0749
Epoch 1186/2000
11/11              0s 6ms/step - loss:
0.0182 - mae: 0.0751
Epoch 1187/2000
```

```
11/11              0s 8ms/step - loss:
0.0174 - mae: 0.0748
Epoch 1188/2000
11/11              0s 6ms/step - loss:
0.0181 - mae: 0.0764
Epoch 1189/2000
11/11              0s 6ms/step - loss:
0.0181 - mae: 0.0761
Epoch 1190/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0748
Epoch 1191/2000
11/11              0s 6ms/step - loss:
0.0183 - mae: 0.0748
Epoch 1192/2000
11/11              0s 6ms/step - loss:
0.0172 - mae: 0.0742
Epoch 1193/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0748
Epoch 1194/2000
11/11              0s 6ms/step - loss:
0.0186 - mae: 0.0751
Epoch 1195/2000
11/11              0s 5ms/step - loss:
0.0187 - mae: 0.0757
Epoch 1196/2000
11/11              0s 6ms/step - loss:
0.0177 - mae: 0.0745
Epoch 1197/2000
11/11              0s 8ms/step - loss:
0.0175 - mae: 0.0749
Epoch 1198/2000
11/11              0s 6ms/step - loss:
0.0185 - mae: 0.0756
Epoch 1199/2000
11/11              0s 5ms/step - loss:
0.0180 - mae: 0.0742
Epoch 1200/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0750
Epoch 1201/2000
11/11              0s 6ms/step - loss:
0.0178 - mae: 0.0749
Epoch 1202/2000
11/11              0s 6ms/step - loss:
0.0174 - mae: 0.0745
Epoch 1203/2000
```

```
11/11              0s 5ms/step - loss:
0.0172 - mae: 0.0731
Epoch 1204/2000
11/11              0s 6ms/step - loss:
0.0183 - mae: 0.0761
Epoch 1205/2000
11/11              0s 6ms/step - loss:
0.0180 - mae: 0.0754
Epoch 1206/2000
11/11              0s 6ms/step - loss:
0.0169 - mae: 0.0741
Epoch 1207/2000
11/11              0s 9ms/step - loss:
0.0171 - mae: 0.0745
Epoch 1208/2000
11/11              0s 6ms/step - loss:
0.0177 - mae: 0.0756
Epoch 1209/2000
11/11              0s 6ms/step - loss:
0.0185 - mae: 0.0755
Epoch 1210/2000
11/11              0s 6ms/step - loss:
0.0174 - mae: 0.0742
Epoch 1211/2000
11/11              0s 6ms/step - loss:
0.0177 - mae: 0.0756
Epoch 1212/2000
11/11              0s 6ms/step - loss:
0.0184 - mae: 0.0761
Epoch 1213/2000
11/11              0s 6ms/step - loss:
0.0170 - mae: 0.0741
Epoch 1214/2000
11/11              0s 6ms/step - loss:
0.0175 - mae: 0.0749
Epoch 1215/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0753
Epoch 1216/2000
11/11              0s 6ms/step - loss:
0.0170 - mae: 0.0744
Epoch 1217/2000
11/11              0s 6ms/step - loss:
0.0174 - mae: 0.0743
Epoch 1218/2000
11/11              0s 6ms/step - loss:
0.0172 - mae: 0.0743
Epoch 1219/2000
```

```
11/11              0s 6ms/step - loss:
0.0177 - mae: 0.0741
Epoch 1220/2000
11/11              0s 6ms/step - loss:
0.0176 - mae: 0.0735
Epoch 1221/2000
11/11              0s 6ms/step - loss:
0.0184 - mae: 0.0765
Epoch 1222/2000
11/11              0s 6ms/step - loss:
0.0171 - mae: 0.0737
Epoch 1223/2000
11/11              0s 6ms/step - loss:
0.0170 - mae: 0.0739
Epoch 1224/2000
11/11              0s 6ms/step - loss:
0.0173 - mae: 0.0735
Epoch 1225/2000
11/11              0s 5ms/step - loss:
0.0177 - mae: 0.0751
Epoch 1226/2000
11/11              0s 6ms/step - loss:
0.0165 - mae: 0.0729
Epoch 1227/2000
11/11              0s 6ms/step - loss:
0.0174 - mae: 0.0734
Epoch 1228/2000
11/11              0s 6ms/step - loss:
0.0173 - mae: 0.0742
Epoch 1229/2000
11/11              0s 9ms/step - loss:
0.0170 - mae: 0.0733
Epoch 1230/2000
11/11              0s 5ms/step - loss:
0.0163 - mae: 0.0730
Epoch 1231/2000
11/11              0s 6ms/step - loss:
0.0175 - mae: 0.0748
Epoch 1232/2000
11/11              0s 6ms/step - loss:
0.0179 - mae: 0.0753
Epoch 1233/2000
11/11              0s 6ms/step - loss:
0.0170 - mae: 0.0738
Epoch 1234/2000
11/11              0s 6ms/step - loss:
0.0178 - mae: 0.0752
Epoch 1235/2000
```

```
11/11              0s 6ms/step - loss:
0.0173 - mae: 0.0744
Epoch 1236/2000
11/11              0s 10ms/step -
loss: 0.0167 - mae: 0.0733
Epoch 1237/2000
11/11              0s 6ms/step - loss:
0.0176 - mae: 0.0745
Epoch 1238/2000
11/11              0s 5ms/step - loss:
0.0177 - mae: 0.0748
Epoch 1239/2000
11/11              0s 6ms/step - loss:
0.0171 - mae: 0.0737
Epoch 1240/2000
11/11              0s 5ms/step - loss:
0.0161 - mae: 0.0726
Epoch 1241/2000
11/11              0s 5ms/step - loss:
0.0168 - mae: 0.0733
Epoch 1242/2000
11/11              0s 5ms/step - loss:
0.0177 - mae: 0.0749
Epoch 1243/2000
11/11              0s 6ms/step - loss:
0.0174 - mae: 0.0742
Epoch 1244/2000
11/11              0s 5ms/step - loss:
0.0171 - mae: 0.0746
Epoch 1245/2000
11/11              0s 5ms/step - loss:
0.0166 - mae: 0.0724
Epoch 1246/2000
11/11              0s 6ms/step - loss:
0.0164 - mae: 0.0726
Epoch 1247/2000
11/11              0s 6ms/step - loss:
0.0168 - mae: 0.0719
Epoch 1248/2000
11/11              0s 5ms/step - loss:
0.0165 - mae: 0.0733
Epoch 1249/2000
11/11              0s 8ms/step - loss:
0.0167 - mae: 0.0726
Epoch 1250/2000
11/11              0s 6ms/step - loss:
0.0168 - mae: 0.0729
Epoch 1251/2000
```

```
11/11            0s 5ms/step - loss:
0.0173 - mae: 0.0730
Epoch 1252/2000
11/11            0s 6ms/step - loss:
0.0165 - mae: 0.0727
Epoch 1253/2000
11/11            0s 6ms/step - loss:
0.0174 - mae: 0.0742
Epoch 1254/2000
11/11            0s 5ms/step - loss:
0.0167 - mae: 0.0728
Epoch 1255/2000
11/11            0s 6ms/step - loss:
0.0169 - mae: 0.0738
Epoch 1256/2000
11/11            0s 6ms/step - loss:
0.0159 - mae: 0.0722
Epoch 1257/2000
11/11            0s 6ms/step - loss:
0.0170 - mae: 0.0734
Epoch 1258/2000
11/11            0s 6ms/step - loss:
0.0177 - mae: 0.0744
Epoch 1259/2000
11/11            0s 5ms/step - loss:
0.0164 - mae: 0.0720
Epoch 1260/2000
11/11            0s 5ms/step - loss:
0.0164 - mae: 0.0718
Epoch 1261/2000
11/11            0s 6ms/step - loss:
0.0167 - mae: 0.0724
Epoch 1262/2000
11/11            0s 8ms/step - loss:
0.0162 - mae: 0.0721
Epoch 1263/2000
11/11            0s 5ms/step - loss:
0.0164 - mae: 0.0724
Epoch 1264/2000
11/11            0s 5ms/step - loss:
0.0165 - mae: 0.0722
Epoch 1265/2000
11/11            0s 6ms/step - loss:
0.0164 - mae: 0.0720
Epoch 1266/2000
11/11            0s 6ms/step - loss:
0.0169 - mae: 0.0726
Epoch 1267/2000
```

```
11/11              0s 5ms/step - loss:
0.0179 - mae: 0.0741
Epoch 1268/2000
11/11              0s 5ms/step - loss:
0.0162 - mae: 0.0729
Epoch 1269/2000
11/11              0s 6ms/step - loss:
0.0168 - mae: 0.0735
Epoch 1270/2000
11/11              0s 5ms/step - loss:
0.0170 - mae: 0.0730
Epoch 1271/2000
11/11              0s 6ms/step - loss:
0.0165 - mae: 0.0731
Epoch 1272/2000
11/11              0s 5ms/step - loss:
0.0173 - mae: 0.0734
Epoch 1273/2000
11/11              0s 6ms/step - loss:
0.0172 - mae: 0.0734
Epoch 1274/2000
11/11              0s 5ms/step - loss:
0.0164 - mae: 0.0720
Epoch 1275/2000
11/11              0s 5ms/step - loss:
0.0164 - mae: 0.0728
Epoch 1276/2000
11/11              0s 5ms/step - loss:
0.0172 - mae: 0.0732
Epoch 1277/2000
11/11              0s 6ms/step - loss:
0.0163 - mae: 0.0725
Epoch 1278/2000
11/11              0s 6ms/step - loss:
0.0176 - mae: 0.0730
Epoch 1279/2000
11/11              0s 5ms/step - loss:
0.0170 - mae: 0.0732
Epoch 1280/2000
11/11              0s 5ms/step - loss:
0.0162 - mae: 0.0720
Epoch 1281/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0716
Epoch 1282/2000
11/11              0s 6ms/step - loss:
0.0167 - mae: 0.0734
Epoch 1283/2000
```

```
11/11              0s 6ms/step - loss:
0.0165 - mae: 0.0728
Epoch 1284/2000
11/11              0s 5ms/step - loss:
0.0158 - mae: 0.0716
Epoch 1285/2000
11/11              0s 6ms/step - loss:
0.0168 - mae: 0.0730
Epoch 1286/2000
11/11              0s 5ms/step - loss:
0.0172 - mae: 0.0735
Epoch 1287/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0714
Epoch 1288/2000
11/11              0s 6ms/step - loss:
0.0165 - mae: 0.0721
Epoch 1289/2000
11/11              0s 6ms/step - loss:
0.0160 - mae: 0.0715
Epoch 1290/2000
11/11              0s 5ms/step - loss:
0.0170 - mae: 0.0733
Epoch 1291/2000
11/11              0s 6ms/step - loss:
0.0166 - mae: 0.0732
Epoch 1292/2000
11/11              0s 5ms/step - loss:
0.0166 - mae: 0.0728
Epoch 1293/2000
11/11              0s 6ms/step - loss:
0.0167 - mae: 0.0724
Epoch 1294/2000
11/11              0s 6ms/step - loss:
0.0162 - mae: 0.0715
Epoch 1295/2000
11/11              0s 6ms/step - loss:
0.0164 - mae: 0.0724
Epoch 1296/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0714
Epoch 1297/2000
11/11              0s 5ms/step - loss:
0.0166 - mae: 0.0724
Epoch 1298/2000
11/11              0s 6ms/step - loss:
0.0162 - mae: 0.0716
Epoch 1299/2000
```

```
11/11              0s 6ms/step - loss:
0.0161 - mae: 0.0720
Epoch 1300/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0718
Epoch 1301/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0707
Epoch 1302/2000
11/11              0s 6ms/step - loss:
0.0165 - mae: 0.0727
Epoch 1303/2000
11/11              0s 6ms/step - loss:
0.0163 - mae: 0.0720
Epoch 1304/2000
11/11              0s 6ms/step - loss:
0.0162 - mae: 0.0725
Epoch 1305/2000
11/11              0s 6ms/step - loss:
0.0174 - mae: 0.0733
Epoch 1306/2000
11/11              0s 6ms/step - loss:
0.0165 - mae: 0.0726
Epoch 1307/2000
11/11              0s 6ms/step - loss:
0.0160 - mae: 0.0716
Epoch 1308/2000
11/11              0s 6ms/step - loss:
0.0160 - mae: 0.0707
Epoch 1309/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0714
Epoch 1310/2000
11/11              0s 5ms/step - loss:
0.0161 - mae: 0.0715
Epoch 1311/2000
11/11              0s 6ms/step - loss:
0.0168 - mae: 0.0732
Epoch 1312/2000
11/11              0s 5ms/step - loss:
0.0163 - mae: 0.0714
Epoch 1313/2000
11/11              0s 6ms/step - loss:
0.0171 - mae: 0.0739
Epoch 1314/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0710
Epoch 1315/2000
```

```
11/11            0s 6ms/step - loss:
0.0157 - mae: 0.0699
Epoch 1316/2000
11/11            0s 9ms/step - loss:
0.0168 - mae: 0.0725
Epoch 1317/2000
11/11            0s 6ms/step - loss:
0.0155 - mae: 0.0706
Epoch 1318/2000
11/11            0s 6ms/step - loss:
0.0166 - mae: 0.0726
Epoch 1319/2000
11/11            0s 6ms/step - loss:
0.0162 - mae: 0.0716
Epoch 1320/2000
11/11            0s 6ms/step - loss:
0.0161 - mae: 0.0715
Epoch 1321/2000
11/11            0s 6ms/step - loss:
0.0155 - mae: 0.0705
Epoch 1322/2000
11/11            0s 6ms/step - loss:
0.0161 - mae: 0.0714
Epoch 1323/2000
11/11            0s 6ms/step - loss:
0.0157 - mae: 0.0714
Epoch 1324/2000
11/11            0s 6ms/step - loss:
0.0166 - mae: 0.0724
Epoch 1325/2000
11/11            0s 6ms/step - loss:
0.0151 - mae: 0.0698
Epoch 1326/2000
11/11            0s 6ms/step - loss:
0.0165 - mae: 0.0718
Epoch 1327/2000
11/11            0s 6ms/step - loss:
0.0152 - mae: 0.0700
Epoch 1328/2000
11/11            0s 6ms/step - loss:
0.0162 - mae: 0.0718
Epoch 1329/2000
11/11            0s 7ms/step - loss:
0.0156 - mae: 0.0712
Epoch 1330/2000
11/11            0s 6ms/step - loss:
0.0159 - mae: 0.0711
Epoch 1331/2000
```

```
11/11              0s 6ms/step - loss:
0.0163 - mae: 0.0720
Epoch 1332/2000
11/11              0s 6ms/step - loss:
0.0163 - mae: 0.0714
Epoch 1333/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0714
Epoch 1334/2000
11/11              0s 6ms/step - loss:
0.0165 - mae: 0.0726
Epoch 1335/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0712
Epoch 1336/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0713
Epoch 1337/2000
11/11              0s 6ms/step - loss:
0.0160 - mae: 0.0711
Epoch 1338/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0707
Epoch 1339/2000
11/11              0s 6ms/step - loss:
0.0164 - mae: 0.0719
Epoch 1340/2000
11/11              0s 5ms/step - loss:
0.0150 - mae: 0.0708
Epoch 1341/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0707
Epoch 1342/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0710
Epoch 1343/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0703
Epoch 1344/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0712
Epoch 1345/2000
11/11              0s 11ms/step -
loss: 0.0163 - mae: 0.0718
Epoch 1346/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0711
Epoch 1347/2000
```

```
11/11              0s 6ms/step - loss:
0.0167 - mae: 0.0725
Epoch 1348/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0717
Epoch 1349/2000
11/11              0s 6ms/step - loss:
0.0161 - mae: 0.0715
Epoch 1350/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0699
Epoch 1351/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0718
Epoch 1352/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0708
Epoch 1353/2000
11/11              0s 7ms/step - loss:
0.0158 - mae: 0.0707
Epoch 1354/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0709
Epoch 1355/2000
11/11              0s 6ms/step - loss:
0.0164 - mae: 0.0712
Epoch 1356/2000
11/11              0s 10ms/step -
loss: 0.0160 - mae: 0.0718
Epoch 1357/2000
11/11              0s 6ms/step - loss:
0.0160 - mae: 0.0716
Epoch 1358/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0698
Epoch 1359/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0711
Epoch 1360/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0703
Epoch 1361/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0716
Epoch 1362/2000
11/11              0s 9ms/step - loss:
0.0159 - mae: 0.0711
Epoch 1363/2000
```

```
11/11              0s 6ms/step - loss:
0.0148 - mae: 0.0695
Epoch 1364/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0698
Epoch 1365/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0714
Epoch 1366/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0710
Epoch 1367/2000
11/11              0s 5ms/step - loss:
0.0162 - mae: 0.0716
Epoch 1368/2000
11/11              0s 5ms/step - loss:
0.0153 - mae: 0.0699
Epoch 1369/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0705
Epoch 1370/2000
11/11              0s 7ms/step - loss:
0.0161 - mae: 0.0713
Epoch 1371/2000
11/11              0s 6ms/step - loss:
0.0153 - mae: 0.0701
Epoch 1372/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0708
Epoch 1373/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0710
Epoch 1374/2000
11/11              0s 6ms/step - loss:
0.0155 - mae: 0.0707
Epoch 1375/2000
11/11              0s 5ms/step - loss:
0.0154 - mae: 0.0701
Epoch 1376/2000
11/11              0s 6ms/step - loss:
0.0155 - mae: 0.0702
Epoch 1377/2000
11/11              0s 6ms/step - loss:
0.0163 - mae: 0.0711
Epoch 1378/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0707
Epoch 1379/2000
```

```
11/11              0s 8ms/step - loss:
0.0154 - mae: 0.0706
Epoch 1380/2000
11/11              0s 6ms/step - loss:
0.0153 - mae: 0.0696
Epoch 1381/2000
11/11              0s 5ms/step - loss:
0.0157 - mae: 0.0694
Epoch 1382/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0698
Epoch 1383/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0706
Epoch 1384/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0713
Epoch 1385/2000
11/11              0s 6ms/step - loss:
0.0163 - mae: 0.0714
Epoch 1386/2000
11/11              0s 5ms/step - loss:
0.0160 - mae: 0.0711
Epoch 1387/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0702
Epoch 1388/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0718
Epoch 1389/2000
11/11              0s 5ms/step - loss:
0.0151 - mae: 0.0695
Epoch 1390/2000
11/11              0s 5ms/step - loss:
0.0158 - mae: 0.0706
Epoch 1391/2000
11/11              0s 9ms/step - loss:
0.0153 - mae: 0.0702
Epoch 1392/2000
11/11              0s 5ms/step - loss:
0.0152 - mae: 0.0689
Epoch 1393/2000
11/11              0s 6ms/step - loss:
0.0168 - mae: 0.0713
Epoch 1394/2000
11/11              0s 6ms/step - loss:
0.0153 - mae: 0.0695
Epoch 1395/2000
```

```
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0694
Epoch 1396/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0702
Epoch 1397/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0709
Epoch 1398/2000
11/11              0s 7ms/step - loss:
0.0164 - mae: 0.0713
Epoch 1399/2000
11/11              0s 6ms/step - loss:
0.0150 - mae: 0.0690
Epoch 1400/2000
11/11              0s 5ms/step - loss:
0.0156 - mae: 0.0703
Epoch 1401/2000
11/11              0s 7ms/step - loss:
0.0153 - mae: 0.0700
Epoch 1402/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0686
Epoch 1403/2000
11/11              0s 6ms/step - loss:
0.0155 - mae: 0.0698
Epoch 1404/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0712
Epoch 1405/2000
11/11              0s 6ms/step - loss:
0.0160 - mae: 0.0718
Epoch 1406/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0692
Epoch 1407/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0701
Epoch 1408/2000
11/11              0s 8ms/step - loss:
0.0147 - mae: 0.0696
Epoch 1409/2000
11/11              0s 7ms/step - loss:
0.0153 - mae: 0.0705
Epoch 1410/2000
11/11              0s 6ms/step - loss:
0.0162 - mae: 0.0717
Epoch 1411/2000
```

```
11/11              0s 6ms/step - loss:
0.0160 - mae: 0.0704
Epoch 1412/2000
11/11              0s 5ms/step - loss:
0.0150 - mae: 0.0698
Epoch 1413/2000
11/11              0s 5ms/step - loss:
0.0156 - mae: 0.0711
Epoch 1414/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0696
Epoch 1415/2000
11/11              0s 5ms/step - loss:
0.0158 - mae: 0.0715
Epoch 1416/2000
11/11              0s 6ms/step - loss:
0.0150 - mae: 0.0696
Epoch 1417/2000
11/11              0s 6ms/step - loss:
0.0150 - mae: 0.0698
Epoch 1418/2000
11/11              0s 5ms/step - loss:
0.0160 - mae: 0.0703
Epoch 1419/2000
11/11              0s 7ms/step - loss:
0.0148 - mae: 0.0688
Epoch 1420/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0696
Epoch 1421/2000
11/11              0s 5ms/step - loss:
0.0153 - mae: 0.0690
Epoch 1422/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0696
Epoch 1423/2000
11/11              0s 7ms/step - loss:
0.0151 - mae: 0.0698
Epoch 1424/2000
11/11              0s 6ms/step - loss:
0.0153 - mae: 0.0694
Epoch 1425/2000
11/11              0s 6ms/step - loss:
0.0144 - mae: 0.0688
Epoch 1426/2000
11/11              0s 6ms/step - loss:
0.0148 - mae: 0.0692
Epoch 1427/2000
```

```
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0700
Epoch 1428/2000
11/11              0s 6ms/step - loss:
0.0155 - mae: 0.0696
Epoch 1429/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0703
Epoch 1430/2000
11/11              0s 7ms/step - loss:
0.0151 - mae: 0.0691
Epoch 1431/2000
11/11              0s 6ms/step - loss:
0.0155 - mae: 0.0703
Epoch 1432/2000
11/11              0s 7ms/step - loss:
0.0153 - mae: 0.0700
Epoch 1433/2000
11/11              0s 8ms/step - loss:
0.0147 - mae: 0.0687
Epoch 1434/2000
11/11              0s 6ms/step - loss:
0.0159 - mae: 0.0702
Epoch 1435/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0698
Epoch 1436/2000
11/11              0s 7ms/step - loss:
0.0151 - mae: 0.0696
Epoch 1437/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0703
Epoch 1438/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0696
Epoch 1439/2000
11/11              0s 8ms/step - loss:
0.0151 - mae: 0.0690
Epoch 1440/2000
11/11              0s 7ms/step - loss:
0.0151 - mae: 0.0690
Epoch 1441/2000
11/11              0s 7ms/step - loss:
0.0145 - mae: 0.0675
Epoch 1442/2000
11/11              0s 7ms/step - loss:
0.0155 - mae: 0.0696
Epoch 1443/2000
```

```
11/11                 0s 8ms/step - loss:
0.0152 - mae: 0.0695
Epoch 1444/2000
11/11                 0s 10ms/step -
loss: 0.0147 - mae: 0.0686
Epoch 1445/2000
11/11                 0s 10ms/step -
loss: 0.0150 - mae: 0.0698
Epoch 1446/2000
11/11                 0s 7ms/step - loss:
0.0150 - mae: 0.0687
Epoch 1447/2000
11/11                 0s 10ms/step -
loss: 0.0147 - mae: 0.0696
Epoch 1448/2000
11/11                 0s 8ms/step - loss:
0.0155 - mae: 0.0706
Epoch 1449/2000
11/11                 0s 6ms/step - loss:
0.0150 - mae: 0.0693
Epoch 1450/2000
11/11                 0s 6ms/step - loss:
0.0155 - mae: 0.0699
Epoch 1451/2000
11/11                 0s 7ms/step - loss:
0.0143 - mae: 0.0680
Epoch 1452/2000
11/11                 0s 6ms/step - loss:
0.0148 - mae: 0.0687
Epoch 1453/2000
11/11                 0s 7ms/step - loss:
0.0152 - mae: 0.0692
Epoch 1454/2000
11/11                 0s 6ms/step - loss:
0.0153 - mae: 0.0703
Epoch 1455/2000
11/11                 0s 6ms/step - loss:
0.0156 - mae: 0.0703
Epoch 1456/2000
11/11                 0s 6ms/step - loss:
0.0149 - mae: 0.0691
Epoch 1457/2000
11/11                 0s 7ms/step - loss:
0.0150 - mae: 0.0688
Epoch 1458/2000
11/11                 0s 6ms/step - loss:
0.0151 - mae: 0.0691
Epoch 1459/2000
```

```
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0689
Epoch 1460/2000
11/11              0s 6ms/step - loss:
0.0143 - mae: 0.0680
Epoch 1461/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0694
Epoch 1462/2000
11/11              0s 6ms/step - loss:
0.0145 - mae: 0.0690
Epoch 1463/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0695
Epoch 1464/2000
11/11              0s 6ms/step - loss:
0.0141 - mae: 0.0674
Epoch 1465/2000
11/11              0s 5ms/step - loss:
0.0154 - mae: 0.0697
Epoch 1466/2000
11/11              0s 6ms/step - loss:
0.0150 - mae: 0.0695
Epoch 1467/2000
11/11              0s 5ms/step - loss:
0.0145 - mae: 0.0684
Epoch 1468/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0692
Epoch 1469/2000
11/11              0s 6ms/step - loss:
0.0155 - mae: 0.0696
Epoch 1470/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0684
Epoch 1471/2000
11/11              0s 5ms/step - loss:
0.0150 - mae: 0.0692
Epoch 1472/2000
11/11              0s 5ms/step - loss:
0.0148 - mae: 0.0684
Epoch 1473/2000
11/11              0s 6ms/step - loss:
0.0140 - mae: 0.0674
Epoch 1474/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0683
Epoch 1475/2000
```

```
11/11              0s 6ms/step - loss:
0.0153 - mae: 0.0693
Epoch 1476/2000
11/11              0s 5ms/step - loss:
0.0151 - mae: 0.0683
Epoch 1477/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0689
Epoch 1478/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0680
Epoch 1479/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0698
Epoch 1480/2000
11/11              0s 9ms/step - loss:
0.0145 - mae: 0.0691
Epoch 1481/2000
11/11              0s 6ms/step - loss:
0.0145 - mae: 0.0688
Epoch 1482/2000
11/11              0s 5ms/step - loss:
0.0140 - mae: 0.0679
Epoch 1483/2000
11/11              0s 6ms/step - loss:
0.0156 - mae: 0.0694
Epoch 1484/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0683
Epoch 1485/2000
11/11              0s 6ms/step - loss:
0.0157 - mae: 0.0706
Epoch 1486/2000
11/11              0s 6ms/step - loss:
0.0140 - mae: 0.0673
Epoch 1487/2000
11/11              0s 6ms/step - loss:
0.0148 - mae: 0.0679
Epoch 1488/2000
11/11              0s 6ms/step - loss:
0.0145 - mae: 0.0683
Epoch 1489/2000
11/11              0s 6ms/step - loss:
0.0150 - mae: 0.0688
Epoch 1490/2000
11/11              0s 6ms/step - loss:
0.0146 - mae: 0.0684
Epoch 1491/2000
```

```
11/11              0s 6ms/step - loss:
0.0146 - mae: 0.0684
Epoch 1492/2000
11/11              0s 6ms/step - loss:
0.0150 - mae: 0.0685
Epoch 1493/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0684
Epoch 1494/2000
11/11              0s 8ms/step - loss:
0.0143 - mae: 0.0674
Epoch 1495/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0694
Epoch 1496/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0697
Epoch 1497/2000
11/11              0s 5ms/step - loss:
0.0145 - mae: 0.0684
Epoch 1498/2000
11/11              0s 6ms/step - loss:
0.0143 - mae: 0.0682
Epoch 1499/2000
11/11              0s 8ms/step - loss:
0.0151 - mae: 0.0695
Epoch 1500/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0681
Epoch 1501/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0684
Epoch 1502/2000
11/11              0s 6ms/step - loss:
0.0148 - mae: 0.0685
Epoch 1503/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0685
Epoch 1504/2000
11/11              0s 6ms/step - loss:
0.0146 - mae: 0.0691
Epoch 1505/2000
11/11              0s 5ms/step - loss:
0.0147 - mae: 0.0681
Epoch 1506/2000
11/11              0s 12ms/step -
loss: 0.0145 - mae: 0.0679
Epoch 1507/2000
```

```
11/11              0s 8ms/step - loss:
0.0139 - mae: 0.0664
Epoch 1508/2000
11/11              0s 8ms/step - loss:
0.0149 - mae: 0.0687
Epoch 1509/2000
11/11              0s 7ms/step - loss:
0.0146 - mae: 0.0679
Epoch 1510/2000
11/11              0s 6ms/step - loss:
0.0145 - mae: 0.0675
Epoch 1511/2000
11/11              0s 6ms/step - loss:
0.0146 - mae: 0.0682
Epoch 1512/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0691
Epoch 1513/2000
11/11              0s 8ms/step - loss:
0.0150 - mae: 0.0688
Epoch 1514/2000
11/11              0s 6ms/step - loss:
0.0145 - mae: 0.0679
Epoch 1515/2000
11/11              0s 6ms/step - loss:
0.0143 - mae: 0.0689
Epoch 1516/2000
11/11              0s 6ms/step - loss:
0.0154 - mae: 0.0689
Epoch 1517/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0685
Epoch 1518/2000
11/11              0s 6ms/step - loss:
0.0142 - mae: 0.0674
Epoch 1519/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0689
Epoch 1520/2000
11/11              0s 8ms/step - loss:
0.0153 - mae: 0.0689
Epoch 1521/2000
11/11              0s 6ms/step - loss:
0.0153 - mae: 0.0680
Epoch 1522/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0688
Epoch 1523/2000
```

```
11/11              0s 7ms/step - loss:
0.0149 - mae: 0.0683
Epoch 1524/2000
11/11              0s 6ms/step - loss:
0.0145 - mae: 0.0677
Epoch 1525/2000
11/11              0s 6ms/step - loss:
0.0146 - mae: 0.0684
Epoch 1526/2000
11/11              0s 6ms/step - loss:
0.0145 - mae: 0.0681
Epoch 1527/2000
11/11              0s 10ms/step -
loss: 0.0140 - mae: 0.0666
Epoch 1528/2000
11/11              0s 6ms/step - loss:
0.0141 - mae: 0.0667
Epoch 1529/2000
11/11              0s 6ms/step - loss:
0.0143 - mae: 0.0676
Epoch 1530/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0676
Epoch 1531/2000
11/11              0s 6ms/step - loss:
0.0142 - mae: 0.0672
Epoch 1532/2000
11/11              0s 6ms/step - loss:
0.0142 - mae: 0.0669
Epoch 1533/2000
11/11              0s 5ms/step - loss:
0.0148 - mae: 0.0685
Epoch 1534/2000
11/11              0s 6ms/step - loss:
0.0142 - mae: 0.0678
Epoch 1535/2000
11/11              0s 6ms/step - loss:
0.0137 - mae: 0.0672
Epoch 1536/2000
11/11              0s 8ms/step - loss:
0.0148 - mae: 0.0675
Epoch 1537/2000
11/11              0s 6ms/step - loss:
0.0143 - mae: 0.0675
Epoch 1538/2000
11/11              0s 7ms/step - loss:
0.0141 - mae: 0.0669
Epoch 1539/2000
```

```
11/11              0s 6ms/step - loss:
0.0144 - mae: 0.0679
Epoch 1540/2000
11/11              0s 6ms/step - loss:
0.0148 - mae: 0.0683
Epoch 1541/2000
11/11              0s 6ms/step - loss:
0.0147 - mae: 0.0686
Epoch 1542/2000
11/11              0s 6ms/step - loss:
0.0151 - mae: 0.0687
Epoch 1543/2000
11/11              0s 6ms/step - loss:
0.0144 - mae: 0.0681
Epoch 1544/2000
11/11              0s 6ms/step - loss:
0.0152 - mae: 0.0694
Epoch 1545/2000
11/11              0s 6ms/step - loss:
0.0144 - mae: 0.0670
Epoch 1546/2000
11/11              0s 6ms/step - loss:
0.0148 - mae: 0.0690
Epoch 1547/2000
11/11              0s 7ms/step - loss:
0.0154 - mae: 0.0690
Epoch 1548/2000
11/11              0s 5ms/step - loss:
0.0144 - mae: 0.0682
Epoch 1549/2000
11/11              0s 6ms/step - loss:
0.0149 - mae: 0.0688
Epoch 1550/2000
11/11              0s 6ms/step - loss:
0.0142 - mae: 0.0668
Epoch 1551/2000
11/11              0s 6ms/step - loss:
0.0140 - mae: 0.0666
Epoch 1552/2000
11/11              0s 6ms/step - loss:
0.0135 - mae: 0.0662
Epoch 1553/2000
11/11              0s 6ms/step - loss:
0.0144 - mae: 0.0671
Epoch 1554/2000
11/11              0s 6ms/step - loss:
0.0158 - mae: 0.0691
Epoch 1555/2000
```

```
11/11                  0s 6ms/step - loss:
0.0146 - mae: 0.0681
Epoch 1556/2000
11/11                  0s 6ms/step - loss:
0.0141 - mae: 0.0681
Epoch 1557/2000
11/11                  0s 7ms/step - loss:
0.0144 - mae: 0.0673
Epoch 1558/2000
11/11                  0s 6ms/step - loss:
0.0144 - mae: 0.0669
Epoch 1559/2000
11/11                  0s 6ms/step - loss:
0.0147 - mae: 0.0679
Epoch 1560/2000
11/11                  0s 7ms/step - loss:
0.0139 - mae: 0.0667
Epoch 1561/2000
11/11                  0s 6ms/step - loss:
0.0146 - mae: 0.0679
Epoch 1562/2000
11/11                  0s 6ms/step - loss:
0.0140 - mae: 0.0667
Epoch 1563/2000
11/11                  0s 6ms/step - loss:
0.0143 - mae: 0.0673
```
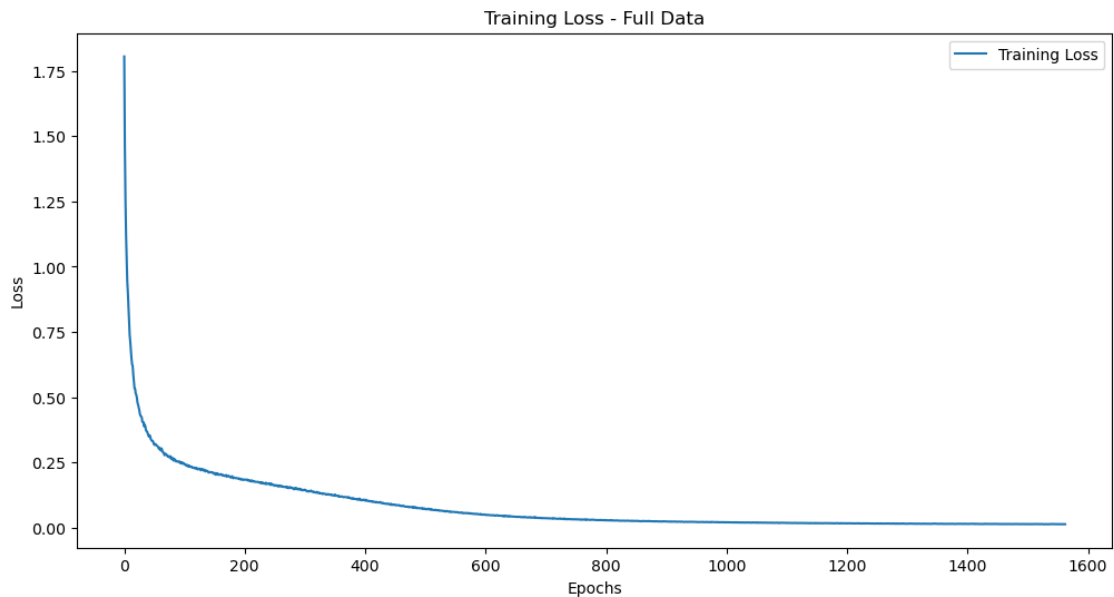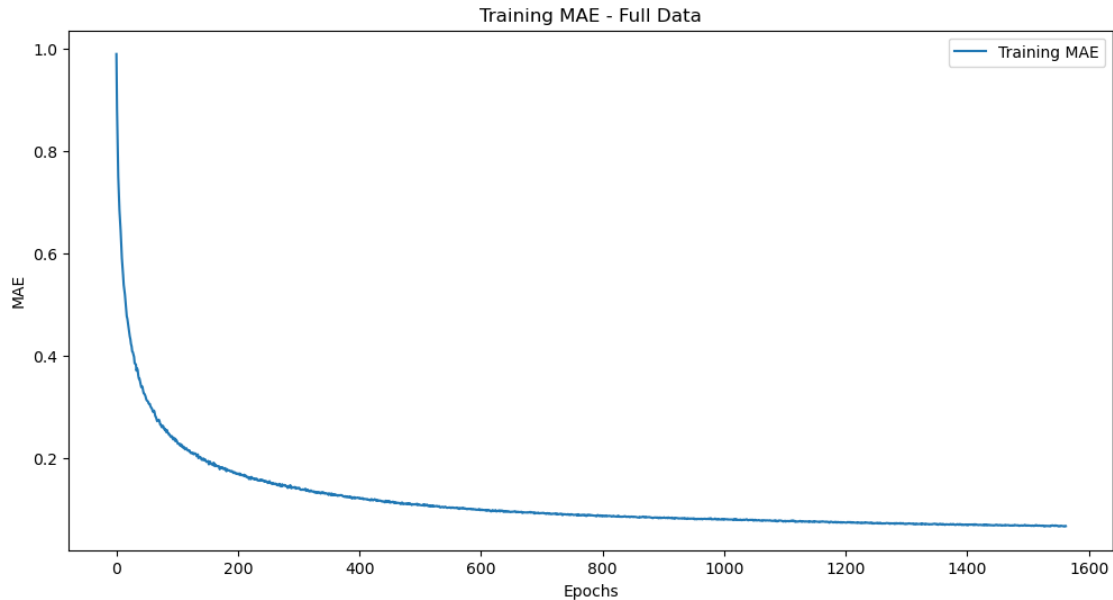

Training Loss - Full Data

Training MAE - Full Data

[ ]: 4.2 Identificação, descrição e desempenho dos dois melhores modelos

Modelo final com dados completos:

   A arquitetura do modelo final é semelhante ao modelo com KFold Cross␣
↪Validation, com a diferença de que foi treinado com todos os dados␣
↪disponíveis, de modo a tentar extrair o máximo de informação dos dados para␣
↪prever o valor AOT 550 nm

A arquitetura do modelo final é a seguinte:

   Camadas: Reduzido para 3 camadas densas (200, 100, 50) para simplificar a␣
↪arquitetura
   Regularização: l1 e l2 aplicadas de maneira semelhante aos modelos␣
↪anteriores testando varaiaçoes
   Dropout: Mantido o padrão decrescente (0.3, 0.156, 0.025) para prevenir␣
↪overfitting
   Ativação: LeakyReLU nas primeiras camadas, ReLU na última camada densa,␣
↪revelou ser uma boa combinação
   Otimização: Adam com taxa de aprendizagem a 0.0001 e EarlyStopping com␣
↪paciencia de 35 epochs

Neste modelo final, por já ser possivel utilizar todos os dados disponiveis␣
↪para treino, o modelo conseguiu melhorar o MAE para 0.0722, revelando que a␣
↪utilização de mais dados para treino é uma mais valia para a construção de␣
↪um modelo mais robusto e com melhor capacidade de generalização

Nesse sentido foi também possivel aumentar o batch_size para 1024, de modo a␣
↪acelerar o treino do modelo e reduzir o tempo de execução e como tal,␣
↪aumentar a paciencia do EarlyStopping para 35 epochs, de modo a garantir que␣
↪o modelo não para de treinar antes de atingir o ponto de convergência,
com um total de 2000 epochs, o modelo conseguiu atingir o ponto de convergência␣
↪e obter um MAE de 0.0722.

[13]:
```python
# Standardizar os dados de teste para fazer previsões
test_data_scaled = scaler.transform(test_data.drop(columns=['id']))
```

[ ]:
```python
# Gerar prediçoes
predictions = model.predict(test_data_scaled)

# Preparar submisao em csv
submission = pd.DataFrame({
    'id': test_data['id'],
    'value_550': predictions.flatten()
})

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

print("Ficheiro de submissão criado com sucesso!")
```

[ ]: 5. Detalhe dos Modelos Construidos e Problemas Encontrados

Durante a iteração dos modelos, foram encontrados alguns problemas que foram␣
↪resolvidos com a adição de regularização L1 e L2, e com a adição de Dropout␣
↪e BatchNormalization, de modo a evitar overfitting e a melhorar a␣
↪generalização do modelo, ou então
com a adição de mais camadas e neurónios para melhorar a capacidade de␣
↪aprendizagem do modelo.

Um dos primeiro problemas foi a errada construção do setup de teste, onde os␣
↪dados de treino eram standadizados e alimentados ao modelo, mas os dados de␣
↪teste não, o que levava a previsões erradas e a um MAE muito elevado, como␣
↪verificado nas primeiras submissões.

Outro problema encontrado foi a escolha da arquitetura do modelo, onde a adição␣
↪de mais camadas e neurónios não levava a uma melhoria significativa do␣
↪modelo, mas sim a um aumento do tempo de treino e a um aumento do MAE, o que␣
↪levou a uma escolha de uma arquitetura mais simples e com menos camadas e␣
↪neurónios, mas com regularização e Dropout, de modo a melhorar a␣
↪generalização do modelo.

Por fim, a escolha do learning rate foi um dos problemas encontrados, onde um␣
↪learning rate muito elevado levava a um modelo instavel que saltava a função␣
↪de erro e não estabilizava no minimo verdadeiro, mas em minimos locais, por␣
↪oposição um learning rate muito baixo levava a um modelo que não aprendia e␣
↪que não melhorava o MAE, o que levou a escolha de um learning rate␣
↪intermédio que permitisse a convergencia do modelo e a estabilização do MAE.

```python
# Enumeração dos modelos submetidos na plataforma e seu desempenho

# Modelo Incial - MAE de 0.0850

def create_model():
    model = Sequential([
        Dense(1280, activation='relu', kernel_regularizer=l2(0.0001),
 ↪input_shape=(X_train_scaled.shape[1],)),
        BatchNormalization(),
        Dropout(0.5),
        Dense(640, activation='relu', kernel_regularizer=l2(0.001)),
        BatchNormalization(),
        Dropout(0.5),
        Dense(320, activation='relu', kernel_regularizer=l2(0.01)),
        BatchNormalization(),
        Dropout(0.2),
        Dense(1)  # Output layer for regression
    ])

    # Compile the model with a lower learning rate
    optimizer = Adam(learning_rate=0.0001)
    model.compile(optimizer=optimizer, loss='mean_squared_error',
 ↪metrics=['mae'])

    return model


# Define the KFold cross-validation
kf = KFold(n_splits=5, shuffle=True, random_state=42)

# Store validation results
val_mae_scores = []

for train_index, val_index in kf.split(X_scaled):
    X_train, X_val = X_scaled[train_index], X_scaled[val_index]
    y_train, y_val = y[train_index], y[val_index]

    # Create a new model instance
    model = create_model()
```

```
    # Early stopping callback
    early_stopping = EarlyStopping(monitor='val_loss', patience=20,␣
↪restore_best_weights=True)

    # Train the model
    history = model.fit(X_train, y_train, epochs=300, batch_size=32,␣
↪validation_data=(X_val, y_val), callbacks=[early_stopping], verbose=1
                      )

    # Print model summary
    model.summary()

    # Evaluate the model on the validation set
    val_loss, val_mae = model.evaluate(X_val, y_val, verbose=0)
    val_mae_scores.append(val_mae)
    print(f"Fold Validation MAE: {val_mae}")

# Calculate the mean and standard deviation of the validation MAE scores
mean_val_mae = np.mean(val_mae_scores)
std_val_mae = np.std(val_mae_scores)

print(f"\nMean Validation MAE: {mean_val_mae}")
print(f"Standard Deviation of Validation MAE: {std_val_mae}")
```

[ ]: 6. Enumeração dos modelos submetidos em kaggle e o seu desempenho

Os modelos iniciais eram caracterizados por uma arquitetura densa com várias␣
↪camadas e neurónios, com regularização l2 e dropout, mas com uma taxa de␣
↪aprendizado muito baixa, o que levava a uma convergência lenta e a um MAE␣
↪elevado

A arquitetura do modelo inicial era a seguinte:

    Camadas: 3 camadas densas com unidades decrescentes (1280, 640, 320)
    Regularização: l2 com valores variáveis (0.0001, 0.001, 0.01)
    Dropout: Alta taxa de dropout (0.5, 0.5, 0.2) para prevenir overfitting
    Ativação: ReLU para todas as camadas
    Otimização: Adam com taxa de aprendizagem de 0.0001

A estrutura inicial é bastante densa com uma taxa de dropout demasiado elevada␣
↪que não capturava correctamente padrões nos dados. A regularização l2 está␣
↪bem distribuída, mas a taxa de aprendizado é baixa, o que leva a uma␣
↪convergência lenta, associado a um batch_zize muito pequeno que leva a um␣
↪tempo para treino muito elevado.

[ ]: # Enumeração dos modelos submetidos na plataforma e seu desempenho

```python
# Modelo Intermedio - MAE de 0.0790

def create_model():
    model = Sequential([
        Dense(200, activation=LeakyReLU(negative_slope=0.01),
 ↪kernel_regularizer=l1(0.0001), input_shape=(X_train.shape[1],)),
        BatchNormalization(),
        Dropout(0.3),
        Dense(100, activation=LeakyReLU(negative_slope=0.01),
 ↪kernel_regularizer=l2(0.001)),
        BatchNormalization(),
        Dropout(0.156),
        Dense(100, activation=LeakyReLU(negative_slope=0.01),
 ↪kernel_regularizer=l2(0.001)),
        BatchNormalization(),
        Dropout(0.156),
        Dense(100, activation=LeakyReLU(negative_slope=0.01),
 ↪kernel_regularizer=l2(0.002)),
        BatchNormalization(),
        Dropout(0.125),
        Dense(100, activation=LeakyReLU(negative_slope=0.01),
 ↪kernel_regularizer=l2(0.002)),
        BatchNormalization(),
        Dropout(0.072),
        Dense(50, activation='relu'),
        BatchNormalization(),
        Dropout(0.025),
        Dense(1)
    ])


    optimizer = Adam(learning_rate=0.0004)
    model.compile(optimizer=optimizer, loss='mean_squared_error',
 ↪metrics=['mae'])

    return model

# K-Fold Cross Validation
kf = KFold(n_splits=10, shuffle=True, random_state=10)


val_mae_scores = []

# Loop para cada fold
for train_index, val_index in kf.split(X_train_scaled):
```

```python
    X_train_fold, X_val_fold = X_train_scaled[train_index],␣
↪X_train_scaled[val_index]
    y_train_fold, y_val_fold = y_train.iloc[train_index], y_train.
↪iloc[val_index]


    model = create_model()

    # Early stopping callback
    early_stopping = EarlyStopping(monitor='val_loss', patience=25,␣
↪restore_best_weights=True)

    # Trainar o modelo
    history = model.fit(X_train_fold, y_train_fold, epochs=550, batch_size=512,␣
↪validation_data=(X_val_fold, y_val_fold), callbacks=[early_stopping],␣
↪verbose=1)

    # Plotting do training and validation loss para cada fold
    plt.figure(figsize=(12, 6))
    plt.plot(history.history['loss'], label='Training Loss')
    plt.plot(history.history['val_loss'], label='Validation Loss')
    plt.xlabel('Epochs')
    plt.ylabel('Loss')
    plt.title(f'Training and Validation Loss - Fold {len(val_mae_scores) + 1}')
    plt.legend()
    plt.show()

    # Plotting do training and validation MAE para cada fold
    plt.figure(figsize=(12, 6))
    plt.plot(history.history['mae'], label='Training MAE')
    plt.plot(history.history['val_mae'], label='Validation MAE')
    plt.xlabel('Epochs')
    plt.ylabel('MAE')
    plt.title(f'Training and Validation MAE - Fold {len(val_mae_scores) + 1}')
    plt.legend()
    plt.show()

    # Avaliar o modelo no conjunto de validação
    val_loss, val_mae = model.evaluate(X_val_fold, y_val_fold, verbose=0)
    val_mae_scores.append(val_mae)
    print(f"Fold Validation MAE: {val_mae}")

# Calcular a média e desvio padrão dos scores de validação
mean_val_mae = np.mean(val_mae_scores)
std_val_mae = np.std(val_mae_scores)

print(f"\nMean Validation MAE: {mean_val_mae}")
```

```
print(f"Standard Deviation of Validation MAE: {std_val_mae}")
```

6. Enumeração dos modelos submetidos em kaggle e o seu desempenho

Na segunda iteração de modelos, a arquitetura foi complicada com mais camadas e␣
↪neurónios numa tentativa de capturar melhor os padroes existentes, mas com␣
↪sucesso reduzido, com regularização L1 e L2, e com uma taxa de aprendizado␣
↪mais elevada, o que levou a uma convergência mais rápida e a uma␣
↪estabilização do MAE

As arquiteturas do modelo nesta iteração era a seguinte:

    Camadas: 6 camadas densas com unidades decrescentes (200, 100, 100, 100,␣
↪100, 50) de modo a capturar padrões mais complexos
    Regularização: Combinação de l1 e l2 (0.0001 e 0.002, respectivamente)
    Dropout: Dropout moderado decrescente (0.3, 0.156, 0.125, 0.072, 0.025)
    Ativação: LeakyReLU para as primeiras camadas, ReLU para a penúltima camada
    Otimização: Adam com taxa de aprendizagem de 0.0004

Nesta iteração a estrutura é mais profunda e equilibrada, com regularização l1␣
↪no início para controle de disperção dos dados e l2 para penalizar grandes␣
↪pesos nas camadas mais acima. A taxa de dropout é ajustada para cada camada,␣
↪o que pode ajudar a regularização sem perder muita informação,
mas a grande alteração foi na taxa de batch_size que foi aumentada para 512, o␣
↪que levou a uma convergência mais rápida e a uma estabilização do MAE, sendo␣
↪tentando varios valores até encontrar o mais estavel onde nao houvesse␣
↪comportamento erratico na maquina.

```python
# Enumeração dos modelos submetidos na plataforma e seu desempenho

# Modelo Intermedio - MAE de 0.0750

def create_model():
    model = Sequential([
        Dense(200, activation=LeakyReLU(negative_slope=0.01),␣
↪kernel_regularizer=l1(0.0001), input_shape=(X_train.shape[1],)),
        BatchNormalization(),
        Dropout(0.3),
        Dense(100, activation=LeakyReLU(negative_slope=0.01),␣
↪kernel_regularizer=l2(0.001)),
        BatchNormalization(),
        Dropout(0.156),
        Dense(50, activation='relu'),
        BatchNormalization(),
        Dropout(0.025),
        Dense(1)
    ])
```

```python
    optimizer = Adam(learning_rate=0.0003)
    model.compile(optimizer=optimizer, loss='mean_squared_error',␣
 ↪metrics=['mae'])

    return model

# K-Fold Cross Validation
kf = KFold(n_splits=10, shuffle=True, random_state=10)


val_mae_scores = []

# Loop para cada fold
for train_index, val_index in kf.split(X_train_scaled):
    X_train_fold, X_val_fold = X_train_scaled[train_index],␣
 ↪X_train_scaled[val_index]
    y_train_fold, y_val_fold = y_train.iloc[train_index], y_train.
 ↪iloc[val_index]


    model = create_model()

    # Early stopping callback
    early_stopping = EarlyStopping(monitor='val_loss', patience=25,␣
 ↪restore_best_weights=True)

    # Trainar o modelo
    history = model.fit(X_train_fold, y_train_fold, epochs=550, batch_size=512,␣
 ↪validation_data=(X_val_fold, y_val_fold), callbacks=[early_stopping],␣
 ↪verbose=1)

    # Plotting do training and validation loss para cada fold
    plt.figure(figsize=(12, 6))
    plt.plot(history.history['loss'], label='Training Loss')
    plt.plot(history.history['val_loss'], label='Validation Loss')
    plt.xlabel('Epochs')
    plt.ylabel('Loss')
    plt.title(f'Training and Validation Loss - Fold {len(val_mae_scores) + 1}')
    plt.legend()
    plt.show()

    # Plotting do training and validation MAE para cada fold
    plt.figure(figsize=(12, 6))
    plt.plot(history.history['mae'], label='Training MAE')
    plt.plot(history.history['val_mae'], label='Validation MAE')
```

```python
    plt.xlabel('Epochs')
    plt.ylabel('MAE')
    plt.title(f'Training and Validation MAE - Fold {len(val_mae_scores) + 1}')
    plt.legend()
    plt.show()

    # Avaliar o modelo no conjunto de validação
    val_loss, val_mae = model.evaluate(X_val_fold, y_val_fold, verbose=0)
    val_mae_scores.append(val_mae)
    print(f"Fold Validation MAE: {val_mae}")

# Calcular a média e desvio padrão dos scores de validação
mean_val_mae = np.mean(val_mae_scores)
std_val_mae = np.std(val_mae_scores)

print(f"\nMean Validation MAE: {mean_val_mae}")
print(f"Standard Deviation of Validation MAE: {std_val_mae}")
```

[ ]: 6. Enumeração dos modelos submetidos em kaggle e o seu desempenho

Na proxima iteração de modelos, a arquitetura foi simplificada com menos
 ↪camadas e neurónios, com regularização L1 e L2, e com uma taxa de
 ↪aprendizado mais elevada, o que levou a uma convergência mais rápida e a uma
 ↪estabilização do MAE, tendo sido testado diferentes valores de kfold que
 ↪poderiam afetar a distribuição dos dados,
ordenação dos dados à entrada do modelo, e a remoção de features que não tinham
 ↪impacto na predição do modelo, não tendo havido grandes melhorias
 ↪significativas.

As arquiteturas do modelo nesta iteração era a seguinte:

    Camadas: Reduzido para 3 camadas densas (200, 100, 50) para simplificar a
 ↪arquitetura
    Regularização: l1 e l2 aplicadas de maneira semelhante aos modelos
 ↪anteriores testando varaiaçoes
    Dropout: Mantido o padrão decrescente (0.3, 0.156, 0.025) para prevenir
 ↪overfitting
    Ativação: LeakyReLU nas primeiras camadas, ReLU na última camada densa,
 ↪revelou ser uma boa combinação
    Otimização: Adam com taxa de aprendizagem a 0.0003 e EarlyStopping com
 ↪paciencia de 25 epochs

Esta iteração adota uma estrutura mais simples e eficaz, onde o objectivo␣
 ↪passou pela profundidade do modelo, isto é, reduzi ao maximo o validation␣
 ↪error exsitente para cada um dos 10 folds. A regularização e dropout foram␣
 ↪mantidos para prevenir overfitting e a taxa de aprendizagem mais baixa␣
 ↪garante que o modelo converge de forma estável.
O valor de epochs foi mantido nos 550 devido à restrição do EarlyStopping, que␣
 ↪garante que o modelo não entra em overfitting e não se torna instavel,␣
 ↪divergindo para valores de erro elevados, percebendo que com o␣
 ↪EarlyStopping o modelo não ultrapassava os 350 a 500 epochs.

[ ]: 7. Conclusão

No final o nosso melhor modelo atigiu um MAE de 0.0722, com uma arquitetura de␣
 ↪3 camadas densas (200, 100, 50) com regularização l1 e l2, e dropout␣
 ↪decrescente (0.3, 0.156, 0.025) para prevenir overfitting, intoduzindo a␣
 ↪inicialização glorot_uniform para tentar melhorar a estabilidade do modelo,
mas não fuicou nem perto do melhor modelo submetido na plataforma, o que revela␣
 ↪que a arquitetura do modelo pode ter sido um grande erro, ou a optimização␣
 ↪dos hyperparametros uma grande falha.

Tentamos sempre um modelo que fosse o mais profundo possivel, com o valor de␣
 ↪val_error mais baixo possivel, e ao mesmo tempo melhorar o MAE para o mais␣
 ↪baixo possivel, mas sem sucesso. Utilizamos a ligação à maquina Niiaa␣
 ↪atravez de umaponte ssh com um servidor localhost de jupyter notebook, mas␣
 ↪**as** melhorias foram apenas incrementais para o modelo que já tinhamos␣
 ↪desenvolvido.

No final, para alem da arquitetura desenvolvida o futuro trabalho passaria pela␣
 ↪utilização do keras tuner para optimização dos hyperparametros na maquina␣
 ↪Niiaa, algo que requeria tempo, mas que poderia ser uma mais valia para a␣
 ↪construção de um modelo mais robusto e com melhor capacidade de␣
 ↪generalização, visto que foram submetidos modelos com scores de 0.005 de MAE.