ASSIGNMENT 2

#Pip install pandas

Defaulting to user installation because normal site-packages is not writeable

Requirement already satisfied: pandas in c:\programdata\anaconda3\lib\site-packages (1.5.3)

Requirement already satisfied: pytz>=2020.1 in c:\programdata\anaconda3\lib\site-packages (from pandas) (2022.7)

Requirement already satisfied: numpy>=1.21.0 in c:\programdata\anaconda3\lib\site-packages (from pandas) (1.23.5)

Requirement already satisfied: python-dateutil>=2.8.1 in c:\programdata\anaconda3\lib\site-packages (from pandas) (2.8.2)

Requirement already satisfied: six>=1.5 in c:\programdata\anaconda3\lib\site-packages (from python-dateutil>=2.8.1->pandas) (1.16.0)

#pip install sklearn

Defaulting to user installation because normal site-packages is not writeable

Requirement already satisfied: sklearn in c:\users\mddan\appdata\roaming\python\python310\site-packages (0.0.post5)

#pip install tensorflow

Defaulting to user installation because normal site-packages is not writeable

Requirement already satisfied: tensorflow in c:\users\mddan\appdata\roaming\python\python310\site-packages (2.12.0)

Requirement already satisfied: tensorflow-intel==2.12.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow) (2.12.0)

Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<5.0.0dev,>=3.20.3 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (4.23.0)

Requirement already satisfied: h5py>=2.9.0 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.12.0->tensorflow) (3.7.0)

Requirement already satisfied: grpcio<2.0,>=1.24.3 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (1.54.0)

Requirement already satisfied: wrapt<1.15,>=1.11.0 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.12.0->tensorflow) (1.14.1)

Requirement already satisfied: numpy<1.24,>=1.22 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.12.0->tensorflow) (1.23.5)

Requirement already satisfied: six>=1.12.0 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.12.0->tensorflow) (1.16.0)

Requirement already satisfied: jax>=0.3.15 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (0.4.9)

Requirement already satisfied: tensorflow-estimator<2.13,>=2.12.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (2.12.0)

Requirement already satisfied: astunparse>=1.6.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (1.6.3)

Requirement already satisfied: google-pasta>=0.1.1 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (0.2.0)

Requirement already satisfied: packaging in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.12.0->tensorflow) (22.0)

Requirement already satisfied: setuptools in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.12.0->tensorflow) (65.6.3)

Requirement already satisfied: keras<2.13,>=2.12.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (2.12.0)

Requirement already satisfied: typing-extensions>=3.6.6 in c:\programdata\anaconda3\lib\site-packages (from tensorflow-intel==2.12.0->tensorflow) (4.4.0)

Requirement already satisfied: absl-py>=1.0.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (1.4.0)

Requirement already satisfied: opt-einsum>=2.3.2 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (3.3.0)

Requirement already satisfied: flatbuffers>=2.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (23.5.8)

Requirement already satisfied: libclang>=13.0.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (16.0.0)

Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (0.31.0)

Requirement already satisfied: gast<=0.4.0,>=0.2.1 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (0.4.0)

Requirement already satisfied: termcolor>=1.1.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (2.3.0)

Requirement already satisfied: tensorboard<2.13,>=2.12 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorflow-intel==2.12.0->tensorflow) (2.12.3)

Requirement already satisfied: wheel<1.0,>=0.23.0 in c:\programdata\anaconda3\lib\site-packages (from astunparse>=1.6.0->tensorflow-intel==2.12.0->tensorflow) (0.38.4)

Requirement already satisfied: scipy>=1.7 in c:\programdata\anaconda3\lib\site-packages (from jax>=0.3.15->tensorflow-intel==2.12.0->tensorflow) (1.10.0)

Requirement already satisfied: ml-dtypes>=0.1.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from jax>=0.3.15->tensorflow-intel==2.12.0->tensorflow) (0.1.0)

Requirement already satisfied: requests<3,>=2.21.0 in c:\programdata\anaconda3\lib\site-packages (from tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (2.28.1)

Requirement already satisfied: werkzeug>=1.0.1 in c:\programdata\anaconda3\lib\site-packages (from tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (2.2.2)

Requirement already satisfied: google-auth-oauthlib<1.1,>=0.5 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (1.0.0)

Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (0.7.0)

Requirement already satisfied: markdown>=2.6.8 in c:\programdata\anaconda3\lib\site-packages (from tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (3.4.1)

Requirement already satisfied: google-auth<3,>=1.6.3 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (2.17.3)

Requirement already satisfied: cachetools<6.0,>=2.0.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from google-auth<3,>=1.6.3->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (5.3.0)

Requirement already satisfied: pyasn1-modules>=0.2.1 in c:\programdata\anaconda3\lib\site-packages (from google-auth<3,>=1.6.3->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (0.2.8)

Requirement already satisfied: rsa<5,>=3.1.4 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from google-auth<3,>=1.6.3->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (4.9)

Requirement already satisfied: requests-oauthlib>=0.7.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from google-auth-oauthlib<1.1,>=0.5->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (1.3.1)

Requirement already satisfied: certifi>=2017.4.17 in c:\programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (2022.12.7)

Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (1.26.14)

Requirement already satisfied: idna<4,>=2.5 in c:\programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (3.4)

Requirement already satisfied: charset-normalizer<3,>=2 in c:\programdata\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (2.0.4)

Requirement already satisfied: MarkupSafe>=2.1.1 in c:\programdata\anaconda3\lib\site-packages (from werkzeug>=1.0.1->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (2.1.1)

Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in c:\programdata\anaconda3\lib\site-packages (from pyasn1-modules>=0.2.1->google-auth<3,>=1.6.3->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (0.4.8)

Requirement already satisfied: oauthlib>=3.0.0 in c:\users\mddan\appdata\roaming\python\python310\site-packages (from requests-oauthlib>=0.7.0->google-auth-oauthlib<1.1,>=0.5->tensorboard<2.13,>=2.12->tensorflow-intel==2.12.0->tensorflow) (3.2.2)

#import all the important packages

```python
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler, OneHotEncoder
import tensorflow as tf
```

#load the dataset

```python
#loading the dataset from the file
df = pd.read_csv('House Price India.csv')
```

#1.Preprocessing the data

```python
#preprocessing the data
df.drop('Date', axis=1, inplace=True)
print(df.isnull().sum())
df = pd.get_dummies(df, columns=['waterfront present'], prefix='waterfront')
scaler = StandardScaler()
df[df.columns] = scaler.fit_transform(df[df.columns])
X_train, X_test, y_train, y_test = train_test_split(df.drop('price', axis=1),
df['price'], test_size=0.2, random_state=42)
```

Output->

id	0
number of bedrooms	0
number of bathrooms	0
living area	0

```
lot area                              0
number of floors                      0
waterfront present                    0
number of views                       0
condition of the house                0
grade of the house                    0
area of the house(excluding basement) 0
area of the basement                  0
built year                            0
renovation year                       0
postal code                           0
lattitude                             0
longitude                             0
living_area_renov                     0
lot_area_renov                        0
number of schools nearby              0
distance from the airport             0
price                                 0
dtype: int64
```

#Declaring ANN model

We will now build the ANN model using TensorFlow. The model will have an input layer, two hidden layers, and an output layer.

2.1 Input layer:

The input layer will have 20 nodes, which is the number of features in the dataset.

2.2 Hidden layers:

The model will have two hidden layers, each with 64 nodes and a rectified linear unit (ReLU) activation function.

```
#declaring the model
model = tf.keras.Sequential([
    tf.keras.layers.Input(shape=(22,)),
    tf.keras.layers.Dense(64, activation='relu'),
    tf.keras.layers.Dense(64, activation='relu'),
    tf.keras.layers.Dense(1)
])
```

#Testing the model

```
#testing the model
model.compile(optimizer='adam', loss='mse', metrics=['mae'])

history = model.fit(X_train, y_train, epochs=100, validation_data=(X_test,
y_test))

test_loss, test_mae = model.evaluate(X_test, y_test)

print('Test loss:', test_loss)
print('Test MAE:', test_mae)
```

OUTPUT->

Epoch 1/100

366/366 [==============================] - 2s 3ms/step - loss: 0.2362 - mae: 0.2523 - val_loss: 0.1624 - val_mae: 0.2110

Epoch 2/100

366/366 [==============================] - 1s 2ms/step - loss: 0.1315 - mae: 0.1715 - val_loss: 0.1049 - val_mae: 0.1567

Epoch 3/100

366/366 [==============================] - 1s 2ms/step - loss: 0.1052 - mae: 0.1511 - val_loss: 0.1005 - val_mae: 0.1457

Epoch 4/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0952 - mae: 0.1437 - val_loss: 0.0981 - val_mae: 0.1381

Epoch 5/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0889 - mae: 0.1395 - val_loss: 0.0923 - val_mae: 0.1346

Epoch 6/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0768 - mae: 0.1223 - val_loss: 0.0930 - val_mae: 0.1274

Epoch 7/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0671 - mae: 0.1205 - val_loss: 0.0832 - val_mae: 0.1193

Epoch 8/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0675 - mae: 0.1147 - val_loss: 0.0839 - val_mae: 0.1176

Epoch 9/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0582 - mae: 0.1113 - val_loss: 0.0757 - val_mae: 0.1178

Epoch 10/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0495 - mae: 0.1017 - val_loss: 0.0733 - val_mae: 0.1068

Epoch 11/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0523 - mae: 0.1022 - val_loss: 0.0819 - val_mae: 0.1148

Epoch 12/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0465 - mae: 0.0959 - val_loss: 0.0810 - val_mae: 0.1069

Epoch 13/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0419 - mae: 0.0907 - val_loss: 0.0686 - val_mae: 0.0993

Epoch 14/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0389 - mae: 0.0881 - val_loss: 0.0897 - val_mae: 0.1191

Epoch 15/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0368 - mae: 0.0872 - val_loss: 0.0752 - val_mae: 0.0930

Epoch 16/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0359 - mae: 0.0843 - val_loss: 0.0731 - val_mae: 0.0974

Epoch 17/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0331 - mae: 0.0828 - val_loss: 0.0709 - val_mae: 0.0961

Epoch 18/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0307 - mae: 0.0788 - val_loss: 0.0662 - val_mae: 0.0893

Epoch 19/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0296 - mae: 0.0771 - val_loss: 0.0672 - val_mae: 0.0925

Epoch 20/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0263 - mae: 0.0742 - val_loss: 0.0729 - val_mae: 0.0900

Epoch 21/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0277 - mae: 0.0763 - val_loss: 0.0674 - val_mae: 0.0969

Epoch 22/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0371 - mae: 0.0823 - val_loss: 0.0726 - val_mae: 0.1041

Epoch 23/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0253 - mae: 0.0705 - val_loss: 0.0667 - val_mae: 0.0852

Epoch 24/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0259 - mae: 0.0724 - val_loss: 0.0623 - val_mae: 0.0888

Epoch 25/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0228 - mae: 0.0686 - val_loss: 0.0753 - val_mae: 0.0953

Epoch 26/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0242 - mae: 0.0688 - val_loss: 0.0679 - val_mae: 0.0978

Epoch 27/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0228 - mae: 0.0683 - val_loss: 0.0584 - val_mae: 0.0868

Epoch 28/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0184 - mae: 0.0638 - val_loss: 0.0872 - val_mae: 0.0902

Epoch 29/100

366/366 [==============================] - 2s 4ms/step - loss: 0.0230 - mae: 0.0668 - val_loss: 0.0625 - val_mae: 0.0823

Epoch 30/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0301 - mae: 0.0702 - val_loss: 0.1081 - val_mae: 0.1580

Epoch 31/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0312 - mae: 0.0772 - val_loss: 0.0654 - val_mae: 0.0808

Epoch 32/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0182 - mae: 0.0604 - val_loss: 0.0614 - val_mae: 0.0863

Epoch 33/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0175 - mae: 0.0593 - val_loss: 0.0529 - val_mae: 0.0788

Epoch 34/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0165 - mae: 0.0592 - val_loss: 0.0660 - val_mae: 0.0840

Epoch 35/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0186 - mae: 0.0634 - val_loss: 0.0588 - val_mae: 0.0791

Epoch 36/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0170 - mae: 0.0586 - val_loss: 0.0651 - val_mae: 0.0890

Epoch 37/100

366/366 [==============================] - 2s 4ms/step - loss: 0.0162 - mae: 0.0566 - val_loss: 0.0649 - val_mae: 0.0806

Epoch 38/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0176 - mae: 0.0592 - val_loss: 0.0714 - val_mae: 0.0845

Epoch 39/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0152 - mae: 0.0572 - val_loss: 0.0578 - val_mae: 0.0742

Epoch 40/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0157 - mae: 0.0566 - val_loss: 0.0727 - val_mae: 0.0851

Epoch 41/100

366/366 [==============================] - 2s 4ms/step - loss: 0.0135 - mae: 0.0539 - val_loss: 0.0607 - val_mae: 0.0768

Epoch 42/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0181 - mae: 0.0609 - val_loss: 0.0618 - val_mae: 0.0783

Epoch 43/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0199 - mae: 0.0620 - val_loss: 0.0726 - val_mae: 0.0785

Epoch 44/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0141 - mae: 0.0537 - val_loss: 0.0703 - val_mae: 0.0782

Epoch 45/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0181 - mae: 0.0560 - val_loss: 0.0922 - val_mae: 0.0989

Epoch 46/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0167 - mae: 0.0569 - val_loss: 0.0718 - val_mae: 0.0811

Epoch 47/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0145 - mae: 0.0548 - val_loss: 0.0575 - val_mae: 0.0742

Epoch 48/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0138 - mae: 0.0535 - val_loss: 0.0606 - val_mae: 0.0742

Epoch 49/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0103 - mae: 0.0480 - val_loss: 0.0682 - val_mae: 0.0719

Epoch 50/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0111 - mae: 0.0503 - val_loss: 0.0655 - val_mae: 0.0800

Epoch 51/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0176 - mae: 0.0572 - val_loss: 0.0632 - val_mae: 0.0762

Epoch 52/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0190 - mae: 0.0583 - val_loss: 0.0599 - val_mae: 0.0732

Epoch 53/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0109 - mae: 0.0478 - val_loss: 0.0627 - val_mae: 0.0791

Epoch 54/100

366/366 [==============================] - 2s 4ms/step - loss: 0.0093 - mae: 0.0464 - val_loss: 0.0684 - val_mae: 0.0746

Epoch 55/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0107 - mae: 0.0489 - val_loss: 0.0783 - val_mae: 0.0782

Epoch 56/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0128 - mae: 0.0506 - val_loss: 0.0680 - val_mae: 0.0896

Epoch 57/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0136 - mae: 0.0528 - val_loss: 0.0795 - val_mae: 0.0857

Epoch 58/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0133 - mae: 0.0515 - val_loss: 0.0592 - val_mae: 0.0691

Epoch 59/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0109 - mae: 0.0477 - val_loss: 0.0616 - val_mae: 0.0743

Epoch 60/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0096 - mae: 0.0468 - val_loss: 0.0604 - val_mae: 0.0739

Epoch 61/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0105 - mae: 0.0465 - val_loss: 0.0531 - val_mae: 0.0694

Epoch 62/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0151 - mae: 0.0525 - val_loss: 0.0823 - val_mae: 0.0852

Epoch 63/100

366/366 [==============================] - 2s 4ms/step - loss: 0.0101 - mae: 0.0479 - val_loss: 0.0661 - val_mae: 0.0775

Epoch 64/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0101 - mae: 0.0454 - val_loss: 0.0587 - val_mae: 0.0708

Epoch 65/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0084 - mae: 0.0437 - val_loss: 0.0685 - val_mae: 0.0731

Epoch 66/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0100 - mae: 0.0463 - val_loss: 0.0631 - val_mae: 0.0769

Epoch 67/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0112 - mae: 0.0481 - val_loss: 0.0690 - val_mae: 0.0781

Epoch 68/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0148 - mae: 0.0533 - val_loss: 0.0643 - val_mae: 0.0719

Epoch 69/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0137 - mae: 0.0472 - val_loss: 0.0662 - val_mae: 0.0763

Epoch 70/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0110 - mae: 0.0464 - val_loss: 0.0652 - val_mae: 0.0836

Epoch 71/100

366/366 [==============================] - 2s 7ms/step - loss: 0.0144 - mae: 0.0498 - val_loss: 0.0692 - val_mae: 0.0767

Epoch 72/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0103 - mae: 0.0450 - val_loss: 0.0755 - val_mae: 0.0783

Epoch 73/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0087 - mae: 0.0444 - val_loss: 0.0622 - val_mae: 0.0691

Epoch 74/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0064 - mae: 0.0407 - val_loss: 0.0703 - val_mae: 0.0766

Epoch 75/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0124 - mae: 0.0476 - val_loss: 0.0690 - val_mae: 0.0791

Epoch 76/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0120 - mae: 0.0480 - val_loss: 0.0613 - val_mae: 0.0734

Epoch 77/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0112 - mae: 0.0469 - val_loss: 0.0666 - val_mae: 0.0711

Epoch 78/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0080 - mae: 0.0411 - val_loss: 0.0560 - val_mae: 0.0708

Epoch 79/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0097 - mae: 0.0445 - val_loss: 0.0596 - val_mae: 0.0685

Epoch 80/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0091 - mae: 0.0424 - val_loss: 0.0668 - val_mae: 0.0718

Epoch 81/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0118 - mae: 0.0494 - val_loss: 0.0566 - val_mae: 0.0699

Epoch 82/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0087 - mae: 0.0427 - val_loss: 0.0629 - val_mae: 0.0681

Epoch 83/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0087 - mae: 0.0423 - val_loss: 0.0693 - val_mae: 0.0787

Epoch 84/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0121 - mae: 0.0451 - val_loss: 0.0638 - val_mae: 0.0689

Epoch 85/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0114 - mae: 0.0442 - val_loss: 0.0646 - val_mae: 0.0701

Epoch 86/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0084 - mae: 0.0415 - val_loss: 0.0654 - val_mae: 0.0708

Epoch 87/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0055 - mae: 0.0372 - val_loss: 0.0624 - val_mae: 0.0688

Epoch 88/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0100 - mae: 0.0441 - val_loss: 0.0664 - val_mae: 0.0699

Epoch 89/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0176 - mae: 0.0531 - val_loss: 0.0576 - val_mae: 0.0716

Epoch 90/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0091 - mae: 0.0410 - val_loss: 0.0616 - val_mae: 0.0697

Epoch 91/100

366/366 [==============================] - 2s 4ms/step - loss: 0.0092 - mae: 0.0422 - val_loss: 0.0627 - val_mae: 0.0723

Epoch 92/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0061 - mae: 0.0387 - val_loss: 0.0659 - val_mae: 0.0708

Epoch 93/100

366/366 [==============================] - 1s 3ms/step - loss: 0.0066 - mae: 0.0397 - val_loss: 0.0622 - val_mae: 0.0678

Epoch 94/100

366/366 [==============================] - 2s 6ms/step - loss: 0.0059 - mae: 0.0374 - val_loss: 0.0602 - val_mae: 0.0671

Epoch 95/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0061 - mae: 0.0367 - val_loss: 0.0653 - val_mae: 0.0666

Epoch 96/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0087 - mae: 0.0422 - val_loss: 0.0654 - val_mae: 0.0722

Epoch 97/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0104 - mae: 0.0435 - val_loss: 0.0648 - val_mae: 0.0725

Epoch 98/100

366/366 [==============================] - 1s 4ms/step - loss: 0.0100 - mae: 0.0436 - val_loss: 0.0721 - val_mae: 0.0707

Epoch 99/100

366/366 [==============================] - 2s 5ms/step - loss: 0.0077 - mae: 0.0402 - val_loss: 0.0618 - val_mae: 0.0666

Epoch 100/100

366/366 [==============================] - 1s 2ms/step - loss: 0.0058 - mae: 0.0369 - val_loss: 0.0705 - val_mae: 0.0686

92/92 [==============================] - 0s 1ms/step - loss: 0.0705 - mae: 0.0686

Test loss: 0.0705379843711853

Test MAE: 0.06859969347715378