Part A

Regression Model With Keras

In [1]:
```
import keras
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
```

In [2]:
```
# Read the data
concrete_data = pd.read_csv("concrete_data.csv")
concrete_data
```

Out[2]:

	Cement	Blast Furnace Slag	Fly Ash	Water	Superplasticizer	Coarse Aggregate	Fine Aggregate	Age	Strength
0	540.0	0.0	0.0	162.0	2.5	1040.0	676.0	28	79.99
1	540.0	0.0	0.0	162.0	2.5	1055.0	676.0	28	61.89
2	332.5	142.5	0.0	228.0	0.0	932.0	594.0	270	40.27
3	332.5	142.5	0.0	228.0	0.0	932.0	594.0	365	41.05
4	198.6	132.4	0.0	192.0	0.0	978.4	825.5	360	44.30
...	...	...	...	...	...	...	...	...	...
1025	276.4	116.0	90.3	179.6	8.9	870.1	768.3	28	44.28
1026	322.2	0.0	115.6	196.0	10.4	817.9	813.4	28	31.18
1027	148.5	139.4	108.6	192.7	6.1	892.4	780.0	28	23.70
1028	159.1	186.7	0.0	175.6	11.3	989.6	788.9	28	32.77
1029	260.9	100.5	78.3	200.6	8.6	864.5	761.5	28	32.40

1030 rows × 9 columns

In [3]:
```
concrete_data.head()
```

Out[3]:

	Cement	Blast Furnace Slag	Fly Ash	Water	Superplasticizer	Coarse Aggregate	Fine Aggregate	Age	Strength
0	540.0	0.0	0.0	162.0	2.5	1040.0	676.0	28	79.99
1	540.0	0.0	0.0	162.0	2.5	1055.0	676.0	28	61.89
2	332.5	142.5	0.0	228.0	0.0	932.0	594.0	270	40.27
3	332.5	142.5	0.0	228.0	0.0	932.0	594.0	365	41.05
4	198.6	132.4	0.0	192.0	0.0	978.4	825.5	360	44.30

In [4]:
```
# Size of the data
concrete_data.shape
```

Out[4]:
```
(1030, 9)
```

In [5]:
```
concrete_data.describe()
```

Out[5]:

	Cement	Blast Furnace Slag	Fly Ash	Water	Superplasticizer	Coarse Aggregate	Fi Aggrega
count	1030.000000	1030.000000	1030.000000	1030.000000	1030.000000	1030.000000	1030.0000
mean	281.167864	73.895825	54.188350	181.567282	6.204660	972.918932	773.5804
std	104.506364	86.279342	63.997004	21.354219	5.973841	77.753954	80.1759
min	102.000000	0.000000	0.000000	121.800000	0.000000	801.000000	594.0000
25%	192.375000	0.000000	0.000000	164.900000	0.000000	932.000000	730.9500
50%	272.900000	22.000000	0.000000	185.000000	6.400000	968.000000	779.5000
75%	350.000000	142.950000	118.300000	192.000000	10.200000	1029.400000	824.0000
max	540.000000	359.400000	200.100000	247.000000	32.200000	1145.000000	992.6000

In [6]:
```
# Sum of the null values
concrete_data.isnull().sum()
```

Out[6]:
```
Cement                0
Blast Furnace Slag    0
Fly Ash               0
Water                 0
Superplasticizer      0
Coarse Aggregate      0
Fine Aggregate        0
Age                   0
Strength              0
dtype: int64
```

Split data into predictors and target

1.Randomly split the data into a training and test sets by holding 30% of the data for testing

In [7]:
```
concrete_data_columns = concrete_data.columns

# all columns except Strength
predictors = concrete_data[concrete_data_columns[concrete_data_columns != 'Streng

# Strength column
target = concrete_data['Strength']
```

In [8]:
```
predictors.head()
```

Out[8]:

	Cement	Blast Furnace Slag	Fly Ash	Water	Superplasticizer	Coarse Aggregate	Fine Aggregate	Age
0	540.0	0.0	0.0	162.0	2.5	1040.0	676.0	28
1	540.0	0.0	0.0	162.0	2.5	1055.0	676.0	28
2	332.5	142.5	0.0	228.0	0.0	932.0	594.0	270
3	332.5	142.5	0.0	228.0	0.0	932.0	594.0	365
4	198.6	132.4	0.0	192.0	0.0	978.4	825.5	360

In [9]:
```
target.head()
```

Out[9]:
```
0    79.99
1    61.89
2    40.27
3    41.05
4    44.30
Name: Strength, dtype: float64
```

In [10]:
```
# split the data
X_train, X_test, y_train, y_test = train_test_split(predictors, target, test_size
```

In [11]:
```
print ('Train set:', X_train.shape,  y_train.shape)
```

```
Train set: (721, 8) (721,)
```

In [12]:
```
print ('Test set:', X_test.shape,  y_test.shape)
```

```
Test set: (309, 8) (309,)
```

Build a Neural Network

In [13]:
```
from keras.models import Sequential
from keras.layers import Dense
from keras import backend as K
```

In [14]:
```
# define regression model
def regression_model():

    # create model
    model = Sequential()
    model.add(Dense(10, activation='relu', input_shape=(X_train.shape[1],)))
    model.add(Dense(1))

    # compile model
    model.compile(optimizer='adam', loss='mean_squared_error')
    return model
```

Train and Test the Network

2. Train the model on the training data using 50 epochs.

In [15]:
```
# build the model
model = regression_model()
```

```
C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

In [16]:

```
# fit the model
model.fit(X_train, y_train, validation_split=0.3, epochs=50, verbose=2)
```

```
Epoch 1/50
16/16 - 2s - 107ms/step - loss: 5005.6108 - val_loss: 1844.0157
Epoch 2/50
16/16 - 0s - 9ms/step - loss: 1022.9368 - val_loss: 872.9194
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 861.8635 - val_loss: 853.6799
Epoch 4/50
16/16 - 0s - 10ms/step - loss: 783.2209 - val_loss: 815.7164
Epoch 5/50
16/16 - 0s - 9ms/step - loss: 753.7516 - val_loss: 800.8212
Epoch 6/50
16/16 - 0s - 9ms/step - loss: 727.6694 - val_loss: 766.5364
Epoch 7/50
16/16 - 0s - 7ms/step - loss: 702.6116 - val_loss: 742.5446
Epoch 8/50
16/16 - 0s - 7ms/step - loss: 678.9673 - val_loss: 719.7095
Epoch 9/50
16/16 - 0s - 10ms/step - loss: 656.0161 - val_loss: 693.6920
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 632.2678 - val_loss: 667.6947
Epoch 11/50
16/16 - 0s - 10ms/step - loss: 609.8391 - val_loss: 647.0920
Epoch 12/50
16/16 - 0s - 9ms/step - loss: 589.3655 - val_loss: 620.2878
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 563.3647 - val_loss: 604.1639
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 544.1182 - val_loss: 575.5012
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 521.9335 - val_loss: 550.8922
Epoch 16/50
16/16 - 0s - 9ms/step - loss: 501.6142 - val_loss: 532.1100
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 482.0738 - val_loss: 509.0140
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 462.3059 - val_loss: 489.2981
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 443.5267 - val_loss: 472.0269
Epoch 20/50
16/16 - 0s - 10ms/step - loss: 424.4535 - val_loss: 449.0220
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 407.1611 - val_loss: 434.7312
Epoch 22/50
16/16 - 0s - 9ms/step - loss: 392.9825 - val_loss: 412.8644
Epoch 23/50
16/16 - 0s - 11ms/step - loss: 375.8995 - val_loss: 396.8607
Epoch 24/50
16/16 - 0s - 10ms/step - loss: 359.7956 - val_loss: 383.1876
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 344.2484 - val_loss: 364.7312
Epoch 26/50
16/16 - 0s - 9ms/step - loss: 331.1489 - val_loss: 348.5832
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 317.6605 - val_loss: 333.7152
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 303.8898 - val_loss: 319.1125
Epoch 29/50
16/16 - 0s - 9ms/step - loss: 291.1184 - val_loss: 310.3617
Epoch 30/50
16/16 - 0s - 10ms/step - loss: 279.5886 - val_loss: 291.9179
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 266.8013 - val_loss: 282.3535
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 257.2824 - val_loss: 268.8030
Epoch 33/50
```

```
16/16 - 0s - 9ms/step - loss: 246.5988 - val_loss: 258.5587
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 236.9086 - val_loss: 247.8431
Epoch 35/50
16/16 - 0s - 10ms/step - loss: 229.2407 - val_loss: 239.2060
Epoch 36/50
16/16 - 0s - 11ms/step - loss: 221.1281 - val_loss: 227.5011
Epoch 37/50
16/16 - 0s - 9ms/step - loss: 211.5669 - val_loss: 220.7207
Epoch 38/50
16/16 - 0s - 11ms/step - loss: 204.2249 - val_loss: 211.0473
Epoch 39/50
16/16 - 0s - 20ms/step - loss: 195.8258 - val_loss: 205.7319
Epoch 40/50
16/16 - 0s - 9ms/step - loss: 189.0862 - val_loss: 195.7145
Epoch 41/50
16/16 - 0s - 9ms/step - loss: 183.5861 - val_loss: 191.1584
Epoch 42/50
16/16 - 0s - 9ms/step - loss: 177.0495 - val_loss: 181.7549
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 170.3110 - val_loss: 174.8850
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 165.3020 - val_loss: 172.2068
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 159.8513 - val_loss: 163.0512
Epoch 46/50
16/16 - 0s - 9ms/step - loss: 155.2731 - val_loss: 157.9178
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 151.6479 - val_loss: 152.6485
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 146.3484 - val_loss: 152.1020
Epoch 49/50
16/16 - 0s - 10ms/step - loss: 147.6274 - val_loss: 143.7058
Epoch 50/50
16/16 - 0s - 13ms/step - loss: 140.1324 - val_loss: 140.9465
```

Out[16]: `<keras.src.callbacks.history.History at 0x1c6e4ee28c0>`

3. Evaluate the model on the test data and compute the mean squared error between the predicted concrete strength and the actual concrete strength.

In [17]:
```
y_pred = model.predict(X_test)
mse = mean_squared_error(y_test, y_pred)
print(mse)
```

```
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
151.8019257295374
```

4. Repeat steps 1 - 3, 50 times, i.e., create a list of 50 mean squared errors.

In [18]:

```
mean = []

for i in range(50):
    def regression_model():

        concrete_data_columns = concrete_data.columns

        # all columns except Strength
        predictors = concrete_data[concrete_data_columns[concrete_data_columns !=

        # Strength column
        target = concrete_data['Strength']

        # split the data
        X_train, X_test, y_train, y_test = train_test_split(predictors, target, t

        # create model
        model = Sequential()
        model.add(Dense(10, activation='relu', input_shape=(X_train.shape[1],)))
        model.add(Dense(1))

        # compile model
        model.compile(optimizer='adam', loss='mean_squared_error')
        return model

    model = regression_model()
    model.fit(X_train, y_train, validation_split=0.3, epochs=50, verbose=2)

    # Calculate mse
    y_pred = model.predict(X_test)
    mse = mean_squared_error(y_test, y_pred)
    print(mse)
    mean.append(mse)

print(mean)
```

```
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 81ms/step - loss: 536952.4375 - val_loss: 446211.5625
Epoch 2/50
16/16 - 0s - 9ms/step - loss: 388376.4062 - val_loss: 317869.0625
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 273420.4688 - val_loss: 219689.7344
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 186831.6719 - val_loss: 147970.9062
Epoch 5/50
16/16 - 0s - 11ms/step - loss: 124610.6641 - val_loss: 96687.3750
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 81016.9766 - val_loss: 61638.1641
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 51622.1680 - val_loss: 38699.1484
Epoch 8/50
16/16 - 0s - 10ms/step - loss: 32571.3438 - val_loss: 24448.3574
Epoch 9/50
16/16 - 0s - 9ms/step - loss: 20978.3594 - val_loss: 15941.4121
Epoch 10/50
16/16 - 0s - 10ms/step - loss: 14085.9229 - val_loss: 11255.6885
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 10525.5146 - val_loss: 8666.7812
Epoch 12/50
16/16 - 0s - 9ms/step - loss: 8465.3330 - val_loss: 7499.8296
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 7589.9292 - val_loss: 6859.6484
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 7086.5347 - val_loss: 6554.0098
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 6805.4307 - val_loss: 6385.5981
Epoch 16/50
16/16 - 0s - 10ms/step - loss: 6657.2407 - val_loss: 6246.9092
Epoch 17/50
16/16 - 0s - 9ms/step - loss: 6511.4907 - val_loss: 6133.2212
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 6377.8872 - val_loss: 6021.1484
Epoch 19/50
16/16 - 0s - 9ms/step - loss: 6254.2065 - val_loss: 5907.5942
Epoch 20/50
16/16 - 0s - 13ms/step - loss: 6136.7593 - val_loss: 5794.0083
Epoch 21/50
16/16 - 0s - 12ms/step - loss: 6001.7446 - val_loss: 5682.1357
Epoch 22/50
16/16 - 0s - 10ms/step - loss: 5878.6260 - val_loss: 5571.1465
Epoch 23/50
16/16 - 0s - 11ms/step - loss: 5754.6133 - val_loss: 5461.4624
Epoch 24/50
16/16 - 0s - 11ms/step - loss: 5632.1636 - val_loss: 5353.4253
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 5517.2793 - val_loss: 5247.8569
Epoch 26/50
16/16 - 0s - 9ms/step - loss: 5395.9771 - val_loss: 5142.1958
Epoch 27/50
16/16 - 0s - 11ms/step - loss: 5284.1064 - val_loss: 5041.6499
Epoch 28/50
16/16 - 0s - 9ms/step - loss: 5177.1895 - val_loss: 4937.8467
Epoch 29/50
16/16 - 0s - 9ms/step - loss: 5065.7329 - val_loss: 4838.9731
Epoch 30/50
16/16 - 0s - 13ms/step - loss: 4958.9551 - val_loss: 4748.5923
Epoch 31/50
16/16 - 0s - 10ms/step - loss: 4857.3530 - val_loss: 4655.1309
Epoch 32/50
16/16 - 0s - 13ms/step - loss: 4759.1416 - val_loss: 4562.6558
Epoch 33/50
16/16 - 0s - 20ms/step - loss: 4666.5283 - val_loss: 4477.2778
```

```
Epoch 34/50
16/16 - 0s - 9ms/step - loss: 4567.2246 - val_loss: 4391.8320
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 4478.3579 - val_loss: 4314.4385
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 4396.4639 - val_loss: 4234.5107
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 4308.0029 - val_loss: 4161.1431
Epoch 38/50
16/16 - 0s - 7ms/step - loss: 4229.2690 - val_loss: 4089.4861
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 4151.3867 - val_loss: 4018.6687
Epoch 40/50
16/16 - 0s - 9ms/step - loss: 4073.2568 - val_loss: 3952.9890
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 4002.6050 - val_loss: 3888.8135
Epoch 42/50
16/16 - 0s - 10ms/step - loss: 3933.3936 - val_loss: 3827.2554
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 3868.2300 - val_loss: 3767.7520
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 3804.1521 - val_loss: 3714.0898
Epoch 45/50
16/16 - 0s - 13ms/step - loss: 3745.4456 - val_loss: 3659.2590
Epoch 46/50
16/16 - 0s - 17ms/step - loss: 3688.1377 - val_loss: 3607.6008
Epoch 47/50
16/16 - 0s - 10ms/step - loss: 3633.9958 - val_loss: 3558.9934
Epoch 48/50
16/16 - 0s - 9ms/step - loss: 3580.3784 - val_loss: 3512.0405
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 3528.5835 - val_loss: 3466.4121
Epoch 50/50
16/16 - 0s - 9ms/step - loss: 3479.7217 - val_loss: 3420.8906
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
3252.9566353602268
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 98ms/step - loss: 116855.5938 - val_loss: 77449.1250
Epoch 2/50
16/16 - 0s - 9ms/step - loss: 54498.7344 - val_loss: 33174.3633
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 22049.6895 - val_loss: 13812.0186
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 10033.3340 - val_loss: 8541.8906
Epoch 5/50
16/16 - 0s - 7ms/step - loss: 7254.1860 - val_loss: 7895.6152
Epoch 6/50
16/16 - 0s - 10ms/step - loss: 6854.4995 - val_loss: 7555.3936
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 6516.6670 - val_loss: 7186.8154
Epoch 8/50
16/16 - 0s - 11ms/step - loss: 6163.0181 - val_loss: 6863.0649
Epoch 9/50
16/16 - 0s - 9ms/step - loss: 5845.2837 - val_loss: 6557.4326
Epoch 10/50
16/16 - 0s - 10ms/step - loss: 5548.8022 - val_loss: 6262.4595
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 5272.8169 - val_loss: 5980.9590
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 5013.4106 - val_loss: 5718.2725
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 4777.7192 - val_loss: 5482.9717
Epoch 14/50
16/16 - 0s - 10ms/step - loss: 4564.6577 - val_loss: 5257.0142
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 4369.1504 - val_loss: 5053.7939
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 4189.7642 - val_loss: 4856.2734
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 4008.8164 - val_loss: 4671.5859
Epoch 18/50
16/16 - 0s - 10ms/step - loss: 3845.5579 - val_loss: 4497.4316
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 3688.3333 - val_loss: 4316.7480
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 3536.0552 - val_loss: 4150.3628
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 3390.2917 - val_loss: 3982.7571
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 3246.4956 - val_loss: 3823.8450
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 3111.5767 - val_loss: 3672.0391
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 2978.0806 - val_loss: 3521.2712
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 2853.0142 - val_loss: 3374.0305
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 2729.9185 - val_loss: 3232.3792
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 2604.0042 - val_loss: 3095.0781
Epoch 28/50
16/16 - 0s - 10ms/step - loss: 2486.4407 - val_loss: 2959.6055
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 2375.1958 - val_loss: 2822.9534
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 2263.8718 - val_loss: 2689.2402
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 2153.0605 - val_loss: 2556.7563
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 2048.6414 - val_loss: 2437.3860
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 1947.2015 - val_loss: 2311.1230
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 1844.5687 - val_loss: 2192.2561
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 1746.1810 - val_loss: 2079.4978
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 1653.9979 - val_loss: 1965.3436
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 1565.9352 - val_loss: 1856.7679
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 1485.6477 - val_loss: 1757.9005
Epoch 39/50
16/16 - 0s - 7ms/step - loss: 1411.4661 - val_loss: 1667.7698
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 1341.3831 - val_loss: 1571.7810
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 1269.2627 - val_loss: 1491.8728
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 1208.3558 - val_loss: 1414.8792
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 1147.7080 - val_loss: 1340.4349
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 1091.3636 - val_loss: 1276.8170
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 1042.1838 - val_loss: 1218.6968
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 996.8047 - val_loss: 1165.6602
Epoch 47/50
16/16 - 0s - 7ms/step - loss: 953.9182 - val_loss: 1115.4586
Epoch 48/50
16/16 - 0s - 7ms/step - loss: 914.4282 - val_loss: 1074.5187
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 881.8834 - val_loss: 1035.7811
Epoch 50/50
16/16 - 0s - 12ms/step - loss: 849.4000 - val_loss: 996.1557
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
924.9396119227171
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 111ms/step - loss: 37523.3398 - val_loss: 29435.3379
Epoch 2/50
16/16 - 0s - 24ms/step - loss: 21667.8457 - val_loss: 16301.3525
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 11795.5635 - val_loss: 8978.0469
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 7014.3462 - val_loss: 5749.5522
Epoch 5/50
16/16 - 0s - 10ms/step - loss: 5172.9385 - val_loss: 4635.0630
Epoch 6/50
16/16 - 0s - 9ms/step - loss: 4592.5151 - val_loss: 4207.8354
Epoch 7/50
16/16 - 0s - 9ms/step - loss: 4322.2642 - val_loss: 3940.6028
Epoch 8/50
16/16 - 0s - 9ms/step - loss: 4072.8220 - val_loss: 3708.7527
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 3829.6121 - val_loss: 3495.3767
Epoch 10/50
16/16 - 0s - 9ms/step - loss: 3615.1047 - val_loss: 3310.6135
Epoch 11/50
16/16 - 0s - 9ms/step - loss: 3395.4419 - val_loss: 3119.3962
Epoch 12/50
16/16 - 0s - 9ms/step - loss: 3200.8250 - val_loss: 2937.4531
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 3016.8196 - val_loss: 2768.0886
Epoch 14/50
16/16 - 0s - 10ms/step - loss: 2841.9231 - val_loss: 2611.1477
Epoch 15/50
16/16 - 0s - 10ms/step - loss: 2684.8928 - val_loss: 2464.7947
Epoch 16/50
16/16 - 0s - 9ms/step - loss: 2530.0142 - val_loss: 2342.1926
Epoch 17/50
16/16 - 0s - 9ms/step - loss: 2391.4092 - val_loss: 2204.7178
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 2255.8879 - val_loss: 2088.9319
Epoch 19/50
16/16 - 0s - 10ms/step - loss: 2132.6094 - val_loss: 1973.9398
Epoch 20/50
16/16 - 0s - 9ms/step - loss: 2018.1654 - val_loss: 1873.8191
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 1910.7017 - val_loss: 1771.5162
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 1808.2699 - val_loss: 1684.0671
Epoch 23/50
16/16 - 0s - 11ms/step - loss: 1714.8016 - val_loss: 1598.7542
Epoch 24/50
16/16 - 0s - 21ms/step - loss: 1627.3411 - val_loss: 1517.2413
Epoch 25/50
16/16 - 0s - 10ms/step - loss: 1543.1962 - val_loss: 1440.8435
Epoch 26/50
16/16 - 0s - 10ms/step - loss: 1464.9113 - val_loss: 1370.8573
Epoch 27/50
16/16 - 0s - 9ms/step - loss: 1392.2834 - val_loss: 1303.7777
Epoch 28/50
16/16 - 0s - 9ms/step - loss: 1322.0531 - val_loss: 1247.9293
Epoch 29/50
16/16 - 0s - 11ms/step - loss: 1259.0503 - val_loss: 1181.3096
Epoch 30/50
16/16 - 0s - 12ms/step - loss: 1195.4631 - val_loss: 1127.4276
Epoch 31/50
16/16 - 0s - 19ms/step - loss: 1140.1998 - val_loss: 1074.5139
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 1083.0513 - val_loss: 1024.6860
Epoch 33/50
16/16 - 0s - 9ms/step - loss: 1033.2661 - val_loss: 977.2953
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 984.6030 - val_loss: 934.7948
Epoch 35/50
16/16 - 0s - 7ms/step - loss: 938.5962 - val_loss: 889.7395
Epoch 36/50
16/16 - 0s - 9ms/step - loss: 894.9020 - val_loss: 850.6526
Epoch 37/50
16/16 - 0s - 9ms/step - loss: 854.8986 - val_loss: 814.9899
Epoch 38/50
16/16 - 0s - 10ms/step - loss: 815.9685 - val_loss: 774.9990
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 779.0701 - val_loss: 744.4066
Epoch 40/50
16/16 - 0s - 9ms/step - loss: 743.0565 - val_loss: 710.9824
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 710.8721 - val_loss: 679.5625
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 679.3474 - val_loss: 649.0952
Epoch 43/50
16/16 - 0s - 9ms/step - loss: 649.2536 - val_loss: 623.3821
Epoch 44/50
16/16 - 0s - 10ms/step - loss: 621.4128 - val_loss: 597.8441
Epoch 45/50
16/16 - 0s - 9ms/step - loss: 593.9661 - val_loss: 569.8509
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 567.9604 - val_loss: 547.3328
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 544.5731 - val_loss: 526.7766
Epoch 48/50
16/16 - 0s - 10ms/step - loss: 520.1022 - val_loss: 502.0615
Epoch 49/50
16/16 - 0s - 9ms/step - loss: 499.6874 - val_loss: 480.9381
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 477.7785 - val_loss: 461.7247
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
522.5021057307683
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 101ms/step - loss: 19797.8535 - val_loss: 12493.8564
Epoch 2/50
16/16 - 0s - 10ms/step - loss: 8408.7490 - val_loss: 5088.4673
Epoch 3/50
16/16 - 0s - 13ms/step - loss: 3711.4263 - val_loss: 2513.1389
Epoch 4/50
16/16 - 0s - 9ms/step - loss: 2282.1897 - val_loss: 1808.9343
Epoch 5/50
16/16 - 0s - 10ms/step - loss: 1883.7434 - val_loss: 1635.4393
Epoch 6/50
16/16 - 0s - 12ms/step - loss: 1749.4512 - val_loss: 1546.1812
Epoch 7/50
16/16 - 0s - 18ms/step - loss: 1659.1420 - val_loss: 1461.2957
Epoch 8/50
16/16 - 0s - 9ms/step - loss: 1565.9991 - val_loss: 1374.9055
Epoch 9/50
16/16 - 0s - 9ms/step - loss: 1474.4871 - val_loss: 1284.8820
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 1379.8313 - val_loss: 1194.4786
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 1286.6052 - val_loss: 1105.7124
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 1198.3923 - val_loss: 1019.8221
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 1112.7871 - val_loss: 938.9351
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 1027.9291 - val_loss: 860.2430
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 949.7724 - val_loss: 790.6087
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 880.4357 - val_loss: 731.5525
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 820.0629 - val_loss: 676.8197
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 765.8350 - val_loss: 625.9241
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 716.5962 - val_loss: 584.2292
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 670.0959 - val_loss: 545.7528
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 630.0786 - val_loss: 511.4388
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 593.9843 - val_loss: 481.1641
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 559.5140 - val_loss: 454.2477
Epoch 24/50
16/16 - 0s - 10ms/step - loss: 528.8821 - val_loss: 430.8537
Epoch 25/50
16/16 - 0s - 10ms/step - loss: 502.7310 - val_loss: 410.3614
Epoch 26/50
16/16 - 0s - 9ms/step - loss: 478.8938 - val_loss: 391.9702
Epoch 27/50
16/16 - 0s - 9ms/step - loss: 455.9510 - val_loss: 376.0990
Epoch 28/50
16/16 - 0s - 10ms/step - loss: 437.1651 - val_loss: 363.7643
Epoch 29/50
16/16 - 0s - 11ms/step - loss: 418.5680 - val_loss: 349.9933
Epoch 30/50
16/16 - 0s - 19ms/step - loss: 400.4259 - val_loss: 339.2839
Epoch 31/50
16/16 - 0s - 9ms/step - loss: 386.5790 - val_loss: 330.4926
Epoch 32/50
16/16 - 0s - 11ms/step - loss: 371.6857 - val_loss: 321.1458
Epoch 33/50
16/16 - 0s - 10ms/step - loss: 360.5193 - val_loss: 313.4631
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 349.7160 - val_loss: 307.4411
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 338.9925 - val_loss: 302.9724
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 329.9827 - val_loss: 297.5626
Epoch 37/50
16/16 - 0s - 12ms/step - loss: 322.7513 - val_loss: 292.7900
Epoch 38/50
16/16 - 0s - 9ms/step - loss: 315.2617 - val_loss: 289.9380
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 308.2743 - val_loss: 284.9368
Epoch 40/50
16/16 - 0s - 15ms/step - loss: 302.6824 - val_loss: 280.7761
Epoch 41/50
16/16 - 0s - 10ms/step - loss: 296.7888 - val_loss: 277.9950
Epoch 42/50
16/16 - 0s - 9ms/step - loss: 291.2375 - val_loss: 276.6440
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 286.2319 - val_loss: 272.0343
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 281.7546 - val_loss: 268.3443
Epoch 45/50
16/16 - 0s - 11ms/step - loss: 277.0194 - val_loss: 266.9150
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 272.9816 - val_loss: 264.1393
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 268.8148 - val_loss: 260.9995
Epoch 48/50
16/16 - 0s - 7ms/step - loss: 265.3907 - val_loss: 259.1310
Epoch 49/50
16/16 - 0s - 7ms/step - loss: 261.9061 - val_loss: 258.4591
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 259.1630 - val_loss: 257.5085
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
305.29441103259325
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 98ms/step - loss: 275478.7812 - val_loss: 195715.0156
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 142496.0000 - val_loss: 94431.7891
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 64807.2578 - val_loss: 40269.2617
Epoch 4/50
16/16 - 0s - 10ms/step - loss: 26420.5000 - val_loss: 15585.1230
Epoch 5/50
16/16 - 0s - 12ms/step - loss: 10351.0205 - val_loss: 6670.6118
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 5356.3730 - val_loss: 4412.4243
Epoch 7/50
16/16 - 0s - 9ms/step - loss: 4274.6245 - val_loss: 3940.4453
Epoch 8/50
16/16 - 0s - 10ms/step - loss: 3983.2683 - val_loss: 3693.6077
Epoch 9/50
16/16 - 0s - 13ms/step - loss: 3741.3508 - val_loss: 3463.1909
Epoch 10/50
16/16 - 0s - 9ms/step - loss: 3502.8330 - val_loss: 3251.8994
Epoch 11/50
16/16 - 0s - 10ms/step - loss: 3285.6785 - val_loss: 3048.6250
Epoch 12/50
16/16 - 0s - 10ms/step - loss: 3076.3093 - val_loss: 2858.5178
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 2887.5635 - val_loss: 2688.7168
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 2710.7092 - val_loss: 2532.2234
Epoch 15/50
16/16 - 0s - 9ms/step - loss: 2545.9934 - val_loss: 2380.9417
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 2390.6924 - val_loss: 2241.2329
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 2247.4607 - val_loss: 2111.7322
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 2114.7903 - val_loss: 1982.9958
Epoch 19/50
16/16 - 0s - 9ms/step - loss: 1988.2736 - val_loss: 1871.0851
Epoch 20/50
16/16 - 0s - 9ms/step - loss: 1876.1964 - val_loss: 1763.5281
Epoch 21/50
16/16 - 0s - 9ms/step - loss: 1768.2924 - val_loss: 1661.4493
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 1668.3895 - val_loss: 1569.0977
Epoch 23/50
16/16 - 0s - 9ms/step - loss: 1578.0947 - val_loss: 1477.2046
Epoch 24/50
16/16 - 0s - 9ms/step - loss: 1486.5299 - val_loss: 1400.2966
Epoch 25/50
16/16 - 0s - 11ms/step - loss: 1407.9340 - val_loss: 1325.5774
Epoch 26/50
16/16 - 0s - 11ms/step - loss: 1331.3363 - val_loss: 1256.5658
Epoch 27/50
16/16 - 0s - 10ms/step - loss: 1260.9642 - val_loss: 1194.9249
Epoch 28/50
16/16 - 0s - 9ms/step - loss: 1196.8368 - val_loss: 1134.1138
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 1134.2598 - val_loss: 1079.3848
Epoch 30/50
16/16 - 0s - 10ms/step - loss: 1078.6838 - val_loss: 1028.8469
Epoch 31/50
16/16 - 0s - 11ms/step - loss: 1027.4646 - val_loss: 979.6123
Epoch 32/50
16/16 - 0s - 11ms/step - loss: 977.2110 - val_loss: 935.9231
Epoch 33/50
16/16 - 0s - 10ms/step - loss: 931.4078 - val_loss: 894.1426
```

```
Epoch 34/50
16/16 - 0s - 9ms/step - loss: 888.4886 - val_loss: 854.7208
Epoch 35/50
16/16 - 0s - 9ms/step - loss: 848.9907 - val_loss: 817.2948
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 811.8150 - val_loss: 781.7087
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 775.3071 - val_loss: 749.9382
Epoch 38/50
16/16 - 0s - 12ms/step - loss: 742.1698 - val_loss: 716.9908
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 710.4028 - val_loss: 686.5225
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 680.7883 - val_loss: 657.9833
Epoch 41/50
16/16 - 0s - 7ms/step - loss: 651.9547 - val_loss: 632.5489
Epoch 42/50
16/16 - 0s - 10ms/step - loss: 626.6369 - val_loss: 605.6389
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 602.4058 - val_loss: 581.4172
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 577.5814 - val_loss: 559.6680
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 556.1746 - val_loss: 538.1924
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 534.0844 - val_loss: 516.9012
Epoch 47/50
16/16 - 0s - 9ms/step - loss: 515.4320 - val_loss: 497.2007
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 495.0044 - val_loss: 479.6578
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 477.7969 - val_loss: 462.1650
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 460.7161 - val_loss: 445.0801
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
501.7470508143145
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 82ms/step - loss: 5883.2202 - val_loss: 5104.8823
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 4940.2178 - val_loss: 4131.2456
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 4177.5239 - val_loss: 3517.3665
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 3564.2727 - val_loss: 3009.9124
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 3039.1519 - val_loss: 2569.2671
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 2605.9468 - val_loss: 2195.9924
Epoch 7/50
16/16 - 0s - 7ms/step - loss: 2249.1970 - val_loss: 1876.5299
Epoch 8/50
16/16 - 0s - 11ms/step - loss: 1870.4420 - val_loss: 1593.7395
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 1600.8608 - val_loss: 1346.2461
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 1362.5171 - val_loss: 1158.2206
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 1187.4006 - val_loss: 963.7601
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 956.9750 - val_loss: 815.6581
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 806.6823 - val_loss: 692.0121
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 694.8293 - val_loss: 594.9893
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 593.4993 - val_loss: 505.4407
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 498.1149 - val_loss: 426.1292
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 423.0501 - val_loss: 368.9768
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 365.8326 - val_loss: 324.5107
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 332.6944 - val_loss: 287.9420
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 283.0094 - val_loss: 246.4443
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 249.2630 - val_loss: 220.4478
Epoch 22/50
16/16 - 0s - 7ms/step - loss: 223.8539 - val_loss: 198.6192
Epoch 23/50
16/16 - 0s - 7ms/step - loss: 207.4595 - val_loss: 190.4244
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 189.2718 - val_loss: 171.0929
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 176.8749 - val_loss: 159.2979
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 166.8877 - val_loss: 150.9167
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 159.4274 - val_loss: 143.8693
Epoch 28/50
16/16 - 0s - 10ms/step - loss: 151.7272 - val_loss: 152.6165
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 146.7699 - val_loss: 135.2615
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 140.6893 - val_loss: 134.1407
Epoch 31/50
16/16 - 0s - 10ms/step - loss: 138.5745 - val_loss: 130.0199
Epoch 32/50
16/16 - 0s - 7ms/step - loss: 132.5314 - val_loss: 125.9648
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 136.2144 - val_loss: 132.8577
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 128.2062 - val_loss: 122.2886
Epoch 35/50
16/16 - 0s - 11ms/step - loss: 127.8939 - val_loss: 122.1157
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 127.9889 - val_loss: 129.7224
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 126.5851 - val_loss: 122.1555
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 123.0003 - val_loss: 120.1556
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 121.5583 - val_loss: 117.3523
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 121.5542 - val_loss: 117.7180
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 119.7158 - val_loss: 116.8017
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 118.9546 - val_loss: 115.4979
Epoch 43/50
16/16 - 0s - 11ms/step - loss: 119.4430 - val_loss: 115.5639
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 118.4347 - val_loss: 113.6736
Epoch 45/50
16/16 - 0s - 9ms/step - loss: 116.1883 - val_loss: 122.2176
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 116.8733 - val_loss: 113.4525
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 115.3998 - val_loss: 113.0652
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 116.5622 - val_loss: 116.0258
Epoch 49/50
16/16 - 0s - 9ms/step - loss: 114.2899 - val_loss: 112.2233
Epoch 50/50
16/16 - 0s - 11ms/step - loss: 115.4113 - val_loss: 115.0639
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
143.93443627425026
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 82ms/step - loss: 2835.0598 - val_loss: 1346.6945
Epoch 2/50
16/16 - 0s - 7ms/step - loss: 1021.0930 - val_loss: 641.2803
Epoch 3/50
16/16 - 0s - 11ms/step - loss: 692.8410 - val_loss: 645.0417
Epoch 4/50
16/16 - 0s - 7ms/step - loss: 670.8753 - val_loss: 607.2582
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 644.3363 - val_loss: 585.4335
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 623.2491 - val_loss: 570.4954
Epoch 7/50
16/16 - 0s - 10ms/step - loss: 600.4878 - val_loss: 550.9606
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 581.1591 - val_loss: 533.5994
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 561.7041 - val_loss: 518.7634
Epoch 10/50
16/16 - 0s - 9ms/step - loss: 543.3087 - val_loss: 501.7377
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 525.1017 - val_loss: 487.1915
Epoch 12/50
16/16 - 0s - 11ms/step - loss: 506.9935 - val_loss: 470.2408
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 490.7181 - val_loss: 458.6059
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 473.8063 - val_loss: 442.3981
Epoch 15/50
16/16 - 0s - 10ms/step - loss: 461.8007 - val_loss: 430.2540
Epoch 16/50
16/16 - 0s - 11ms/step - loss: 444.6916 - val_loss: 417.7201
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 430.2458 - val_loss: 406.0794
Epoch 18/50
16/16 - 0s - 10ms/step - loss: 418.5024 - val_loss: 396.0986
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 406.4134 - val_loss: 383.1766
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 392.7068 - val_loss: 375.5503
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 381.8432 - val_loss: 364.2503
Epoch 22/50
16/16 - 0s - 7ms/step - loss: 371.1830 - val_loss: 354.1363
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 362.4646 - val_loss: 347.5306
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 350.8311 - val_loss: 335.2755
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 343.4409 - val_loss: 326.8908
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 332.5503 - val_loss: 317.0553
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 324.1536 - val_loss: 308.4908
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 318.3511 - val_loss: 301.0706
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 308.3607 - val_loss: 293.6260
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 300.6234 - val_loss: 288.3910
Epoch 31/50
16/16 - 0s - 9ms/step - loss: 294.0128 - val_loss: 280.7959
Epoch 32/50
16/16 - 0s - 9ms/step - loss: 286.7934 - val_loss: 275.2073
Epoch 33/50
16/16 - 0s - 10ms/step - loss: 280.5230 - val_loss: 268.9479
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 274.4731 - val_loss: 264.1304
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 268.8089 - val_loss: 258.8759
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 263.2348 - val_loss: 252.3519
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 256.9785 - val_loss: 247.9933
Epoch 38/50
16/16 - 0s - 11ms/step - loss: 252.4781 - val_loss: 242.0436
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 248.2507 - val_loss: 237.5810
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 240.1180 - val_loss: 235.0135
Epoch 41/50
16/16 - 0s - 9ms/step - loss: 234.0857 - val_loss: 231.0067
Epoch 42/50
16/16 - 0s - 9ms/step - loss: 228.8605 - val_loss: 224.0151
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 225.0804 - val_loss: 218.4297
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 219.7776 - val_loss: 215.7733
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 217.3365 - val_loss: 211.4216
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 212.0290 - val_loss: 206.9277
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 207.2302 - val_loss: 204.5347
Epoch 48/50
16/16 - 0s - 10ms/step - loss: 203.6849 - val_loss: 200.2386
Epoch 49/50
16/16 - 0s - 7ms/step - loss: 199.8516 - val_loss: 198.0422
Epoch 50/50
16/16 - 0s - 7ms/step - loss: 196.4032 - val_loss: 193.1375
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
216.1732789063173
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 83ms/step - loss: 56155.8359 - val_loss: 34444.1484
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 22960.6855 - val_loss: 15652.3926
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 13367.7148 - val_loss: 12201.6240
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 12176.5615 - val_loss: 11553.4570
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 11628.9443 - val_loss: 10916.2959
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 10970.3525 - val_loss: 10352.2930
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 10395.2178 - val_loss: 9793.0283
Epoch 8/50
16/16 - 0s - 9ms/step - loss: 9860.5537 - val_loss: 9259.2939
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 9349.0996 - val_loss: 8756.9805
Epoch 10/50
16/16 - 0s - 9ms/step - loss: 8848.3711 - val_loss: 8356.6309
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 8425.1943 - val_loss: 7886.0298
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 7993.2275 - val_loss: 7497.6621
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 7599.6626 - val_loss: 7122.2769
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 7233.7231 - val_loss: 6730.8257
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 6855.4097 - val_loss: 6382.7305
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 6502.1240 - val_loss: 6010.2158
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 6119.1753 - val_loss: 5653.0347
Epoch 18/50
16/16 - 0s - 7ms/step - loss: 5735.2720 - val_loss: 5257.0791
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 5328.3789 - val_loss: 4837.7510
Epoch 20/50
16/16 - 0s - 7ms/step - loss: 4878.2563 - val_loss: 4414.4014
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 4444.4624 - val_loss: 4021.4036
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 4080.3660 - val_loss: 3699.9539
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 3782.7036 - val_loss: 3460.6301
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 3564.7188 - val_loss: 3278.1104
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 3390.7424 - val_loss: 3126.8555
Epoch 26/50
16/16 - 0s - 9ms/step - loss: 3232.6243 - val_loss: 3000.8647
Epoch 27/50
16/16 - 0s - 7ms/step - loss: 3098.6184 - val_loss: 2886.1350
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 2976.9702 - val_loss: 2775.9724
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 2859.4971 - val_loss: 2676.5710
Epoch 30/50
16/16 - 0s - 9ms/step - loss: 2753.1033 - val_loss: 2584.5593
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 2658.5688 - val_loss: 2495.2549
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 2567.3372 - val_loss: 2411.1809
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 2485.2156 - val_loss: 2330.3987
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 2410.6008 - val_loss: 2257.7620
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 2329.8447 - val_loss: 2190.9136
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 2262.1201 - val_loss: 2123.1716
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 2195.5833 - val_loss: 2061.3647
Epoch 38/50
16/16 - 0s - 10ms/step - loss: 2138.2568 - val_loss: 2002.1901
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 2070.0984 - val_loss: 1941.6338
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 2008.6102 - val_loss: 1885.0815
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 1946.5940 - val_loss: 1831.5479
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 1891.6417 - val_loss: 1778.1167
Epoch 43/50
16/16 - 0s - 9ms/step - loss: 1838.2445 - val_loss: 1726.9890
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 1785.2402 - val_loss: 1680.2759
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 1744.0542 - val_loss: 1632.6113
Epoch 46/50
16/16 - 0s - 10ms/step - loss: 1689.9589 - val_loss: 1587.7484
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 1642.2712 - val_loss: 1542.5510
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 1602.0961 - val_loss: 1500.3324
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 1557.9738 - val_loss: 1459.0803
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 1513.8116 - val_loss: 1418.9224
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
1404.1110880882145
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 79ms/step - loss: 52260.6445 - val_loss: 24533.2949
Epoch 2/50
16/16 - 0s - 11ms/step - loss: 12688.2031 - val_loss: 5691.6919
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 4831.4282 - val_loss: 4826.9897
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 4590.8091 - val_loss: 4435.2954
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 4121.9878 - val_loss: 4112.9736
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 3822.8550 - val_loss: 3855.2324
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 3551.9158 - val_loss: 3604.7786
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 3302.6626 - val_loss: 3360.8655
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 3062.2910 - val_loss: 3137.2612
Epoch 10/50
16/16 - 0s - 7ms/step - loss: 2838.7854 - val_loss: 2917.0757
Epoch 11/50
16/16 - 0s - 10ms/step - loss: 2619.9670 - val_loss: 2724.1133
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 2428.1333 - val_loss: 2541.8110
Epoch 13/50
16/16 - 0s - 7ms/step - loss: 2242.0090 - val_loss: 2381.8574
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 2088.5535 - val_loss: 2220.5554
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 1934.0389 - val_loss: 2091.7209
Epoch 16/50
16/16 - 0s - 7ms/step - loss: 1805.6376 - val_loss: 1964.1947
Epoch 17/50
16/16 - 0s - 7ms/step - loss: 1682.4575 - val_loss: 1847.8577
Epoch 18/50
16/16 - 0s - 7ms/step - loss: 1577.3048 - val_loss: 1747.3291
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 1478.1490 - val_loss: 1650.0699
Epoch 20/50
16/16 - 0s - 7ms/step - loss: 1388.9833 - val_loss: 1571.1113
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 1313.5682 - val_loss: 1491.9850
Epoch 22/50
16/16 - 0s - 7ms/step - loss: 1243.3621 - val_loss: 1426.2261
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 1185.8219 - val_loss: 1364.3943
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 1124.0364 - val_loss: 1305.3964
Epoch 25/50
16/16 - 0s - 7ms/step - loss: 1076.1793 - val_loss: 1255.7394
Epoch 26/50
16/16 - 0s - 7ms/step - loss: 1031.8788 - val_loss: 1208.8967
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 987.3838 - val_loss: 1163.1808
Epoch 28/50
16/16 - 0s - 7ms/step - loss: 952.4434 - val_loss: 1135.6711
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 918.8109 - val_loss: 1086.7454
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 890.5647 - val_loss: 1058.4020
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 864.0166 - val_loss: 1023.5593
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 834.4449 - val_loss: 999.5739
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 807.0020 - val_loss: 961.9705
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 781.9343 - val_loss: 938.9476
Epoch 35/50
16/16 - 0s - 10ms/step - loss: 761.3962 - val_loss: 912.1044
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 740.4709 - val_loss: 890.5728
Epoch 37/50
16/16 - 0s - 10ms/step - loss: 720.3898 - val_loss: 862.7223
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 704.5150 - val_loss: 842.2335
Epoch 39/50
16/16 - 0s - 7ms/step - loss: 686.0382 - val_loss: 822.2824
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 665.2775 - val_loss: 797.8252
Epoch 41/50
16/16 - 0s - 7ms/step - loss: 651.7874 - val_loss: 775.4286
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 630.6982 - val_loss: 769.1265
Epoch 43/50
16/16 - 0s - 7ms/step - loss: 616.8594 - val_loss: 740.5063
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 601.4108 - val_loss: 722.8030
Epoch 45/50
16/16 - 0s - 7ms/step - loss: 586.5505 - val_loss: 703.2112
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 573.4982 - val_loss: 685.3655
Epoch 47/50
16/16 - 0s - 15ms/step - loss: 557.6171 - val_loss: 671.6018
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 545.6883 - val_loss: 654.2755
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 532.2750 - val_loss: 638.3258
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 519.8839 - val_loss: 624.7943
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
494.0788563858191
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 81ms/step - loss: 266666.5938 - val_loss: 215026.0625
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 182996.2500 - val_loss: 142872.6406
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 117865.0156 - val_loss: 87608.1016
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 69837.0469 - val_loss: 48811.1328
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 37873.9023 - val_loss: 25113.6621
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 19274.7402 - val_loss: 12430.4238
Epoch 7/50
16/16 - 0s - 7ms/step - loss: 9723.8594 - val_loss: 6788.0093
Epoch 8/50
16/16 - 0s - 10ms/step - loss: 5739.5508 - val_loss: 4675.6943
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 4324.9033 - val_loss: 4017.5544
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 3847.5398 - val_loss: 3781.0991
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 3636.7256 - val_loss: 3605.6875
Epoch 12/50
16/16 - 0s - 7ms/step - loss: 3450.9067 - val_loss: 3425.1096
Epoch 13/50
16/16 - 0s - 11ms/step - loss: 3272.2461 - val_loss: 3244.5764
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 3103.1907 - val_loss: 3062.5391
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 2932.9468 - val_loss: 2875.5430
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 2772.5295 - val_loss: 2699.0044
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 2623.8013 - val_loss: 2512.1870
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 2472.9395 - val_loss: 2332.9666
Epoch 19/50
16/16 - 0s - 10ms/step - loss: 2328.4409 - val_loss: 2161.1487
Epoch 20/50
16/16 - 0s - 10ms/step - loss: 2199.2988 - val_loss: 1999.3951
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 2073.7397 - val_loss: 1838.2690
Epoch 22/50
16/16 - 0s - 11ms/step - loss: 1947.8682 - val_loss: 1646.4901
Epoch 23/50
16/16 - 0s - 7ms/step - loss: 1783.2335 - val_loss: 1502.1973
Epoch 24/50
16/16 - 0s - 7ms/step - loss: 1660.7759 - val_loss: 1391.7347
Epoch 25/50
16/16 - 0s - 7ms/step - loss: 1547.0441 - val_loss: 1303.4417
Epoch 26/50
16/16 - 0s - 7ms/step - loss: 1464.2161 - val_loss: 1237.7163
Epoch 27/50
16/16 - 0s - 10ms/step - loss: 1401.4952 - val_loss: 1184.6162
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 1347.7744 - val_loss: 1140.3501
Epoch 29/50
16/16 - 0s - 12ms/step - loss: 1298.8090 - val_loss: 1102.9755
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 1255.2935 - val_loss: 1062.4736
Epoch 31/50
16/16 - 0s - 7ms/step - loss: 1212.5115 - val_loss: 1027.3361
Epoch 32/50
16/16 - 0s - 7ms/step - loss: 1175.3804 - val_loss: 993.0677
Epoch 33/50
16/16 - 0s - 11ms/step - loss: 1139.4618 - val_loss: 963.8006
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 1097.5895 - val_loss: 932.5145
Epoch 35/50
16/16 - 0s - 10ms/step - loss: 1061.9822 - val_loss: 904.2192
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 1026.8914 - val_loss: 883.5176
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 994.1789 - val_loss: 854.2249
Epoch 38/50
16/16 - 0s - 10ms/step - loss: 962.9028 - val_loss: 828.6626
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 932.8591 - val_loss: 807.4000
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 904.7289 - val_loss: 780.0591
Epoch 41/50
16/16 - 0s - 7ms/step - loss: 878.2812 - val_loss: 761.2701
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 852.0764 - val_loss: 744.9771
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 831.4602 - val_loss: 723.5716
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 805.0786 - val_loss: 700.1835
Epoch 45/50
16/16 - 0s - 7ms/step - loss: 784.1037 - val_loss: 686.0219
Epoch 46/50
16/16 - 0s - 7ms/step - loss: 762.6141 - val_loss: 671.8445
Epoch 47/50
16/16 - 0s - 7ms/step - loss: 741.9490 - val_loss: 653.3143
Epoch 48/50
16/16 - 0s - 7ms/step - loss: 719.0732 - val_loss: 635.1776
Epoch 49/50
16/16 - 0s - 7ms/step - loss: 699.5233 - val_loss: 619.0630
Epoch 50/50
16/16 - 0s - 7ms/step - loss: 677.8359 - val_loss: 604.5717
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
568.0229355590624
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 99ms/step - loss: 110932.0781 - val_loss: 75981.0859
Epoch 2/50
16/16 - 0s - 7ms/step - loss: 56475.2461 - val_loss: 36075.2109
Epoch 3/50
16/16 - 0s - 12ms/step - loss: 26032.3047 - val_loss: 15945.1094
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 11461.1523 - val_loss: 7161.2397
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 5377.7480 - val_loss: 3737.1721
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 3151.9885 - val_loss: 2564.4915
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 2381.2046 - val_loss: 2208.1970
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 2157.0955 - val_loss: 2071.6152
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 2055.2004 - val_loss: 1985.9911
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 1977.4950 - val_loss: 1905.5859
Epoch 11/50
16/16 - 0s - 9ms/step - loss: 1909.6171 - val_loss: 1825.3064
Epoch 12/50
16/16 - 0s - 10ms/step - loss: 1839.0139 - val_loss: 1749.2954
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 1772.5848 - val_loss: 1674.2767
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 1707.0358 - val_loss: 1604.7174
Epoch 15/50
16/16 - 0s - 9ms/step - loss: 1646.8296 - val_loss: 1534.7570
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 1587.9775 - val_loss: 1468.5695
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 1528.6492 - val_loss: 1404.8734
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 1474.5365 - val_loss: 1344.4442
Epoch 19/50
16/16 - 0s - 10ms/step - loss: 1423.7732 - val_loss: 1289.6489
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 1375.4766 - val_loss: 1240.5538
Epoch 21/50
16/16 - 0s - 9ms/step - loss: 1331.6947 - val_loss: 1192.6628
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 1287.7550 - val_loss: 1147.8633
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 1247.1000 - val_loss: 1103.4907
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 1205.9655 - val_loss: 1061.5577
Epoch 25/50
16/16 - 0s - 11ms/step - loss: 1169.5070 - val_loss: 1019.8928
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 1132.2976 - val_loss: 982.9055
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 1099.8135 - val_loss: 949.6463
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 1068.9067 - val_loss: 918.6583
Epoch 29/50
16/16 - 0s - 7ms/step - loss: 1039.0793 - val_loss: 889.5673
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 1011.0621 - val_loss: 861.6983
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 982.9521 - val_loss: 836.5541
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 957.6340 - val_loss: 812.5127
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 933.3030 - val_loss: 788.6246
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 911.9683 - val_loss: 767.4651
Epoch 35/50
16/16 - 0s - 20ms/step - loss: 888.0491 - val_loss: 747.0252
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 868.0735 - val_loss: 728.6835
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 846.6071 - val_loss: 709.4483
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 828.8625 - val_loss: 692.3345
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 811.1070 - val_loss: 677.3179
Epoch 40/50
16/16 - 0s - 9ms/step - loss: 795.2831 - val_loss: 663.3017
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 777.7857 - val_loss: 648.4188
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 762.1086 - val_loss: 635.2377
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 746.9147 - val_loss: 622.0153
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 732.6393 - val_loss: 610.3759
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 720.1437 - val_loss: 599.4470
Epoch 46/50
16/16 - 0s - 10ms/step - loss: 705.2858 - val_loss: 590.2611
Epoch 47/50
16/16 - 0s - 9ms/step - loss: 692.5519 - val_loss: 580.6107
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 681.4360 - val_loss: 569.1580
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 669.9786 - val_loss: 562.1978
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 658.1454 - val_loss: 552.9341
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
593.8456578893338
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 80ms/step - loss: 145122.7812 - val_loss: 121564.5000
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 103793.4922 - val_loss: 86510.4297
Epoch 3/50
16/16 - 0s - 10ms/step - loss: 73823.5234 - val_loss: 61540.8672
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 52613.7070 - val_loss: 44127.6562
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 37811.1797 - val_loss: 32051.1230
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 27601.6504 - val_loss: 23572.5781
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 20350.8281 - val_loss: 17763.0137
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 15393.9609 - val_loss: 13627.0742
Epoch 9/50
16/16 - 0s - 9ms/step - loss: 11890.4043 - val_loss: 10725.8467
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 9453.1611 - val_loss: 8670.9854
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 7705.9883 - val_loss: 7161.6323
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 6417.2788 - val_loss: 6052.0474
Epoch 13/50
16/16 - 0s - 11ms/step - loss: 5512.0186 - val_loss: 5164.9263
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 4789.6558 - val_loss: 4539.8882
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 4270.9751 - val_loss: 4058.5918
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 3875.1423 - val_loss: 3661.8765
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 3531.7708 - val_loss: 3373.2729
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 3279.2866 - val_loss: 3129.2483
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 3065.8398 - val_loss: 2927.4290
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 2886.2261 - val_loss: 2753.0166
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 2728.3213 - val_loss: 2608.1055
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 2596.5037 - val_loss: 2478.0122
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 2481.5688 - val_loss: 2363.9534
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 2382.2649 - val_loss: 2265.5820
Epoch 25/50
16/16 - 0s - 10ms/step - loss: 2296.0862 - val_loss: 2180.7886
Epoch 26/50
16/16 - 0s - 7ms/step - loss: 2219.3140 - val_loss: 2105.5659
Epoch 27/50
16/16 - 0s - 11ms/step - loss: 2154.1292 - val_loss: 2038.4814
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 2098.3469 - val_loss: 1978.7239
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 2048.5537 - val_loss: 1926.6843
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 2005.3694 - val_loss: 1881.1562
Epoch 31/50
16/16 - 0s - 9ms/step - loss: 1967.1082 - val_loss: 1843.1514
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 1933.9052 - val_loss: 1809.4899
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 1904.6604 - val_loss: 1778.0486
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 1875.9215 - val_loss: 1752.1740
Epoch 35/50
16/16 - 0s - 11ms/step - loss: 1851.5317 - val_loss: 1727.2987
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 1828.9143 - val_loss: 1705.6417
Epoch 37/50
16/16 - 0s - 11ms/step - loss: 1809.2699 - val_loss: 1686.8058
Epoch 38/50
16/16 - 0s - 9ms/step - loss: 1792.4236 - val_loss: 1669.4070
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 1777.0303 - val_loss: 1654.1724
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 1763.2793 - val_loss: 1641.9906
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 1751.5291 - val_loss: 1630.9304
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 1740.7576 - val_loss: 1620.2067
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 1730.1565 - val_loss: 1610.9366
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 1721.2914 - val_loss: 1601.8710
Epoch 45/50
16/16 - 0s - 10ms/step - loss: 1712.6111 - val_loss: 1593.5481
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 1704.7448 - val_loss: 1586.7563
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 1697.9413 - val_loss: 1580.3981
Epoch 48/50
16/16 - 0s - 7ms/step - loss: 1691.5985 - val_loss: 1574.3724
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 1685.5125 - val_loss: 1568.9222
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 1679.6165 - val_loss: 1564.1122
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
1587.2726731367716
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 81ms/step - loss: 176800.0781 - val_loss: 129172.4531
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 99164.7891 - val_loss: 66693.1328
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 47394.1914 - val_loss: 26974.6367
Epoch 4/50
16/16 - 0s - 10ms/step - loss: 15928.3701 - val_loss: 5848.5024
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 3814.5452 - val_loss: 3239.3521
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 3236.3269 - val_loss: 3127.9165
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 2901.4414 - val_loss: 2815.8054
Epoch 8/50
16/16 - 0s - 11ms/step - loss: 2657.5586 - val_loss: 2674.4890
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 2484.7051 - val_loss: 2531.7068
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 2320.8440 - val_loss: 2398.6040
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 2172.8093 - val_loss: 2280.0835
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 2033.0150 - val_loss: 2163.8699
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 1905.6771 - val_loss: 2055.7126
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 1797.3447 - val_loss: 1948.7958
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 1682.4861 - val_loss: 1849.5793
Epoch 16/50
16/16 - 0s - 10ms/step - loss: 1592.6796 - val_loss: 1763.5173
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 1503.7068 - val_loss: 1685.5255
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 1416.3610 - val_loss: 1606.8055
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 1348.0919 - val_loss: 1536.6660
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 1284.0939 - val_loss: 1468.0078
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 1216.9320 - val_loss: 1411.3114
Epoch 22/50
16/16 - 0s - 14ms/step - loss: 1162.7417 - val_loss: 1352.2787
Epoch 23/50
16/16 - 0s - 10ms/step - loss: 1106.2554 - val_loss: 1301.9196
Epoch 24/50
16/16 - 0s - 10ms/step - loss: 1061.0436 - val_loss: 1248.1106
Epoch 25/50
16/16 - 0s - 7ms/step - loss: 1014.9003 - val_loss: 1200.3491
Epoch 26/50
16/16 - 0s - 12ms/step - loss: 974.6918 - val_loss: 1155.2177
Epoch 27/50
16/16 - 0s - 7ms/step - loss: 936.3161 - val_loss: 1114.0944
Epoch 28/50
16/16 - 0s - 7ms/step - loss: 901.4531 - val_loss: 1071.2308
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 867.8869 - val_loss: 1032.1760
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 835.6595 - val_loss: 994.7012
Epoch 31/50
16/16 - 0s - 7ms/step - loss: 808.8467 - val_loss: 959.8156
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 779.3156 - val_loss: 926.5268
Epoch 33/50
16/16 - 0s - 10ms/step - loss: 751.6005 - val_loss: 895.1404
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 728.3712 - val_loss: 862.6322
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 702.9457 - val_loss: 833.8112
Epoch 36/50
16/16 - 0s - 9ms/step - loss: 682.2952 - val_loss: 805.6442
Epoch 37/50
16/16 - 0s - 9ms/step - loss: 661.9171 - val_loss: 778.3012
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 639.6531 - val_loss: 752.7984
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 618.2040 - val_loss: 727.4355
Epoch 40/50
16/16 - 0s - 7ms/step - loss: 600.6319 - val_loss: 703.6058
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 588.8248 - val_loss: 680.8597
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 564.0027 - val_loss: 658.2463
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 548.9578 - val_loss: 638.0782
Epoch 44/50
16/16 - 0s - 9ms/step - loss: 533.1480 - val_loss: 617.4196
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 519.7600 - val_loss: 598.5142
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 503.8234 - val_loss: 580.1511
Epoch 47/50
16/16 - 0s - 7ms/step - loss: 489.7798 - val_loss: 562.2727
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 479.1412 - val_loss: 543.7443
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 464.4653 - val_loss: 529.3395
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 453.0473 - val_loss: 512.5017
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
404.6109536867491
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 81ms/step - loss: 131268.8906 - val_loss: 100856.8047
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 79652.9922 - val_loss: 57769.4688
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 43240.5625 - val_loss: 28533.4199
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 20313.0234 - val_loss: 12262.3584
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 8885.4824 - val_loss: 5669.7798
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 5012.4189 - val_loss: 3887.7429
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 4062.0828 - val_loss: 3509.6895
Epoch 8/50
16/16 - 0s - 7ms/step - loss: 3826.9172 - val_loss: 3298.6104
Epoch 9/50
16/16 - 0s - 7ms/step - loss: 3584.2488 - val_loss: 3100.0386
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 3366.1440 - val_loss: 2899.5176
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 3151.3562 - val_loss: 2712.2041
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 2941.6704 - val_loss: 2530.0947
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 2750.9792 - val_loss: 2360.8862
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 2572.9363 - val_loss: 2207.6692
Epoch 15/50
16/16 - 0s - 9ms/step - loss: 2392.9585 - val_loss: 2054.9067
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 2233.6885 - val_loss: 1920.5173
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 2084.4004 - val_loss: 1797.4386
Epoch 18/50
16/16 - 0s - 7ms/step - loss: 1948.5369 - val_loss: 1683.2314
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 1822.5605 - val_loss: 1577.3878
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 1704.4889 - val_loss: 1477.3572
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 1594.7646 - val_loss: 1389.8252
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 1496.5282 - val_loss: 1307.1097
Epoch 23/50
16/16 - 0s - 9ms/step - loss: 1399.4891 - val_loss: 1230.8988
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 1315.5646 - val_loss: 1160.8385
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 1234.8599 - val_loss: 1099.9458
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 1167.0649 - val_loss: 1037.6581
Epoch 27/50
16/16 - 0s - 7ms/step - loss: 1097.9772 - val_loss: 989.3409
Epoch 28/50
16/16 - 0s - 9ms/step - loss: 1033.5258 - val_loss: 935.7007
Epoch 29/50
16/16 - 0s - 10ms/step - loss: 976.4088 - val_loss: 891.1203
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 923.8370 - val_loss: 850.6523
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 875.1624 - val_loss: 808.5464
Epoch 32/50
16/16 - 0s - 7ms/step - loss: 830.9177 - val_loss: 776.5377
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 786.7383 - val_loss: 738.4995
```

```
Epoch 34/50
16/16 - 0s - 20ms/step - loss: 748.9832 - val_loss: 706.5934
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 712.1223 - val_loss: 678.1580
Epoch 36/50
16/16 - 0s - 7ms/step - loss: 678.3253 - val_loss: 649.7292
Epoch 37/50
16/16 - 0s - 11ms/step - loss: 647.2968 - val_loss: 625.8170
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 618.1593 - val_loss: 598.4927
Epoch 39/50
16/16 - 0s - 7ms/step - loss: 593.1521 - val_loss: 575.1179
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 563.1574 - val_loss: 558.2192
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 541.2661 - val_loss: 532.6578
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 516.6749 - val_loss: 513.6285
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 495.4042 - val_loss: 492.6492
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 476.2870 - val_loss: 477.3395
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 456.8158 - val_loss: 455.9973
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 437.4715 - val_loss: 442.4797
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 419.0478 - val_loss: 424.6333
Epoch 48/50
16/16 - 0s - 7ms/step - loss: 404.7151 - val_loss: 408.2227
Epoch 49/50
16/16 - 0s - 12ms/step - loss: 387.2599 - val_loss: 395.6548
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 370.9176 - val_loss: 378.8578
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
403.4136079276229
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 82ms/step - loss: 145091.4219 - val_loss: 98394.6328
Epoch 2/50
16/16 - 0s - 10ms/step - loss: 74853.3281 - val_loss: 47153.5234
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 34811.3672 - val_loss: 22181.9102
Epoch 4/50
16/16 - 0s - 9ms/step - loss: 16889.9395 - val_loss: 12255.7764
Epoch 5/50
16/16 - 0s - 11ms/step - loss: 10228.5830 - val_loss: 9432.9199
Epoch 6/50
16/16 - 0s - 10ms/step - loss: 8393.5049 - val_loss: 8823.7100
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 7884.2324 - val_loss: 8626.1660
Epoch 8/50
16/16 - 0s - 10ms/step - loss: 7656.0356 - val_loss: 8393.6582
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 7460.0620 - val_loss: 8179.4478
Epoch 10/50
16/16 - 0s - 10ms/step - loss: 7259.7485 - val_loss: 7961.2949
Epoch 11/50
16/16 - 0s - 11ms/step - loss: 7072.1299 - val_loss: 7732.8276
Epoch 12/50
16/16 - 0s - 11ms/step - loss: 6882.1499 - val_loss: 7520.1934
Epoch 13/50
16/16 - 0s - 10ms/step - loss: 6703.2275 - val_loss: 7319.5381
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 6526.5474 - val_loss: 7111.0801
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 6348.9932 - val_loss: 6928.3208
Epoch 16/50
16/16 - 0s - 9ms/step - loss: 6180.8530 - val_loss: 6743.6504
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 6018.0815 - val_loss: 6579.5439
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 5872.8442 - val_loss: 6391.5620
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 5711.4551 - val_loss: 6219.1191
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 5566.8052 - val_loss: 6064.4287
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 5415.4419 - val_loss: 5905.4585
Epoch 22/50
16/16 - 0s - 11ms/step - loss: 5289.2061 - val_loss: 5758.6411
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 5150.2808 - val_loss: 5622.2896
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 5030.7422 - val_loss: 5466.1558
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 4894.8389 - val_loss: 5336.4722
Epoch 26/50
16/16 - 0s - 7ms/step - loss: 4777.5366 - val_loss: 5206.7930
Epoch 27/50
16/16 - 0s - 7ms/step - loss: 4661.7183 - val_loss: 5079.9683
Epoch 28/50
16/16 - 0s - 7ms/step - loss: 4553.3618 - val_loss: 4963.5356
Epoch 29/50
16/16 - 0s - 7ms/step - loss: 4436.7661 - val_loss: 4848.8955
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 4337.3677 - val_loss: 4730.2471
Epoch 31/50
16/16 - 0s - 9ms/step - loss: 4233.2505 - val_loss: 4616.4839
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 4138.4912 - val_loss: 4526.7827
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 4039.6128 - val_loss: 4421.9922
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 3945.5359 - val_loss: 4328.4336
Epoch 35/50
16/16 - 0s - 7ms/step - loss: 3858.8384 - val_loss: 4216.3184
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 3765.4761 - val_loss: 4123.1411
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 3676.5198 - val_loss: 4031.5942
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 3590.4707 - val_loss: 3949.8147
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 3501.3525 - val_loss: 3850.9165
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 3424.2654 - val_loss: 3763.8958
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 3334.2292 - val_loss: 3674.2771
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 3254.9595 - val_loss: 3583.3064
Epoch 43/50
16/16 - 0s - 7ms/step - loss: 3168.9695 - val_loss: 3508.0557
Epoch 44/50
16/16 - 0s - 7ms/step - loss: 3091.1555 - val_loss: 3418.6797
Epoch 45/50
16/16 - 0s - 10ms/step - loss: 3006.4470 - val_loss: 3318.4097
Epoch 46/50
16/16 - 0s - 12ms/step - loss: 2928.7317 - val_loss: 3234.6877
Epoch 47/50
16/16 - 0s - 7ms/step - loss: 2851.0835 - val_loss: 3137.2622
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 2769.1033 - val_loss: 3053.6599
Epoch 49/50
16/16 - 0s - 7ms/step - loss: 2691.2170 - val_loss: 2971.0198
Epoch 50/50
16/16 - 0s - 7ms/step - loss: 2618.9917 - val_loss: 2898.3242
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
2160.146545110711
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 85ms/step - loss: 92092.6094 - val_loss: 69729.5547
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 53747.6797 - val_loss: 38805.3164
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 28904.2266 - val_loss: 20281.3477
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 14893.8164 - val_loss: 10476.1143
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 8007.9756 - val_loss: 5851.6465
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 5081.0117 - val_loss: 3962.7361
Epoch 7/50
16/16 - 0s - 10ms/step - loss: 3897.8176 - val_loss: 3351.8030
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 3552.7246 - val_loss: 3130.2678
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 3431.3367 - val_loss: 3037.0547
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 3361.9937 - val_loss: 2984.2935
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 3311.2358 - val_loss: 2935.7947
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 3253.9192 - val_loss: 2895.9985
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 3199.2346 - val_loss: 2855.4651
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 3146.3389 - val_loss: 2813.4180
Epoch 15/50
16/16 - 0s - 7ms/step - loss: 3089.3308 - val_loss: 2768.5593
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 3036.2588 - val_loss: 2724.5491
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 2982.1226 - val_loss: 2681.5544
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 2931.5159 - val_loss: 2644.1538
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 2873.4128 - val_loss: 2598.2659
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 2822.8123 - val_loss: 2554.8081
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 2769.7974 - val_loss: 2518.6284
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 2719.0842 - val_loss: 2479.4326
Epoch 23/50
16/16 - 0s - 9ms/step - loss: 2671.3494 - val_loss: 2438.0378
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 2620.5923 - val_loss: 2399.5083
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 2571.7563 - val_loss: 2359.4211
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 2524.8235 - val_loss: 2322.2551
Epoch 27/50
16/16 - 0s - 9ms/step - loss: 2483.3459 - val_loss: 2283.6821
Epoch 28/50
16/16 - 0s - 10ms/step - loss: 2437.9883 - val_loss: 2251.6523
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 2388.7344 - val_loss: 2211.6650
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 2346.0710 - val_loss: 2177.2905
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 2305.7456 - val_loss: 2145.9133
Epoch 32/50
16/16 - 0s - 13ms/step - loss: 2263.5046 - val_loss: 2111.2283
Epoch 33/50
16/16 - 0s - 9ms/step - loss: 2224.4043 - val_loss: 2074.1782
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 2184.5569 - val_loss: 2044.5568
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 2148.5520 - val_loss: 2012.7511
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 2111.1975 - val_loss: 1982.4692
Epoch 37/50
16/16 - 0s - 11ms/step - loss: 2074.1970 - val_loss: 1956.1235
Epoch 38/50
16/16 - 0s - 10ms/step - loss: 2039.9088 - val_loss: 1925.5150
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 2007.2350 - val_loss: 1895.3018
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 1975.9233 - val_loss: 1866.3381
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 1941.5032 - val_loss: 1841.1968
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 1908.8424 - val_loss: 1814.1962
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 1880.4485 - val_loss: 1783.1996
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 1848.9675 - val_loss: 1759.4642
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 1819.1508 - val_loss: 1735.4430
Epoch 46/50
16/16 - 0s - 11ms/step - loss: 1792.8342 - val_loss: 1710.4623
Epoch 47/50
16/16 - 0s - 9ms/step - loss: 1763.5410 - val_loss: 1685.8282
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 1738.2834 - val_loss: 1659.9666
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 1711.3798 - val_loss: 1640.4216
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 1686.3898 - val_loss: 1615.1082
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
1509.3741361232417
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 82ms/step - loss: 107474.7891 - val_loss: 86177.7734
Epoch 2/50
16/16 - 0s - 7ms/step - loss: 68202.7109 - val_loss: 53983.3750
Epoch 3/50
16/16 - 0s - 7ms/step - loss: 42194.1133 - val_loss: 33659.0430
Epoch 4/50
16/16 - 0s - 7ms/step - loss: 25898.9688 - val_loss: 20953.8281
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 15843.2988 - val_loss: 13080.0645
Epoch 6/50
16/16 - 0s - 7ms/step - loss: 9739.8193 - val_loss: 8414.2979
Epoch 7/50
16/16 - 0s - 7ms/step - loss: 6236.0415 - val_loss: 5750.4785
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 4314.1763 - val_loss: 4313.1133
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 3310.3352 - val_loss: 3580.8057
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 2848.9543 - val_loss: 3181.0903
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 2602.6672 - val_loss: 2962.1763
Epoch 12/50
16/16 - 0s - 7ms/step - loss: 2458.1970 - val_loss: 2739.8333
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 2219.3438 - val_loss: 2287.8640
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 1712.0458 - val_loss: 1763.9890
Epoch 15/50
16/16 - 0s - 10ms/step - loss: 1385.0656 - val_loss: 1487.6976
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 1149.0221 - val_loss: 1242.7286
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 982.2109 - val_loss: 1068.7534
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 849.4102 - val_loss: 939.0252
Epoch 19/50
16/16 - 0s - 10ms/step - loss: 753.3567 - val_loss: 838.8391
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 678.9655 - val_loss: 761.3542
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 624.8096 - val_loss: 702.0176
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 579.7088 - val_loss: 651.3826
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 543.6971 - val_loss: 605.8623
Epoch 24/50
16/16 - 0s - 7ms/step - loss: 513.5392 - val_loss: 568.0952
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 487.7671 - val_loss: 545.8927
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 468.2035 - val_loss: 516.8607
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 448.4094 - val_loss: 493.6848
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 433.7726 - val_loss: 475.5166
Epoch 29/50
16/16 - 0s - 10ms/step - loss: 420.0011 - val_loss: 457.2869
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 408.0465 - val_loss: 447.3515
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 397.9488 - val_loss: 426.7882
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 388.6401 - val_loss: 419.0464
Epoch 33/50
16/16 - 0s - 11ms/step - loss: 379.2884 - val_loss: 404.1042
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 373.4647 - val_loss: 399.8539
Epoch 35/50
16/16 - 0s - 9ms/step - loss: 364.3249 - val_loss: 386.0822
Epoch 36/50
16/16 - 0s - 9ms/step - loss: 360.7928 - val_loss: 377.1212
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 353.4992 - val_loss: 375.1031
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 348.2616 - val_loss: 361.8507
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 344.7719 - val_loss: 361.3361
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 338.3351 - val_loss: 349.4381
Epoch 41/50
16/16 - 0s - 11ms/step - loss: 334.9977 - val_loss: 347.5235
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 330.6790 - val_loss: 344.3346
Epoch 43/50
16/16 - 0s - 7ms/step - loss: 326.7034 - val_loss: 341.3643
Epoch 44/50
16/16 - 0s - 7ms/step - loss: 324.0359 - val_loss: 334.2361
Epoch 45/50
16/16 - 0s - 7ms/step - loss: 320.4907 - val_loss: 326.5380
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 316.4089 - val_loss: 330.1657
Epoch 47/50
16/16 - 0s - 10ms/step - loss: 314.4132 - val_loss: 318.7637
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 311.0863 - val_loss: 316.4138
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 307.0811 - val_loss: 315.7003
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 302.4203 - val_loss: 311.0650
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
347.4321303876172
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 81ms/step - loss: 19255.9219 - val_loss: 10031.8672
Epoch 2/50
16/16 - 0s - 10ms/step - loss: 6149.9170 - val_loss: 2804.4048
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 2112.0393 - val_loss: 1499.2659
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 1537.9166 - val_loss: 1457.1909
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 1484.4305 - val_loss: 1379.7822
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 1389.6272 - val_loss: 1294.8776
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 1311.4711 - val_loss: 1232.7402
Epoch 8/50
16/16 - 0s - 7ms/step - loss: 1241.2112 - val_loss: 1176.8794
Epoch 9/50
16/16 - 0s - 7ms/step - loss: 1175.9904 - val_loss: 1119.2806
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 1113.3324 - val_loss: 1068.9652
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 1059.5947 - val_loss: 1020.1397
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 1003.7318 - val_loss: 973.1947
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 956.3391 - val_loss: 928.5010
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 906.8055 - val_loss: 886.5229
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 863.1936 - val_loss: 848.5895
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 822.3511 - val_loss: 810.3922
Epoch 17/50
16/16 - 0s - 7ms/step - loss: 783.4230 - val_loss: 773.8750
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 743.2544 - val_loss: 745.4471
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 711.7628 - val_loss: 711.0398
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 675.8571 - val_loss: 684.1231
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 646.9676 - val_loss: 657.5469
Epoch 22/50
16/16 - 0s - 7ms/step - loss: 618.3588 - val_loss: 629.4122
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 591.7877 - val_loss: 601.7709
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 564.6821 - val_loss: 576.5460
Epoch 25/50
16/16 - 0s - 7ms/step - loss: 542.4006 - val_loss: 549.6859
Epoch 26/50
16/16 - 0s - 11ms/step - loss: 515.4529 - val_loss: 522.7645
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 494.6371 - val_loss: 499.3345
Epoch 28/50
16/16 - 0s - 10ms/step - loss: 472.8833 - val_loss: 479.3175
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 454.0804 - val_loss: 456.5353
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 434.9575 - val_loss: 437.1717
Epoch 31/50
16/16 - 0s - 7ms/step - loss: 415.6145 - val_loss: 415.7412
Epoch 32/50
16/16 - 0s - 10ms/step - loss: 395.1467 - val_loss: 393.6208
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 364.5643 - val_loss: 372.6975
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 337.9742 - val_loss: 353.3663
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 314.7086 - val_loss: 330.4018
Epoch 36/50
16/16 - 0s - 11ms/step - loss: 295.1015 - val_loss: 309.3813
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 273.4982 - val_loss: 293.5185
Epoch 38/50
16/16 - 0s - 10ms/step - loss: 256.3607 - val_loss: 273.4647
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 240.9143 - val_loss: 257.4029
Epoch 40/50
16/16 - 0s - 10ms/step - loss: 224.9230 - val_loss: 248.1928
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 211.2942 - val_loss: 234.3046
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 200.4130 - val_loss: 224.3229
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 191.2355 - val_loss: 213.7919
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 183.7975 - val_loss: 203.7273
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 178.0150 - val_loss: 205.3997
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 169.0841 - val_loss: 190.5669
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 162.2415 - val_loss: 183.4723
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 159.0290 - val_loss: 190.3834
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 154.0960 - val_loss: 171.6262
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 149.5851 - val_loss: 167.9540
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
182.00989134869812
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 82ms/step - loss: 4158.4014 - val_loss: 4336.5669
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 3284.8149 - val_loss: 3287.4690
Epoch 3/50
16/16 - 0s - 7ms/step - loss: 2241.1562 - val_loss: 2174.7102
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 1337.9062 - val_loss: 1135.9033
Epoch 5/50
16/16 - 0s - 7ms/step - loss: 789.5135 - val_loss: 665.7492
Epoch 6/50
16/16 - 0s - 7ms/step - loss: 502.2849 - val_loss: 440.0117
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 350.0967 - val_loss: 315.2543
Epoch 8/50
16/16 - 0s - 11ms/step - loss: 253.5434 - val_loss: 243.3333
Epoch 9/50
16/16 - 0s - 11ms/step - loss: 213.1335 - val_loss: 193.5840
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 188.2459 - val_loss: 174.9260
Epoch 11/50
16/16 - 0s - 11ms/step - loss: 174.4211 - val_loss: 166.7211
Epoch 12/50
16/16 - 0s - 7ms/step - loss: 166.1846 - val_loss: 169.9871
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 155.3898 - val_loss: 149.8003
Epoch 14/50
16/16 - 0s - 10ms/step - loss: 149.0944 - val_loss: 144.4462
Epoch 15/50
16/16 - 0s - 7ms/step - loss: 146.9795 - val_loss: 145.1487
Epoch 16/50
16/16 - 0s - 11ms/step - loss: 141.3503 - val_loss: 135.2442
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 156.0313 - val_loss: 133.0479
Epoch 18/50
16/16 - 0s - 7ms/step - loss: 133.6968 - val_loss: 133.3940
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 137.6447 - val_loss: 128.6391
Epoch 20/50
16/16 - 0s - 7ms/step - loss: 132.1894 - val_loss: 124.8373
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 129.6951 - val_loss: 122.8263
Epoch 22/50
16/16 - 0s - 7ms/step - loss: 135.8370 - val_loss: 141.0988
Epoch 23/50
16/16 - 0s - 7ms/step - loss: 125.7970 - val_loss: 120.6240
Epoch 24/50
16/16 - 0s - 7ms/step - loss: 122.5190 - val_loss: 116.0682
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 119.4466 - val_loss: 116.7834
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 119.2879 - val_loss: 116.9776
Epoch 27/50
16/16 - 0s - 7ms/step - loss: 116.7063 - val_loss: 113.0315
Epoch 28/50
16/16 - 0s - 7ms/step - loss: 114.7011 - val_loss: 110.6562
Epoch 29/50
16/16 - 0s - 10ms/step - loss: 112.9958 - val_loss: 110.8807
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 112.5248 - val_loss: 124.5309
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 116.4295 - val_loss: 114.0894
Epoch 32/50
16/16 - 0s - 9ms/step - loss: 110.9860 - val_loss: 114.7615
Epoch 33/50
16/16 - 0s - 14ms/step - loss: 113.7030 - val_loss: 107.7295
```

```
Epoch 34/50
16/16 - 0s - 18ms/step - loss: 116.9257 - val_loss: 108.5589
Epoch 35/50
16/16 - 0s - 9ms/step - loss: 109.9204 - val_loss: 107.6732
Epoch 36/50
16/16 - 0s - 9ms/step - loss: 109.8645 - val_loss: 104.9138
Epoch 37/50
16/16 - 0s - 9ms/step - loss: 108.1788 - val_loss: 103.8703
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 107.7836 - val_loss: 124.7038
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 117.9466 - val_loss: 102.8791
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 106.5671 - val_loss: 103.6854
Epoch 41/50
16/16 - 0s - 10ms/step - loss: 110.2473 - val_loss: 102.3136
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 112.4133 - val_loss: 106.6257
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 112.5374 - val_loss: 100.5320
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 115.1221 - val_loss: 107.9715
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 103.6571 - val_loss: 104.5028
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 104.0623 - val_loss: 98.6501
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 104.7717 - val_loss: 99.2269
Epoch 48/50
16/16 - 0s - 11ms/step - loss: 103.3929 - val_loss: 113.2031
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 103.4942 - val_loss: 100.1968
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 108.1261 - val_loss: 97.5793
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
118.68449321897319
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 88ms/step - loss: 45064.2578 - val_loss: 37474.3008
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 30349.9570 - val_loss: 24849.2402
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 19539.9258 - val_loss: 15643.5771
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 12051.9443 - val_loss: 9426.1885
Epoch 5/50
16/16 - 0s - 11ms/step - loss: 7374.2686 - val_loss: 5825.0488
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 4931.4482 - val_loss: 3970.1509
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 3761.9111 - val_loss: 3149.6511
Epoch 8/50
16/16 - 0s - 7ms/step - loss: 3297.7307 - val_loss: 2771.5068
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 3069.7136 - val_loss: 2590.2441
Epoch 10/50
16/16 - 0s - 24ms/step - loss: 2935.0295 - val_loss: 2466.9194
Epoch 11/50
16/16 - 0s - 7ms/step - loss: 2815.4441 - val_loss: 2364.4373
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 2699.5923 - val_loss: 2269.5732
Epoch 13/50
16/16 - 0s - 10ms/step - loss: 2590.0852 - val_loss: 2179.3860
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 2488.1960 - val_loss: 2095.5916
Epoch 15/50
16/16 - 0s - 9ms/step - loss: 2386.0923 - val_loss: 2015.0785
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 2289.1257 - val_loss: 1934.2523
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 2195.4211 - val_loss: 1855.2203
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 2100.4993 - val_loss: 1778.5359
Epoch 19/50
16/16 - 0s - 9ms/step - loss: 2012.3708 - val_loss: 1703.2068
Epoch 20/50
16/16 - 0s - 10ms/step - loss: 1925.4792 - val_loss: 1635.6256
Epoch 21/50
16/16 - 0s - 9ms/step - loss: 1844.8461 - val_loss: 1571.4015
Epoch 22/50
16/16 - 0s - 9ms/step - loss: 1766.3638 - val_loss: 1507.9899
Epoch 23/50
16/16 - 0s - 9ms/step - loss: 1685.6609 - val_loss: 1451.8152
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 1613.9398 - val_loss: 1391.8550
Epoch 25/50
16/16 - 0s - 10ms/step - loss: 1539.7727 - val_loss: 1338.4642
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 1470.6123 - val_loss: 1288.1412
Epoch 27/50
16/16 - 0s - 16ms/step - loss: 1408.7911 - val_loss: 1235.6418
Epoch 28/50
16/16 - 0s - 11ms/step - loss: 1345.3090 - val_loss: 1180.2120
Epoch 29/50
16/16 - 0s - 11ms/step - loss: 1282.5554 - val_loss: 1135.3835
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 1228.4576 - val_loss: 1092.8027
Epoch 31/50
16/16 - 0s - 7ms/step - loss: 1175.2976 - val_loss: 1049.5088
Epoch 32/50
16/16 - 0s - 7ms/step - loss: 1126.8993 - val_loss: 1005.3913
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 1076.0293 - val_loss: 964.5416
```

```
Epoch 34/50
16/16 - 0s - 7ms/step - loss: 1035.3298 - val_loss: 930.0962
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 991.8555 - val_loss: 893.9102
Epoch 36/50
16/16 - 0s - 7ms/step - loss: 956.0311 - val_loss: 867.9298
Epoch 37/50
16/16 - 0s - 10ms/step - loss: 914.1773 - val_loss: 833.6664
Epoch 38/50
16/16 - 0s - 7ms/step - loss: 882.1823 - val_loss: 805.0522
Epoch 39/50
16/16 - 0s - 10ms/step - loss: 848.5459 - val_loss: 778.5557
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 818.5852 - val_loss: 750.2766
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 791.0814 - val_loss: 731.9679
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 764.7392 - val_loss: 710.5685
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 738.9196 - val_loss: 683.5847
Epoch 44/50
16/16 - 0s - 10ms/step - loss: 713.7739 - val_loss: 664.5093
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 692.7555 - val_loss: 648.1823
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 670.6529 - val_loss: 628.8735
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 651.5133 - val_loss: 610.1127
Epoch 48/50
16/16 - 0s - 9ms/step - loss: 631.8007 - val_loss: 591.9922
Epoch 49/50
16/16 - 0s - 18ms/step - loss: 613.7048 - val_loss: 577.3178
Epoch 50/50
16/16 - 0s - 13ms/step - loss: 596.3986 - val_loss: 562.2012
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 8ms/step
625.7820778489855
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 100ms/step - loss: 3617.9292 - val_loss: 1931.7596
Epoch 2/50
16/16 - 0s - 7ms/step - loss: 2079.8228 - val_loss: 1458.3405
Epoch 3/50
16/16 - 0s - 7ms/step - loss: 1631.8114 - val_loss: 1219.8712
Epoch 4/50
16/16 - 0s - 7ms/step - loss: 1343.9993 - val_loss: 1038.8564
Epoch 5/50
16/16 - 0s - 7ms/step - loss: 1104.0312 - val_loss: 894.7006
Epoch 6/50
16/16 - 0s - 10ms/step - loss: 939.7991 - val_loss: 766.5261
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 795.0470 - val_loss: 667.6473
Epoch 8/50
16/16 - 0s - 14ms/step - loss: 682.5315 - val_loss: 584.2354
Epoch 9/50
16/16 - 0s - 9ms/step - loss: 589.6713 - val_loss: 518.8076
Epoch 10/50
16/16 - 0s - 9ms/step - loss: 518.0394 - val_loss: 461.3558
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 461.4031 - val_loss: 410.7219
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 410.8516 - val_loss: 370.4455
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 374.0379 - val_loss: 340.4996
Epoch 14/50
16/16 - 0s - 12ms/step - loss: 341.1957 - val_loss: 317.1531
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 313.9556 - val_loss: 293.6354
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 289.0022 - val_loss: 275.9872
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 267.2090 - val_loss: 269.0027
Epoch 18/50
16/16 - 0s - 11ms/step - loss: 253.9575 - val_loss: 243.5141
Epoch 19/50
16/16 - 0s - 11ms/step - loss: 233.7832 - val_loss: 229.0298
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 219.7874 - val_loss: 228.8932
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 211.1181 - val_loss: 223.0047
Epoch 22/50
16/16 - 0s - 7ms/step - loss: 202.4173 - val_loss: 205.3832
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 193.3768 - val_loss: 203.1311
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 186.8203 - val_loss: 195.3341
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 181.9792 - val_loss: 193.9549
Epoch 26/50
16/16 - 0s - 10ms/step - loss: 178.2354 - val_loss: 188.4992
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 174.0188 - val_loss: 196.8729
Epoch 28/50
16/16 - 0s - 7ms/step - loss: 171.9721 - val_loss: 182.7637
Epoch 29/50
16/16 - 0s - 7ms/step - loss: 166.9118 - val_loss: 185.9393
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 164.8092 - val_loss: 176.0822
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 162.1707 - val_loss: 180.6255
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 159.1797 - val_loss: 173.3141
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 155.6859 - val_loss: 167.7741
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 155.9911 - val_loss: 164.5165
Epoch 35/50
16/16 - 0s - 7ms/step - loss: 158.5769 - val_loss: 163.3437
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 150.3654 - val_loss: 162.8513
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 150.1171 - val_loss: 157.6455
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 146.2114 - val_loss: 162.9780
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 143.5663 - val_loss: 153.0955
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 140.6124 - val_loss: 149.6144
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 138.6982 - val_loss: 156.1147
Epoch 42/50
16/16 - 0s - 10ms/step - loss: 135.5138 - val_loss: 146.5313
Epoch 43/50
16/16 - 0s - 7ms/step - loss: 134.0143 - val_loss: 147.7372
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 132.9186 - val_loss: 144.0267
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 131.4996 - val_loss: 152.7919
Epoch 46/50
16/16 - 0s - 10ms/step - loss: 130.6039 - val_loss: 137.9308
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 129.7792 - val_loss: 135.2629
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 125.6282 - val_loss: 137.9358
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 126.0553 - val_loss: 132.3974
Epoch 50/50
16/16 - 0s - 10ms/step - loss: 128.7312 - val_loss: 139.9632
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
152.14846329581073
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 100ms/step - loss: 33315.7070 - val_loss: 19390.0645
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 12260.5654 - val_loss: 5983.3276
Epoch 3/50
16/16 - 0s - 28ms/step - loss: 3373.6072 - val_loss: 1356.2045
Epoch 4/50
16/16 - 0s - 16ms/step - loss: 854.7803 - val_loss: 637.1950
Epoch 5/50
16/16 - 0s - 6ms/step - loss: 577.6874 - val_loss: 636.5633
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 557.2181 - val_loss: 596.4750
Epoch 7/50
16/16 - 0s - 6ms/step - loss: 525.7673 - val_loss: 561.1648
Epoch 8/50
16/16 - 0s - 19ms/step - loss: 502.2896 - val_loss: 538.4138
Epoch 9/50
16/16 - 0s - 11ms/step - loss: 483.7891 - val_loss: 517.9418
Epoch 10/50
16/16 - 0s - 29ms/step - loss: 465.6026 - val_loss: 499.3024
Epoch 11/50
16/16 - 0s - 13ms/step - loss: 449.3276 - val_loss: 481.3351
Epoch 12/50
16/16 - 0s - 13ms/step - loss: 433.6212 - val_loss: 467.7967
Epoch 13/50
16/16 - 0s - 10ms/step - loss: 418.6861 - val_loss: 452.3311
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 406.0168 - val_loss: 440.2472
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 391.8423 - val_loss: 428.9905
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 380.4549 - val_loss: 418.9105
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 370.3423 - val_loss: 408.1274
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 360.3655 - val_loss: 399.4656
Epoch 19/50
16/16 - 0s - 11ms/step - loss: 352.1499 - val_loss: 391.3277
Epoch 20/50
16/16 - 0s - 10ms/step - loss: 344.1068 - val_loss: 383.4698
Epoch 21/50
16/16 - 0s - 10ms/step - loss: 336.8708 - val_loss: 376.4793
Epoch 22/50
16/16 - 0s - 10ms/step - loss: 329.7846 - val_loss: 369.8139
Epoch 23/50
16/16 - 0s - 15ms/step - loss: 323.0999 - val_loss: 363.5691
Epoch 24/50
16/16 - 0s - 18ms/step - loss: 316.3420 - val_loss: 357.4250
Epoch 25/50
16/16 - 0s - 11ms/step - loss: 311.8248 - val_loss: 351.0583
Epoch 26/50
16/16 - 0s - 10ms/step - loss: 306.7572 - val_loss: 345.9631
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 299.6986 - val_loss: 340.5213
Epoch 28/50
16/16 - 0s - 9ms/step - loss: 293.1909 - val_loss: 334.7602
Epoch 29/50
16/16 - 0s - 9ms/step - loss: 288.7129 - val_loss: 329.2765
Epoch 30/50
16/16 - 0s - 11ms/step - loss: 283.1523 - val_loss: 324.1963
Epoch 31/50
16/16 - 0s - 10ms/step - loss: 278.7985 - val_loss: 318.9291
Epoch 32/50
16/16 - 0s - 11ms/step - loss: 273.5090 - val_loss: 313.6073
Epoch 33/50
16/16 - 0s - 12ms/step - loss: 268.4223 - val_loss: 309.2906
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 264.5292 - val_loss: 304.6049
Epoch 35/50
16/16 - 0s - 14ms/step - loss: 260.2242 - val_loss: 299.9361
Epoch 36/50
16/16 - 0s - 11ms/step - loss: 257.3165 - val_loss: 295.7130
Epoch 37/50
16/16 - 0s - 19ms/step - loss: 253.2640 - val_loss: 291.5112
Epoch 38/50
16/16 - 0s - 9ms/step - loss: 248.5847 - val_loss: 287.3509
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 245.3826 - val_loss: 283.5446
Epoch 40/50
16/16 - 0s - 10ms/step - loss: 242.3205 - val_loss: 279.5042
Epoch 41/50
16/16 - 0s - 21ms/step - loss: 237.0693 - val_loss: 275.2142
Epoch 42/50
16/16 - 0s - 9ms/step - loss: 232.9408 - val_loss: 271.1628
Epoch 43/50
16/16 - 0s - 9ms/step - loss: 229.5517 - val_loss: 267.4595
Epoch 44/50
16/16 - 0s - 9ms/step - loss: 226.3061 - val_loss: 263.2069
Epoch 45/50
16/16 - 0s - 9ms/step - loss: 222.8232 - val_loss: 259.4497
Epoch 46/50
16/16 - 0s - 9ms/step - loss: 219.1664 - val_loss: 255.9637
Epoch 47/50
16/16 - 0s - 10ms/step - loss: 216.3932 - val_loss: 252.8500
Epoch 48/50
16/16 - 0s - 12ms/step - loss: 213.0635 - val_loss: 249.0967
Epoch 49/50
16/16 - 0s - 10ms/step - loss: 210.0585 - val_loss: 245.2732
Epoch 50/50
16/16 - 0s - 9ms/step - loss: 206.6009 - val_loss: 241.6960
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
258.8014442321201
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 147ms/step - loss: 2463.1045 - val_loss: 2113.8010
Epoch 2/50
16/16 - 0s - 15ms/step - loss: 1914.4777 - val_loss: 1679.3424
Epoch 3/50
16/16 - 0s - 9ms/step - loss: 1611.5623 - val_loss: 1375.9722
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 1363.7145 - val_loss: 1217.2812
Epoch 5/50
16/16 - 0s - 21ms/step - loss: 1209.4167 - val_loss: 1054.1707
Epoch 6/50
16/16 - 0s - 16ms/step - loss: 1064.6747 - val_loss: 929.2290
Epoch 7/50
16/16 - 0s - 11ms/step - loss: 919.8139 - val_loss: 894.3738
Epoch 8/50
16/16 - 0s - 10ms/step - loss: 868.9971 - val_loss: 732.5302
Epoch 9/50
16/16 - 0s - 9ms/step - loss: 712.7883 - val_loss: 616.6612
Epoch 10/50
16/16 - 0s - 24ms/step - loss: 620.8002 - val_loss: 539.2232
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 541.9109 - val_loss: 475.9677
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 477.9186 - val_loss: 410.0489
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 425.2866 - val_loss: 362.3872
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 371.3807 - val_loss: 316.8476
Epoch 15/50
16/16 - 0s - 17ms/step - loss: 329.2446 - val_loss: 283.4722
Epoch 16/50
16/16 - 0s - 19ms/step - loss: 289.9131 - val_loss: 252.7471
Epoch 17/50
16/16 - 0s - 9ms/step - loss: 270.5845 - val_loss: 229.3344
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 237.2057 - val_loss: 202.8812
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 209.5034 - val_loss: 188.6073
Epoch 20/50
16/16 - 0s - 12ms/step - loss: 192.4445 - val_loss: 175.7643
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 175.2501 - val_loss: 169.8111
Epoch 22/50
16/16 - 0s - 10ms/step - loss: 165.1670 - val_loss: 166.7904
Epoch 23/50
16/16 - 0s - 9ms/step - loss: 154.3265 - val_loss: 148.2597
Epoch 24/50
16/16 - 0s - 10ms/step - loss: 144.0994 - val_loss: 132.7243
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 133.8893 - val_loss: 127.4613
Epoch 26/50
16/16 - 0s - 9ms/step - loss: 128.2594 - val_loss: 121.4607
Epoch 27/50
16/16 - 0s - 9ms/step - loss: 122.1386 - val_loss: 116.8976
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 122.2470 - val_loss: 112.9622
Epoch 29/50
16/16 - 0s - 9ms/step - loss: 117.8006 - val_loss: 110.5840
Epoch 30/50
16/16 - 0s - 9ms/step - loss: 112.7845 - val_loss: 107.9208
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 108.9287 - val_loss: 105.7603
Epoch 32/50
16/16 - 0s - 11ms/step - loss: 105.9654 - val_loss: 105.0542
Epoch 33/50
16/16 - 0s - 9ms/step - loss: 105.3075 - val_loss: 102.7127
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 103.3428 - val_loss: 102.4656
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 102.8719 - val_loss: 102.6696
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 102.6407 - val_loss: 101.3813
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 103.7846 - val_loss: 117.8759
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 104.6604 - val_loss: 98.4824
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 105.7752 - val_loss: 111.4406
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 100.2186 - val_loss: 97.4650
Epoch 41/50
16/16 - 0s - 10ms/step - loss: 99.6751 - val_loss: 97.4118
Epoch 42/50
16/16 - 0s - 10ms/step - loss: 99.1562 - val_loss: 107.5690
Epoch 43/50
16/16 - 0s - 11ms/step - loss: 101.8967 - val_loss: 96.8185
Epoch 44/50
16/16 - 0s - 9ms/step - loss: 101.3249 - val_loss: 95.5447
Epoch 45/50
16/16 - 0s - 9ms/step - loss: 103.6693 - val_loss: 131.3017
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 106.3727 - val_loss: 102.3242
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 101.3976 - val_loss: 94.5396
Epoch 48/50
16/16 - 0s - 9ms/step - loss: 100.4276 - val_loss: 95.9317
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 96.5043 - val_loss: 94.8056
Epoch 50/50
16/16 - 0s - 9ms/step - loss: 95.4896 - val_loss: 94.4261
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
121.74727045411525
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 82ms/step - loss: 95153.0234 - val_loss: 64245.2578
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 46783.6211 - val_loss: 26040.9316
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 16723.1543 - val_loss: 7576.0513
Epoch 4/50
16/16 - 0s - 11ms/step - loss: 5042.2793 - val_loss: 3549.9763
Epoch 5/50
16/16 - 0s - 10ms/step - loss: 3083.4700 - val_loss: 3412.0840
Epoch 6/50
16/16 - 0s - 12ms/step - loss: 2925.6733 - val_loss: 3236.9834
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 2728.5718 - val_loss: 2980.7742
Epoch 8/50
16/16 - 0s - 10ms/step - loss: 2561.0828 - val_loss: 2792.8660
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 2410.8589 - val_loss: 2622.2319
Epoch 10/50
16/16 - 0s - 9ms/step - loss: 2257.7717 - val_loss: 2462.5869
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 2112.4663 - val_loss: 2303.0347
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 1969.7423 - val_loss: 2143.0396
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 1834.7108 - val_loss: 1996.8654
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 1707.4624 - val_loss: 1858.6670
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 1583.8710 - val_loss: 1724.9045
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 1466.4365 - val_loss: 1600.8013
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 1361.3677 - val_loss: 1482.4454
Epoch 18/50
16/16 - 0s - 10ms/step - loss: 1261.0447 - val_loss: 1371.2635
Epoch 19/50
16/16 - 0s - 9ms/step - loss: 1167.9453 - val_loss: 1281.2365
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 1082.8668 - val_loss: 1183.4832
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 1004.6310 - val_loss: 1092.8993
Epoch 22/50
16/16 - 0s - 11ms/step - loss: 934.1757 - val_loss: 1014.5715
Epoch 23/50
16/16 - 0s - 9ms/step - loss: 871.4149 - val_loss: 952.6115
Epoch 24/50
16/16 - 0s - 14ms/step - loss: 808.4076 - val_loss: 883.2999
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 755.9577 - val_loss: 817.1461
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 707.5366 - val_loss: 772.5388
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 661.3555 - val_loss: 719.8326
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 623.3209 - val_loss: 675.0306
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 587.8163 - val_loss: 640.1646
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 554.8575 - val_loss: 603.0302
Epoch 31/50
16/16 - 0s - 11ms/step - loss: 528.3694 - val_loss: 573.9450
Epoch 32/50
16/16 - 0s - 9ms/step - loss: 501.6265 - val_loss: 546.0233
Epoch 33/50
16/16 - 0s - 7ms/step - loss: 481.4140 - val_loss: 520.3583
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 459.6454 - val_loss: 495.7292
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 443.1867 - val_loss: 478.7971
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 424.2065 - val_loss: 458.1818
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 410.6393 - val_loss: 442.9908
Epoch 38/50
16/16 - 0s - 9ms/step - loss: 395.7733 - val_loss: 425.3633
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 385.9396 - val_loss: 412.1281
Epoch 40/50
16/16 - 0s - 10ms/step - loss: 372.9950 - val_loss: 405.1526
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 361.1820 - val_loss: 389.2056
Epoch 42/50
16/16 - 0s - 10ms/step - loss: 352.7788 - val_loss: 377.0887
Epoch 43/50
16/16 - 0s - 9ms/step - loss: 344.7702 - val_loss: 371.5122
Epoch 44/50
16/16 - 0s - 10ms/step - loss: 333.6812 - val_loss: 358.2572
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 326.5311 - val_loss: 353.1933
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 318.7780 - val_loss: 343.7175
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 311.5219 - val_loss: 336.5851
Epoch 48/50
16/16 - 0s - 11ms/step - loss: 305.3646 - val_loss: 329.4294
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 299.5338 - val_loss: 323.6673
Epoch 50/50
16/16 - 0s - 7ms/step - loss: 292.2841 - val_loss: 315.7625
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
305.65498750729927
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 84ms/step - loss: 20644.2285 - val_loss: 5993.9360
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 4504.1846 - val_loss: 4930.6704
Epoch 3/50
16/16 - 0s - 9ms/step - loss: 4276.0645 - val_loss: 3896.5798
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 3460.9912 - val_loss: 3693.8794
Epoch 5/50
16/16 - 0s - 9ms/step - loss: 3185.5063 - val_loss: 3410.3232
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 2918.8152 - val_loss: 3224.6763
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 2718.4634 - val_loss: 3065.0212
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 2528.4531 - val_loss: 2904.6436
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 2362.4944 - val_loss: 2766.9661
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 2209.6428 - val_loss: 2629.6592
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 2091.4578 - val_loss: 2499.1804
Epoch 12/50
16/16 - 0s - 9ms/step - loss: 1954.6770 - val_loss: 2386.7175
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 1844.2511 - val_loss: 2268.5867
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 1741.0605 - val_loss: 2162.6277
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 1647.3199 - val_loss: 2053.2439
Epoch 16/50
16/16 - 0s - 12ms/step - loss: 1549.3885 - val_loss: 1967.8285
Epoch 17/50
16/16 - 0s - 9ms/step - loss: 1468.2291 - val_loss: 1856.0394
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 1385.8702 - val_loss: 1771.2162
Epoch 19/50
16/16 - 0s - 10ms/step - loss: 1306.0812 - val_loss: 1675.2814
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 1236.2190 - val_loss: 1597.9882
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 1168.4077 - val_loss: 1509.6683
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 1104.3694 - val_loss: 1427.1189
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 1047.1843 - val_loss: 1362.0654
Epoch 24/50
16/16 - 0s - 9ms/step - loss: 989.9757 - val_loss: 1280.3910
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 935.1581 - val_loss: 1216.5756
Epoch 26/50
16/16 - 0s - 9ms/step - loss: 878.4808 - val_loss: 1157.2166
Epoch 27/50
16/16 - 0s - 18ms/step - loss: 829.6326 - val_loss: 1089.8605
Epoch 28/50
16/16 - 0s - 12ms/step - loss: 782.7478 - val_loss: 1027.5111
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 741.5109 - val_loss: 971.3867
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 701.0143 - val_loss: 922.1370
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 657.4070 - val_loss: 864.2476
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 625.6638 - val_loss: 820.2234
Epoch 33/50
16/16 - 0s - 7ms/step - loss: 593.1171 - val_loss: 776.2714
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 560.8606 - val_loss: 733.2292
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 534.6954 - val_loss: 696.3161
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 501.4779 - val_loss: 651.5868
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 476.9396 - val_loss: 632.1318
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 452.7897 - val_loss: 584.4670
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 429.3938 - val_loss: 554.4737
Epoch 40/50
16/16 - 0s - 9ms/step - loss: 406.7109 - val_loss: 530.5751
Epoch 41/50
16/16 - 0s - 19ms/step - loss: 387.0447 - val_loss: 497.7462
Epoch 42/50
16/16 - 0s - 10ms/step - loss: 373.1713 - val_loss: 477.0739
Epoch 43/50
16/16 - 0s - 9ms/step - loss: 356.3210 - val_loss: 457.5417
Epoch 44/50
16/16 - 0s - 9ms/step - loss: 343.2852 - val_loss: 427.6880
Epoch 45/50
16/16 - 0s - 9ms/step - loss: 322.4708 - val_loss: 412.6254
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 311.0263 - val_loss: 390.2154
Epoch 47/50
16/16 - 0s - 10ms/step - loss: 298.1420 - val_loss: 372.9871
Epoch 48/50
16/16 - 0s - 9ms/step - loss: 286.0895 - val_loss: 357.8033
Epoch 49/50
16/16 - 0s - 9ms/step - loss: 276.2157 - val_loss: 341.8210
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 268.3646 - val_loss: 326.8321
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
275.40327355342174
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 83ms/step - loss: 67454.3359 - val_loss: 47572.8125
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 33421.2461 - val_loss: 21739.4707
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 13982.4980 - val_loss: 8294.3125
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 4771.3101 - val_loss: 2756.0254
Epoch 5/50
16/16 - 0s - 7ms/step - loss: 1592.4358 - val_loss: 1376.1768
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 1164.8112 - val_loss: 1247.0868
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 1126.3308 - val_loss: 1219.6348
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 1080.2373 - val_loss: 1201.6393
Epoch 9/50
16/16 - 0s - 8ms/step - loss: 1054.4159 - val_loss: 1179.8356
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 1030.2178 - val_loss: 1152.4513
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 1006.5923 - val_loss: 1119.9941
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 984.3819 - val_loss: 1077.1853
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 958.9268 - val_loss: 1055.0901
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 937.3522 - val_loss: 1036.2351
Epoch 15/50
16/16 - 0s - 8ms/step - loss: 917.1903 - val_loss: 1014.0462
Epoch 16/50
16/16 - 0s - 11ms/step - loss: 896.0405 - val_loss: 985.8176
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 878.1528 - val_loss: 959.6257
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 859.8591 - val_loss: 944.8397
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 844.8383 - val_loss: 922.5446
Epoch 20/50
16/16 - 0s - 10ms/step - loss: 827.5094 - val_loss: 903.0259
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 813.3276 - val_loss: 888.2424
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 797.3019 - val_loss: 866.6736
Epoch 23/50
16/16 - 0s - 7ms/step - loss: 782.4548 - val_loss: 846.9559
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 769.2173 - val_loss: 829.8587
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 757.6989 - val_loss: 811.1642
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 742.4282 - val_loss: 804.8289
Epoch 27/50
16/16 - 0s - 9ms/step - loss: 728.0905 - val_loss: 779.9042
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 714.5900 - val_loss: 764.9274
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 703.5265 - val_loss: 751.1146
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 689.0802 - val_loss: 731.3491
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 675.7950 - val_loss: 716.8065
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 663.9286 - val_loss: 703.1158
Epoch 33/50
16/16 - 0s - 10ms/step - loss: 651.7719 - val_loss: 679.0790
```

```
Epoch 34/50
16/16 - 0s - 9ms/step - loss: 636.5140 - val_loss: 668.1849
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 621.3682 - val_loss: 638.8663
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 604.1969 - val_loss: 611.9718
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 586.4743 - val_loss: 588.5302
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 565.9606 - val_loss: 571.6172
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 547.2471 - val_loss: 546.5123
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 532.2117 - val_loss: 537.7772
Epoch 41/50
16/16 - 0s - 7ms/step - loss: 518.1937 - val_loss: 523.3288
Epoch 42/50
16/16 - 0s - 11ms/step - loss: 509.1381 - val_loss: 512.8832
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 497.7785 - val_loss: 504.4276
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 488.8077 - val_loss: 496.6250
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 479.2961 - val_loss: 482.7452
Epoch 46/50
16/16 - 0s - 10ms/step - loss: 470.5941 - val_loss: 475.8042
Epoch 47/50
16/16 - 0s - 7ms/step - loss: 461.5694 - val_loss: 465.3607
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 454.8986 - val_loss: 459.9312
Epoch 49/50
16/16 - 0s - 11ms/step - loss: 446.6042 - val_loss: 452.3385
Epoch 50/50
16/16 - 0s - 9ms/step - loss: 437.6443 - val_loss: 439.5837
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
500.48277701127336
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 98ms/step - loss: 109065.5938 - val_loss: 74528.1719
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 52929.5781 - val_loss: 31915.0215
Epoch 3/50
16/16 - 0s - 7ms/step - loss: 20984.4512 - val_loss: 11283.2881
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 7578.6348 - val_loss: 4219.6982
Epoch 5/50
16/16 - 0s - 11ms/step - loss: 3599.5679 - val_loss: 2673.8730
Epoch 6/50
16/16 - 0s - 9ms/step - loss: 2874.2051 - val_loss: 2448.3948
Epoch 7/50
16/16 - 0s - 8ms/step - loss: 2760.5432 - val_loss: 2354.1155
Epoch 8/50
16/16 - 0s - 8ms/step - loss: 2644.1350 - val_loss: 2252.1772
Epoch 9/50
16/16 - 0s - 10ms/step - loss: 2522.8062 - val_loss: 2157.5308
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 2412.3464 - val_loss: 2070.9875
Epoch 11/50
16/16 - 0s - 9ms/step - loss: 2307.9072 - val_loss: 1994.0098
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 2210.6208 - val_loss: 1916.6918
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 2123.1057 - val_loss: 1842.6826
Epoch 14/50
16/16 - 0s - 8ms/step - loss: 2041.2501 - val_loss: 1770.0609
Epoch 15/50
16/16 - 0s - 7ms/step - loss: 1959.2726 - val_loss: 1704.2522
Epoch 16/50
16/16 - 0s - 8ms/step - loss: 1881.9277 - val_loss: 1641.8901
Epoch 17/50
16/16 - 0s - 7ms/step - loss: 1810.2666 - val_loss: 1583.5233
Epoch 18/50
16/16 - 0s - 8ms/step - loss: 1742.9637 - val_loss: 1521.3572
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 1672.6030 - val_loss: 1467.8278
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 1612.9491 - val_loss: 1415.4615
Epoch 21/50
16/16 - 0s - 7ms/step - loss: 1550.1873 - val_loss: 1367.4233
Epoch 22/50
16/16 - 0s - 7ms/step - loss: 1498.1050 - val_loss: 1322.7762
Epoch 23/50
16/16 - 0s - 7ms/step - loss: 1443.5609 - val_loss: 1276.3184
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 1394.0027 - val_loss: 1235.1249
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 1347.5436 - val_loss: 1197.0262
Epoch 26/50
16/16 - 0s - 9ms/step - loss: 1300.7253 - val_loss: 1161.2687
Epoch 27/50
16/16 - 0s - 10ms/step - loss: 1260.6010 - val_loss: 1125.6633
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 1225.2152 - val_loss: 1092.1323
Epoch 29/50
16/16 - 0s - 9ms/step - loss: 1184.8828 - val_loss: 1063.2650
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 1153.2537 - val_loss: 1034.4987
Epoch 31/50
16/16 - 0s - 11ms/step - loss: 1120.5465 - val_loss: 1009.1181
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 1090.1559 - val_loss: 985.1135
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 1062.2102 - val_loss: 960.7428
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 1036.0822 - val_loss: 937.6685
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 1012.0327 - val_loss: 912.6067
Epoch 36/50
16/16 - 0s - 10ms/step - loss: 986.4665 - val_loss: 892.5589
Epoch 37/50
16/16 - 0s - 7ms/step - loss: 961.5186 - val_loss: 871.4107
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 944.1840 - val_loss: 849.6518
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 918.4310 - val_loss: 835.0992
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 899.2948 - val_loss: 814.4040
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 880.7819 - val_loss: 796.0383
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 861.3476 - val_loss: 779.8765
Epoch 43/50
16/16 - 0s - 9ms/step - loss: 842.3054 - val_loss: 764.3329
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 823.6415 - val_loss: 749.1860
Epoch 45/50
16/16 - 0s - 8ms/step - loss: 810.2009 - val_loss: 732.4214
Epoch 46/50
16/16 - 0s - 8ms/step - loss: 791.9222 - val_loss: 723.1015
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 775.1482 - val_loss: 704.7697
Epoch 48/50
16/16 - 0s - 9ms/step - loss: 758.8757 - val_loss: 691.5570
Epoch 49/50
16/16 - 0s - 10ms/step - loss: 743.6707 - val_loss: 677.8976
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 730.1298 - val_loss: 665.4073
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
798.3383600740375
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 2s - 120ms/step - loss: 20365.8262 - val_loss: 6019.1309
Epoch 2/50
16/16 - 0s - 5ms/step - loss: 2578.4824 - val_loss: 1898.1506
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 1815.9777 - val_loss: 1717.7294
Epoch 4/50
16/16 - 0s - 9ms/step - loss: 1383.5475 - val_loss: 1437.9362
Epoch 5/50
16/16 - 0s - 4ms/step - loss: 1167.6027 - val_loss: 1258.7710
Epoch 6/50
16/16 - 0s - 4ms/step - loss: 1018.9685 - val_loss: 1092.8090
Epoch 7/50
16/16 - 0s - 4ms/step - loss: 889.9617 - val_loss: 943.4429
Epoch 8/50
16/16 - 0s - 4ms/step - loss: 771.8546 - val_loss: 811.6819
Epoch 9/50
16/16 - 0s - 3ms/step - loss: 664.2925 - val_loss: 693.1477
Epoch 10/50
16/16 - 0s - 7ms/step - loss: 573.3377 - val_loss: 589.4545
Epoch 11/50
16/16 - 0s - 4ms/step - loss: 491.7094 - val_loss: 502.2362
Epoch 12/50
16/16 - 0s - 8ms/step - loss: 424.1866 - val_loss: 429.5657
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 366.3883 - val_loss: 366.8604
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 314.5262 - val_loss: 321.8387
Epoch 15/50
16/16 - 0s - 4ms/step - loss: 278.3885 - val_loss: 281.0069
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 247.7962 - val_loss: 248.5955
Epoch 17/50
16/16 - 0s - 4ms/step - loss: 221.4486 - val_loss: 223.4950
Epoch 18/50
16/16 - 0s - 6ms/step - loss: 201.9671 - val_loss: 203.7041
Epoch 19/50
16/16 - 0s - 8ms/step - loss: 186.4356 - val_loss: 188.2268
Epoch 20/50
16/16 - 0s - 6ms/step - loss: 173.8418 - val_loss: 176.0649
Epoch 21/50
16/16 - 0s - 6ms/step - loss: 164.4728 - val_loss: 166.9405
Epoch 22/50
16/16 - 0s - 9ms/step - loss: 155.9881 - val_loss: 159.8820
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 150.0830 - val_loss: 153.5571
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 145.2189 - val_loss: 148.9265
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 141.0760 - val_loss: 144.8431
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 137.8863 - val_loss: 142.2465
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 135.5246 - val_loss: 139.5094
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 133.1202 - val_loss: 137.6117
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 131.4159 - val_loss: 135.6118
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 129.7824 - val_loss: 134.0012
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 128.3044 - val_loss: 132.6831
Epoch 32/50
16/16 - 0s - 12ms/step - loss: 127.0490 - val_loss: 131.5203
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 126.3966 - val_loss: 130.4117
```

```
Epoch 34/50
16/16 - 0s - 6ms/step - loss: 125.9226 - val_loss: 129.7397
Epoch 35/50
16/16 - 0s - 7ms/step - loss: 125.0119 - val_loss: 128.3484
Epoch 36/50
16/16 - 0s - 7ms/step - loss: 124.0060 - val_loss: 127.3223
Epoch 37/50
16/16 - 0s - 7ms/step - loss: 123.0115 - val_loss: 126.3557
Epoch 38/50
16/16 - 0s - 10ms/step - loss: 121.9846 - val_loss: 125.6042
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 121.3054 - val_loss: 124.8920
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 121.0205 - val_loss: 124.0679
Epoch 41/50
16/16 - 0s - 6ms/step - loss: 120.1667 - val_loss: 123.3160
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 119.4260 - val_loss: 122.5505
Epoch 43/50
16/16 - 0s - 6ms/step - loss: 119.6986 - val_loss: 121.9044
Epoch 44/50
16/16 - 0s - 4ms/step - loss: 118.7843 - val_loss: 121.5047
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 118.0574 - val_loss: 120.5322
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 117.3995 - val_loss: 120.2760
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 117.0054 - val_loss: 119.2721
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 117.3188 - val_loss: 118.8041
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 117.6513 - val_loss: 118.5265
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 119.5651 - val_loss: 118.3505
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
138.38200124681944
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 43ms/step - loss: 3548.2974 - val_loss: 2852.3938
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 2732.2913 - val_loss: 2344.7544
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 2183.8833 - val_loss: 1894.6356
Epoch 4/50
16/16 - 0s - 4ms/step - loss: 1744.4164 - val_loss: 1551.9653
Epoch 5/50
16/16 - 0s - 6ms/step - loss: 1389.0253 - val_loss: 1243.6906
Epoch 6/50
16/16 - 0s - 11ms/step - loss: 1130.8207 - val_loss: 1033.1088
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 937.2235 - val_loss: 857.6716
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 800.6700 - val_loss: 734.2563
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 689.5628 - val_loss: 653.3725
Epoch 10/50
16/16 - 0s - 6ms/step - loss: 608.4338 - val_loss: 582.6069
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 535.1328 - val_loss: 518.2637
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 466.5372 - val_loss: 433.6843
Epoch 13/50
16/16 - 0s - 4ms/step - loss: 419.1741 - val_loss: 374.9273
Epoch 14/50
16/16 - 0s - 4ms/step - loss: 373.5135 - val_loss: 331.2625
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 317.3970 - val_loss: 297.1304
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 279.5744 - val_loss: 271.2615
Epoch 17/50
16/16 - 0s - 6ms/step - loss: 260.8157 - val_loss: 249.3699
Epoch 18/50
16/16 - 0s - 6ms/step - loss: 229.2178 - val_loss: 214.2444
Epoch 19/50
16/16 - 0s - 11ms/step - loss: 207.3553 - val_loss: 196.0266
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 192.5997 - val_loss: 180.4874
Epoch 21/50
16/16 - 0s - 6ms/step - loss: 179.9921 - val_loss: 167.8574
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 175.2137 - val_loss: 172.5064
Epoch 23/50
16/16 - 0s - 4ms/step - loss: 158.8867 - val_loss: 164.3408
Epoch 24/50
16/16 - 0s - 4ms/step - loss: 155.9290 - val_loss: 139.6474
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 142.0248 - val_loss: 143.3429
Epoch 26/50
16/16 - 0s - 11ms/step - loss: 144.7369 - val_loss: 129.7283
Epoch 27/50
16/16 - 0s - 10ms/step - loss: 138.3294 - val_loss: 127.0819
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 130.2149 - val_loss: 123.8197
Epoch 29/50
16/16 - 0s - 4ms/step - loss: 128.5567 - val_loss: 118.7015
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 128.7315 - val_loss: 115.2406
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 121.1664 - val_loss: 119.7335
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 119.2186 - val_loss: 126.1837
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 121.2736 - val_loss: 137.0446
```

```
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 118.1646 - val_loss: 115.4464
Epoch 35/50
16/16 - 0s - 4ms/step - loss: 113.7159 - val_loss: 108.4656
Epoch 36/50
16/16 - 0s - 4ms/step - loss: 112.7237 - val_loss: 108.9391
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 114.3771 - val_loss: 129.4743
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 115.2609 - val_loss: 110.1252
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 111.3896 - val_loss: 103.9965
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 114.9180 - val_loss: 103.9696
Epoch 41/50
16/16 - 0s - 6ms/step - loss: 108.7275 - val_loss: 107.4320
Epoch 42/50
16/16 - 0s - 4ms/step - loss: 107.8001 - val_loss: 122.2910
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 114.2986 - val_loss: 101.3074
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 107.7977 - val_loss: 109.1163
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 108.4596 - val_loss: 100.2105
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 109.3196 - val_loss: 100.3806
Epoch 47/50
16/16 - 0s - 9ms/step - loss: 107.9760 - val_loss: 103.3648
Epoch 48/50
16/16 - 0s - 4ms/step - loss: 104.4599 - val_loss: 103.6243
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 105.3475 - val_loss: 99.9676
Epoch 50/50
16/16 - 0s - 6ms/step - loss: 104.7015 - val_loss: 99.4029
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
127.48945082266957
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 43ms/step - loss: 115272.0000 - val_loss: 65915.0625
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 39734.2891 - val_loss: 17625.5801
Epoch 3/50
16/16 - 0s - 4ms/step - loss: 9413.3301 - val_loss: 3856.1428
Epoch 4/50
16/16 - 0s - 4ms/step - loss: 3158.5344 - val_loss: 2396.1558
Epoch 5/50
16/16 - 0s - 4ms/step - loss: 2663.1880 - val_loss: 2342.4177
Epoch 6/50
16/16 - 0s - 4ms/step - loss: 2528.6614 - val_loss: 2186.6521
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 2368.4761 - val_loss: 2072.1235
Epoch 8/50
16/16 - 0s - 4ms/step - loss: 2232.7173 - val_loss: 1961.1906
Epoch 9/50
16/16 - 0s - 4ms/step - loss: 2108.3318 - val_loss: 1852.4392
Epoch 10/50
16/16 - 0s - 6ms/step - loss: 1986.5703 - val_loss: 1746.4570
Epoch 11/50
16/16 - 0s - 6ms/step - loss: 1870.2380 - val_loss: 1643.5200
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 1754.2902 - val_loss: 1549.0814
Epoch 13/50
16/16 - 0s - 4ms/step - loss: 1643.7832 - val_loss: 1454.2229
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 1539.6007 - val_loss: 1366.6356
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 1444.3453 - val_loss: 1284.7948
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 1351.0424 - val_loss: 1209.8323
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 1263.9062 - val_loss: 1139.2493
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 1185.4568 - val_loss: 1073.2892
Epoch 19/50
16/16 - 0s - 6ms/step - loss: 1110.9880 - val_loss: 1013.6135
Epoch 20/50
16/16 - 0s - 10ms/step - loss: 1042.7744 - val_loss: 957.2443
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 980.4494 - val_loss: 908.3493
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 920.7525 - val_loss: 861.0004
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 869.4677 - val_loss: 817.8985
Epoch 24/50
16/16 - 0s - 4ms/step - loss: 818.9474 - val_loss: 779.0080
Epoch 25/50
16/16 - 0s - 5ms/step - loss: 774.5327 - val_loss: 743.9127
Epoch 26/50
16/16 - 0s - 6ms/step - loss: 735.7797 - val_loss: 710.8312
Epoch 27/50
16/16 - 0s - 7ms/step - loss: 698.3868 - val_loss: 680.9359
Epoch 28/50
16/16 - 0s - 10ms/step - loss: 663.8138 - val_loss: 653.3311
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 633.7273 - val_loss: 628.8598
Epoch 30/50
16/16 - 0s - 4ms/step - loss: 606.2526 - val_loss: 604.8717
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 578.2946 - val_loss: 583.7791
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 554.9670 - val_loss: 563.9824
Epoch 33/50
16/16 - 0s - 4ms/step - loss: 533.0936 - val_loss: 543.1310
```

```
Epoch 34/50
16/16 - 0s - 4ms/step - loss: 511.5740 - val_loss: 524.5410
Epoch 35/50
16/16 - 0s - 4ms/step - loss: 492.6862 - val_loss: 508.5081
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 473.9698 - val_loss: 491.2763
Epoch 37/50
16/16 - 0s - 4ms/step - loss: 457.0900 - val_loss: 475.2053
Epoch 38/50
16/16 - 0s - 4ms/step - loss: 440.7933 - val_loss: 461.7702
Epoch 39/50
16/16 - 0s - 4ms/step - loss: 426.0556 - val_loss: 446.9064
Epoch 40/50
16/16 - 0s - 6ms/step - loss: 412.8058 - val_loss: 432.4346
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 398.9087 - val_loss: 420.0425
Epoch 42/50
16/16 - 0s - 4ms/step - loss: 384.7979 - val_loss: 405.8331
Epoch 43/50
16/16 - 0s - 4ms/step - loss: 372.7520 - val_loss: 394.3261
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 361.9467 - val_loss: 381.2396
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 349.3569 - val_loss: 368.7429
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 337.3373 - val_loss: 358.5784
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 328.7386 - val_loss: 347.3986
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 317.7290 - val_loss: 335.2543
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 309.1265 - val_loss: 325.6492
Epoch 50/50
16/16 - 0s - 12ms/step - loss: 298.1402 - val_loss: 315.1316
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
305.6322195041894
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 58ms/step - loss: 967923.4375 - val_loss: 813217.9375
Epoch 2/50
16/16 - 0s - 14ms/step - loss: 700683.9375 - val_loss: 578741.5000
Epoch 3/50
16/16 - 0s - 4ms/step - loss: 491802.3438 - val_loss: 394634.7500
Epoch 4/50
16/16 - 0s - 5ms/step - loss: 325818.8750 - val_loss: 250046.9062
Epoch 5/50
16/16 - 0s - 6ms/step - loss: 197424.2812 - val_loss: 141760.6406
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 106135.0156 - val_loss: 70031.0859
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 49437.9180 - val_loss: 29433.6270
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 19426.8613 - val_loss: 10927.6387
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 7086.7280 - val_loss: 4341.4697
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 3158.2388 - val_loss: 2735.4775
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 2247.6555 - val_loss: 2493.9619
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 2120.6006 - val_loss: 2461.3257
Epoch 13/50
16/16 - 0s - 6ms/step - loss: 2096.5332 - val_loss: 2438.2808
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 2067.4700 - val_loss: 2409.9834
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 2036.7792 - val_loss: 2377.4377
Epoch 16/50
16/16 - 0s - 6ms/step - loss: 2007.2590 - val_loss: 2346.9705
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 1979.3369 - val_loss: 2316.5508
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 1951.2582 - val_loss: 2288.7617
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 1920.1206 - val_loss: 2257.8589
Epoch 20/50
16/16 - 0s - 4ms/step - loss: 1888.4611 - val_loss: 2229.0225
Epoch 21/50
16/16 - 0s - 6ms/step - loss: 1860.2729 - val_loss: 2199.4426
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 1830.7965 - val_loss: 2168.9299
Epoch 23/50
16/16 - 0s - 6ms/step - loss: 1799.9252 - val_loss: 2138.3240
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 1770.9620 - val_loss: 2108.5996
Epoch 25/50
16/16 - 0s - 5ms/step - loss: 1740.5100 - val_loss: 2078.2222
Epoch 26/50
16/16 - 0s - 10ms/step - loss: 1711.6030 - val_loss: 2047.4076
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 1683.1500 - val_loss: 2016.9001
Epoch 28/50
16/16 - 0s - 6ms/step - loss: 1653.9349 - val_loss: 1987.1362
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 1625.4130 - val_loss: 1957.4667
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 1597.4073 - val_loss: 1928.2858
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 1569.7007 - val_loss: 1899.6565
Epoch 32/50
16/16 - 0s - 6ms/step - loss: 1541.4821 - val_loss: 1869.9445
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 1514.0428 - val_loss: 1839.2540
```

```
Epoch 34/50
16/16 - 0s - 12ms/step - loss: 1487.4678 - val_loss: 1810.6820
Epoch 35/50
16/16 - 0s - 6ms/step - loss: 1462.2849 - val_loss: 1782.5170
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 1433.8298 - val_loss: 1753.9581
Epoch 37/50
16/16 - 0s - 4ms/step - loss: 1409.4080 - val_loss: 1725.8607
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 1384.2645 - val_loss: 1697.0023
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 1358.0907 - val_loss: 1669.8303
Epoch 40/50
16/16 - 0s - 11ms/step - loss: 1335.1157 - val_loss: 1642.1757
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 1309.4945 - val_loss: 1615.4901
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 1285.8082 - val_loss: 1588.6011
Epoch 43/50
16/16 - 0s - 4ms/step - loss: 1262.5023 - val_loss: 1562.2468
Epoch 44/50
16/16 - 0s - 6ms/step - loss: 1239.8774 - val_loss: 1535.8547
Epoch 45/50
16/16 - 0s - 6ms/step - loss: 1216.5013 - val_loss: 1510.4766
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 1195.9630 - val_loss: 1485.6990
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 1173.9630 - val_loss: 1458.9398
Epoch 48/50
16/16 - 0s - 6ms/step - loss: 1151.7859 - val_loss: 1435.0168
Epoch 49/50
16/16 - 0s - 6ms/step - loss: 1130.0404 - val_loss: 1410.5408
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 1109.5930 - val_loss: 1385.7483
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
1093.3178729301023
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 42ms/step - loss: 22222.8047 - val_loss: 12933.2236
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 7777.5010 - val_loss: 5569.0151
Epoch 3/50
16/16 - 0s - 4ms/step - loss: 4202.2788 - val_loss: 4694.1704
Epoch 4/50
16/16 - 0s - 4ms/step - loss: 4056.2966 - val_loss: 4629.7939
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 3939.1375 - val_loss: 4486.6206
Epoch 6/50
16/16 - 0s - 6ms/step - loss: 3804.6816 - val_loss: 4375.5010
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 3707.4980 - val_loss: 4253.4521
Epoch 8/50
16/16 - 0s - 4ms/step - loss: 3599.0244 - val_loss: 4135.5825
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 3487.7366 - val_loss: 4016.5154
Epoch 10/50
16/16 - 0s - 6ms/step - loss: 3393.1790 - val_loss: 3884.3157
Epoch 11/50
16/16 - 0s - 10ms/step - loss: 3284.1069 - val_loss: 3772.2017
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 3164.9880 - val_loss: 3640.5720
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 3061.3481 - val_loss: 3515.7659
Epoch 14/50
16/16 - 0s - 4ms/step - loss: 2954.1450 - val_loss: 3402.3386
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 2858.5493 - val_loss: 3277.7598
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 2755.1431 - val_loss: 3165.9990
Epoch 17/50
16/16 - 0s - 4ms/step - loss: 2661.9041 - val_loss: 3057.5591
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 2566.2131 - val_loss: 2959.5195
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 2473.0002 - val_loss: 2842.3003
Epoch 20/50
16/16 - 0s - 11ms/step - loss: 2390.5115 - val_loss: 2745.9229
Epoch 21/50
16/16 - 0s - 4ms/step - loss: 2306.8889 - val_loss: 2635.3716
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 2233.1064 - val_loss: 2540.4839
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 2131.1875 - val_loss: 2447.9102
Epoch 24/50
16/16 - 0s - 6ms/step - loss: 2054.9019 - val_loss: 2357.6172
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 1989.8241 - val_loss: 2276.5493
Epoch 26/50
16/16 - 0s - 6ms/step - loss: 1916.9178 - val_loss: 2186.5259
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 1850.0105 - val_loss: 2113.3469
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 1774.3069 - val_loss: 2025.2373
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 1713.1267 - val_loss: 1954.0529
Epoch 30/50
16/16 - 0s - 6ms/step - loss: 1645.3927 - val_loss: 1880.9452
Epoch 31/50
16/16 - 0s - 6ms/step - loss: 1584.6549 - val_loss: 1808.1528
Epoch 32/50
16/16 - 0s - 4ms/step - loss: 1527.7570 - val_loss: 1743.3590
Epoch 33/50
16/16 - 0s - 4ms/step - loss: 1470.6771 - val_loss: 1680.1023
```

```
Epoch 34/50
16/16 - 0s - 4ms/step - loss: 1420.8204 - val_loss: 1616.8499
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 1367.8241 - val_loss: 1555.1902
Epoch 36/50
16/16 - 0s - 7ms/step - loss: 1319.6392 - val_loss: 1495.4056
Epoch 37/50
16/16 - 0s - 10ms/step - loss: 1271.0938 - val_loss: 1440.0247
Epoch 38/50
16/16 - 0s - 9ms/step - loss: 1223.8800 - val_loss: 1387.7367
Epoch 39/50
16/16 - 0s - 4ms/step - loss: 1181.1042 - val_loss: 1336.4706
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 1140.1731 - val_loss: 1291.4032
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 1099.4849 - val_loss: 1240.8921
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 1061.7245 - val_loss: 1193.9525
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 1025.2468 - val_loss: 1151.3196
Epoch 44/50
16/16 - 0s - 4ms/step - loss: 984.2549 - val_loss: 1109.0151
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 951.7869 - val_loss: 1068.3967
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 916.9460 - val_loss: 1030.1444
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 890.5006 - val_loss: 993.2946
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 853.4547 - val_loss: 955.9003
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 825.5585 - val_loss: 919.7374
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 793.3280 - val_loss: 889.9941
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
663.1308765804703
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 53ms/step - loss: 42419.4492 - val_loss: 23855.7129
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 13521.7236 - val_loss: 6022.0801
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 2948.6189 - val_loss: 1433.4192
Epoch 4/50
16/16 - 0s - 4ms/step - loss: 956.4722 - val_loss: 977.6102
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 870.3471 - val_loss: 956.9923
Epoch 6/50
16/16 - 0s - 11ms/step - loss: 838.1219 - val_loss: 916.3950
Epoch 7/50
16/16 - 0s - 9ms/step - loss: 792.7135 - val_loss: 888.5015
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 763.3268 - val_loss: 857.7415
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 736.2099 - val_loss: 826.5871
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 708.8127 - val_loss: 790.5717
Epoch 11/50
16/16 - 0s - 6ms/step - loss: 680.1862 - val_loss: 762.9060
Epoch 12/50
16/16 - 0s - 6ms/step - loss: 653.5610 - val_loss: 731.6365
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 629.0059 - val_loss: 703.5448
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 604.0570 - val_loss: 675.7764
Epoch 15/50
16/16 - 0s - 11ms/step - loss: 580.8362 - val_loss: 649.5665
Epoch 16/50
16/16 - 0s - 4ms/step - loss: 559.9761 - val_loss: 621.6099
Epoch 17/50
16/16 - 0s - 7ms/step - loss: 537.0693 - val_loss: 600.1870
Epoch 18/50
16/16 - 0s - 6ms/step - loss: 518.5257 - val_loss: 578.8240
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 499.5480 - val_loss: 552.7391
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 481.7798 - val_loss: 534.4713
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 465.5633 - val_loss: 516.8043
Epoch 22/50
16/16 - 0s - 6ms/step - loss: 449.9735 - val_loss: 499.0439
Epoch 23/50
16/16 - 0s - 6ms/step - loss: 435.6804 - val_loss: 481.1380
Epoch 24/50
16/16 - 0s - 6ms/step - loss: 422.1242 - val_loss: 465.5942
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 408.9112 - val_loss: 451.0599
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 397.3073 - val_loss: 437.3021
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 386.7804 - val_loss: 425.4721
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 375.1518 - val_loss: 411.7679
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 365.4733 - val_loss: 399.7889
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 356.2932 - val_loss: 388.2693
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 346.9372 - val_loss: 379.9204
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 339.2071 - val_loss: 368.4195
Epoch 33/50
16/16 - 0s - 4ms/step - loss: 333.5725 - val_loss: 362.4315
```

```
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 322.7647 - val_loss: 349.5469
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 316.9712 - val_loss: 342.9872
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 308.9023 - val_loss: 335.5479
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 302.2767 - val_loss: 326.3381
Epoch 38/50
16/16 - 0s - 8ms/step - loss: 295.3994 - val_loss: 319.6542
Epoch 39/50
16/16 - 0s - 10ms/step - loss: 289.1809 - val_loss: 312.9366
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 283.5516 - val_loss: 304.4892
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 278.2312 - val_loss: 300.9847
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 271.9748 - val_loss: 292.9333
Epoch 43/50
16/16 - 0s - 7ms/step - loss: 267.1288 - val_loss: 287.2164
Epoch 44/50
16/16 - 0s - 10ms/step - loss: 261.4296 - val_loss: 280.0821
Epoch 45/50
16/16 - 0s - 6ms/step - loss: 255.9024 - val_loss: 274.9184
Epoch 46/50
16/16 - 0s - 6ms/step - loss: 251.0779 - val_loss: 270.7639
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 246.3378 - val_loss: 264.7891
Epoch 48/50
16/16 - 0s - 6ms/step - loss: 242.4000 - val_loss: 258.7999
Epoch 49/50
16/16 - 0s - 6ms/step - loss: 236.6722 - val_loss: 255.5092
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 233.2738 - val_loss: 248.9144
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
257.52770919779095
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 42ms/step - loss: 31235.4688 - val_loss: 19004.2012
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 11063.9492 - val_loss: 6246.6196
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 3910.1206 - val_loss: 3837.8147
Epoch 4/50
16/16 - 0s - 5ms/step - loss: 3185.8503 - val_loss: 3704.3079
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 3038.8704 - val_loss: 3461.0559
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 2836.8657 - val_loss: 3274.8708
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 2680.1531 - val_loss: 3074.5491
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 2524.5737 - val_loss: 2891.0813
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 2379.1841 - val_loss: 2698.4421
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 2228.8665 - val_loss: 2518.4314
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 2084.2937 - val_loss: 2342.5459
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 1946.8497 - val_loss: 2172.4570
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 1814.9131 - val_loss: 2015.5262
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 1687.7113 - val_loss: 1861.9125
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 1574.3031 - val_loss: 1724.7283
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 1453.7614 - val_loss: 1585.8558
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 1351.7650 - val_loss: 1461.8774
Epoch 18/50
16/16 - 0s - 6ms/step - loss: 1251.2527 - val_loss: 1350.4893
Epoch 19/50
16/16 - 0s - 6ms/step - loss: 1160.8284 - val_loss: 1243.5455
Epoch 20/50
16/16 - 0s - 6ms/step - loss: 1072.4548 - val_loss: 1149.6387
Epoch 21/50
16/16 - 0s - 6ms/step - loss: 994.4363 - val_loss: 1051.5707
Epoch 22/50
16/16 - 0s - 13ms/step - loss: 916.2933 - val_loss: 968.3215
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 847.5409 - val_loss: 889.7628
Epoch 24/50
16/16 - 0s - 4ms/step - loss: 782.8844 - val_loss: 819.3485
Epoch 25/50
16/16 - 0s - 5ms/step - loss: 724.2108 - val_loss: 754.0953
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 671.8005 - val_loss: 691.5409
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 621.7449 - val_loss: 641.5430
Epoch 28/50
16/16 - 0s - 9ms/step - loss: 575.6310 - val_loss: 589.2811
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 533.7481 - val_loss: 547.2810
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 498.6172 - val_loss: 506.7857
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 461.8936 - val_loss: 469.9638
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 431.5849 - val_loss: 437.8964
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 402.4139 - val_loss: 407.1931
```

```
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 377.3547 - val_loss: 380.5154
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 354.7388 - val_loss: 360.0530
Epoch 36/50
16/16 - 0s - 7ms/step - loss: 332.5435 - val_loss: 334.7003
Epoch 37/50
16/16 - 0s - 7ms/step - loss: 313.2926 - val_loss: 315.3971
Epoch 38/50
16/16 - 0s - 7ms/step - loss: 294.8036 - val_loss: 301.0394
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 278.7467 - val_loss: 282.0449
Epoch 40/50
16/16 - 0s - 4ms/step - loss: 266.8747 - val_loss: 268.6132
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 252.0505 - val_loss: 254.3686
Epoch 42/50
16/16 - 0s - 6ms/step - loss: 243.3653 - val_loss: 246.2525
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 231.1019 - val_loss: 232.3409
Epoch 44/50
16/16 - 0s - 11ms/step - loss: 220.1895 - val_loss: 224.0695
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 212.6179 - val_loss: 213.7417
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 204.7770 - val_loss: 209.0121
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 196.1850 - val_loss: 199.3930
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 190.1593 - val_loss: 195.2664
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 185.0885 - val_loss: 188.0095
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 181.0181 - val_loss: 182.4945
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
194.94660505670998
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 58ms/step - loss: 223119.9219 - val_loss: 192128.3750
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 177191.0625 - val_loss: 148883.5781
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 133587.2656 - val_loss: 106728.4766
Epoch 4/50
16/16 - 0s - 5ms/step - loss: 92199.5391 - val_loss: 69908.9141
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 58563.5078 - val_loss: 42271.5625
Epoch 6/50
16/16 - 0s - 11ms/step - loss: 34708.2695 - val_loss: 23668.7969
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 19001.1016 - val_loss: 12348.1533
Epoch 8/50
16/16 - 0s - 4ms/step - loss: 9744.7695 - val_loss: 6180.4668
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 4909.3486 - val_loss: 3244.5459
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 2662.9165 - val_loss: 2132.1985
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 1829.7455 - val_loss: 1786.5472
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 1551.9215 - val_loss: 1710.6228
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 1469.9215 - val_loss: 1700.1251
Epoch 14/50
16/16 - 0s - 6ms/step - loss: 1441.5758 - val_loss: 1691.5000
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 1423.6141 - val_loss: 1680.2457
Epoch 16/50
16/16 - 0s - 11ms/step - loss: 1406.7410 - val_loss: 1662.7410
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 1389.8762 - val_loss: 1645.8214
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 1373.3127 - val_loss: 1628.5492
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 1355.8077 - val_loss: 1612.8235
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 1338.8832 - val_loss: 1594.1604
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 1321.2181 - val_loss: 1577.2517
Epoch 22/50
16/16 - 0s - 6ms/step - loss: 1304.8707 - val_loss: 1558.3873
Epoch 23/50
16/16 - 0s - 6ms/step - loss: 1287.8435 - val_loss: 1539.4279
Epoch 24/50
16/16 - 0s - 7ms/step - loss: 1270.9647 - val_loss: 1522.8192
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 1253.3914 - val_loss: 1509.2783
Epoch 26/50
16/16 - 0s - 4ms/step - loss: 1238.4169 - val_loss: 1490.0361
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 1220.3472 - val_loss: 1473.2297
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 1204.6021 - val_loss: 1454.5090
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 1187.7123 - val_loss: 1436.9705
Epoch 30/50
16/16 - 0s - 6ms/step - loss: 1172.3140 - val_loss: 1422.4495
Epoch 31/50
16/16 - 0s - 10ms/step - loss: 1156.0149 - val_loss: 1405.0671
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 1141.2515 - val_loss: 1385.5400
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 1124.8427 - val_loss: 1369.7018
```

```
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 1109.9359 - val_loss: 1353.0801
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 1097.9614 - val_loss: 1344.2180
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 1079.7517 - val_loss: 1320.5294
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 1066.3307 - val_loss: 1301.7478
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 1053.2073 - val_loss: 1285.5497
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 1037.1788 - val_loss: 1277.8632
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 1023.8042 - val_loss: 1261.4738
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 1010.9312 - val_loss: 1238.6829
Epoch 42/50
16/16 - 0s - 6ms/step - loss: 995.9546 - val_loss: 1227.5775
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 982.8595 - val_loss: 1213.3284
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 969.7805 - val_loss: 1201.1682
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 957.4561 - val_loss: 1187.3707
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 945.3013 - val_loss: 1169.9927
Epoch 47/50
16/16 - 0s - 6ms/step - loss: 932.2964 - val_loss: 1153.6783
Epoch 48/50
16/16 - 0s - 11ms/step - loss: 920.6146 - val_loss: 1141.8894
Epoch 49/50
16/16 - 0s - 7ms/step - loss: 909.3785 - val_loss: 1127.5505
Epoch 50/50
16/16 - 0s - 9ms/step - loss: 899.1209 - val_loss: 1109.2850
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
935.790732333077
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 41ms/step - loss: 183274.2344 - val_loss: 141842.5469
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 118918.1719 - val_loss: 87911.4375
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 72807.7812 - val_loss: 50739.4961
Epoch 4/50
16/16 - 0s - 5ms/step - loss: 41094.0508 - val_loss: 25531.9473
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 19393.2207 - val_loss: 10257.3955
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 7638.3013 - val_loss: 4288.4883
Epoch 7/50
16/16 - 0s - 12ms/step - loss: 4164.7954 - val_loss: 3574.2239
Epoch 8/50
16/16 - 0s - 6ms/step - loss: 3552.3032 - val_loss: 3176.3733
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 3086.9966 - val_loss: 2767.1128
Epoch 10/50
16/16 - 0s - 4ms/step - loss: 2726.2949 - val_loss: 2443.9004
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 2439.1956 - val_loss: 2207.0979
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 2217.5337 - val_loss: 2042.2666
Epoch 13/50
16/16 - 0s - 6ms/step - loss: 2031.8914 - val_loss: 1896.8491
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 1897.4695 - val_loss: 1778.6201
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 1775.0521 - val_loss: 1670.6758
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 1675.9421 - val_loss: 1592.7310
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 1590.6799 - val_loss: 1524.8079
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 1512.8754 - val_loss: 1458.4124
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 1445.8541 - val_loss: 1394.6248
Epoch 20/50
16/16 - 0s - 7ms/step - loss: 1379.0580 - val_loss: 1342.3074
Epoch 21/50
16/16 - 0s - 10ms/step - loss: 1320.5256 - val_loss: 1297.1741
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 1268.0637 - val_loss: 1244.4529
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 1218.8702 - val_loss: 1203.0608
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 1175.1520 - val_loss: 1168.2891
Epoch 25/50
16/16 - 0s - 5ms/step - loss: 1130.2950 - val_loss: 1128.7773
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 1093.0349 - val_loss: 1099.4360
Epoch 27/50
16/16 - 0s - 11ms/step - loss: 1055.9351 - val_loss: 1065.0281
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 1023.9872 - val_loss: 1035.5875
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 993.1581 - val_loss: 1013.6541
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 964.9621 - val_loss: 984.6976
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 937.4641 - val_loss: 965.1343
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 909.2381 - val_loss: 936.5746
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 885.1020 - val_loss: 915.1807
```

```
Epoch 34/50
16/16 - 0s - 6ms/step - loss: 861.6947 - val_loss: 899.1792
Epoch 35/50
16/16 - 0s - 6ms/step - loss: 840.1174 - val_loss: 875.7872
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 818.2807 - val_loss: 859.1409
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 798.6099 - val_loss: 842.7263
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 778.9473 - val_loss: 827.0212
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 761.6311 - val_loss: 808.7591
Epoch 40/50
16/16 - 0s - 10ms/step - loss: 744.5118 - val_loss: 794.1534
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 727.8043 - val_loss: 779.8235
Epoch 42/50
16/16 - 0s - 6ms/step - loss: 712.8566 - val_loss: 764.6395
Epoch 43/50
16/16 - 0s - 6ms/step - loss: 697.2366 - val_loss: 751.7237
Epoch 44/50
16/16 - 0s - 4ms/step - loss: 683.9517 - val_loss: 738.1500
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 670.3837 - val_loss: 722.0869
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 657.2526 - val_loss: 714.6379
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 645.0572 - val_loss: 697.7535
Epoch 48/50
16/16 - 0s - 6ms/step - loss: 631.2827 - val_loss: 689.9865
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 618.7615 - val_loss: 676.7526
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 607.8148 - val_loss: 667.0460
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
690.3707038776413
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 43ms/step - loss: 170866.5938 - val_loss: 137089.5781
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 117919.1953 - val_loss: 93845.6953
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 80809.7266 - val_loss: 64399.4609
Epoch 4/50
16/16 - 0s - 5ms/step - loss: 55597.8086 - val_loss: 44200.5820
Epoch 5/50
16/16 - 0s - 11ms/step - loss: 38189.0625 - val_loss: 30163.7285
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 26045.3848 - val_loss: 20474.4883
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 17660.7227 - val_loss: 13836.9375
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 11914.3027 - val_loss: 9365.6172
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 8024.4038 - val_loss: 6381.8135
Epoch 10/50
16/16 - 0s - 4ms/step - loss: 5416.7070 - val_loss: 4418.8359
Epoch 11/50
16/16 - 0s - 4ms/step - loss: 3727.6147 - val_loss: 3113.8311
Epoch 12/50
16/16 - 0s - 4ms/step - loss: 2612.1719 - val_loss: 2283.2231
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 1907.0581 - val_loss: 1767.7301
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 1483.6578 - val_loss: 1447.8699
Epoch 15/50
16/16 - 0s - 6ms/step - loss: 1227.1871 - val_loss: 1256.4373
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 1078.2184 - val_loss: 1141.6958
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 991.8212 - val_loss: 1068.1832
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 940.0992 - val_loss: 1018.1890
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 902.0807 - val_loss: 985.2968
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 878.0977 - val_loss: 956.0473
Epoch 21/50
16/16 - 0s - 6ms/step - loss: 854.4852 - val_loss: 933.0556
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 835.8999 - val_loss: 908.9952
Epoch 23/50
16/16 - 0s - 6ms/step - loss: 816.1039 - val_loss: 886.5048
Epoch 24/50
16/16 - 0s - 11ms/step - loss: 797.9745 - val_loss: 864.8600
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 781.5345 - val_loss: 843.0306
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 763.9012 - val_loss: 822.2502
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 746.7969 - val_loss: 802.3593
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 731.0377 - val_loss: 781.7798
Epoch 29/50
16/16 - 0s - 4ms/step - loss: 714.7511 - val_loss: 760.9547
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 697.4005 - val_loss: 741.8622
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 681.4362 - val_loss: 721.9953
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 665.8560 - val_loss: 702.7420
Epoch 33/50
16/16 - 0s - 6ms/step - loss: 650.1696 - val_loss: 685.3212
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 635.4994 - val_loss: 667.9714
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 622.4880 - val_loss: 651.6620
Epoch 36/50
16/16 - 0s - 6ms/step - loss: 609.7001 - val_loss: 636.4482
Epoch 37/50
16/16 - 0s - 6ms/step - loss: 597.6321 - val_loss: 621.9857
Epoch 38/50
16/16 - 0s - 6ms/step - loss: 586.0038 - val_loss: 608.2238
Epoch 39/50
16/16 - 0s - 7ms/step - loss: 575.1599 - val_loss: 595.3448
Epoch 40/50
16/16 - 0s - 10ms/step - loss: 566.3294 - val_loss: 581.0657
Epoch 41/50
16/16 - 0s - 4ms/step - loss: 554.7078 - val_loss: 570.0547
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 545.5070 - val_loss: 558.6161
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 536.6450 - val_loss: 548.1624
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 528.8692 - val_loss: 537.5097
Epoch 45/50
16/16 - 0s - 4ms/step - loss: 520.3318 - val_loss: 528.2614
Epoch 46/50
16/16 - 0s - 6ms/step - loss: 512.2682 - val_loss: 518.9384
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 504.9900 - val_loss: 509.2386
Epoch 48/50
16/16 - 0s - 6ms/step - loss: 496.9489 - val_loss: 499.6639
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 489.1617 - val_loss: 490.8626
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 482.7237 - val_loss: 480.9784
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step
456.6824356703957
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 35ms/step - loss: 250215.0938 - val_loss: 178018.0938
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 131398.0156 - val_loss: 84319.1328
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 56944.7031 - val_loss: 31725.5273
Epoch 4/50
16/16 - 0s - 5ms/step - loss: 19250.5918 - val_loss: 8818.4971
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 5123.3276 - val_loss: 2232.8015
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 1802.3831 - val_loss: 1349.6796
Epoch 7/50
16/16 - 0s - 6ms/step - loss: 1418.5199 - val_loss: 1257.5273
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 1311.4637 - val_loss: 1151.5692
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 1204.2107 - val_loss: 1064.4431
Epoch 10/50
16/16 - 0s - 4ms/step - loss: 1113.7994 - val_loss: 991.0649
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 1035.8193 - val_loss: 929.5318
Epoch 12/50
16/16 - 0s - 4ms/step - loss: 967.1951 - val_loss: 877.8187
Epoch 13/50
16/16 - 0s - 4ms/step - loss: 912.5799 - val_loss: 831.0693
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 858.9117 - val_loss: 791.0993
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 815.6360 - val_loss: 752.1644
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 776.3025 - val_loss: 720.9695
Epoch 17/50
16/16 - 0s - 6ms/step - loss: 744.7236 - val_loss: 693.7766
Epoch 18/50
16/16 - 0s - 11ms/step - loss: 716.0057 - val_loss: 669.0379
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 690.6066 - val_loss: 646.9940
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 669.7922 - val_loss: 628.2255
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 647.5936 - val_loss: 608.1604
Epoch 22/50
16/16 - 0s - 6ms/step - loss: 628.8830 - val_loss: 591.3859
Epoch 23/50
16/16 - 0s - 10ms/step - loss: 611.2997 - val_loss: 576.2580
Epoch 24/50
16/16 - 0s - 4ms/step - loss: 594.7323 - val_loss: 560.5568
Epoch 25/50
16/16 - 0s - 5ms/step - loss: 578.9174 - val_loss: 545.5233
Epoch 26/50
16/16 - 0s - 6ms/step - loss: 562.9213 - val_loss: 531.8594
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 547.8918 - val_loss: 518.5109
Epoch 28/50
16/16 - 0s - 6ms/step - loss: 532.7314 - val_loss: 503.6791
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 518.0950 - val_loss: 490.8449
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 503.8007 - val_loss: 477.4232
Epoch 31/50
16/16 - 0s - 4ms/step - loss: 489.6117 - val_loss: 463.3542
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 475.6471 - val_loss: 450.9552
Epoch 33/50
16/16 - 0s - 6ms/step - loss: 460.6272 - val_loss: 436.7041
```

```
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 447.3547 - val_loss: 423.6031
Epoch 35/50
16/16 - 0s - 6ms/step - loss: 433.6687 - val_loss: 410.8337
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 420.3579 - val_loss: 398.1289
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 407.5231 - val_loss: 386.0581
Epoch 38/50
16/16 - 0s - 12ms/step - loss: 395.5230 - val_loss: 374.6868
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 383.6439 - val_loss: 363.9665
Epoch 40/50
16/16 - 0s - 4ms/step - loss: 373.0121 - val_loss: 352.8487
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 361.9211 - val_loss: 343.2760
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 350.9780 - val_loss: 332.5291
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 340.8785 - val_loss: 322.8562
Epoch 44/50
16/16 - 0s - 6ms/step - loss: 330.3945 - val_loss: 313.3127
Epoch 45/50
16/16 - 0s - 4ms/step - loss: 322.2737 - val_loss: 303.4937
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 311.4972 - val_loss: 297.5781
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 303.1807 - val_loss: 286.4936
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 293.2698 - val_loss: 278.3043
Epoch 49/50
16/16 - 0s - 4ms/step - loss: 284.6785 - val_loss: 269.4458
Epoch 50/50
16/16 - 0s - 4ms/step - loss: 276.1660 - val_loss: 262.6913
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
281.40288464260834
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 52ms/step - loss: 16734.5371 - val_loss: 11253.0986
Epoch 2/50
16/16 - 0s - 7ms/step - loss: 8207.1836 - val_loss: 5967.2573
Epoch 3/50
16/16 - 0s - 9ms/step - loss: 4740.9785 - val_loss: 4245.8721
Epoch 4/50
16/16 - 0s - 4ms/step - loss: 3653.9426 - val_loss: 3649.9370
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 3209.0291 - val_loss: 3234.7432
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 2859.7312 - val_loss: 2865.6360
Epoch 7/50
16/16 - 0s - 6ms/step - loss: 2559.0076 - val_loss: 2526.9829
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 2269.5352 - val_loss: 2219.7400
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 2014.3582 - val_loss: 1964.0374
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 1799.2257 - val_loss: 1752.3926
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 1611.2902 - val_loss: 1581.5280
Epoch 12/50
16/16 - 0s - 4ms/step - loss: 1464.3536 - val_loss: 1431.9111
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 1343.8564 - val_loss: 1318.0538
Epoch 14/50
16/16 - 0s - 6ms/step - loss: 1251.3203 - val_loss: 1220.6670
Epoch 15/50
16/16 - 0s - 6ms/step - loss: 1170.6627 - val_loss: 1139.8359
Epoch 16/50
16/16 - 0s - 4ms/step - loss: 1096.8038 - val_loss: 1068.5785
Epoch 17/50
16/16 - 0s - 6ms/step - loss: 1036.3916 - val_loss: 1002.8903
Epoch 18/50
16/16 - 0s - 11ms/step - loss: 984.4453 - val_loss: 946.0498
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 932.9204 - val_loss: 896.3392
Epoch 20/50
16/16 - 0s - 6ms/step - loss: 886.3723 - val_loss: 849.3523
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 840.2125 - val_loss: 802.0403
Epoch 22/50
16/16 - 0s - 4ms/step - loss: 792.0281 - val_loss: 756.3260
Epoch 23/50
16/16 - 0s - 4ms/step - loss: 750.2266 - val_loss: 714.3425
Epoch 24/50
16/16 - 0s - 6ms/step - loss: 711.0190 - val_loss: 672.6807
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 667.8931 - val_loss: 625.9484
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 621.5145 - val_loss: 583.4755
Epoch 27/50
16/16 - 0s - 10ms/step - loss: 574.8159 - val_loss: 535.7614
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 527.1723 - val_loss: 499.8538
Epoch 29/50
16/16 - 0s - 4ms/step - loss: 488.1946 - val_loss: 468.5452
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 456.3591 - val_loss: 437.8919
Epoch 31/50
16/16 - 0s - 6ms/step - loss: 426.5218 - val_loss: 412.6768
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 403.0360 - val_loss: 389.2798
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 377.7756 - val_loss: 368.1877
```

```
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 355.6796 - val_loss: 350.3909
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 337.6574 - val_loss: 335.3296
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 320.5533 - val_loss: 318.5167
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 306.5564 - val_loss: 304.5291
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 291.9278 - val_loss: 293.6872
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 280.5793 - val_loss: 283.2072
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 267.7226 - val_loss: 270.2245
Epoch 41/50
16/16 - 0s - 4ms/step - loss: 257.8424 - val_loss: 263.1826
Epoch 42/50
16/16 - 0s - 6ms/step - loss: 247.5930 - val_loss: 252.5404
Epoch 43/50
16/16 - 0s - 6ms/step - loss: 238.9049 - val_loss: 243.9483
Epoch 44/50
16/16 - 0s - 11ms/step - loss: 230.5490 - val_loss: 236.7189
Epoch 45/50
16/16 - 0s - 6ms/step - loss: 222.9155 - val_loss: 230.4170
Epoch 46/50
16/16 - 0s - 6ms/step - loss: 215.9364 - val_loss: 222.7394
Epoch 47/50
16/16 - 0s - 6ms/step - loss: 211.8082 - val_loss: 218.4902
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 203.6192 - val_loss: 211.5375
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 198.4272 - val_loss: 205.3177
Epoch 50/50
16/16 - 0s - 6ms/step - loss: 193.1526 - val_loss: 201.7097
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
211.97415738496272
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 63ms/step - loss: 8870.5635 - val_loss: 2864.1794
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 2645.5830 - val_loss: 2178.2810
Epoch 3/50
16/16 - 0s - 6ms/step - loss: 2322.7881 - val_loss: 1709.2676
Epoch 4/50
16/16 - 0s - 9ms/step - loss: 1901.5614 - val_loss: 1557.8617
Epoch 5/50
16/16 - 0s - 6ms/step - loss: 1721.6696 - val_loss: 1417.8275
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 1569.1880 - val_loss: 1311.9569
Epoch 7/50
16/16 - 0s - 6ms/step - loss: 1451.3256 - val_loss: 1222.5944
Epoch 8/50
16/16 - 0s - 7ms/step - loss: 1354.8296 - val_loss: 1144.5464
Epoch 9/50
16/16 - 0s - 7ms/step - loss: 1252.7664 - val_loss: 1071.9689
Epoch 10/50
16/16 - 0s - 6ms/step - loss: 1166.9403 - val_loss: 996.7536
Epoch 11/50
16/16 - 0s - 11ms/step - loss: 1084.7814 - val_loss: 929.0576
Epoch 12/50
16/16 - 0s - 4ms/step - loss: 1016.4233 - val_loss: 870.7259
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 942.7966 - val_loss: 811.5319
Epoch 14/50
16/16 - 0s - 7ms/step - loss: 879.5912 - val_loss: 759.1242
Epoch 15/50
16/16 - 0s - 7ms/step - loss: 811.5581 - val_loss: 713.5099
Epoch 16/50
16/16 - 0s - 11ms/step - loss: 749.7332 - val_loss: 662.9597
Epoch 17/50
16/16 - 0s - 7ms/step - loss: 689.5850 - val_loss: 619.7981
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 641.8173 - val_loss: 571.8436
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 589.8804 - val_loss: 527.4701
Epoch 20/50
16/16 - 0s - 6ms/step - loss: 543.3813 - val_loss: 491.4513
Epoch 21/50
16/16 - 0s - 6ms/step - loss: 498.6490 - val_loss: 444.3677
Epoch 22/50
16/16 - 0s - 6ms/step - loss: 456.1975 - val_loss: 407.3955
Epoch 23/50
16/16 - 0s - 7ms/step - loss: 406.8171 - val_loss: 367.7960
Epoch 24/50
16/16 - 0s - 10ms/step - loss: 365.0358 - val_loss: 336.6142
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 326.8902 - val_loss: 301.7726
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 291.5114 - val_loss: 271.1188
Epoch 27/50
16/16 - 0s - 6ms/step - loss: 260.6771 - val_loss: 251.2765
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 239.0614 - val_loss: 232.5116
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 221.5244 - val_loss: 226.3257
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 205.5508 - val_loss: 208.9216
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 190.2511 - val_loss: 198.6027
Epoch 32/50
16/16 - 0s - 7ms/step - loss: 177.3810 - val_loss: 185.8594
Epoch 33/50
16/16 - 0s - 9ms/step - loss: 168.5744 - val_loss: 180.7700
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 160.2106 - val_loss: 180.6806
Epoch 35/50
16/16 - 0s - 6ms/step - loss: 156.1793 - val_loss: 169.2546
Epoch 36/50
16/16 - 0s - 6ms/step - loss: 151.1232 - val_loss: 165.9326
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 142.5583 - val_loss: 156.8618
Epoch 38/50
16/16 - 0s - 7ms/step - loss: 134.1252 - val_loss: 151.6126
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 128.3651 - val_loss: 146.3110
Epoch 40/50
16/16 - 0s - 10ms/step - loss: 123.7525 - val_loss: 144.8426
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 119.5940 - val_loss: 137.9178
Epoch 42/50
16/16 - 0s - 6ms/step - loss: 115.1614 - val_loss: 135.9514
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 113.4454 - val_loss: 131.0012
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 109.8844 - val_loss: 140.5654
Epoch 45/50
16/16 - 0s - 10ms/step - loss: 109.9728 - val_loss: 126.6942
Epoch 46/50
16/16 - 0s - 10ms/step - loss: 105.5709 - val_loss: 123.9527
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 105.1132 - val_loss: 124.1513
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 102.7150 - val_loss: 121.8268
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 100.5411 - val_loss: 119.2798
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 100.0475 - val_loss: 119.4710
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
129.71324830868278
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 42ms/step - loss: 31740.1562 - val_loss: 20293.6172
Epoch 2/50
16/16 - 0s - 4ms/step - loss: 14243.5400 - val_loss: 8435.1758
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 5593.2026 - val_loss: 3665.3701
Epoch 4/50
16/16 - 0s - 5ms/step - loss: 2561.9604 - val_loss: 2670.1816
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 2047.9642 - val_loss: 2597.3267
Epoch 6/50
16/16 - 0s - 5ms/step - loss: 1984.2949 - val_loss: 2467.3418
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 1884.7349 - val_loss: 2337.2842
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 1802.2332 - val_loss: 2229.8394
Epoch 9/50
16/16 - 0s - 7ms/step - loss: 1724.2903 - val_loss: 2131.0476
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 1648.4235 - val_loss: 2028.6205
Epoch 11/50
16/16 - 0s - 7ms/step - loss: 1578.6957 - val_loss: 1932.8848
Epoch 12/50
16/16 - 0s - 11ms/step - loss: 1515.9774 - val_loss: 1839.0848
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 1447.5607 - val_loss: 1758.3599
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 1386.4612 - val_loss: 1679.3704
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 1330.2957 - val_loss: 1593.3904
Epoch 16/50
16/16 - 0s - 6ms/step - loss: 1270.0507 - val_loss: 1526.1921
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 1216.6205 - val_loss: 1452.4966
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 1167.2006 - val_loss: 1387.4130
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 1117.9816 - val_loss: 1331.3833
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 1074.3656 - val_loss: 1280.6338
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 1034.9786 - val_loss: 1235.2125
Epoch 22/50
16/16 - 0s - 6ms/step - loss: 1001.2972 - val_loss: 1190.8202
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 972.5718 - val_loss: 1151.3944
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 945.3947 - val_loss: 1112.2114
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 916.9542 - val_loss: 1084.9503
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 894.8561 - val_loss: 1055.2291
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 872.0256 - val_loss: 1027.7496
Epoch 28/50
16/16 - 0s - 4ms/step - loss: 851.8021 - val_loss: 1002.2156
Epoch 29/50
16/16 - 0s - 6ms/step - loss: 833.2383 - val_loss: 978.8457
Epoch 30/50
16/16 - 0s - 6ms/step - loss: 815.7466 - val_loss: 958.5120
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 800.8114 - val_loss: 936.0079
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 781.0679 - val_loss: 915.2763
Epoch 33/50
16/16 - 0s - 7ms/step - loss: 762.0889 - val_loss: 881.6837
```

```
Epoch 34/50
16/16 - 0s - 6ms/step - loss: 731.4796 - val_loss: 849.4752
Epoch 35/50
16/16 - 0s - 9ms/step - loss: 707.2964 - val_loss: 811.3264
Epoch 36/50
16/16 - 0s - 6ms/step - loss: 677.9992 - val_loss: 780.3427
Epoch 37/50
16/16 - 0s - 6ms/step - loss: 653.4993 - val_loss: 746.1616
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 631.3223 - val_loss: 716.1381
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 613.3209 - val_loss: 696.6509
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 594.6448 - val_loss: 668.4896
Epoch 41/50
16/16 - 0s - 11ms/step - loss: 581.2891 - val_loss: 652.1614
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 567.5275 - val_loss: 638.3157
Epoch 43/50
16/16 - 0s - 6ms/step - loss: 554.3781 - val_loss: 615.5068
Epoch 44/50
16/16 - 0s - 6ms/step - loss: 541.3879 - val_loss: 601.5285
Epoch 45/50
16/16 - 0s - 4ms/step - loss: 529.5809 - val_loss: 588.7108
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 514.6597 - val_loss: 567.8497
Epoch 47/50
16/16 - 0s - 6ms/step - loss: 503.4471 - val_loss: 553.8442
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 489.4554 - val_loss: 538.4984
Epoch 49/50
16/16 - 0s - 4ms/step - loss: 480.0441 - val_loss: 528.4881
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 470.5056 - val_loss: 512.8032
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
506.85007352411105
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 41ms/step - loss: 418443.3750 - val_loss: 342902.7812
Epoch 2/50
16/16 - 0s - 5ms/step - loss: 290889.9688 - val_loss: 232276.3125
Epoch 3/50
16/16 - 0s - 6ms/step - loss: 193636.7031 - val_loss: 150826.3750
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 123438.0078 - val_loss: 93396.3750
Epoch 5/50
16/16 - 0s - 10ms/step - loss: 74917.9062 - val_loss: 54952.5586
Epoch 6/50
16/16 - 0s - 9ms/step - loss: 43109.4141 - val_loss: 30581.4512
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 23487.7461 - val_loss: 16061.6396
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 12153.9170 - val_loss: 8069.9658
Epoch 9/50
16/16 - 0s - 11ms/step - loss: 6168.1646 - val_loss: 4015.7551
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 3226.7620 - val_loss: 2176.5203
Epoch 11/50
16/16 - 0s - 4ms/step - loss: 1934.2843 - val_loss: 1404.8655
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 1411.9205 - val_loss: 1103.0613
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 1207.5776 - val_loss: 999.5478
Epoch 14/50
16/16 - 0s - 4ms/step - loss: 1133.4893 - val_loss: 960.9495
Epoch 15/50
16/16 - 0s - 4ms/step - loss: 1103.1892 - val_loss: 943.9598
Epoch 16/50
16/16 - 0s - 4ms/step - loss: 1087.0249 - val_loss: 931.6660
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 1072.7681 - val_loss: 921.7384
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 1060.0790 - val_loss: 911.4908
Epoch 19/50
16/16 - 0s - 4ms/step - loss: 1046.4089 - val_loss: 901.1558
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 1034.5734 - val_loss: 890.2078
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 1019.0847 - val_loss: 880.5251
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 1006.3635 - val_loss: 870.4482
Epoch 23/50
16/16 - 0s - 6ms/step - loss: 993.0127 - val_loss: 860.5035
Epoch 24/50
16/16 - 0s - 6ms/step - loss: 980.3035 - val_loss: 850.6996
Epoch 25/50
16/16 - 0s - 7ms/step - loss: 966.5468 - val_loss: 840.2606
Epoch 26/50
16/16 - 0s - 10ms/step - loss: 953.8397 - val_loss: 830.5408
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 940.4008 - val_loss: 820.6079
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 927.3707 - val_loss: 811.4026
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 915.4988 - val_loss: 801.5987
Epoch 30/50
16/16 - 0s - 8ms/step - loss: 902.7740 - val_loss: 791.8557
Epoch 31/50
16/16 - 0s - 10ms/step - loss: 889.4424 - val_loss: 782.9329
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 877.7875 - val_loss: 773.9847
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 865.6974 - val_loss: 765.0331
```

```
Epoch 34/50
16/16 - 0s - 7ms/step - loss: 854.0639 - val_loss: 756.6486
Epoch 35/50
16/16 - 0s - 7ms/step - loss: 842.4055 - val_loss: 748.0165
Epoch 36/50
16/16 - 0s - 7ms/step - loss: 831.0543 - val_loss: 740.1726
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 820.8638 - val_loss: 732.3638
Epoch 38/50
16/16 - 0s - 6ms/step - loss: 808.7567 - val_loss: 723.9583
Epoch 39/50
16/16 - 0s - 9ms/step - loss: 798.6542 - val_loss: 715.8679
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 787.8342 - val_loss: 708.1682
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 777.4016 - val_loss: 700.8278
Epoch 42/50
16/16 - 0s - 4ms/step - loss: 768.1771 - val_loss: 694.4271
Epoch 43/50
16/16 - 0s - 4ms/step - loss: 757.3189 - val_loss: 687.2397
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 748.3843 - val_loss: 679.5693
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 738.7192 - val_loss: 672.6339
Epoch 46/50
16/16 - 0s - 6ms/step - loss: 729.5532 - val_loss: 666.5648
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 720.1177 - val_loss: 660.1076
Epoch 48/50
16/16 - 0s - 7ms/step - loss: 712.0383 - val_loss: 652.9071
Epoch 49/50
16/16 - 0s - 10ms/step - loss: 703.1505 - val_loss: 647.6696
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 694.6678 - val_loss: 641.3251
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
697.7192568134071
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 73ms/step - loss: 14620.6406 - val_loss: 8011.1353
Epoch 2/50
16/16 - 0s - 11ms/step - loss: 4969.5449 - val_loss: 2285.0227
Epoch 3/50
16/16 - 0s - 7ms/step - loss: 1413.1642 - val_loss: 874.6490
Epoch 4/50
16/16 - 0s - 6ms/step - loss: 771.9243 - val_loss: 762.8804
Epoch 5/50
16/16 - 0s - 6ms/step - loss: 725.6833 - val_loss: 749.0833
Epoch 6/50
16/16 - 0s - 6ms/step - loss: 698.8806 - val_loss: 716.2421
Epoch 7/50
16/16 - 0s - 6ms/step - loss: 670.6763 - val_loss: 686.8896
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 645.2725 - val_loss: 661.5606
Epoch 9/50
16/16 - 0s - 6ms/step - loss: 619.4174 - val_loss: 635.9460
Epoch 10/50
16/16 - 0s - 6ms/step - loss: 593.9574 - val_loss: 608.4731
Epoch 11/50
16/16 - 0s - 7ms/step - loss: 567.1904 - val_loss: 581.3456
Epoch 12/50
16/16 - 0s - 7ms/step - loss: 541.8013 - val_loss: 556.4323
Epoch 13/50
16/16 - 0s - 8ms/step - loss: 514.4803 - val_loss: 528.7185
Epoch 14/50
16/16 - 0s - 9ms/step - loss: 490.8340 - val_loss: 502.5293
Epoch 15/50
16/16 - 0s - 7ms/step - loss: 466.7263 - val_loss: 477.6623
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 442.5625 - val_loss: 453.2006
Epoch 17/50
16/16 - 0s - 6ms/step - loss: 419.6856 - val_loss: 432.2575
Epoch 18/50
16/16 - 0s - 7ms/step - loss: 399.4309 - val_loss: 407.8581
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 378.8459 - val_loss: 387.7468
Epoch 20/50
16/16 - 0s - 11ms/step - loss: 359.5374 - val_loss: 369.9273
Epoch 21/50
16/16 - 0s - 6ms/step - loss: 342.2535 - val_loss: 349.4415
Epoch 22/50
16/16 - 0s - 12ms/step - loss: 326.3694 - val_loss: 330.9630
Epoch 23/50
16/16 - 0s - 8ms/step - loss: 309.2510 - val_loss: 313.5963
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 294.2292 - val_loss: 296.8644
Epoch 25/50
16/16 - 0s - 5ms/step - loss: 280.0210 - val_loss: 283.2455
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 266.3295 - val_loss: 267.1233
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 254.1610 - val_loss: 253.3058
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 241.4591 - val_loss: 240.7413
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 229.9521 - val_loss: 229.1511
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 219.7422 - val_loss: 217.2833
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 210.0766 - val_loss: 208.0258
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 201.1625 - val_loss: 196.9732
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 192.5449 - val_loss: 187.6910
```

```
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 183.8893 - val_loss: 178.5788
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 176.5271 - val_loss: 173.1682
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 169.9513 - val_loss: 163.4594
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 163.4285 - val_loss: 157.9188
Epoch 38/50
16/16 - 0s - 6ms/step - loss: 157.8681 - val_loss: 151.6501
Epoch 39/50
16/16 - 0s - 8ms/step - loss: 153.1625 - val_loss: 144.6774
Epoch 40/50
16/16 - 0s - 8ms/step - loss: 148.1843 - val_loss: 139.4429
Epoch 41/50
16/16 - 0s - 10ms/step - loss: 146.2312 - val_loss: 135.8149
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 139.9109 - val_loss: 130.8888
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 136.2601 - val_loss: 128.3469
Epoch 44/50
16/16 - 0s - 7ms/step - loss: 133.5055 - val_loss: 123.7823
Epoch 45/50
16/16 - 0s - 6ms/step - loss: 131.2361 - val_loss: 121.2053
Epoch 46/50
16/16 - 0s - 6ms/step - loss: 126.6785 - val_loss: 117.5548
Epoch 47/50
16/16 - 0s - 7ms/step - loss: 124.0665 - val_loss: 116.7252
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 122.2895 - val_loss: 112.9347
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 119.9382 - val_loss: 112.2651
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 118.7183 - val_loss: 109.9152
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
143.6981741287313
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 82ms/step - loss: 19033.1543 - val_loss: 10784.7109
Epoch 2/50
16/16 - 0s - 9ms/step - loss: 6834.3931 - val_loss: 4713.0552
Epoch 3/50
16/16 - 0s - 8ms/step - loss: 4196.5630 - val_loss: 3810.7051
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 3671.8555 - val_loss: 3258.5930
Epoch 5/50
16/16 - 0s - 8ms/step - loss: 3103.6350 - val_loss: 2802.4941
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 2627.8108 - val_loss: 2358.8657
Epoch 7/50
16/16 - 0s - 7ms/step - loss: 2204.8711 - val_loss: 1975.5844
Epoch 8/50
16/16 - 0s - 12ms/step - loss: 1839.8334 - val_loss: 1635.8003
Epoch 9/50
16/16 - 0s - 10ms/step - loss: 1513.4932 - val_loss: 1338.5547
Epoch 10/50
16/16 - 0s - 10ms/step - loss: 1245.8226 - val_loss: 1112.0887
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 1025.1920 - val_loss: 934.0842
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 861.2413 - val_loss: 786.7285
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 725.2719 - val_loss: 689.8149
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 630.6596 - val_loss: 624.5541
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 562.1287 - val_loss: 566.0967
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 513.9578 - val_loss: 529.4284
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 476.4142 - val_loss: 498.2061
Epoch 18/50
16/16 - 0s - 6ms/step - loss: 446.0206 - val_loss: 474.6780
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 424.7484 - val_loss: 454.2562
Epoch 20/50
16/16 - 0s - 8ms/step - loss: 405.2598 - val_loss: 437.9836
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 390.2303 - val_loss: 422.7771
Epoch 22/50
16/16 - 0s - 8ms/step - loss: 378.3160 - val_loss: 410.0815
Epoch 23/50
16/16 - 0s - 12ms/step - loss: 369.3705 - val_loss: 401.1252
Epoch 24/50
16/16 - 0s - 7ms/step - loss: 358.4376 - val_loss: 389.0698
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 349.1910 - val_loss: 384.2886
Epoch 26/50
16/16 - 0s - 6ms/step - loss: 341.0392 - val_loss: 375.0925
Epoch 27/50
16/16 - 0s - 7ms/step - loss: 334.2009 - val_loss: 363.5494
Epoch 28/50
16/16 - 0s - 6ms/step - loss: 326.7709 - val_loss: 358.0243
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 321.0653 - val_loss: 350.1845
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 315.3041 - val_loss: 343.3150
Epoch 31/50
16/16 - 0s - 6ms/step - loss: 309.6212 - val_loss: 341.6569
Epoch 32/50
16/16 - 0s - 6ms/step - loss: 304.7866 - val_loss: 332.2284
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 302.6512 - val_loss: 326.2430
```

```
Epoch 34/50
16/16 - 0s - 8ms/step - loss: 297.8642 - val_loss: 327.1479
Epoch 35/50
16/16 - 0s - 10ms/step - loss: 293.1942 - val_loss: 316.3997
Epoch 36/50
16/16 - 0s - 11ms/step - loss: 289.9980 - val_loss: 315.5453
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 287.0077 - val_loss: 309.4858
Epoch 38/50
16/16 - 0s - 4ms/step - loss: 282.9442 - val_loss: 306.2696
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 280.1776 - val_loss: 304.8980
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 278.0990 - val_loss: 298.5517
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 274.1822 - val_loss: 297.2433
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 271.9916 - val_loss: 293.8615
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 268.1999 - val_loss: 288.1685
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 265.3328 - val_loss: 284.8738
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 261.6467 - val_loss: 280.3715
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 257.9063 - val_loss: 276.8889
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 253.1123 - val_loss: 273.2596
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 250.7138 - val_loss: 273.3166
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 245.3724 - val_loss: 266.3745
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 240.3387 - val_loss: 266.9453
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
282.19414430733946
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 84ms/step - loss: 561.9923 - val_loss: 488.4327
Epoch 2/50
16/16 - 0s - 8ms/step - loss: 410.7035 - val_loss: 337.2363
Epoch 3/50
16/16 - 0s - 11ms/step - loss: 349.2256 - val_loss: 307.7029
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 324.0522 - val_loss: 286.1291
Epoch 5/50
16/16 - 0s - 7ms/step - loss: 303.4869 - val_loss: 272.4164
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 282.7735 - val_loss: 256.8917
Epoch 7/50
16/16 - 0s - 10ms/step - loss: 263.1388 - val_loss: 237.5923
Epoch 8/50
16/16 - 0s - 9ms/step - loss: 241.0661 - val_loss: 213.0068
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 218.4379 - val_loss: 193.7371
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 194.5012 - val_loss: 166.5774
Epoch 11/50
16/16 - 0s - 4ms/step - loss: 170.5978 - val_loss: 152.7120
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 153.0532 - val_loss: 144.2137
Epoch 13/50
16/16 - 0s - 4ms/step - loss: 134.4375 - val_loss: 119.3893
Epoch 14/50
16/16 - 0s - 7ms/step - loss: 124.0383 - val_loss: 111.4408
Epoch 15/50
16/16 - 0s - 11ms/step - loss: 116.5009 - val_loss: 115.0034
Epoch 16/50
16/16 - 0s - 9ms/step - loss: 110.8474 - val_loss: 103.8678
Epoch 17/50
16/16 - 0s - 8ms/step - loss: 106.1848 - val_loss: 109.7271
Epoch 18/50
16/16 - 0s - 9ms/step - loss: 104.1767 - val_loss: 97.3104
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 100.1648 - val_loss: 92.6924
Epoch 20/50
16/16 - 0s - 10ms/step - loss: 97.6265 - val_loss: 102.8997
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 99.3477 - val_loss: 109.5447
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 96.0046 - val_loss: 93.9170
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 93.8194 - val_loss: 89.4797
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 92.4360 - val_loss: 95.7221
Epoch 25/50
16/16 - 0s - 5ms/step - loss: 90.9070 - val_loss: 84.9044
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 91.8590 - val_loss: 88.5477
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 90.1170 - val_loss: 85.3175
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 89.5079 - val_loss: 93.1500
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 90.9464 - val_loss: 82.6332
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 91.6141 - val_loss: 82.8923
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 88.3907 - val_loss: 81.7969
Epoch 32/50
16/16 - 0s - 4ms/step - loss: 87.3621 - val_loss: 89.8692
Epoch 33/50
16/16 - 0s - 4ms/step - loss: 89.5632 - val_loss: 81.8814
```

```
Epoch 34/50
16/16 - 0s - 4ms/step - loss: 88.5253 - val_loss: 80.8396
Epoch 35/50
16/16 - 0s - 5ms/step - loss: 90.0920 - val_loss: 81.2192
Epoch 36/50
16/16 - 0s - 5ms/step - loss: 86.6430 - val_loss: 80.2231
Epoch 37/50
16/16 - 0s - 4ms/step - loss: 88.0542 - val_loss: 81.4602
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 86.1723 - val_loss: 84.5337
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 87.1999 - val_loss: 83.1792
Epoch 40/50
16/16 - 0s - 7ms/step - loss: 86.1670 - val_loss: 81.9899
Epoch 41/50
16/16 - 0s - 9ms/step - loss: 86.8468 - val_loss: 94.2197
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 85.3855 - val_loss: 93.3990
Epoch 43/50
16/16 - 0s - 10ms/step - loss: 89.3489 - val_loss: 96.2255
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 85.6984 - val_loss: 80.5483
Epoch 45/50
16/16 - 0s - 10ms/step - loss: 85.6886 - val_loss: 80.9336
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 85.9846 - val_loss: 78.2862
Epoch 47/50
16/16 - 0s - 4ms/step - loss: 83.8014 - val_loss: 81.3440
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 85.5530 - val_loss: 90.5060
Epoch 49/50
16/16 - 0s - 4ms/step - loss: 83.6801 - val_loss: 77.9870
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 84.2285 - val_loss: 79.2732
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
85.99136960204592
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 48ms/step - loss: 11516.4424 - val_loss: 7245.3271
Epoch 2/50
16/16 - 0s - 6ms/step - loss: 7353.2642 - val_loss: 5491.3408
Epoch 3/50
16/16 - 0s - 9ms/step - loss: 6247.7495 - val_loss: 4961.4858
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 5627.8462 - val_loss: 4443.1377
Epoch 5/50
16/16 - 0s - 9ms/step - loss: 5003.6621 - val_loss: 3908.0710
Epoch 6/50
16/16 - 0s - 7ms/step - loss: 4325.9434 - val_loss: 3338.9902
Epoch 7/50
16/16 - 0s - 11ms/step - loss: 3696.6865 - val_loss: 2831.7280
Epoch 8/50
16/16 - 0s - 9ms/step - loss: 3132.7156 - val_loss: 2422.3840
Epoch 9/50
16/16 - 0s - 9ms/step - loss: 2643.0439 - val_loss: 2076.1096
Epoch 10/50
16/16 - 0s - 11ms/step - loss: 2246.2903 - val_loss: 1782.1597
Epoch 11/50
16/16 - 0s - 9ms/step - loss: 1877.3962 - val_loss: 1537.5953
Epoch 12/50
16/16 - 0s - 7ms/step - loss: 1584.9122 - val_loss: 1320.9697
Epoch 13/50
16/16 - 0s - 7ms/step - loss: 1316.0620 - val_loss: 1138.1105
Epoch 14/50
16/16 - 0s - 12ms/step - loss: 1122.6406 - val_loss: 964.1675
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 937.9918 - val_loss: 817.6222
Epoch 16/50
16/16 - 0s - 5ms/step - loss: 784.9465 - val_loss: 700.9109
Epoch 17/50
16/16 - 0s - 5ms/step - loss: 668.9567 - val_loss: 600.2482
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 575.6345 - val_loss: 524.5902
Epoch 19/50
16/16 - 0s - 5ms/step - loss: 508.3138 - val_loss: 463.7221
Epoch 20/50
16/16 - 0s - 5ms/step - loss: 451.3681 - val_loss: 417.5342
Epoch 21/50
16/16 - 0s - 5ms/step - loss: 410.6892 - val_loss: 380.1917
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 378.5800 - val_loss: 349.9920
Epoch 23/50
16/16 - 0s - 6ms/step - loss: 350.5360 - val_loss: 323.9322
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 329.9077 - val_loss: 300.5046
Epoch 25/50
16/16 - 0s - 10ms/step - loss: 309.9572 - val_loss: 283.6783
Epoch 26/50
16/16 - 0s - 5ms/step - loss: 295.6944 - val_loss: 270.5401
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 284.4809 - val_loss: 259.3327
Epoch 28/50
16/16 - 0s - 5ms/step - loss: 274.8351 - val_loss: 249.2461
Epoch 29/50
16/16 - 0s - 5ms/step - loss: 265.5689 - val_loss: 239.9984
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 258.3424 - val_loss: 232.7046
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 252.1095 - val_loss: 226.5071
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 245.8216 - val_loss: 220.4377
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 240.5789 - val_loss: 215.0548
```

```
Epoch 34/50
16/16 - 0s - 9ms/step - loss: 235.9700 - val_loss: 211.0151
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 230.0948 - val_loss: 206.4966
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 226.1003 - val_loss: 202.3965
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 221.6235 - val_loss: 199.5582
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 218.4738 - val_loss: 195.7321
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 214.6627 - val_loss: 192.2524
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 210.9496 - val_loss: 190.1243
Epoch 41/50
16/16 - 0s - 12ms/step - loss: 208.0033 - val_loss: 186.7542
Epoch 42/50
16/16 - 0s - 6ms/step - loss: 204.9446 - val_loss: 184.3957
Epoch 43/50
16/16 - 0s - 7ms/step - loss: 202.3149 - val_loss: 181.4273
Epoch 44/50
16/16 - 0s - 8ms/step - loss: 198.8906 - val_loss: 179.1478
Epoch 45/50
16/16 - 0s - 7ms/step - loss: 196.3402 - val_loss: 177.8721
Epoch 46/50
16/16 - 0s - 10ms/step - loss: 193.9771 - val_loss: 175.2220
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 191.0387 - val_loss: 172.6768
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 189.2368 - val_loss: 173.9932
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 186.7521 - val_loss: 169.4139
Epoch 50/50
16/16 - 0s - 8ms/step - loss: 185.0578 - val_loss: 168.1026
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step
204.80885005809614
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 74ms/step - loss: 13724.4844 - val_loss: 9967.2588
Epoch 2/50
16/16 - 0s - 11ms/step - loss: 8059.8369 - val_loss: 5611.8032
Epoch 3/50
16/16 - 0s - 6ms/step - loss: 4437.2139 - val_loss: 2947.2375
Epoch 4/50
16/16 - 0s - 8ms/step - loss: 2282.8933 - val_loss: 1470.2786
Epoch 5/50
16/16 - 0s - 6ms/step - loss: 1146.7817 - val_loss: 803.7549
Epoch 6/50
16/16 - 0s - 8ms/step - loss: 673.5857 - val_loss: 618.5987
Epoch 7/50
16/16 - 0s - 9ms/step - loss: 529.9453 - val_loss: 538.3770
Epoch 8/50
16/16 - 0s - 11ms/step - loss: 453.1069 - val_loss: 453.3966
Epoch 9/50
16/16 - 0s - 10ms/step - loss: 398.9100 - val_loss: 401.1005
Epoch 10/50
16/16 - 0s - 8ms/step - loss: 363.3188 - val_loss: 363.5027
Epoch 11/50
16/16 - 0s - 8ms/step - loss: 338.0766 - val_loss: 340.8145
Epoch 12/50
16/16 - 0s - 9ms/step - loss: 323.9948 - val_loss: 326.0922
Epoch 13/50
16/16 - 0s - 9ms/step - loss: 311.3418 - val_loss: 313.5050
Epoch 14/50
16/16 - 0s - 7ms/step - loss: 303.4467 - val_loss: 304.7804
Epoch 15/50
16/16 - 0s - 9ms/step - loss: 298.0271 - val_loss: 298.4042
Epoch 16/50
16/16 - 0s - 9ms/step - loss: 293.5436 - val_loss: 293.5895
Epoch 17/50
16/16 - 0s - 9ms/step - loss: 289.7942 - val_loss: 289.0593
Epoch 18/50
16/16 - 0s - 7ms/step - loss: 286.6746 - val_loss: 285.0690
Epoch 19/50
16/16 - 0s - 9ms/step - loss: 283.2079 - val_loss: 281.8039
Epoch 20/50
16/16 - 0s - 7ms/step - loss: 280.4536 - val_loss: 278.6045
Epoch 21/50
16/16 - 0s - 11ms/step - loss: 278.0605 - val_loss: 276.8636
Epoch 22/50
16/16 - 0s - 10ms/step - loss: 275.4187 - val_loss: 273.4404
Epoch 23/50
16/16 - 0s - 11ms/step - loss: 273.2575 - val_loss: 270.8616
Epoch 24/50
16/16 - 0s - 6ms/step - loss: 270.7364 - val_loss: 268.8539
Epoch 25/50
16/16 - 0s - 8ms/step - loss: 269.1382 - val_loss: 265.8073
Epoch 26/50
16/16 - 0s - 10ms/step - loss: 265.9777 - val_loss: 264.2070
Epoch 27/50
16/16 - 0s - 8ms/step - loss: 264.0514 - val_loss: 262.3873
Epoch 28/50
16/16 - 0s - 8ms/step - loss: 262.1336 - val_loss: 260.3843
Epoch 29/50
16/16 - 0s - 9ms/step - loss: 259.7807 - val_loss: 257.4499
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 257.2951 - val_loss: 255.1923
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 254.9959 - val_loss: 253.6949
Epoch 32/50
16/16 - 0s - 11ms/step - loss: 252.8965 - val_loss: 251.1498
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 250.4846 - val_loss: 248.6204
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 248.8577 - val_loss: 247.1515
Epoch 35/50
16/16 - 0s - 7ms/step - loss: 246.7886 - val_loss: 244.2390
Epoch 36/50
16/16 - 0s - 11ms/step - loss: 244.2426 - val_loss: 242.5445
Epoch 37/50
16/16 - 0s - 5ms/step - loss: 242.2529 - val_loss: 241.0450
Epoch 38/50
16/16 - 0s - 5ms/step - loss: 240.6416 - val_loss: 238.7578
Epoch 39/50
16/16 - 0s - 4ms/step - loss: 238.1288 - val_loss: 236.1622
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 236.3310 - val_loss: 234.3781
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 234.1028 - val_loss: 232.3795
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 232.1965 - val_loss: 230.2166
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 230.3011 - val_loss: 228.2803
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 228.1715 - val_loss: 226.3711
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 226.2043 - val_loss: 224.4090
Epoch 46/50
16/16 - 0s - 5ms/step - loss: 224.2253 - val_loss: 222.2662
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 221.8694 - val_loss: 221.2065
Epoch 48/50
16/16 - 0s - 5ms/step - loss: 219.9858 - val_loss: 218.4780
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 217.4628 - val_loss: 217.3245
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 215.2367 - val_loss: 214.6167
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 3ms/step
237.80014805845587
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 43ms/step - loss: 512.8104 - val_loss: 391.1484
Epoch 2/50
16/16 - 0s - 5ms/step - loss: 379.9218 - val_loss: 330.3748
Epoch 3/50
16/16 - 0s - 7ms/step - loss: 336.6942 - val_loss: 302.3349
Epoch 4/50
16/16 - 0s - 9ms/step - loss: 312.8567 - val_loss: 282.5168
Epoch 5/50
16/16 - 0s - 9ms/step - loss: 297.4137 - val_loss: 275.4087
Epoch 6/50
16/16 - 0s - 4ms/step - loss: 288.4165 - val_loss: 267.1527
Epoch 7/50
16/16 - 0s - 4ms/step - loss: 282.9466 - val_loss: 264.5155
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 276.7398 - val_loss: 257.0499
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 272.8150 - val_loss: 256.4919
Epoch 10/50
16/16 - 0s - 4ms/step - loss: 269.7618 - val_loss: 253.7420
Epoch 11/50
16/16 - 0s - 4ms/step - loss: 266.7752 - val_loss: 249.9551
Epoch 12/50
16/16 - 0s - 4ms/step - loss: 264.2749 - val_loss: 248.4965
Epoch 13/50
16/16 - 0s - 4ms/step - loss: 262.1801 - val_loss: 245.5650
Epoch 14/50
16/16 - 0s - 4ms/step - loss: 259.0732 - val_loss: 245.0595
Epoch 15/50
16/16 - 0s - 4ms/step - loss: 257.2482 - val_loss: 243.3789
Epoch 16/50
16/16 - 0s - 4ms/step - loss: 254.9845 - val_loss: 240.5255
Epoch 17/50
16/16 - 0s - 4ms/step - loss: 252.8863 - val_loss: 238.3668
Epoch 18/50
16/16 - 0s - 4ms/step - loss: 251.0313 - val_loss: 236.6496
Epoch 19/50
16/16 - 0s - 4ms/step - loss: 248.4911 - val_loss: 235.5963
Epoch 20/50
16/16 - 0s - 4ms/step - loss: 247.2553 - val_loss: 234.6166
Epoch 21/50
16/16 - 0s - 4ms/step - loss: 244.8800 - val_loss: 232.0571
Epoch 22/50
16/16 - 0s - 3ms/step - loss: 242.7754 - val_loss: 229.6808
Epoch 23/50
16/16 - 0s - 4ms/step - loss: 241.5061 - val_loss: 229.5402
Epoch 24/50
16/16 - 0s - 4ms/step - loss: 239.2730 - val_loss: 227.1839
Epoch 25/50
16/16 - 0s - 4ms/step - loss: 237.4784 - val_loss: 225.7583
Epoch 26/50
16/16 - 0s - 4ms/step - loss: 235.7607 - val_loss: 225.3170
Epoch 27/50
16/16 - 0s - 5ms/step - loss: 234.6406 - val_loss: 222.3887
Epoch 28/50
16/16 - 0s - 13ms/step - loss: 232.3594 - val_loss: 223.2491
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 230.4658 - val_loss: 219.8061
Epoch 30/50
16/16 - 0s - 5ms/step - loss: 229.3924 - val_loss: 219.6848
Epoch 31/50
16/16 - 0s - 5ms/step - loss: 228.1454 - val_loss: 216.7878
Epoch 32/50
16/16 - 0s - 5ms/step - loss: 225.9119 - val_loss: 216.2603
Epoch 33/50
16/16 - 0s - 5ms/step - loss: 224.3535 - val_loss: 215.4644
```

```
Epoch 34/50
16/16 - 0s - 6ms/step - loss: 222.7671 - val_loss: 214.3708
Epoch 35/50
16/16 - 0s - 8ms/step - loss: 221.4294 - val_loss: 213.1829
Epoch 36/50
16/16 - 0s - 9ms/step - loss: 220.7923 - val_loss: 210.4956
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 218.0122 - val_loss: 212.0254
Epoch 38/50
16/16 - 0s - 9ms/step - loss: 216.8687 - val_loss: 208.7927
Epoch 39/50
16/16 - 0s - 5ms/step - loss: 215.5721 - val_loss: 207.0160
Epoch 40/50
16/16 - 0s - 5ms/step - loss: 215.9580 - val_loss: 207.4770
Epoch 41/50
16/16 - 0s - 6ms/step - loss: 212.5413 - val_loss: 204.3204
Epoch 42/50
16/16 - 0s - 7ms/step - loss: 210.9214 - val_loss: 205.0273
Epoch 43/50
16/16 - 0s - 6ms/step - loss: 209.7450 - val_loss: 203.3145
Epoch 44/50
16/16 - 0s - 7ms/step - loss: 208.1445 - val_loss: 201.2632
Epoch 45/50
16/16 - 0s - 11ms/step - loss: 207.0644 - val_loss: 200.3884
Epoch 46/50
16/16 - 0s - 6ms/step - loss: 205.5373 - val_loss: 199.2973
Epoch 47/50
16/16 - 0s - 6ms/step - loss: 204.2743 - val_loss: 198.1914
Epoch 48/50
16/16 - 0s - 6ms/step - loss: 202.5787 - val_loss: 197.1521
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 201.1603 - val_loss: 195.8679
Epoch 50/50
16/16 - 0s - 5ms/step - loss: 199.8294 - val_loss: 195.5537
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
239.00586978790028
Epoch 1/50

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
16/16 - 1s - 70ms/step - loss: 670120.8125 - val_loss: 526892.5625
Epoch 2/50
16/16 - 0s - 12ms/step - loss: 431603.7500 - val_loss: 328945.8125
Epoch 3/50
16/16 - 0s - 5ms/step - loss: 264447.5312 - val_loss: 196004.9062
Epoch 4/50
16/16 - 0s - 4ms/step - loss: 154506.2812 - val_loss: 111682.5781
Epoch 5/50
16/16 - 0s - 4ms/step - loss: 86363.8906 - val_loss: 60591.8438
Epoch 6/50
16/16 - 0s - 4ms/step - loss: 45977.8477 - val_loss: 31223.8242
Epoch 7/50
16/16 - 0s - 5ms/step - loss: 23233.2207 - val_loss: 15443.4600
Epoch 8/50
16/16 - 0s - 4ms/step - loss: 11374.8818 - val_loss: 7395.9731
Epoch 9/50
16/16 - 0s - 5ms/step - loss: 5494.0894 - val_loss: 3579.5610
Epoch 10/50
16/16 - 0s - 5ms/step - loss: 2787.2061 - val_loss: 1902.7070
Epoch 11/50
16/16 - 0s - 4ms/step - loss: 1638.5411 - val_loss: 1210.1636
Epoch 12/50
16/16 - 0s - 6ms/step - loss: 1129.9916 - val_loss: 970.3204
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 960.0380 - val_loss: 876.2218
Epoch 14/50
16/16 - 0s - 6ms/step - loss: 889.9127 - val_loss: 844.8280
Epoch 15/50
16/16 - 0s - 10ms/step - loss: 865.1714 - val_loss: 831.1259
Epoch 16/50
16/16 - 0s - 7ms/step - loss: 853.5133 - val_loss: 823.2668
Epoch 17/50
16/16 - 0s - 6ms/step - loss: 842.3594 - val_loss: 816.7324
Epoch 18/50
16/16 - 0s - 5ms/step - loss: 834.6355 - val_loss: 809.9715
Epoch 19/50
16/16 - 0s - 7ms/step - loss: 826.4431 - val_loss: 803.6091
Epoch 20/50
16/16 - 0s - 7ms/step - loss: 817.3983 - val_loss: 796.2557
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 808.6954 - val_loss: 789.5569
Epoch 22/50
16/16 - 0s - 5ms/step - loss: 800.6441 - val_loss: 782.3218
Epoch 23/50
16/16 - 0s - 6ms/step - loss: 792.4899 - val_loss: 775.9427
Epoch 24/50
16/16 - 0s - 8ms/step - loss: 785.1497 - val_loss: 768.2559
Epoch 25/50
16/16 - 0s - 9ms/step - loss: 775.7565 - val_loss: 762.0804
Epoch 26/50
16/16 - 0s - 11ms/step - loss: 767.2587 - val_loss: 755.4307
Epoch 27/50
16/16 - 0s - 6ms/step - loss: 759.4487 - val_loss: 748.8729
Epoch 28/50
16/16 - 0s - 7ms/step - loss: 751.3254 - val_loss: 741.7713
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 743.5064 - val_loss: 735.5860
Epoch 30/50
16/16 - 0s - 7ms/step - loss: 736.0775 - val_loss: 728.5712
Epoch 31/50
16/16 - 0s - 7ms/step - loss: 728.3671 - val_loss: 723.1716
Epoch 32/50
16/16 - 0s - 8ms/step - loss: 720.2151 - val_loss: 716.4919
Epoch 33/50
16/16 - 0s - 8ms/step - loss: 713.6828 - val_loss: 711.3347
```

```
Epoch 34/50
16/16 - 0s - 10ms/step - loss: 705.5391 - val_loss: 704.8763
Epoch 35/50
16/16 - 0s - 9ms/step - loss: 698.4438 - val_loss: 699.0233
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 691.5983 - val_loss: 692.5367
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 684.0435 - val_loss: 687.8353
Epoch 38/50
16/16 - 0s - 9ms/step - loss: 677.5747 - val_loss: 682.2143
Epoch 39/50
16/16 - 0s - 6ms/step - loss: 670.7160 - val_loss: 676.9704
Epoch 40/50
16/16 - 0s - 11ms/step - loss: 665.3727 - val_loss: 672.2367
Epoch 41/50
16/16 - 0s - 8ms/step - loss: 657.8136 - val_loss: 666.1722
Epoch 42/50
16/16 - 0s - 8ms/step - loss: 652.4261 - val_loss: 661.5184
Epoch 43/50
16/16 - 0s - 8ms/step - loss: 645.0946 - val_loss: 655.8090
Epoch 44/50
16/16 - 0s - 10ms/step - loss: 639.3206 - val_loss: 650.7717
Epoch 45/50
16/16 - 0s - 6ms/step - loss: 633.6622 - val_loss: 646.5850
Epoch 46/50
16/16 - 0s - 12ms/step - loss: 628.1723 - val_loss: 641.3834
Epoch 47/50
16/16 - 0s - 8ms/step - loss: 621.7435 - val_loss: 637.8887
Epoch 48/50
16/16 - 0s - 8ms/step - loss: 616.1786 - val_loss: 633.1475
Epoch 49/50
16/16 - 0s - 8ms/step - loss: 610.5407 - val_loss: 629.5751
Epoch 50/50
16/16 - 0s - 11ms/step - loss: 605.8591 - val_loss: 625.5920
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step
613.0175002287959

C:\Users\nensi\anaconda3\lib\site-packages\keras\src\layers\core\dense.py:87: Us
erWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When us
ing Sequential models, prefer using an `Input(shape)` object as the first layer
in the model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
```

```
Epoch 1/50
16/16 - 1s - 71ms/step - loss: 150830.2188 - val_loss: 114607.7578
Epoch 2/50
16/16 - 0s - 10ms/step - loss: 87280.6719 - val_loss: 62975.5391
Epoch 3/50
16/16 - 0s - 9ms/step - loss: 45688.8867 - val_loss: 30871.3184
Epoch 4/50
16/16 - 0s - 7ms/step - loss: 20901.3613 - val_loss: 13040.4014
Epoch 5/50
16/16 - 0s - 5ms/step - loss: 8232.3828 - val_loss: 4633.5195
Epoch 6/50
16/16 - 0s - 12ms/step - loss: 3211.4355 - val_loss: 2146.7163
Epoch 7/50
16/16 - 0s - 6ms/step - loss: 2045.9763 - val_loss: 1878.3013
Epoch 8/50
16/16 - 0s - 5ms/step - loss: 1946.0635 - val_loss: 1790.1635
Epoch 9/50
16/16 - 0s - 6ms/step - loss: 1843.1466 - val_loss: 1716.7458
Epoch 10/50
16/16 - 0s - 6ms/step - loss: 1762.6851 - val_loss: 1653.2458
Epoch 11/50
16/16 - 0s - 5ms/step - loss: 1694.1223 - val_loss: 1596.3407
Epoch 12/50
16/16 - 0s - 5ms/step - loss: 1638.3969 - val_loss: 1534.3463
Epoch 13/50
16/16 - 0s - 5ms/step - loss: 1569.8491 - val_loss: 1487.7273
Epoch 14/50
16/16 - 0s - 5ms/step - loss: 1515.7910 - val_loss: 1437.3256
Epoch 15/50
16/16 - 0s - 5ms/step - loss: 1460.8981 - val_loss: 1387.9941
Epoch 16/50
16/16 - 0s - 4ms/step - loss: 1412.6039 - val_loss: 1341.4943
Epoch 17/50
16/16 - 0s - 4ms/step - loss: 1364.3186 - val_loss: 1296.3236
Epoch 18/50
16/16 - 0s - 4ms/step - loss: 1316.3771 - val_loss: 1256.7750
Epoch 19/50
16/16 - 0s - 4ms/step - loss: 1269.1112 - val_loss: 1210.4327
Epoch 20/50
16/16 - 0s - 4ms/step - loss: 1223.6620 - val_loss: 1170.9755
Epoch 21/50
16/16 - 0s - 8ms/step - loss: 1181.2239 - val_loss: 1128.5181
Epoch 22/50
16/16 - 0s - 4ms/step - loss: 1137.9161 - val_loss: 1092.5374
Epoch 23/50
16/16 - 0s - 5ms/step - loss: 1098.3208 - val_loss: 1057.6611
Epoch 24/50
16/16 - 0s - 5ms/step - loss: 1061.3234 - val_loss: 1018.6804
Epoch 25/50
16/16 - 0s - 6ms/step - loss: 1025.6200 - val_loss: 986.3038
Epoch 26/50
16/16 - 0s - 8ms/step - loss: 989.1255 - val_loss: 952.6727
Epoch 27/50
16/16 - 0s - 9ms/step - loss: 954.1769 - val_loss: 918.4147
Epoch 28/50
16/16 - 0s - 10ms/step - loss: 921.3503 - val_loss: 890.2896
Epoch 29/50
16/16 - 0s - 8ms/step - loss: 890.3525 - val_loss: 861.8423
Epoch 30/50
16/16 - 0s - 10ms/step - loss: 860.4117 - val_loss: 831.9578
Epoch 31/50
16/16 - 0s - 8ms/step - loss: 829.5070 - val_loss: 802.5521
Epoch 32/50
16/16 - 0s - 6ms/step - loss: 803.6110 - val_loss: 779.0927
Epoch 33/50
```

```
16/16 - 0s - 5ms/step - loss: 774.2253 - val_loss: 749.2175
Epoch 34/50
16/16 - 0s - 5ms/step - loss: 749.0431 - val_loss: 725.7986
Epoch 35/50
16/16 - 0s - 6ms/step - loss: 723.9067 - val_loss: 703.2871
Epoch 36/50
16/16 - 0s - 8ms/step - loss: 701.8402 - val_loss: 678.0751
Epoch 37/50
16/16 - 0s - 8ms/step - loss: 676.7864 - val_loss: 660.9268
Epoch 38/50
16/16 - 0s - 7ms/step - loss: 655.7462 - val_loss: 636.6107
Epoch 39/50
16/16 - 0s - 11ms/step - loss: 634.9697 - val_loss: 618.7869
Epoch 40/50
16/16 - 0s - 9ms/step - loss: 614.2036 - val_loss: 596.3291
Epoch 41/50
16/16 - 0s - 5ms/step - loss: 596.7516 - val_loss: 575.4592
Epoch 42/50
16/16 - 0s - 5ms/step - loss: 576.5698 - val_loss: 562.3719
Epoch 43/50
16/16 - 0s - 5ms/step - loss: 559.3148 - val_loss: 542.6275
Epoch 44/50
16/16 - 0s - 5ms/step - loss: 541.7844 - val_loss: 525.5818
Epoch 45/50
16/16 - 0s - 5ms/step - loss: 528.5386 - val_loss: 508.3450
Epoch 46/50
16/16 - 0s - 6ms/step - loss: 509.1435 - val_loss: 500.2437
Epoch 47/50
16/16 - 0s - 5ms/step - loss: 495.4642 - val_loss: 481.4661
Epoch 48/50
16/16 - 0s - 4ms/step - loss: 480.5768 - val_loss: 464.9105
Epoch 49/50
16/16 - 0s - 5ms/step - loss: 467.3183 - val_loss: 453.1908
Epoch 50/50
16/16 - 0s - 4ms/step - loss: 453.8451 - val_loss: 439.8998
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step
493.8150367387497
[3252.9566353602268, 924.9396119227171, 522.5021057307683, 305.29441103259325, 5
01.7470508143145, 143.93443627425026, 216.1732789063173, 1404.1110880882145, 49
4.0788563858191, 568.0229355590624, 593.8456578893338, 1587.2726731367716, 404.6
109536867491, 403.4136079276229, 2160.146545110711, 1509.3741361232417, 347.4321
303876172, 182.00989134869812, 118.68449321897319, 625.7820778489855, 152.148463
29581073, 258.8014442321201, 121.74727045411525, 305.65498750729927, 275.4032735
5342174, 500.48277701127336, 798.3383600740375, 138.38200124681944, 127.48945082
266957, 305.6322195041894, 1093.3178729301023, 663.1308765804703, 257.5277091977
9095, 194.94660505670998, 935.790732333077, 690.3707038776413, 456.682435670395
7, 281.40288464260834, 211.97415738496272, 129.71324830868278, 506.8500735241110
5, 697.7192568134071, 143.6981741287313, 282.19414430733946, 85.99136960204592,
204.80885005809614, 237.80014805845587, 239.00586978790028, 613.0175002287959, 4
93.8150367387497]
```

In [19]:
```
# mean of mse
mean_mse = np.mean(mean)
print("Mean of mean squared error: ",mean_mse)
```

```
Mean of mean squared error:  553.4034094736963
```

In [20]:
```
# Standard deviation of mse
std_mse = np.std(mean)
print("Standard deviation of mean squared error: ",std_mse)
```

```
Standard deviation of mean squared error:  572.8774814131643
```

In [ ]: