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In [14]: import numpy as np
import pandas as pd
import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers
from sklearn.model_selection import train_test_split, KFold
from sklearn.preprocessing import StandardScaler

import matplotlib.pyplot as plt

# Load dataset properly (space-separated format)
file_path = "housing.csv" # Update this if needed
column_names = [
    "CRIM", "ZN", "INDUS", "CHAS", "NOX", "RM", "AGE", "DIS", "RAD", "TAX", "PTR
    "B", "LSTAT", "MEDV" # MEDV (Median Value of homes) is the target variable
]

# Read the dataset
df = pd.read_csv(file_path, delim_whitespace=True, names=column_names)

# Split features (X) and target (y)
X = df.drop(columns=["MEDV"]).values # Features
y = df["MEDV"].values # Target variable (house prices)

# Standardize input features (important for NN stability)
scaler = StandardScaler()
X = scaler.fit_transform(X)

# Split into training (80%) and test (20%) sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_

# Define Neural Network model
def build_model():
    model = keras.Sequential([
        layers.Dense(64, activation='relu', kernel_initializer='he_normal', kern
        layers.Dropout(0.2),
        layers.Dense(32, activation='relu', kernel_initializer='he_normal', kern
        layers.Dropout(0.2),
        layers.Dense(1, activation='linear') # Linear output for regression
    ])

    model.compile(optimizer=keras.optimizers.Adam(learning_rate=0.001, clipvalue
        loss='mse',
        metrics=['mae'])
    return model

# Perform k-Fold Cross-Validation (k=5)
kf = KFold(n_splits=5, shuffle=True, random_state=42)
fold_scores = []

for train_idx, val_idx in kf.split(X_train):
    X_train_fold, X_val_fold = X_train[train_idx], X_train[val_idx]
    y_train_fold, y_val_fold = y_train[train_idx], y_train[val_idx]

    model = build_model()
    model.fit(X_train_fold, y_train_fold, epochs=100, batch_size=32, validation_

# Evaluate performance

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score = model.evaluate(X_val_fold, y_val_fold, verbose=0)
fold_scores.append(score[1]) # Mean Absolute Error (MAE)

print(f'Average Validation MAE across folds: {np.mean(fold_scores):.4f}')


# Final training on the full training dataset
final_model = build_model()
history = final_model.fit(X_train, y_train, epochs=100, batch_size=32, validation


# Evaluate on test set
test_score = final_model.evaluate(X_test, y_test, verbose=0)
print(f'Test MAE: {test_score[1]:.4f}')


# Plot MAE for each fold
plt.figure(figsize=(10, 5))
plt.plot(range(1, len(fold_scores) + 1), fold_scores, marker='o', linestyle='-',
plt.axhline(y=np.mean(fold_scores), color='r', linestyle='--', label='Average Va
plt.xlabel('Fold')
plt.ylabel('Mean Absolute Error (MAE)')
plt.title('Validation MAE across folds')
plt.legend()
plt.grid(True)
plt.show()


# Plot final test set evaluation
plt.figure(figsize=(10, 5))
plt.bar(['Test MAE'], [test_score[1]], color='g')
plt.ylabel('Mean Absolute Error (MAE)')
plt.title('Test Set Evaluation')
plt.grid(True)
plt.show()


# Plot training vs validation loss
plt.figure(figsize=(10, 5))
plt.plot(history.history['loss'], label='Training Loss')
plt.plot(history.history['val_loss'], label='Validation Loss')
plt.xlabel('Epochs')
plt.ylabel('Loss')
plt.title('Training vs Validation Loss')
plt.legend()
plt.grid(True)
plt.show()
```


Epoch 1/100
11/11  10s 95ms/step - loss: 620.2696 - mae: 22.5490 - val_loss: 515.2630 - val_mae: 20.7211


Epoch 2/100
11/11  0s 13ms/step - loss: 539.4170 - mae: 20.6905 - val_loss: 445.5368 - val_mae: 18.9819


Epoch 3/100
11/11  0s 13ms/step - loss: 457.5542 - mae: 18.4224 - val_loss: 383.6109 - val_mae: 17.3959


Epoch 4/100
11/11  0s 13ms/step - loss: 395.2365 - mae: 16.9439 - val_loss: 327.3215 - val_mae: 15.9924


Epoch 5/100
11/11  0s 13ms/step - loss: 330.3442 - mae: 14.9730 - val_loss: 271.3047 - val_mae: 14.4988


Epoch 6/100
11/11  0s 13ms/step - loss: 271.8636 - mae: 13.7635 - val_loss: 217.9785 - val_mae: 12.8962


Epoch 7/100
11/11  0s 14ms/step - loss: 254.8548 - mae: 13.2280 - val_loss: 165.1224 - val_mae: 11.0971


Epoch 8/100
11/11  0s 13ms/step - loss: 159.4485 - mae: 10.6176 - val_loss: 117.7444 - val_mae: 9.2376


Epoch 9/100
11/11  0s 13ms/step - loss: 139.8072 - mae: 9.5012 - val_loss: 79.5486 - val_mae: 7.3404


Epoch 10/100
11/11  0s 13ms/step - loss: 93.6518 - mae: 7.8483 - val_loss: 56.5526 - val_mae: 5.9358


Epoch 11/100
11/11  0s 13ms/step - loss: 65.8205 - mae: 6.2344 - val_loss: 47.9269 - val_mae: 5.1914


Epoch 12/100
11/11  0s 16ms/step - loss: 65.0621 - mae: 6.0229 - val_loss: 44.7995 - val_mae: 4.8962


Epoch 13/100
11/11  0s 13ms/step - loss: 60.5756 - mae: 6.0766 - val_loss: 43.0707 - val_mae: 4.7696

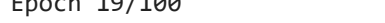
Epoch 14/100
11/11  0s 12ms/step - loss: 63.3663 - mae: 6.1520 - val_loss: 40.1521 - val_mae: 4.5915

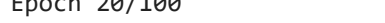
Epoch 15/100
11/11  0s 12ms/step - loss: 61.0636 - mae: 5.8036 - val_loss: 38.1136 - val_mae: 4.4702



















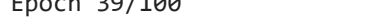
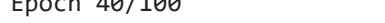
Epoch 16/100
11/11  0s 12ms/step - loss: 64.9780 - mae: 5.7761 - val_loss: 35.6868 - val_mae: 4.3061





















Epoch 17/100
11/11  0s 13ms/step - loss: 43.6712 - mae: 4.8110 - val_loss: 33.9032 - val_mae: 4.1696



















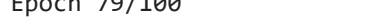
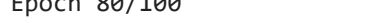
Epoch 18/100
11/11  0s 23ms/step - loss: 49.8769 - mae: 5.3674 - val_loss: 32.7440 - val_mae: 4.0882





















Epoch 19/100
11/11  0s 12ms/step - loss: 44.8867 - mae: 4.6717 - val_loss: 32.0224 - val_mae: 4.0396


Epoch 20/100
11/11  0s 12ms/step - loss: 53.8025 - mae: 5.0595 - val_loss: 30.3644 - val_mae: 3.9289


Epoch 21/100
11/11  0s 13ms/step - loss: 42.8405 - mae: 4.8658 - val_loss: 29.2432 - val_mae: 3.8548
Epoch 22/100
11/11  0s 12ms/step - loss: 45.0787 - mae: 4.7949 - val_loss: 28.3975 - val_mae: 3.7848
Epoch 23/100
11/11  0s 12ms/step - loss: 40.2419 - mae: 4.5459 - val_loss: 27.7134 - val_mae: 3.7256
Epoch 24/100
11/11  0s 12ms/step - loss: 40.8490 - mae: 4.6315 - val_loss: 27.3690 - val_mae: 3.6904
Epoch 25/100
11/11  0s 14ms/step - loss: 44.5289 - mae: 5.0118 - val_loss: 28.3845 - val_mae: 3.7845
Epoch 26/100
11/11  0s 13ms/step - loss: 40.2904 - mae: 4.6815 - val_loss: 27.4738 - val_mae: 3.6974
Epoch 27/100
11/11  0s 13ms/step - loss: 42.0189 - mae: 4.8853 - val_loss: 25.9650 - val_mae: 3.5440
Epoch 28/100
11/11  0s 12ms/step - loss: 43.9177 - mae: 4.7881 - val_loss: 25.9763 - val_mae: 3.5227
Epoch 29/100
11/11  0s 13ms/step - loss: 48.0085 - mae: 4.9497 - val_loss: 26.1911 - val_mae: 3.5166
Epoch 30/100
11/11  0s 12ms/step - loss: 38.6848 - mae: 4.5673 - val_loss: 25.8900 - val_mae: 3.5012
Epoch 31/100
11/11  0s 12ms/step - loss: 35.9545 - mae: 4.2637 - val_loss: 24.3854 - val_mae: 3.3631
Epoch 32/100
11/11  0s 13ms/step - loss: 42.9461 - mae: 4.8606 - val_loss: 24.6926 - val_mae: 3.4017
Epoch 33/100
11/11  0s 12ms/step - loss: 36.4939 - mae: 4.5267 - val_loss: 24.6274 - val_mae: 3.4037
Epoch 34/100
11/11  0s 12ms/step - loss: 26.9790 - mae: 3.5717 - val_loss: 24.0237 - val_mae: 3.3470
Epoch 35/100
11/11  0s 12ms/step - loss: 36.2768 - mae: 4.5025 - val_loss: 23.2383 - val_mae: 3.2699
Epoch 36/100
11/11  0s 13ms/step - loss: 34.5309 - mae: 4.3592 - val_loss: 23.1115 - val_mae: 3.2629
Epoch 37/100
11/11  0s 12ms/step - loss: 36.5546 - mae: 4.3004 - val_loss: 23.0294 - val_mae: 3.2742
Epoch 38/100
11/11  0s 12ms/step - loss: 34.9280 - mae: 4.4093 - val_loss: 22.0587 - val_mae: 3.2144
Epoch 39/100
11/11  0s 26ms/step - loss: 33.2098 - mae: 4.2939 - val_loss: 22.6378 - val_mae: 3.2704
Epoch 40/100
11/11  0s 12ms/step - loss: 33.0712 - mae: 4.3352 - val_loss: 23.4197 - val_mae: 3.3195


Epoch 41/100
11/11  0s 12ms/step - loss: 33.9421 - mae: 4.2018 - val_loss: 23.7022 - val_mae: 3.3343
Epoch 42/100
11/11  0s 12ms/step - loss: 33.8700 - mae: 4.1671 - val_loss: 22.0914 - val_mae: 3.1709
Epoch 43/100
11/11  0s 12ms/step - loss: 34.5299 - mae: 4.4825 - val_loss: 22.3529 - val_mae: 3.1980
Epoch 44/100
11/11  0s 12ms/step - loss: 35.9912 - mae: 4.4012 - val_loss: 23.8947 - val_mae: 3.3412
Epoch 45/100
11/11  0s 12ms/step - loss: 41.7067 - mae: 4.5996 - val_loss: 23.2923 - val_mae: 3.2815
Epoch 46/100
11/11  0s 12ms/step - loss: 33.4501 - mae: 4.0959 - val_loss: 21.8290 - val_mae: 3.1649
Epoch 47/100
11/11  0s 12ms/step - loss: 40.4897 - mae: 4.7162 - val_loss: 20.8345 - val_mae: 3.1033
Epoch 48/100
11/11  0s 12ms/step - loss: 30.8674 - mae: 4.2155 - val_loss: 20.8898 - val_mae: 3.1083
Epoch 49/100
11/11  0s 12ms/step - loss: 34.1707 - mae: 4.2496 - val_loss: 20.8459 - val_mae: 3.0904
Epoch 50/100
11/11  0s 12ms/step - loss: 35.6375 - mae: 4.2877 - val_loss: 21.3367 - val_mae: 3.1325
Epoch 51/100
11/11  0s 12ms/step - loss: 35.3752 - mae: 4.2701 - val_loss: 20.2690 - val_mae: 3.0106
Epoch 52/100
11/11  0s 13ms/step - loss: 29.4736 - mae: 4.1318 - val_loss: 19.9301 - val_mae: 2.9388
Epoch 53/100
11/11  0s 12ms/step - loss: 37.3782 - mae: 4.5921 - val_loss: 20.9393 - val_mae: 3.0648
Epoch 54/100
11/11  0s 12ms/step - loss: 30.1532 - mae: 3.9251 - val_loss: 21.5851 - val_mae: 3.1304
Epoch 55/100
11/11  0s 12ms/step - loss: 37.5866 - mae: 4.0386 - val_loss: 20.6243 - val_mae: 3.0389
Epoch 56/100
11/11  0s 12ms/step - loss: 30.7542 - mae: 3.9269 - val_loss: 20.1101 - val_mae: 3.0054
Epoch 57/100
11/11  0s 14ms/step - loss: 27.6509 - mae: 3.7835 - val_loss: 22.1052 - val_mae: 3.1916
Epoch 58/100
11/11  0s 12ms/step - loss: 39.7961 - mae: 4.2996 - val_loss: 23.0594 - val_mae: 3.2488
Epoch 59/100
11/11  0s 12ms/step - loss: 31.1745 - mae: 4.1621 - val_loss: 21.6755 - val_mae: 3.1258
Epoch 60/100
11/11  0s 12ms/step - loss: 28.4465 - mae: 3.6918 - val_loss: 19.8535 - val_mae: 2.9797


Epoch 61/100
11/11  0s 12ms/step - loss: 31.2033 - mae: 4.0105 - val_loss: 19.4888 - val_mae: 2.9295
Epoch 62/100
11/11  0s 12ms/step - loss: 28.9221 - mae: 3.9387 - val_loss: 20.6280 - val_mae: 3.0703
Epoch 63/100
11/11  0s 14ms/step - loss: 30.5008 - mae: 4.1023 - val_loss: 20.1624 - val_mae: 3.0444
Epoch 64/100
11/11  0s 12ms/step - loss: 24.7706 - mae: 3.6880 - val_loss: 19.9180 - val_mae: 2.9835
Epoch 65/100
11/11  0s 12ms/step - loss: 29.6354 - mae: 3.7662 - val_loss: 21.0536 - val_mae: 3.0803
Epoch 66/100
11/11  0s 12ms/step - loss: 30.1458 - mae: 3.9034 - val_loss: 20.5907 - val_mae: 3.0370
Epoch 67/100
11/11  0s 12ms/step - loss: 32.7332 - mae: 4.1503 - val_loss: 20.0458 - val_mae: 2.9977
Epoch 68/100
11/11  0s 12ms/step - loss: 31.5901 - mae: 4.0714 - val_loss: 19.2998 - val_mae: 2.9101
Epoch 69/100
11/11  0s 12ms/step - loss: 30.4684 - mae: 4.0843 - val_loss: 19.3071 - val_mae: 2.9026
Epoch 70/100
11/11  0s 12ms/step - loss: 36.0649 - mae: 4.1506 - val_loss: 20.5937 - val_mae: 3.0174
Epoch 71/100
11/11  0s 13ms/step - loss: 30.3583 - mae: 3.9561 - val_loss: 19.5458 - val_mae: 2.9309
Epoch 72/100
11/11  0s 12ms/step - loss: 24.2744 - mae: 3.4440 - val_loss: 19.0550 - val_mae: 2.9188
Epoch 73/100
11/11  0s 12ms/step - loss: 31.0714 - mae: 4.0084 - val_loss: 19.4196 - val_mae: 2.9420
Epoch 74/100
11/11  0s 12ms/step - loss: 28.5280 - mae: 3.8253 - val_loss: 19.6354 - val_mae: 2.9644
Epoch 75/100
11/11  0s 12ms/step - loss: 27.7035 - mae: 3.7381 - val_loss: 20.5399 - val_mae: 3.0837
Epoch 76/100
11/11  0s 16ms/step - loss: 25.7892 - mae: 3.6854 - val_loss: 19.4870 - val_mae: 2.9429
Epoch 77/100
11/11  0s 12ms/step - loss: 30.9297 - mae: 3.9893 - val_loss: 19.8005 - val_mae: 2.9357
Epoch 78/100
11/11  0s 12ms/step - loss: 31.5069 - mae: 4.0124 - val_loss: 19.8011 - val_mae: 2.9981
Epoch 79/100
11/11  0s 12ms/step - loss: 31.5301 - mae: 4.0969 - val_loss: 18.9581 - val_mae: 2.9277
Epoch 80/100
11/11  0s 14ms/step - loss: 24.7684 - mae: 3.6910 - val_loss: 19.1533 - val_mae: 2.9303


Epoch 81/100
11/11  0s 12ms/step - loss: 29.6080 - mae: 4.0028 - val_loss: 18.9988 - val_mae: 2.8885
Epoch 82/100
11/11  0s 12ms/step - loss: 28.6111 - mae: 3.6422 - val_loss: 19.8486 - val_mae: 2.9762
Epoch 83/100
11/11  0s 12ms/step - loss: 33.2193 - mae: 4.1775 - val_loss: 20.4907 - val_mae: 3.0423
Epoch 84/100
11/11  0s 13ms/step - loss: 28.2332 - mae: 3.8143 - val_loss: 17.9819 - val_mae: 2.8402
Epoch 85/100
11/11  0s 13ms/step - loss: 29.4543 - mae: 3.8442 - val_loss: 18.5411 - val_mae: 2.8801
Epoch 86/100
11/11  0s 12ms/step - loss: 26.9465 - mae: 3.8911 - val_loss: 20.4717 - val_mae: 3.0572
Epoch 87/100
11/11  0s 12ms/step - loss: 32.4274 - mae: 4.1474 - val_loss: 19.9188 - val_mae: 3.0013
Epoch 88/100
11/11  0s 12ms/step - loss: 29.0378 - mae: 3.9225 - val_loss: 18.4329 - val_mae: 2.8587
Epoch 89/100
11/11  0s 13ms/step - loss: 30.3892 - mae: 4.0066 - val_loss: 18.1925 - val_mae: 2.8357
Epoch 90/100
11/11  0s 13ms/step - loss: 25.8317 - mae: 3.5911 - val_loss: 19.1860 - val_mae: 2.9624
Epoch 91/100
11/11  0s 13ms/step - loss: 21.0597 - mae: 3.4445 - val_loss: 18.8974 - val_mae: 2.9294
Epoch 92/100
11/11  0s 12ms/step - loss: 29.0472 - mae: 4.0714 - val_loss: 18.1333 - val_mae: 2.8624
Epoch 93/100
11/11  0s 12ms/step - loss: 26.2037 - mae: 3.7038 - val_loss: 17.7798 - val_mae: 2.8103
Epoch 94/100
11/11  0s 12ms/step - loss: 26.5499 - mae: 3.7301 - val_loss: 18.2361 - val_mae: 2.8490
Epoch 95/100
11/11  0s 12ms/step - loss: 26.1289 - mae: 3.7182 - val_loss: 18.7814 - val_mae: 2.8870
Epoch 96/100
11/11  0s 12ms/step - loss: 26.2032 - mae: 3.7364 - val_loss: 18.2078 - val_mae: 2.8584
Epoch 97/100
11/11  0s 12ms/step - loss: 27.6292 - mae: 3.6627 - val_loss: 17.8559 - val_mae: 2.8511
Epoch 98/100
11/11  0s 12ms/step - loss: 32.9302 - mae: 4.0863 - val_loss: 18.4246 - val_mae: 2.9010
Epoch 99/100
11/11  0s 12ms/step - loss: 31.9759 - mae: 4.3382 - val_loss: 19.1030 - val_mae: 2.9411
Epoch 100/100
11/11  0s 12ms/step - loss: 34.0345 - mae: 4.0330 - val_loss: 18.9373 - val_mae: 2.9127


Epoch 1/100
11/11  9s 93ms/step - loss: 654.3751 - mae: 24.0681 - val_loss: 625.7372 - val_mae: 23.1029


Epoch 2/100
11/11  0s 14ms/step - loss: 567.2027 - mae: 22.1383 - val_loss: 534.1229 - val_mae: 21.0134


Epoch 3/100
11/11  0s 17ms/step - loss: 511.8211 - mae: 20.5105 - val_loss: 451.4685 - val_mae: 18.9206


Epoch 4/100
11/11  0s 13ms/step - loss: 408.5195 - mae: 18.0916 - val_loss: 374.2969 - val_mae: 16.7603


Epoch 5/100
11/11  0s 13ms/step - loss: 340.9180 - mae: 16.2575 - val_loss: 301.6703 - val_mae: 14.5773


Epoch 6/100
11/11  0s 12ms/step - loss: 276.1319 - mae: 13.9607 - val_loss: 233.3349 - val_mae: 12.2808


Epoch 7/100
11/11  0s 12ms/step - loss: 204.1889 - mae: 12.0863 - val_loss: 173.7068 - val_mae: 10.2434


Epoch 8/100
11/11  0s 13ms/step - loss: 166.3791 - mae: 10.6155 - val_loss: 126.8936 - val_mae: 8.5153


Epoch 9/100
11/11  0s 13ms/step - loss: 101.4799 - mae: 7.8416 - val_loss: 97.1934 - val_mae: 7.3180


Epoch 10/100
11/11  0s 12ms/step - loss: 97.1692 - mae: 7.6028 - val_loss: 79.7973 - val_mae: 6.7944


Epoch 11/100
11/11  0s 24ms/step - loss: 91.0361 - mae: 7.2915 - val_loss: 66.7904 - val_mae: 6.2361


Epoch 12/100
11/11  0s 12ms/step - loss: 75.9157 - mae: 6.8472 - val_loss: 55.7584 - val_mae: 5.6114


Epoch 13/100
11/11  0s 12ms/step - loss: 60.2523 - mae: 5.6787 - val_loss: 47.2278 - val_mae: 5.0593

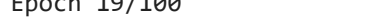
Epoch 14/100
11/11  0s 12ms/step - loss: 64.2865 - mae: 5.9903 - val_loss: 40.1973 - val_mae: 4.5870

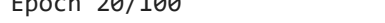
Epoch 15/100
11/11  0s 12ms/step - loss: 59.0848 - mae: 5.5227 - val_loss: 34.7322 - val_mae: 4.1648

Epoch 16/100
11/11  0s 14ms/step - loss: 49.9485 - mae: 5.3771 - val_loss: 31.2999 - val_mae: 3.8830



















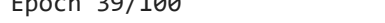
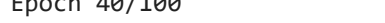
Epoch 17/100
11/11  0s 12ms/step - loss: 51.2218 - mae: 5.2609 - val_loss: 28.0998 - val_mae: 3.7001

Epoch 18/100
11/11  0s 13ms/step - loss: 51.3119 - mae: 5.3014 - val_loss: 26.2056 - val_mae: 3.5385





















Epoch 19/100
11/11  0s 12ms/step - loss: 49.0151 - mae: 5.1073 - val_loss: 25.9020 - val_mae: 3.4419



















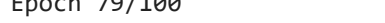
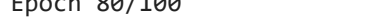
Epoch 20/100
11/11  0s 12ms/step - loss: 60.1950 - mae: 5.5027 - val_loss: 25.6623 - val_mae: 3.3899


```



















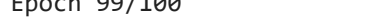

Epoch 21/100
11/11  0s 12ms/step - loss: 47.3329 - mae: 4.9669 - val_loss:
24.6772 - val_mae: 3.3531
Epoch 22/100
11/11  0s 12ms/step - loss: 55.1203 - mae: 5.4539 - val_loss:
23.6131 - val_mae: 3.3110
Epoch 23/100
11/11  0s 13ms/step - loss: 43.0484 - mae: 4.8890 - val_loss:
22.3201 - val_mae: 3.2570
Epoch 24/100
11/11  0s 13ms/step - loss: 46.2609 - mae: 4.9699 - val_loss:
22.1272 - val_mae: 3.2533
Epoch 25/100
11/11  0s 12ms/step - loss: 44.9135 - mae: 4.7982 - val_loss:
21.5817 - val_mae: 3.2260
Epoch 26/100
11/11  0s 13ms/step - loss: 47.8560 - mae: 4.9805 - val_loss:
21.4065 - val_mae: 3.2163
Epoch 27/100
11/11  0s 12ms/step - loss: 31.6189 - mae: 4.1225 - val_loss:
21.0472 - val_mae: 3.1934
Epoch 28/100
11/11  0s 13ms/step - loss: 39.5149 - mae: 4.4535 - val_loss:
20.4612 - val_mae: 3.1632
Epoch 29/100
11/11  0s 12ms/step - loss: 34.6426 - mae: 4.3725 - val_loss:
20.1189 - val_mae: 3.1426
Epoch 30/100
11/11  0s 12ms/step - loss: 41.6523 - mae: 4.6635 - val_loss:
19.8198 - val_mae: 3.1043
Epoch 31/100
11/11  0s 12ms/step - loss: 35.1397 - mae: 4.1223 - val_loss:
20.0726 - val_mae: 3.0886
Epoch 32/100
11/11  0s 12ms/step - loss: 36.1362 - mae: 4.2630 - val_loss:
19.8788 - val_mae: 3.0579
Epoch 33/100
11/11  0s 14ms/step - loss: 38.3460 - mae: 4.4694 - val_loss:
19.4118 - val_mae: 3.0234
Epoch 34/100
11/11  0s 13ms/step - loss: 35.2987 - mae: 4.4000 - val_loss:
19.2101 - val_mae: 2.9935
Epoch 35/100
11/11  0s 13ms/step - loss: 37.9960 - mae: 4.5691 - val_loss:
19.5585 - val_mae: 3.0359
Epoch 36/100
11/11  0s 13ms/step - loss: 46.7394 - mae: 4.6672 - val_loss:
18.6116 - val_mae: 2.9797
Epoch 37/100
11/11  0s 12ms/step - loss: 33.5538 - mae: 4.3045 - val_loss:
18.1386 - val_mae: 2.9058
Epoch 38/100
11/11  0s 12ms/step - loss: 38.4512 - mae: 4.3963 - val_loss:
19.3784 - val_mae: 2.9899
Epoch 39/100
11/11  0s 12ms/step - loss: 31.0904 - mae: 3.8187 - val_loss:
19.9260 - val_mae: 3.0078
Epoch 40/100
11/11  0s 14ms/step - loss: 35.4758 - mae: 3.9791 - val_loss:
18.5619 - val_mae: 2.8951

```


Epoch 41/100
11/11  0s 18ms/step - loss: 33.2513 - mae: 4.1750 - val_loss: 18.1573 - val_mae: 2.9037
Epoch 42/100
11/11  0s 15ms/step - loss: 31.4972 - mae: 4.1152 - val_loss: 18.9684 - val_mae: 2.9885
Epoch 43/100
11/11  0s 20ms/step - loss: 36.8984 - mae: 4.2241 - val_loss: 19.9854 - val_mae: 3.0877
Epoch 44/100
11/11  0s 28ms/step - loss: 37.2512 - mae: 4.2470 - val_loss: 19.6538 - val_mae: 3.0482
Epoch 45/100
11/11  0s 10ms/step - loss: 44.1559 - mae: 4.5005 - val_loss: 17.9548 - val_mae: 2.8771
Epoch 46/100
11/11  0s 12ms/step - loss: 29.5521 - mae: 4.0062 - val_loss: 17.3224 - val_mae: 2.8198
Epoch 47/100
11/11  0s 12ms/step - loss: 32.9788 - mae: 4.1353 - val_loss: 17.7488 - val_mae: 2.8684
Epoch 48/100
11/11  0s 13ms/step - loss: 42.5587 - mae: 4.5016 - val_loss: 17.2046 - val_mae: 2.8971
Epoch 49/100
11/11  0s 12ms/step - loss: 35.7968 - mae: 4.2222 - val_loss: 17.1094 - val_mae: 2.9288
Epoch 50/100
11/11  0s 18ms/step - loss: 32.5922 - mae: 4.2252 - val_loss: 17.0176 - val_mae: 2.9287
Epoch 51/100
11/11  0s 17ms/step - loss: 36.8141 - mae: 4.5083 - val_loss: 17.1217 - val_mae: 2.8687
Epoch 52/100
11/11  0s 13ms/step - loss: 34.6540 - mae: 4.2068 - val_loss: 17.7842 - val_mae: 2.9183
Epoch 53/100
11/11  0s 14ms/step - loss: 40.2197 - mae: 4.2875 - val_loss: 18.0878 - val_mae: 2.9696
Epoch 54/100
11/11  0s 13ms/step - loss: 28.8888 - mae: 3.8732 - val_loss: 17.0445 - val_mae: 2.8772
Epoch 55/100
11/11  0s 13ms/step - loss: 33.8866 - mae: 4.1743 - val_loss: 17.6512 - val_mae: 2.9116
Epoch 56/100
11/11  0s 14ms/step - loss: 32.4492 - mae: 4.1754 - val_loss: 16.6570 - val_mae: 2.7881
Epoch 57/100
11/11  0s 13ms/step - loss: 32.1509 - mae: 4.0178 - val_loss: 17.0044 - val_mae: 2.8513
Epoch 58/100
11/11  0s 16ms/step - loss: 29.4201 - mae: 4.0450 - val_loss: 17.6151 - val_mae: 2.9067
Epoch 59/100
11/11  0s 26ms/step - loss: 32.0627 - mae: 3.9795 - val_loss: 17.4481 - val_mae: 2.8475
Epoch 60/100
11/11  0s 11ms/step - loss: 32.7333 - mae: 4.0097 - val_loss: 17.4018 - val_mae: 2.8132


Epoch 61/100
11/11  0s 13ms/step - loss: 34.8499 - mae: 4.2222 - val_loss: 17.2498 - val_mae: 2.8011
Epoch 62/100
11/11  0s 13ms/step - loss: 28.2844 - mae: 3.8435 - val_loss: 16.8617 - val_mae: 2.7744
Epoch 63/100
11/11  0s 13ms/step - loss: 28.6546 - mae: 4.0070 - val_loss: 16.4025 - val_mae: 2.7695
Epoch 64/100
11/11  0s 13ms/step - loss: 32.3194 - mae: 4.1136 - val_loss: 16.5158 - val_mae: 2.8027
Epoch 65/100
11/11  0s 13ms/step - loss: 29.4322 - mae: 3.8442 - val_loss: 16.6876 - val_mae: 2.8172
Epoch 66/100
11/11  0s 12ms/step - loss: 29.3472 - mae: 3.8692 - val_loss: 16.9366 - val_mae: 2.8244
Epoch 67/100
11/11  0s 12ms/step - loss: 34.7122 - mae: 4.0309 - val_loss: 16.9833 - val_mae: 2.8089
Epoch 68/100
11/11  0s 12ms/step - loss: 32.5136 - mae: 4.0498 - val_loss: 16.4374 - val_mae: 2.8310
Epoch 69/100
11/11  0s 12ms/step - loss: 34.7527 - mae: 4.2228 - val_loss: 16.0795 - val_mae: 2.8242
Epoch 70/100
11/11  0s 12ms/step - loss: 36.1304 - mae: 4.1937 - val_loss: 16.7908 - val_mae: 2.8635
Epoch 71/100
11/11  0s 13ms/step - loss: 33.8455 - mae: 4.1522 - val_loss: 16.7358 - val_mae: 2.8197
Epoch 72/100
11/11  0s 12ms/step - loss: 33.7393 - mae: 4.1614 - val_loss: 16.4750 - val_mae: 2.7634
Epoch 73/100
11/11  0s 12ms/step - loss: 32.4145 - mae: 4.0028 - val_loss: 16.6466 - val_mae: 2.7919
Epoch 74/100
11/11  0s 21ms/step - loss: 30.4457 - mae: 3.9145 - val_loss: 17.6917 - val_mae: 2.8806
Epoch 75/100
11/11  0s 16ms/step - loss: 35.0974 - mae: 4.3091 - val_loss: 17.0566 - val_mae: 2.8592
Epoch 76/100
11/11  0s 13ms/step - loss: 32.5215 - mae: 4.1673 - val_loss: 16.8570 - val_mae: 2.8783
Epoch 77/100
11/11  0s 14ms/step - loss: 27.0138 - mae: 3.7014 - val_loss: 17.2818 - val_mae: 2.9033
Epoch 78/100
11/11  0s 13ms/step - loss: 30.8652 - mae: 3.8737 - val_loss: 17.2002 - val_mae: 2.9063
Epoch 79/100
11/11  0s 12ms/step - loss: 34.0605 - mae: 4.1904 - val_loss: 16.1468 - val_mae: 2.8319
Epoch 80/100
11/11  0s 13ms/step - loss: 32.9215 - mae: 4.2933 - val_loss: 15.7814 - val_mae: 2.8666


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Epoch 81/100
11/11  0s 12ms/step - loss: 37.6990 - mae: 4.3303 - val_loss:
16.6341 - val_mae: 2.8527
Epoch 82/100
11/11  0s 12ms/step - loss: 26.1107 - mae: 3.6258 - val_loss:
17.2221 - val_mae: 2.8551
Epoch 83/100
11/11  0s 13ms/step - loss: 31.3518 - mae: 3.7384 - val_loss:
16.5911 - val_mae: 2.7767
Epoch 84/100
11/11  0s 13ms/step - loss: 24.6671 - mae: 3.6784 - val_loss:
16.4614 - val_mae: 2.7535
Epoch 85/100
11/11  0s 13ms/step - loss: 32.9929 - mae: 4.0494 - val_loss:
15.6999 - val_mae: 2.7682
Epoch 86/100
11/11  0s 13ms/step - loss: 28.0242 - mae: 3.8405 - val_loss:
15.0929 - val_mae: 2.7089
Epoch 87/100
11/11  0s 12ms/step - loss: 33.2985 - mae: 3.9832 - val_loss:
15.9325 - val_mae: 2.7095
Epoch 88/100
11/11  0s 14ms/step - loss: 30.0448 - mae: 3.9212 - val_loss:
15.9537 - val_mae: 2.7149
Epoch 89/100
11/11  0s 16ms/step - loss: 28.3724 - mae: 3.7573 - val_loss:
16.4270 - val_mae: 2.7828
Epoch 90/100
11/11  0s 13ms/step - loss: 30.3331 - mae: 3.9831 - val_loss:
16.8156 - val_mae: 2.8190
Epoch 91/100
11/11  0s 12ms/step - loss: 25.7983 - mae: 3.7436 - val_loss:
16.4617 - val_mae: 2.8438
Epoch 92/100
11/11  0s 12ms/step - loss: 30.1548 - mae: 3.9755 - val_loss:
16.1483 - val_mae: 2.7976
Epoch 93/100
11/11  0s 12ms/step - loss: 25.6010 - mae: 3.5671 - val_loss:
16.1082 - val_mae: 2.7367
Epoch 94/100
11/11  0s 12ms/step - loss: 30.9302 - mae: 3.9495 - val_loss:
16.0369 - val_mae: 2.7580
Epoch 95/100
11/11  0s 12ms/step - loss: 29.9553 - mae: 3.8634 - val_loss:
15.9049 - val_mae: 2.7421
Epoch 96/100
11/11  0s 12ms/step - loss: 27.9913 - mae: 3.7073 - val_loss:
16.0092 - val_mae: 2.7449
Epoch 97/100
11/11  0s 12ms/step - loss: 30.5098 - mae: 3.9078 - val_loss:
15.9736 - val_mae: 2.7839
Epoch 98/100
11/11  0s 12ms/step - loss: 29.9320 - mae: 3.8435 - val_loss:
15.7671 - val_mae: 2.7562
Epoch 99/100
11/11  0s 12ms/step - loss: 32.2096 - mae: 4.0009 - val_loss:
16.1994 - val_mae: 2.7473
Epoch 100/100
11/11  0s 13ms/step - loss: 26.6838 - mae: 3.6846 - val_loss:
15.9394 - val_mae: 2.7742


```


Epoch 1/100
11/11  8s 91ms/step - loss: 652.1558 - mae: 23.5146 - val_loss: 540.3988 - val_mae: 21.1403


Epoch 2/100
11/11  1s 12ms/step - loss: 567.9658 - mae: 21.7354 - val_loss: 477.6289 - val_mae: 19.6284


Epoch 3/100
11/11  0s 12ms/step - loss: 493.5356 - mae: 19.8901 - val_loss: 411.8697 - val_mae: 17.9325


Epoch 4/100
11/11  0s 13ms/step - loss: 388.4410 - mae: 17.2970 - val_loss: 342.9717 - val_mae: 16.0265


Epoch 5/100
11/11  0s 12ms/step - loss: 330.5087 - mae: 15.8880 - val_loss: 273.5076 - val_mae: 13.9198


Epoch 6/100
11/11  0s 12ms/step - loss: 242.7737 - mae: 13.3690 - val_loss: 208.2469 - val_mae: 11.7605


Epoch 7/100
11/11  0s 12ms/step - loss: 190.0987 - mae: 11.5746 - val_loss: 150.7112 - val_mae: 9.5685


Epoch 8/100
11/11  0s 12ms/step - loss: 123.1325 - mae: 8.9322 - val_loss: 106.2246 - val_mae: 7.4636


Epoch 9/100
11/11  0s 12ms/step - loss: 69.5409 - mae: 6.7081 - val_loss: 79.3745 - val_mae: 6.0357


Epoch 10/100
11/11  0s 13ms/step - loss: 65.5580 - mae: 6.0682 - val_loss: 70.0340 - val_mae: 5.5485


Epoch 11/100
11/11  0s 12ms/step - loss: 45.9087 - mae: 5.1002 - val_loss: 67.8994 - val_mae: 5.3229


Epoch 12/100
11/11  0s 12ms/step - loss: 51.8978 - mae: 5.3229 - val_loss: 65.6636 - val_mae: 5.1447


Epoch 13/100
11/11  0s 12ms/step - loss: 51.4829 - mae: 5.4045 - val_loss: 63.2641 - val_mae: 4.9695

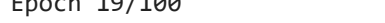
Epoch 14/100
11/11  0s 12ms/step - loss: 42.4456 - mae: 5.0245 - val_loss: 61.6592 - val_mae: 4.8677

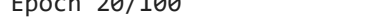
Epoch 15/100
11/11  0s 12ms/step - loss: 44.7445 - mae: 4.9287 - val_loss: 60.0770 - val_mae: 4.7605





















Epoch 16/100
11/11  0s 13ms/step - loss: 44.5263 - mae: 5.0775 - val_loss: 58.2345 - val_mae: 4.6795




















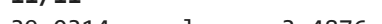
Epoch 17/100
11/11  0s 12ms/step - loss: 38.1431 - mae: 4.6680 - val_loss: 56.5541 - val_mae: 4.6153





















Epoch 18/100
11/11  0s 12ms/step - loss: 38.0083 - mae: 4.5057 - val_loss: 55.3111 - val_mae: 4.5286



















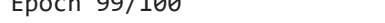

Epoch 19/100
11/11  0s 12ms/step - loss: 39.4102 - mae: 4.8199 - val_loss: 54.7085 - val_mae: 4.4584


Epoch 20/100
11/11  0s 12ms/step - loss: 38.0353 - mae: 4.5161 - val_loss: 53.7722 - val_mae: 4.3976


Epoch 21/100
11/11  0s 12ms/step - loss: 36.3619 - mae: 4.4556 - val_loss: 53.2922 - val_mae: 4.3570
Epoch 22/100
11/11  0s 12ms/step - loss: 37.3779 - mae: 4.4940 - val_loss: 53.4019 - val_mae: 4.3141
Epoch 23/100
11/11  0s 12ms/step - loss: 33.3048 - mae: 4.1730 - val_loss: 52.0690 - val_mae: 4.2747
Epoch 24/100
11/11  0s 12ms/step - loss: 42.3498 - mae: 4.6195 - val_loss: 50.9736 - val_mae: 4.2021
Epoch 25/100
11/11  0s 12ms/step - loss: 34.3305 - mae: 4.3805 - val_loss: 49.2162 - val_mae: 4.1873
Epoch 26/100
11/11  0s 13ms/step - loss: 40.5194 - mae: 4.6462 - val_loss: 48.7019 - val_mae: 4.0901
Epoch 27/100
11/11  0s 13ms/step - loss: 29.1511 - mae: 3.9511 - val_loss: 48.2950 - val_mae: 4.0373
Epoch 28/100
11/11  0s 13ms/step - loss: 41.5400 - mae: 4.6139 - val_loss: 47.6293 - val_mae: 4.0053
Epoch 29/100
11/11  0s 13ms/step - loss: 32.7476 - mae: 4.1913 - val_loss: 46.8908 - val_mae: 3.9788
Epoch 30/100
11/11  0s 15ms/step - loss: 29.0560 - mae: 4.0169 - val_loss: 46.3969 - val_mae: 3.9713
Epoch 31/100
11/11  0s 12ms/step - loss: 34.9207 - mae: 4.2290 - val_loss: 46.3317 - val_mae: 3.9561
Epoch 32/100
11/11  0s 12ms/step - loss: 28.3120 - mae: 3.9951 - val_loss: 46.9776 - val_mae: 3.9435
Epoch 33/100
11/11  0s 12ms/step - loss: 33.4214 - mae: 4.2301 - val_loss: 46.8235 - val_mae: 3.9172
Epoch 34/100
11/11  0s 13ms/step - loss: 30.6601 - mae: 4.0365 - val_loss: 46.5117 - val_mae: 3.8903
Epoch 35/100
11/11  0s 16ms/step - loss: 26.7843 - mae: 3.8691 - val_loss: 45.8217 - val_mae: 3.8808
Epoch 36/100
11/11  0s 13ms/step - loss: 28.1348 - mae: 3.8961 - val_loss: 45.0523 - val_mae: 3.8267
Epoch 37/100
11/11  0s 12ms/step - loss: 30.7032 - mae: 4.1450 - val_loss: 44.7618 - val_mae: 3.7935
Epoch 38/100
11/11  0s 12ms/step - loss: 31.1753 - mae: 4.1458 - val_loss: 44.7493 - val_mae: 3.7505
Epoch 39/100
11/11  0s 13ms/step - loss: 26.6024 - mae: 3.7909 - val_loss: 43.6194 - val_mae: 3.7969
Epoch 40/100
11/11  0s 13ms/step - loss: 38.9063 - mae: 4.5348 - val_loss: 43.4868 - val_mae: 3.7870


Epoch 41/100
11/11  0s 15ms/step - loss: 29.2651 - mae: 3.9513 - val_loss: 44.0852 - val_mae: 3.7153
Epoch 42/100
11/11  0s 13ms/step - loss: 28.8160 - mae: 4.0181 - val_loss: 43.8997 - val_mae: 3.6909
Epoch 43/100
11/11  0s 12ms/step - loss: 27.3103 - mae: 3.8196 - val_loss: 42.7834 - val_mae: 3.6829
Epoch 44/100
11/11  0s 12ms/step - loss: 28.7277 - mae: 4.0304 - val_loss: 42.1733 - val_mae: 3.7094
Epoch 45/100
11/11  0s 13ms/step - loss: 36.5713 - mae: 4.1485 - val_loss: 42.8663 - val_mae: 3.6154
Epoch 46/100
11/11  0s 12ms/step - loss: 32.2041 - mae: 4.1661 - val_loss: 42.5101 - val_mae: 3.6053
Epoch 47/100
11/11  0s 13ms/step - loss: 31.1986 - mae: 4.1325 - val_loss: 43.1417 - val_mae: 3.6061
Epoch 48/100
11/11  0s 12ms/step - loss: 26.0378 - mae: 3.8138 - val_loss: 43.0533 - val_mae: 3.5683
Epoch 49/100
11/11  0s 12ms/step - loss: 33.6849 - mae: 4.0176 - val_loss: 41.8853 - val_mae: 3.5894
Epoch 50/100
11/11  0s 15ms/step - loss: 28.6828 - mae: 4.0245 - val_loss: 42.2451 - val_mae: 3.5999
Epoch 51/100
11/11  0s 12ms/step - loss: 26.7065 - mae: 3.8168 - val_loss: 41.7802 - val_mae: 3.6363
Epoch 52/100
11/11  0s 12ms/step - loss: 27.9109 - mae: 3.7336 - val_loss: 41.9689 - val_mae: 3.5915
Epoch 53/100
11/11  0s 12ms/step - loss: 27.9380 - mae: 3.8088 - val_loss: 42.3026 - val_mae: 3.5295
Epoch 54/100
11/11  0s 13ms/step - loss: 27.5400 - mae: 3.8848 - val_loss: 42.9338 - val_mae: 3.4998
Epoch 55/100
11/11  0s 12ms/step - loss: 28.0896 - mae: 3.9336 - val_loss: 41.8868 - val_mae: 3.5291
Epoch 56/100
11/11  0s 12ms/step - loss: 29.2403 - mae: 4.0286 - val_loss: 41.3394 - val_mae: 3.5104
Epoch 57/100
11/11  0s 12ms/step - loss: 25.0094 - mae: 3.6529 - val_loss: 40.9243 - val_mae: 3.4822
Epoch 58/100
11/11  0s 12ms/step - loss: 28.3282 - mae: 3.8807 - val_loss: 40.4389 - val_mae: 3.4756
Epoch 59/100
11/11  0s 12ms/step - loss: 23.9808 - mae: 3.3274 - val_loss: 39.5179 - val_mae: 3.5626
Epoch 60/100
11/11  0s 12ms/step - loss: 30.7669 - mae: 4.1992 - val_loss: 39.0314 - val_mae: 3.4876


Epoch 61/100
11/11  0s 13ms/step - loss: 23.8391 - mae: 3.6413 - val_loss: 39.6873 - val_mae: 3.4503
Epoch 62/100
11/11  0s 14ms/step - loss: 25.5550 - mae: 3.6349 - val_loss: 39.8054 - val_mae: 3.4361
Epoch 63/100
11/11  0s 12ms/step - loss: 27.1337 - mae: 3.7882 - val_loss: 40.2493 - val_mae: 3.4331
Epoch 64/100
11/11  0s 12ms/step - loss: 24.1596 - mae: 3.5887 - val_loss: 40.0002 - val_mae: 3.4274
Epoch 65/100
11/11  0s 12ms/step - loss: 28.3941 - mae: 3.9023 - val_loss: 40.2111 - val_mae: 3.4168
Epoch 66/100
11/11  0s 12ms/step - loss: 28.8419 - mae: 3.9396 - val_loss: 39.7047 - val_mae: 3.4280
Epoch 67/100
11/11  0s 23ms/step - loss: 28.8776 - mae: 4.0349 - val_loss: 38.3478 - val_mae: 3.4032
Epoch 68/100
11/11  0s 13ms/step - loss: 24.8709 - mae: 3.6169 - val_loss: 38.6358 - val_mae: 3.3995
Epoch 69/100
11/11  0s 12ms/step - loss: 25.3141 - mae: 3.8358 - val_loss: 39.6575 - val_mae: 3.3900
Epoch 70/100
11/11  0s 13ms/step - loss: 27.4319 - mae: 3.8212 - val_loss: 39.2993 - val_mae: 3.3882
Epoch 71/100
11/11  0s 12ms/step - loss: 22.6524 - mae: 3.5462 - val_loss: 38.2969 - val_mae: 3.4207
Epoch 72/100
11/11  0s 14ms/step - loss: 26.6332 - mae: 3.8041 - val_loss: 38.7206 - val_mae: 3.4099
Epoch 73/100
11/11  0s 13ms/step - loss: 26.4196 - mae: 3.8733 - val_loss: 39.2630 - val_mae: 3.3972
Epoch 74/100
11/11  0s 14ms/step - loss: 27.6559 - mae: 3.8359 - val_loss: 39.3557 - val_mae: 3.3694
Epoch 75/100
11/11  0s 14ms/step - loss: 27.8616 - mae: 3.8484 - val_loss: 40.0798 - val_mae: 3.3624
Epoch 76/100
11/11  0s 11ms/step - loss: 25.8159 - mae: 3.7435 - val_loss: 39.7349 - val_mae: 3.3911
Epoch 77/100
11/11  0s 12ms/step - loss: 25.2647 - mae: 3.5422 - val_loss: 39.5716 - val_mae: 3.3982
Epoch 78/100
11/11  0s 12ms/step - loss: 22.4827 - mae: 3.4572 - val_loss: 40.9691 - val_mae: 3.3904
Epoch 79/100
11/11  0s 13ms/step - loss: 27.3886 - mae: 3.8134 - val_loss: 39.7438 - val_mae: 3.3741
Epoch 80/100
11/11  0s 15ms/step - loss: 28.2546 - mae: 3.8376 - val_loss: 40.3622 - val_mae: 3.3759



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Epoch 81/100
11/11  0s 13ms/step - loss: 30.0524 - mae: 3.9512 - val_loss:
42.0521 - val_mae: 3.3938
Epoch 82/100
11/11  0s 12ms/step - loss: 27.5293 - mae: 3.7673 - val_loss:
41.1799 - val_mae: 3.3532
Epoch 83/100
11/11  0s 12ms/step - loss: 21.8365 - mae: 3.2898 - val_loss:
41.3022 - val_mae: 3.3723
Epoch 84/100
11/11  0s 12ms/step - loss: 28.1285 - mae: 3.8333 - val_loss:
40.2807 - val_mae: 3.3694
Epoch 85/100
11/11  0s 12ms/step - loss: 27.5492 - mae: 4.0226 - val_loss:
38.9310 - val_mae: 3.3893
Epoch 86/100
11/11  0s 14ms/step - loss: 24.6923 - mae: 3.6058 - val_loss:
39.7120 - val_mae: 3.3147
Epoch 87/100
11/11  0s 12ms/step - loss: 23.4172 - mae: 3.4550 - val_loss:
39.1129 - val_mae: 3.3080
Epoch 88/100
11/11  0s 13ms/step - loss: 24.4149 - mae: 3.6699 - val_loss:
39.2242 - val_mae: 3.3107
Epoch 89/100
11/11  0s 12ms/step - loss: 29.2384 - mae: 3.9793 - val_loss:
40.2513 - val_mae: 3.2925
Epoch 90/100
11/11  0s 12ms/step - loss: 29.0678 - mae: 3.8195 - val_loss:
39.3575 - val_mae: 3.2902
Epoch 91/100
11/11  0s 12ms/step - loss: 23.2549 - mae: 3.5484 - val_loss:
39.7368 - val_mae: 3.2682
Epoch 92/100
11/11  0s 16ms/step - loss: 27.3079 - mae: 3.9671 - val_loss:
40.0117 - val_mae: 3.2640
Epoch 93/100
11/11  0s 12ms/step - loss: 26.2288 - mae: 3.7963 - val_loss:
38.9445 - val_mae: 3.3347
Epoch 94/100
11/11  0s 12ms/step - loss: 25.4250 - mae: 3.6403 - val_loss:
38.4574 - val_mae: 3.3480
Epoch 95/100
11/11  0s 12ms/step - loss: 22.0587 - mae: 3.3795 - val_loss:
38.3881 - val_mae: 3.2851
Epoch 96/100
11/11  0s 12ms/step - loss: 23.3985 - mae: 3.5722 - val_loss:
39.4304 - val_mae: 3.2791
Epoch 97/100
11/11  0s 13ms/step - loss: 23.6879 - mae: 3.4651 - val_loss:
38.7537 - val_mae: 3.2812
Epoch 98/100
11/11  0s 14ms/step - loss: 24.1559 - mae: 3.7225 - val_loss:
38.9067 - val_mae: 3.2747
Epoch 99/100
11/11  0s 12ms/step - loss: 25.4567 - mae: 3.7656 - val_loss:
38.3294 - val_mae: 3.2782
Epoch 100/100
11/11  0s 12ms/step - loss: 21.2446 - mae: 3.3851 - val_loss:
37.9414 - val_mae: 3.2686
```


Epoch 1/100
11/11  9s 97ms/step - loss: 516.7977 - mae: 20.7899 - val_loss: 542.8661 - val_mae: 20.8495


Epoch 2/100
11/11  0s 15ms/step - loss: 481.1187 - mae: 19.8715 - val_loss: 471.4465 - val_mae: 18.9687


Epoch 3/100
11/11  0s 13ms/step - loss: 409.0672 - mae: 17.6902 - val_loss: 392.9219 - val_mae: 16.9226


Epoch 4/100
11/11  0s 12ms/step - loss: 336.7422 - mae: 15.7329 - val_loss: 313.9356 - val_mae: 14.8053


Epoch 5/100
11/11  0s 12ms/step - loss: 260.7024 - mae: 13.7134 - val_loss: 241.7068 - val_mae: 12.7328


Epoch 6/100
11/11  0s 13ms/step - loss: 202.3529 - mae: 11.8896 - val_loss: 182.9226 - val_mae: 11.1489


Epoch 7/100
11/11  0s 12ms/step - loss: 186.6064 - mae: 11.0693 - val_loss: 141.3344 - val_mae: 9.7284


Epoch 8/100
11/11  0s 13ms/step - loss: 144.4150 - mae: 9.4067 - val_loss: 115.4135 - val_mae: 8.6597


Epoch 9/100
11/11  0s 12ms/step - loss: 140.8383 - mae: 9.3002 - val_loss: 95.3287 - val_mae: 7.8105


Epoch 10/100
11/11  0s 12ms/step - loss: 114.4728 - mae: 8.4167 - val_loss: 77.8460 - val_mae: 6.9969


Epoch 11/100
11/11  0s 13ms/step - loss: 74.0673 - mae: 6.8136 - val_loss: 62.7462 - val_mae: 6.2545


Epoch 12/100
11/11  0s 16ms/step - loss: 64.6968 - mae: 6.0292 - val_loss: 50.4553 - val_mae: 5.6269


Epoch 13/100
11/11  0s 12ms/step - loss: 63.6071 - mae: 5.8381 - val_loss: 41.7241 - val_mae: 5.1390


Epoch 14/100
11/11  0s 12ms/step - loss: 63.6481 - mae: 5.9921 - val_loss: 36.0037 - val_mae: 4.7507


Epoch 15/100
11/11  0s 12ms/step - loss: 60.9397 - mae: 5.7777 - val_loss: 32.0786 - val_mae: 4.5004

Epoch 16/100
11/11  0s 13ms/step - loss: 55.9856 - mae: 5.7525 - val_loss: 29.6014 - val_mae: 4.3038





















Epoch 17/100
11/11  0s 12ms/step - loss: 45.4325 - mae: 5.1240 - val_loss: 27.2186 - val_mae: 4.0302

Epoch 18/100
11/11  0s 12ms/step - loss: 51.7555 - mae: 5.4356 - val_loss: 25.7819 - val_mae: 3.8519





















Epoch 19/100
11/11  0s 13ms/step - loss: 45.4971 - mae: 5.0308 - val_loss: 24.9378 - val_mae: 3.6898





















Epoch 20/100
11/11  0s 13ms/step - loss: 46.9094 - mae: 4.9731 - val_loss: 24.9388 - val_mae: 3.6529

```





















Epoch 21/100
11/11  0s 13ms/step - loss: 43.6188 - mae: 4.7460 - val_loss:
24.0150 - val_mae: 3.5594
Epoch 22/100
11/11  0s 14ms/step - loss: 46.1662 - mae: 4.8372 - val_loss:
23.3208 - val_mae: 3.5124
Epoch 23/100
11/11  0s 16ms/step - loss: 47.6534 - mae: 5.0211 - val_loss:
22.1780 - val_mae: 3.3927
Epoch 24/100
11/11  0s 14ms/step - loss: 32.4199 - mae: 4.1566 - val_loss:
22.1061 - val_mae: 3.3836
Epoch 25/100
11/11  0s 16ms/step - loss: 45.2278 - mae: 4.8716 - val_loss:
22.0409 - val_mae: 3.3658
Epoch 26/100
11/11  0s 13ms/step - loss: 36.2888 - mae: 4.6051 - val_loss:
21.8826 - val_mae: 3.3440
Epoch 27/100
11/11  0s 12ms/step - loss: 37.5281 - mae: 4.5742 - val_loss:
21.5292 - val_mae: 3.2958
Epoch 28/100
11/11  0s 12ms/step - loss: 45.9648 - mae: 4.9884 - val_loss:
21.3939 - val_mae: 3.2571
Epoch 29/100
11/11  0s 12ms/step - loss: 42.0526 - mae: 4.5777 - val_loss:
20.7406 - val_mae: 3.1956
Epoch 30/100
11/11  0s 12ms/step - loss: 39.7766 - mae: 4.6193 - val_loss:
20.6386 - val_mae: 3.1486
Epoch 31/100
11/11  0s 13ms/step - loss: 38.8822 - mae: 4.6543 - val_loss:
21.2002 - val_mae: 3.1739
Epoch 32/100
11/11  0s 12ms/step - loss: 35.6417 - mae: 4.3453 - val_loss:
20.9165 - val_mae: 3.1474
Epoch 33/100
11/11  0s 14ms/step - loss: 39.8468 - mae: 4.5458 - val_loss:
19.8412 - val_mae: 3.0072
Epoch 34/100
11/11  0s 13ms/step - loss: 42.2798 - mae: 4.8822 - val_loss:
20.0256 - val_mae: 2.9813
Epoch 35/100
11/11  0s 13ms/step - loss: 35.8509 - mae: 4.5452 - val_loss:
20.4343 - val_mae: 3.0024
Epoch 36/100
11/11  0s 24ms/step - loss: 30.0502 - mae: 4.0928 - val_loss:
19.8760 - val_mae: 2.9329
Epoch 37/100
11/11  0s 12ms/step - loss: 39.4016 - mae: 4.6920 - val_loss:
19.5594 - val_mae: 2.8959
Epoch 38/100
11/11  0s 12ms/step - loss: 32.8264 - mae: 4.2708 - val_loss:
19.5579 - val_mae: 2.9027
Epoch 39/100
11/11  0s 12ms/step - loss: 31.1347 - mae: 4.0871 - val_loss:
19.2844 - val_mae: 2.8617
Epoch 40/100
11/11  0s 12ms/step - loss: 32.2773 - mae: 4.1898 - val_loss:
19.3493 - val_mae: 2.8588

```


Epoch 41/100
11/11  0s 13ms/step - loss: 30.4486 - mae: 4.0124 - val_loss: 19.9233 - val_mae: 2.9235
Epoch 42/100
11/11  0s 13ms/step - loss: 35.3982 - mae: 4.5829 - val_loss: 20.1873 - val_mae: 2.9175
Epoch 43/100
11/11  0s 12ms/step - loss: 28.2744 - mae: 3.9343 - val_loss: 19.9350 - val_mae: 2.8768
Epoch 44/100
11/11  0s 12ms/step - loss: 30.6568 - mae: 4.2627 - val_loss: 19.7101 - val_mae: 2.8714
Epoch 45/100
11/11  0s 13ms/step - loss: 36.0269 - mae: 4.4642 - val_loss: 19.4491 - val_mae: 2.8387
Epoch 46/100
11/11  0s 12ms/step - loss: 29.8968 - mae: 3.9792 - val_loss: 18.7228 - val_mae: 2.7730
Epoch 47/100
11/11  0s 13ms/step - loss: 29.3358 - mae: 4.0330 - val_loss: 17.8225 - val_mae: 2.6827
Epoch 48/100
11/11  0s 21ms/step - loss: 26.6238 - mae: 3.8123 - val_loss: 18.1123 - val_mae: 2.7174
Epoch 49/100
11/11  0s 12ms/step - loss: 27.4483 - mae: 3.7591 - val_loss: 18.3418 - val_mae: 2.7308
Epoch 50/100
11/11  0s 12ms/step - loss: 33.7175 - mae: 4.2069 - val_loss: 18.1526 - val_mae: 2.6840
Epoch 51/100
11/11  0s 13ms/step - loss: 29.4288 - mae: 3.9423 - val_loss: 18.1155 - val_mae: 2.6550
Epoch 52/100
11/11  0s 12ms/step - loss: 27.0967 - mae: 3.8097 - val_loss: 18.7346 - val_mae: 2.6929
Epoch 53/100
11/11  0s 13ms/step - loss: 20.6737 - mae: 3.2453 - val_loss: 19.5637 - val_mae: 2.7519
Epoch 54/100
11/11  0s 12ms/step - loss: 33.7049 - mae: 4.3102 - val_loss: 19.1063 - val_mae: 2.6973
Epoch 55/100
11/11  0s 12ms/step - loss: 27.9451 - mae: 3.8852 - val_loss: 18.9712 - val_mae: 2.6676
Epoch 56/100
11/11  0s 12ms/step - loss: 29.2899 - mae: 3.7650 - val_loss: 19.7869 - val_mae: 2.7298
Epoch 57/100
11/11  0s 12ms/step - loss: 27.7953 - mae: 3.8577 - val_loss: 20.6502 - val_mae: 2.8153
Epoch 58/100
11/11  0s 12ms/step - loss: 25.9488 - mae: 3.8100 - val_loss: 20.1292 - val_mae: 2.7120
Epoch 59/100
11/11  0s 12ms/step - loss: 26.6757 - mae: 3.8182 - val_loss: 19.4182 - val_mae: 2.6669
Epoch 60/100
11/11  0s 15ms/step - loss: 27.8216 - mae: 3.8521 - val_loss: 18.6143 - val_mae: 2.6096


Epoch 61/100
11/11  0s 12ms/step - loss: 26.4426 - mae: 3.8781 - val_loss: 18.7277 - val_mae: 2.5776
Epoch 62/100
11/11  0s 12ms/step - loss: 32.1488 - mae: 4.1774 - val_loss: 19.6824 - val_mae: 2.6418
Epoch 63/100
11/11  0s 13ms/step - loss: 29.3163 - mae: 3.9278 - val_loss: 19.1805 - val_mae: 2.6104
Epoch 64/100
11/11  0s 14ms/step - loss: 25.7738 - mae: 3.7548 - val_loss: 19.2526 - val_mae: 2.6033
Epoch 65/100
11/11  0s 12ms/step - loss: 25.2863 - mae: 3.6626 - val_loss: 19.2374 - val_mae: 2.6097
Epoch 66/100
11/11  0s 12ms/step - loss: 24.8995 - mae: 3.7986 - val_loss: 18.8169 - val_mae: 2.5822
Epoch 67/100
11/11  0s 12ms/step - loss: 30.4719 - mae: 3.9845 - val_loss: 18.0790 - val_mae: 2.5356
Epoch 68/100
11/11  0s 13ms/step - loss: 32.8635 - mae: 3.9681 - val_loss: 18.8380 - val_mae: 2.6025
Epoch 69/100
11/11  0s 13ms/step - loss: 27.9700 - mae: 3.8858 - val_loss: 19.2631 - val_mae: 2.6232
Epoch 70/100
11/11  0s 23ms/step - loss: 26.5447 - mae: 3.8640 - val_loss: 19.2701 - val_mae: 2.6118
Epoch 71/100
11/11  0s 12ms/step - loss: 25.1388 - mae: 3.6542 - val_loss: 18.5526 - val_mae: 2.5565
Epoch 72/100
11/11  0s 12ms/step - loss: 31.3233 - mae: 3.9322 - val_loss: 18.6372 - val_mae: 2.5489
Epoch 73/100
11/11  0s 13ms/step - loss: 27.6699 - mae: 3.8762 - val_loss: 18.9560 - val_mae: 2.5736
Epoch 74/100
11/11  0s 13ms/step - loss: 21.7965 - mae: 3.3540 - val_loss: 19.6036 - val_mae: 2.6058
Epoch 75/100
11/11  0s 12ms/step - loss: 29.8020 - mae: 4.1592 - val_loss: 19.6659 - val_mae: 2.5886
Epoch 76/100
11/11  0s 12ms/step - loss: 30.5069 - mae: 4.0388 - val_loss: 19.0405 - val_mae: 2.4872
Epoch 77/100
11/11  0s 13ms/step - loss: 27.0475 - mae: 3.8011 - val_loss: 18.8938 - val_mae: 2.4702
Epoch 78/100
11/11  0s 13ms/step - loss: 26.0009 - mae: 3.6738 - val_loss: 19.3976 - val_mae: 2.5041
Epoch 79/100
11/11  0s 12ms/step - loss: 25.9760 - mae: 3.5958 - val_loss: 19.7803 - val_mae: 2.5471
Epoch 80/100
11/11  0s 12ms/step - loss: 27.7534 - mae: 3.8115 - val_loss: 19.2194 - val_mae: 2.4842


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Epoch 81/100
11/11  0s 25ms/step - loss: 27.1299 - mae: 3.8416 - val_loss:
19.9620 - val_mae: 2.5569
Epoch 82/100
11/11  0s 13ms/step - loss: 22.2321 - mae: 3.2436 - val_loss:
20.4733 - val_mae: 2.6362
Epoch 83/100
11/11  0s 14ms/step - loss: 28.3073 - mae: 3.8653 - val_loss:
20.6880 - val_mae: 2.6200
Epoch 84/100
11/11  0s 13ms/step - loss: 26.8455 - mae: 3.7723 - val_loss:
19.9753 - val_mae: 2.5632
Epoch 85/100
11/11  0s 12ms/step - loss: 24.1122 - mae: 3.5396 - val_loss:
18.4856 - val_mae: 2.4685
Epoch 86/100
11/11  0s 13ms/step - loss: 28.9892 - mae: 3.9007 - val_loss:
18.7249 - val_mae: 2.4656
Epoch 87/100
11/11  0s 13ms/step - loss: 28.5615 - mae: 3.6699 - val_loss:
19.4867 - val_mae: 2.5021
Epoch 88/100
11/11  0s 12ms/step - loss: 28.9328 - mae: 3.7974 - val_loss:
18.9801 - val_mae: 2.4558
Epoch 89/100
11/11  0s 23ms/step - loss: 27.2696 - mae: 3.5861 - val_loss:
18.8792 - val_mae: 2.4444
Epoch 90/100
11/11  0s 13ms/step - loss: 22.4594 - mae: 3.3207 - val_loss:
19.5074 - val_mae: 2.4862
Epoch 91/100
11/11  0s 12ms/step - loss: 26.2740 - mae: 3.8390 - val_loss:
19.1355 - val_mae: 2.5060
Epoch 92/100
11/11  0s 12ms/step - loss: 25.0146 - mae: 3.6406 - val_loss:
19.3437 - val_mae: 2.4962
Epoch 93/100
11/11  0s 12ms/step - loss: 28.4450 - mae: 3.8095 - val_loss:
19.1652 - val_mae: 2.4564
Epoch 94/100
11/11  0s 14ms/step - loss: 23.1269 - mae: 3.6037 - val_loss:
19.0565 - val_mae: 2.4544
Epoch 95/100
11/11  0s 12ms/step - loss: 22.9452 - mae: 3.5599 - val_loss:
19.7526 - val_mae: 2.4934
Epoch 96/100
11/11  0s 13ms/step - loss: 27.3846 - mae: 3.7379 - val_loss:
20.0660 - val_mae: 2.5363
Epoch 97/100
11/11  0s 13ms/step - loss: 24.5055 - mae: 3.6520 - val_loss:
19.2979 - val_mae: 2.4729
Epoch 98/100
11/11  0s 12ms/step - loss: 29.2431 - mae: 3.8830 - val_loss:
18.9288 - val_mae: 2.4681
Epoch 99/100
11/11  0s 22ms/step - loss: 21.1472 - mae: 3.3603 - val_loss:
18.9324 - val_mae: 2.5156
Epoch 100/100
11/11  0s 12ms/step - loss: 23.0072 - mae: 3.3918 - val_loss:
18.4835 - val_mae: 2.4924


```


Epoch 1/100
11/11  8s 91ms/step - loss: 664.9630 - mae: 23.6887 - val_loss: 514.6874 - val_mae: 20.7208


Epoch 2/100
11/11  0s 15ms/step - loss: 593.2025 - mae: 22.3107 - val_loss: 465.0459 - val_mae: 19.2536


Epoch 3/100
11/11  0s 12ms/step - loss: 527.6546 - mae: 20.3753 - val_loss: 418.3965 - val_mae: 18.0413


Epoch 4/100
11/11  0s 12ms/step - loss: 451.9919 - mae: 18.7183 - val_loss: 372.9700 - val_mae: 16.8997


Epoch 5/100
11/11  0s 13ms/step - loss: 443.8034 - mae: 18.2619 - val_loss: 328.1088 - val_mae: 15.7509


Epoch 6/100
11/11  0s 12ms/step - loss: 381.4230 - mae: 16.7337 - val_loss: 283.5959 - val_mae: 14.6744


Epoch 7/100
11/11  0s 12ms/step - loss: 326.3298 - mae: 15.6422 - val_loss: 237.7278 - val_mae: 13.5597


Epoch 8/100
11/11  0s 12ms/step - loss: 225.6249 - mae: 12.6727 - val_loss: 190.6595 - val_mae: 12.1681


Epoch 9/100
11/11  0s 12ms/step - loss: 204.2025 - mae: 12.3632 - val_loss: 144.1546 - val_mae: 10.4606


Epoch 10/100
11/11  0s 14ms/step - loss: 164.1543 - mae: 10.5569 - val_loss: 102.7222 - val_mae: 8.5954


Epoch 11/100
11/11  0s 12ms/step - loss: 129.3009 - mae: 9.3149 - val_loss: 70.0984 - val_mae: 6.7161


Epoch 12/100
11/11  0s 15ms/step - loss: 94.8449 - mae: 7.5978 - val_loss: 52.2635 - val_mae: 5.6001


Epoch 13/100
11/11  0s 13ms/step - loss: 77.9495 - mae: 6.9775 - val_loss: 43.1861 - val_mae: 5.0753

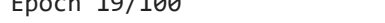
Epoch 14/100
11/11  0s 13ms/step - loss: 69.4825 - mae: 6.6788 - val_loss: 36.7004 - val_mae: 4.6155

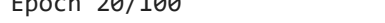
Epoch 15/100
11/11  0s 13ms/step - loss: 65.2075 - mae: 6.0918 - val_loss: 30.1460 - val_mae: 4.1075





















Epoch 16/100
11/11  0s 12ms/step - loss: 47.3653 - mae: 5.0668 - val_loss: 26.0475 - val_mae: 3.7405





















Epoch 17/100
11/11  0s 14ms/step - loss: 48.7728 - mae: 5.1599 - val_loss: 23.4396 - val_mae: 3.4882





















Epoch 18/100
11/11  0s 13ms/step - loss: 52.3505 - mae: 5.4584 - val_loss: 21.3713 - val_mae: 3.3296

Epoch 19/100
11/11  0s 13ms/step - loss: 51.6102 - mae: 5.3156 - val_loss: 20.2888 - val_mae: 3.2737





















Epoch 20/100
11/11  0s 14ms/step - loss: 45.8811 - mae: 5.1208 - val_loss: 19.2530 - val_mae: 3.2041

Epoch 21/100
11/11  0s 12ms/step - loss: 54.1033 - mae: 5.6041 - val_loss: 18.3325 - val_mae: 3.1165
Epoch 22/100
11/11  0s 27ms/step - loss: 39.5453 - mae: 4.6521 - val_loss: 17.9272 - val_mae: 3.0934
Epoch 23/100
11/11  0s 13ms/step - loss: 48.6490 - mae: 5.0148 - val_loss: 17.0803 - val_mae: 3.0095
Epoch 24/100
11/11  0s 13ms/step - loss: 34.7934 - mae: 4.4087 - val_loss: 16.4845 - val_mae: 2.9574
Epoch 25/100
11/11  0s 13ms/step - loss: 36.3858 - mae: 4.4707 - val_loss: 16.3688 - val_mae: 2.9459
Epoch 26/100
11/11  0s 12ms/step - loss: 39.6142 - mae: 4.5356 - val_loss: 16.4572 - val_mae: 2.9832
Epoch 27/100
11/11  0s 13ms/step - loss: 44.9495 - mae: 4.8610 - val_loss: 16.6704 - val_mae: 3.0303
Epoch 28/100
11/11  0s 12ms/step - loss: 41.6211 - mae: 4.5687 - val_loss: 16.6983 - val_mae: 3.0489
Epoch 29/100
11/11  0s 13ms/step - loss: 45.7407 - mae: 4.9793 - val_loss: 15.0717 - val_mae: 2.8265
Epoch 30/100
11/11  0s 13ms/step - loss: 35.3568 - mae: 4.3660 - val_loss: 15.2094 - val_mae: 2.8577
Epoch 31/100
11/11  0s 24ms/step - loss: 36.1312 - mae: 4.3702 - val_loss: 15.3593 - val_mae: 2.8911
Epoch 32/100
11/11  0s 12ms/step - loss: 48.2105 - mae: 4.9938 - val_loss: 15.1394 - val_mae: 2.8697
Epoch 33/100
11/11  0s 12ms/step - loss: 39.4408 - mae: 4.5326 - val_loss: 14.2585 - val_mae: 2.7620
Epoch 34/100
11/11  0s 12ms/step - loss: 42.2824 - mae: 4.8015 - val_loss: 14.0146 - val_mae: 2.7274
Epoch 35/100
11/11  0s 12ms/step - loss: 38.6733 - mae: 4.2373 - val_loss: 14.0473 - val_mae: 2.7331
Epoch 36/100
11/11  0s 12ms/step - loss: 38.0515 - mae: 4.5629 - val_loss: 13.6584 - val_mae: 2.6768
Epoch 37/100
11/11  0s 12ms/step - loss: 36.6186 - mae: 4.3703 - val_loss: 13.4177 - val_mae: 2.6528
Epoch 38/100
11/11  0s 12ms/step - loss: 43.6956 - mae: 4.6652 - val_loss: 12.6456 - val_mae: 2.5196
Epoch 39/100
11/11  0s 11ms/step - loss: 35.8442 - mae: 4.3912 - val_loss: 12.4481 - val_mae: 2.4906
Epoch 40/100
11/11  0s 12ms/step - loss: 35.4495 - mae: 4.3348 - val_loss: 12.5474 - val_mae: 2.4927

Epoch 41/100
11/11  0s 22ms/step - loss: 33.3418 - mae: 4.3368 - val_loss: 12.7022 - val_mae: 2.5285
Epoch 42/100
11/11  0s 12ms/step - loss: 39.2527 - mae: 4.7441 - val_loss: 12.7015 - val_mae: 2.5172
Epoch 43/100
11/11  0s 12ms/step - loss: 44.0646 - mae: 4.7492 - val_loss: 12.8225 - val_mae: 2.5174
Epoch 44/100
11/11  0s 12ms/step - loss: 29.1222 - mae: 3.9669 - val_loss: 13.3414 - val_mae: 2.5929
Epoch 45/100
11/11  0s 13ms/step - loss: 35.7667 - mae: 4.3807 - val_loss: 12.9103 - val_mae: 2.5608
Epoch 46/100
11/11  0s 12ms/step - loss: 38.2857 - mae: 4.7869 - val_loss: 12.5974 - val_mae: 2.4882
Epoch 47/100
11/11  0s 12ms/step - loss: 37.1138 - mae: 4.3257 - val_loss: 12.3051 - val_mae: 2.4401
Epoch 48/100
11/11  0s 12ms/step - loss: 31.3198 - mae: 4.2467 - val_loss: 12.4751 - val_mae: 2.4543
Epoch 49/100
11/11  0s 12ms/step - loss: 38.4954 - mae: 4.3660 - val_loss: 13.2081 - val_mae: 2.5750
Epoch 50/100
11/11  0s 12ms/step - loss: 35.4760 - mae: 4.0502 - val_loss: 12.9629 - val_mae: 2.5425
Epoch 51/100
11/11  0s 15ms/step - loss: 36.7802 - mae: 4.2541 - val_loss: 12.3342 - val_mae: 2.4680
Epoch 52/100
11/11  0s 12ms/step - loss: 36.6430 - mae: 4.4785 - val_loss: 12.4634 - val_mae: 2.4815
Epoch 53/100
11/11  0s 12ms/step - loss: 31.6700 - mae: 4.0234 - val_loss: 12.9376 - val_mae: 2.5403
Epoch 54/100
11/11  0s 12ms/step - loss: 32.2503 - mae: 4.1680 - val_loss: 12.1699 - val_mae: 2.4370
Epoch 55/100
11/11  0s 12ms/step - loss: 34.5836 - mae: 4.3710 - val_loss: 11.7752 - val_mae: 2.3828
Epoch 56/100
11/11  0s 11ms/step - loss: 34.0785 - mae: 4.2531 - val_loss: 12.1421 - val_mae: 2.4360
Epoch 57/100
11/11  0s 12ms/step - loss: 37.5968 - mae: 4.6483 - val_loss: 12.2705 - val_mae: 2.4459
Epoch 58/100
11/11  0s 23ms/step - loss: 27.6297 - mae: 3.9211 - val_loss: 11.9648 - val_mae: 2.3876
Epoch 59/100
11/11  0s 13ms/step - loss: 35.9456 - mae: 4.2784 - val_loss: 11.8404 - val_mae: 2.3647
Epoch 60/100
11/11  0s 12ms/step - loss: 36.2987 - mae: 4.3949 - val_loss: 11.7794 - val_mae: 2.3367

Epoch 61/100
11/11  0s 12ms/step - loss: 37.2629 - mae: 4.3855 - val_loss: 11.6488 - val_mae: 2.3352
Epoch 62/100
11/11  0s 12ms/step - loss: 35.5063 - mae: 4.3037 - val_loss: 11.9857 - val_mae: 2.3686
Epoch 63/100
11/11  0s 13ms/step - loss: 43.6474 - mae: 4.6320 - val_loss: 12.8407 - val_mae: 2.5231
Epoch 64/100
11/11  0s 14ms/step - loss: 33.8969 - mae: 4.3673 - val_loss: 11.7246 - val_mae: 2.3297
Epoch 65/100
11/11  0s 12ms/step - loss: 29.3974 - mae: 3.9133 - val_loss: 11.9646 - val_mae: 2.3552
Epoch 66/100
11/11  0s 12ms/step - loss: 37.4281 - mae: 4.2901 - val_loss: 12.3970 - val_mae: 2.4375
Epoch 67/100
11/11  0s 12ms/step - loss: 31.6042 - mae: 4.0153 - val_loss: 11.9607 - val_mae: 2.3848
Epoch 68/100
11/11  0s 12ms/step - loss: 34.1883 - mae: 4.4259 - val_loss: 12.1140 - val_mae: 2.4278
Epoch 69/100
11/11  0s 15ms/step - loss: 39.8746 - mae: 4.5358 - val_loss: 12.3224 - val_mae: 2.4630
Epoch 70/100
11/11  0s 13ms/step - loss: 31.6930 - mae: 4.0021 - val_loss: 11.7541 - val_mae: 2.3862
Epoch 71/100
11/11  0s 12ms/step - loss: 34.0580 - mae: 4.2500 - val_loss: 11.6242 - val_mae: 2.3755
Epoch 72/100
11/11  0s 12ms/step - loss: 33.5886 - mae: 4.1468 - val_loss: 11.4448 - val_mae: 2.3588
Epoch 73/100
11/11  0s 12ms/step - loss: 30.3389 - mae: 4.0502 - val_loss: 11.5269 - val_mae: 2.3848
Epoch 74/100
11/11  0s 13ms/step - loss: 38.2127 - mae: 4.3502 - val_loss: 11.5418 - val_mae: 2.3930
Epoch 75/100
11/11  0s 12ms/step - loss: 30.4484 - mae: 4.0763 - val_loss: 11.6184 - val_mae: 2.4077
Epoch 76/100
11/11  0s 12ms/step - loss: 32.7098 - mae: 4.0866 - val_loss: 11.4400 - val_mae: 2.3621
Epoch 77/100
11/11  0s 13ms/step - loss: 27.2855 - mae: 3.7638 - val_loss: 11.7102 - val_mae: 2.3917
Epoch 78/100
11/11  0s 21ms/step - loss: 33.4894 - mae: 4.1260 - val_loss: 11.9096 - val_mae: 2.4148
Epoch 79/100
11/11  0s 12ms/step - loss: 26.1624 - mae: 3.8824 - val_loss: 11.5838 - val_mae: 2.3541
Epoch 80/100
11/11  0s 12ms/step - loss: 29.5565 - mae: 3.7541 - val_loss: 11.4781 - val_mae: 2.3522


```

Epoch 81/100
11/11  0s 13ms/step - loss: 35.1981 - mae: 4.2228 - val_loss:
11.5121 - val_mae: 2.3433
Epoch 82/100
11/11  0s 12ms/step - loss: 36.2161 - mae: 4.1793 - val_loss:
11.4414 - val_mae: 2.3542
Epoch 83/100
11/11  0s 12ms/step - loss: 31.9913 - mae: 4.0382 - val_loss:
11.8661 - val_mae: 2.4407
Epoch 84/100
11/11  0s 12ms/step - loss: 32.1711 - mae: 4.2512 - val_loss:
11.4569 - val_mae: 2.3849
Epoch 85/100
11/11  0s 13ms/step - loss: 38.2120 - mae: 4.1226 - val_loss:
12.0720 - val_mae: 2.4642
Epoch 86/100
11/11  0s 13ms/step - loss: 31.8367 - mae: 4.0546 - val_loss:
11.2336 - val_mae: 2.3491
Epoch 87/100
11/11  0s 15ms/step - loss: 30.4867 - mae: 3.8984 - val_loss:
10.8801 - val_mae: 2.2939
Epoch 88/100
11/11  0s 12ms/step - loss: 29.2033 - mae: 3.8532 - val_loss:
11.2650 - val_mae: 2.3665
Epoch 89/100
11/11  0s 12ms/step - loss: 26.8581 - mae: 3.8158 - val_loss:
11.1979 - val_mae: 2.3638
Epoch 90/100
11/11  0s 12ms/step - loss: 34.1391 - mae: 4.2173 - val_loss:
10.9255 - val_mae: 2.3108
Epoch 91/100
11/11  0s 13ms/step - loss: 26.2048 - mae: 3.7369 - val_loss:
10.9113 - val_mae: 2.3108
Epoch 92/100
11/11  0s 13ms/step - loss: 31.4931 - mae: 4.0747 - val_loss:
10.8390 - val_mae: 2.3148
Epoch 93/100
11/11  0s 12ms/step - loss: 25.2583 - mae: 3.7443 - val_loss:
11.1949 - val_mae: 2.3625
Epoch 94/100
11/11  0s 12ms/step - loss: 33.8747 - mae: 3.9670 - val_loss:
11.0238 - val_mae: 2.3499
Epoch 95/100
11/11  0s 22ms/step - loss: 32.1001 - mae: 4.1783 - val_loss:
10.6191 - val_mae: 2.2917
Epoch 96/100
11/11  0s 13ms/step - loss: 30.3857 - mae: 4.1293 - val_loss:
10.4483 - val_mae: 2.2922
Epoch 97/100
11/11  0s 12ms/step - loss: 27.1880 - mae: 3.7962 - val_loss:
10.5281 - val_mae: 2.3050
Epoch 98/100
11/11  0s 12ms/step - loss: 23.0885 - mae: 3.4019 - val_loss:
11.2052 - val_mae: 2.3885
Epoch 99/100
11/11  0s 12ms/step - loss: 26.8037 - mae: 3.7964 - val_loss:
11.1011 - val_mae: 2.3782
Epoch 100/100
11/11  0s 12ms/step - loss: 28.4208 - mae: 3.8729 - val_loss:
10.5730 - val_mae: 2.2838


```

Average Validation MAE across folds: 2.7463


Epoch 1/100

11/11  8s 91ms/step - loss: 617.7765 - mae: 22.4958 - val_loss: 456.2929 - val_mae: 19.6547


Epoch 2/100

11/11  0s 14ms/step - loss: 525.3419 - mae: 20.6153 - val_loss: 381.0958 - val_mae: 17.7210


Epoch 3/100

11/11  0s 13ms/step - loss: 411.1614 - mae: 18.0322 - val_loss: 311.6101 - val_mae: 15.7850


Epoch 4/100

11/11  0s 11ms/step - loss: 326.1548 - mae: 15.6501 - val_loss: 246.4425 - val_mae: 13.8056


Epoch 5/100

11/11  0s 13ms/step - loss: 262.5637 - mae: 13.7284 - val_loss: 185.7236 - val_mae: 11.7225


Epoch 6/100

11/11  0s 12ms/step - loss: 233.4237 - mae: 12.7078 - val_loss: 132.9026 - val_mae: 9.5990


Epoch 7/100

11/11  0s 12ms/step - loss: 153.1158 - mae: 9.6686 - val_loss: 90.8469 - val_mae: 7.5735


Epoch 8/100

11/11  0s 14ms/step - loss: 138.3147 - mae: 9.3100 - val_loss: 63.1882 - val_mae: 6.0427


Epoch 9/100

11/11  0s 12ms/step - loss: 112.1017 - mae: 8.6169 - val_loss: 47.6826 - val_mae: 5.0695


Epoch 10/100

11/11  0s 12ms/step - loss: 83.5018 - mae: 7.2996 - val_loss: 40.1285 - val_mae: 4.5469


Epoch 11/100

11/11  0s 13ms/step - loss: 82.7643 - mae: 6.7517 - val_loss: 35.2805 - val_mae: 4.1755


Epoch 12/100

11/11  0s 13ms/step - loss: 73.3657 - mae: 6.5624 - val_loss: 33.9906 - val_mae: 4.0806


Epoch 13/100

11/11  0s 13ms/step - loss: 61.1731 - mae: 5.7723 - val_loss: 33.0564 - val_mae: 4.0470


Epoch 14/100

11/11  0s 14ms/step - loss: 64.8188 - mae: 6.0442 - val_loss: 30.7847 - val_mae: 3.8184


Epoch 15/100

11/11  0s 13ms/step - loss: 57.6963 - mae: 5.8906 - val_loss: 29.5546 - val_mae: 3.7173


Epoch 16/100

11/11  0s 12ms/step - loss: 52.1865 - mae: 5.4834 - val_loss: 29.4991 - val_mae: 3.7115


Epoch 17/100

11/11  0s 15ms/step - loss: 55.3028 - mae: 5.5817 - val_loss: 29.8802 - val_mae: 3.7649

Epoch 18/100

11/11  0s 12ms/step - loss: 46.0004 - mae: 5.1428 - val_loss: 29.3616 - val_mae: 3.7216





















Epoch 19/100

11/11  0s 12ms/step - loss: 51.5379 - mae: 5.4944 - val_loss: 28.9287 - val_mae: 3.6686





















Epoch 20/100

11/11  0s 25ms/step - loss: 46.7002 - mae: 5.3052 - val_loss:





















```

29.0773 - val_mae: 3.6669
Epoch 21/100
11/11  0s 11ms/step - loss: 58.5295 - mae: 5.6695 - val_loss:
28.5402 - val_mae: 3.6222
Epoch 22/100
11/11  0s 14ms/step - loss: 49.7377 - mae: 5.3575 - val_loss:
29.1093 - val_mae: 3.6632
Epoch 23/100
11/11  0s 12ms/step - loss: 40.7496 - mae: 4.7737 - val_loss:
28.1013 - val_mae: 3.6022
Epoch 24/100
11/11  0s 13ms/step - loss: 44.4952 - mae: 4.9973 - val_loss:
27.4578 - val_mae: 3.5526
Epoch 25/100
11/11  0s 13ms/step - loss: 40.9787 - mae: 4.9017 - val_loss:
26.6796 - val_mae: 3.4825
Epoch 26/100
11/11  0s 12ms/step - loss: 38.9244 - mae: 4.5210 - val_loss:
26.2177 - val_mae: 3.4481
Epoch 27/100
11/11  0s 13ms/step - loss: 40.8144 - mae: 4.7080 - val_loss:
26.0624 - val_mae: 3.4568
Epoch 28/100
11/11  0s 25ms/step - loss: 37.7855 - mae: 4.7963 - val_loss:
25.7540 - val_mae: 3.4348
Epoch 29/100
11/11  0s 12ms/step - loss: 47.6566 - mae: 5.1746 - val_loss:
25.6261 - val_mae: 3.4161
Epoch 30/100
11/11  0s 12ms/step - loss: 43.0688 - mae: 5.0639 - val_loss:
25.5090 - val_mae: 3.3956
Epoch 31/100
11/11  0s 12ms/step - loss: 41.6642 - mae: 4.7438 - val_loss:
26.0384 - val_mae: 3.4359
Epoch 32/100
11/11  0s 12ms/step - loss: 33.6881 - mae: 4.3611 - val_loss:
25.3036 - val_mae: 3.3816
Epoch 33/100
11/11  0s 12ms/step - loss: 45.8692 - mae: 4.9922 - val_loss:
24.8782 - val_mae: 3.3571
Epoch 34/100
11/11  0s 12ms/step - loss: 48.0719 - mae: 5.0720 - val_loss:
24.3695 - val_mae: 3.3172
Epoch 35/100
11/11  0s 12ms/step - loss: 47.5413 - mae: 5.0865 - val_loss:
24.3031 - val_mae: 3.2977
Epoch 36/100
11/11  0s 14ms/step - loss: 42.5462 - mae: 4.7727 - val_loss:
23.9742 - val_mae: 3.2785
Epoch 37/100
11/11  0s 15ms/step - loss: 42.8030 - mae: 4.8015 - val_loss:
23.7035 - val_mae: 3.2524
Epoch 38/100
11/11  0s 13ms/step - loss: 32.2671 - mae: 4.3834 - val_loss:
23.8254 - val_mae: 3.2396
Epoch 39/100
11/11  0s 12ms/step - loss: 38.6169 - mae: 4.6021 - val_loss:
23.6094 - val_mae: 3.1643
Epoch 40/100
11/11  0s 13ms/step - loss: 42.4603 - mae: 4.8470 - val_loss:

```





















22.9340 - val_mae: 3.1049
Epoch 41/100
11/11  0s 12ms/step - loss: 35.1985 - mae: 4.2264 - val_loss: 22.4644 - val_mae: 3.0895
Epoch 42/100
11/11  0s 20ms/step - loss: 35.9941 - mae: 4.3304 - val_loss: 22.1361 - val_mae: 3.0673
Epoch 43/100
11/11  0s 14ms/step - loss: 33.6204 - mae: 4.2447 - val_loss: 21.7197 - val_mae: 3.0200
Epoch 44/100
11/11  0s 12ms/step - loss: 30.9786 - mae: 4.0689 - val_loss: 22.0841 - val_mae: 3.0355
Epoch 45/100
11/11  0s 13ms/step - loss: 35.4536 - mae: 4.4146 - val_loss: 22.1001 - val_mae: 3.0317
Epoch 46/100
11/11  0s 12ms/step - loss: 34.9002 - mae: 4.4104 - val_loss: 21.8944 - val_mae: 3.0036
Epoch 47/100
11/11  0s 12ms/step - loss: 35.4558 - mae: 4.5066 - val_loss: 21.1792 - val_mae: 2.9571
Epoch 48/100
11/11  0s 12ms/step - loss: 34.1834 - mae: 4.1564 - val_loss: 20.7994 - val_mae: 2.9128
Epoch 49/100
11/11  0s 12ms/step - loss: 33.4549 - mae: 4.2485 - val_loss: 20.5741 - val_mae: 2.9291
Epoch 50/100
11/11  0s 20ms/step - loss: 33.3754 - mae: 4.3590 - val_loss: 20.6308 - val_mae: 2.9580
Epoch 51/100
11/11  0s 13ms/step - loss: 32.1017 - mae: 4.2512 - val_loss: 20.7118 - val_mae: 2.9687
Epoch 52/100
11/11  0s 12ms/step - loss: 36.7127 - mae: 4.4246 - val_loss: 20.5787 - val_mae: 2.9335
Epoch 53/100
11/11  0s 12ms/step - loss: 33.6616 - mae: 4.2822 - val_loss: 21.3345 - val_mae: 3.0200
Epoch 54/100
11/11  0s 12ms/step - loss: 33.0691 - mae: 4.3736 - val_loss: 20.5622 - val_mae: 2.9537
Epoch 55/100
11/11  0s 12ms/step - loss: 35.5356 - mae: 4.3983 - val_loss: 20.1818 - val_mae: 2.8977
Epoch 56/100
11/11  0s 12ms/step - loss: 37.3707 - mae: 4.5054 - val_loss: 19.8720 - val_mae: 2.8851
Epoch 57/100
11/11  0s 12ms/step - loss: 27.2578 - mae: 3.9329 - val_loss: 19.5414 - val_mae: 2.8991
Epoch 58/100
11/11  0s 13ms/step - loss: 25.8231 - mae: 3.7559 - val_loss: 19.5714 - val_mae: 2.9267
Epoch 59/100
11/11  0s 13ms/step - loss: 33.4166 - mae: 4.1690 - val_loss: 19.2763 - val_mae: 2.8918
Epoch 60/100
11/11  0s 21ms/step - loss: 32.4264 - mae: 4.3260 - val_loss:

```

19.4408 - val_mae: 2.8553
Epoch 61/100
11/11  0s 12ms/step - loss: 31.4819 - mae: 3.9507 - val_loss:
19.0822 - val_mae: 2.7963
Epoch 62/100
11/11  0s 12ms/step - loss: 32.5005 - mae: 4.2687 - val_loss:
19.2688 - val_mae: 2.8371
Epoch 63/100
11/11  0s 13ms/step - loss: 24.9500 - mae: 3.6162 - val_loss:
19.2447 - val_mae: 2.8437
Epoch 64/100
11/11  0s 12ms/step - loss: 25.3962 - mae: 3.7977 - val_loss:
19.3501 - val_mae: 2.8365
Epoch 65/100
11/11  0s 13ms/step - loss: 37.6304 - mae: 4.4250 - val_loss:
19.0095 - val_mae: 2.7849
Epoch 66/100
11/11  0s 12ms/step - loss: 26.7021 - mae: 3.8791 - val_loss:
19.0241 - val_mae: 2.8131
Epoch 67/100
11/11  0s 12ms/step - loss: 25.5306 - mae: 3.6780 - val_loss:
19.1017 - val_mae: 2.7881
Epoch 68/100
11/11  0s 21ms/step - loss: 29.2947 - mae: 3.9716 - val_loss:
18.9192 - val_mae: 2.7799
Epoch 69/100
11/11  0s 12ms/step - loss: 26.8000 - mae: 3.8042 - val_loss:
18.7279 - val_mae: 2.7793
Epoch 70/100
11/11  0s 12ms/step - loss: 28.5849 - mae: 3.8885 - val_loss:
18.5258 - val_mae: 2.7865
Epoch 71/100
11/11  0s 12ms/step - loss: 31.5140 - mae: 4.0131 - val_loss:
18.7372 - val_mae: 2.7970
Epoch 72/100
11/11  0s 12ms/step - loss: 33.4902 - mae: 3.9536 - val_loss:
18.6205 - val_mae: 2.7505
Epoch 73/100
11/11  0s 12ms/step - loss: 29.6813 - mae: 3.9891 - val_loss:
18.8783 - val_mae: 2.7593
Epoch 74/100
11/11  0s 12ms/step - loss: 24.9340 - mae: 3.7484 - val_loss:
19.0306 - val_mae: 2.7961
Epoch 75/100
11/11  0s 12ms/step - loss: 25.7782 - mae: 3.6999 - val_loss:
19.0307 - val_mae: 2.8084
Epoch 76/100
11/11  0s 21ms/step - loss: 30.3371 - mae: 4.0241 - val_loss:
18.8585 - val_mae: 2.7745
Epoch 77/100
11/11  0s 12ms/step - loss: 29.5310 - mae: 3.9789 - val_loss:
18.3513 - val_mae: 2.6994
Epoch 78/100
11/11  0s 12ms/step - loss: 25.1835 - mae: 3.7359 - val_loss:
18.0267 - val_mae: 2.6998
Epoch 79/100
11/11  0s 12ms/step - loss: 26.9312 - mae: 3.8075 - val_loss:
18.0890 - val_mae: 2.7205
Epoch 80/100
11/11  0s 12ms/step - loss: 30.2390 - mae: 4.2054 - val_loss:

```

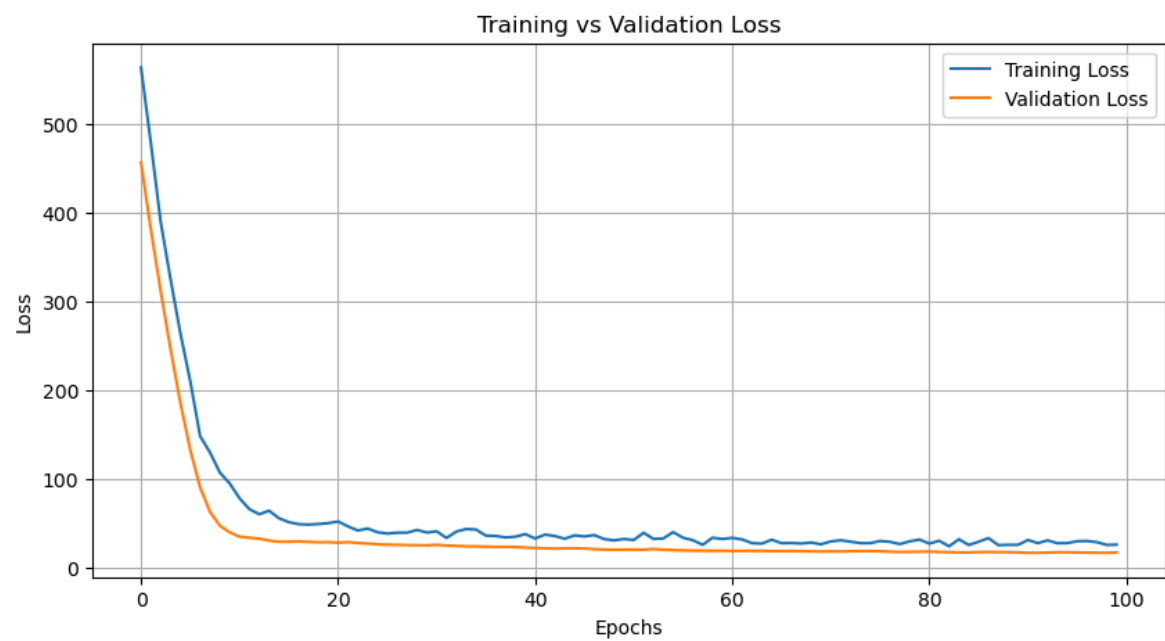
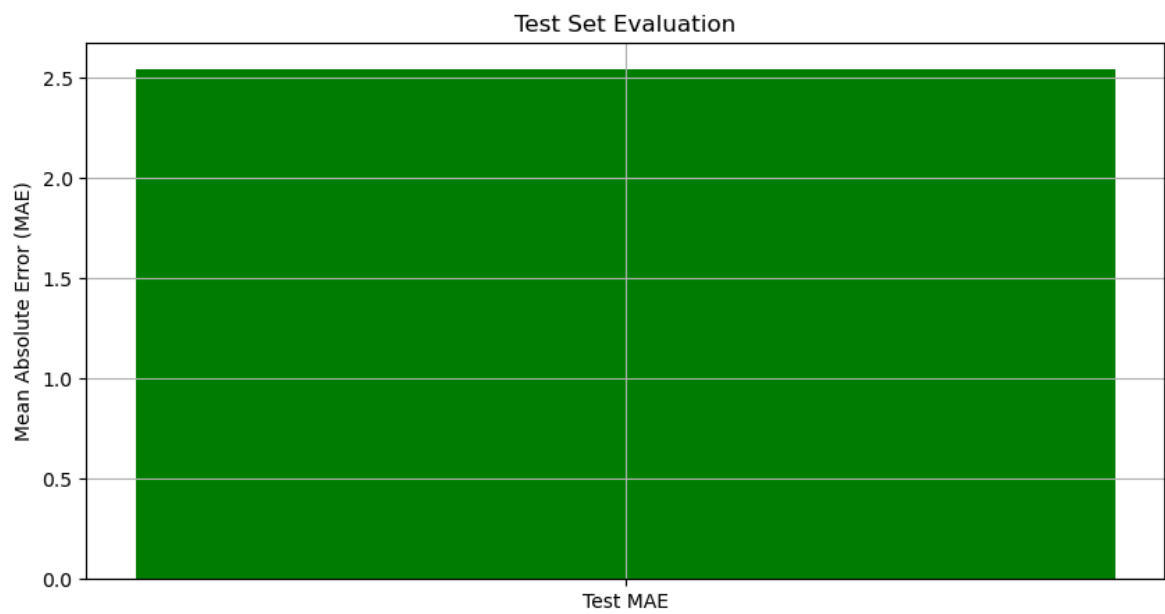
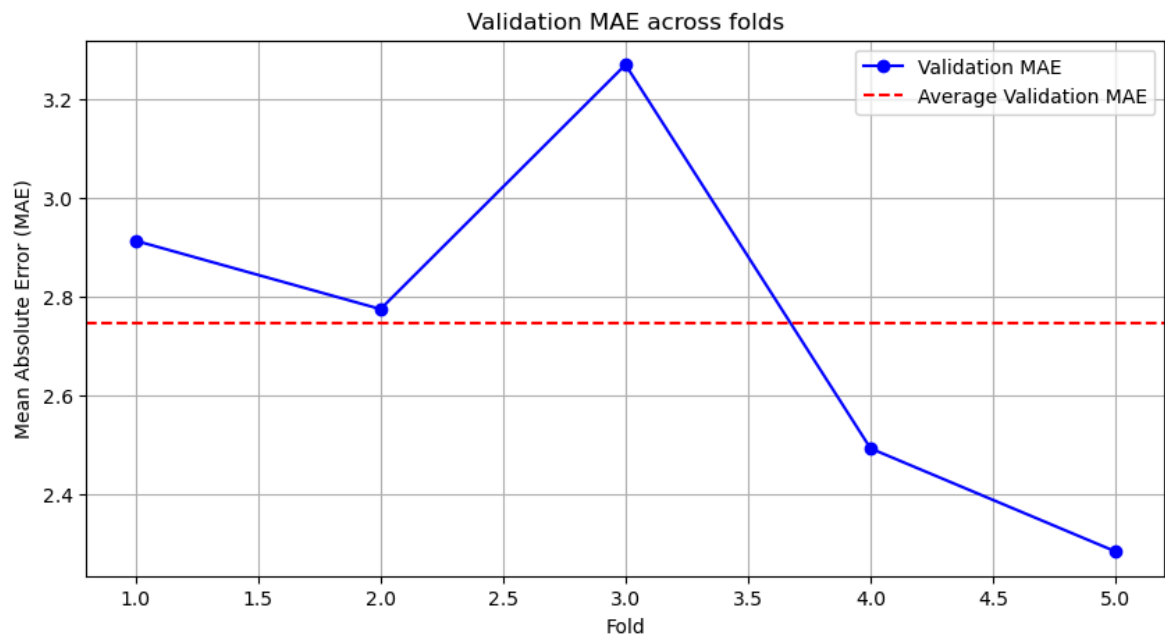
```

18.3130 - val_mae: 2.7357
Epoch 81/100
11/11  0s 12ms/step - loss: 32.7495 - mae: 4.0332 - val_loss:
18.4199 - val_mae: 2.7430
Epoch 82/100
11/11  0s 12ms/step - loss: 27.6888 - mae: 3.7755 - val_loss:
18.0037 - val_mae: 2.6559
Epoch 83/100
11/11  0s 23ms/step - loss: 23.0561 - mae: 3.5975 - val_loss:
17.8140 - val_mae: 2.6569
Epoch 84/100
11/11  0s 13ms/step - loss: 31.3025 - mae: 4.0951 - val_loss:
17.4964 - val_mae: 2.6368
Epoch 85/100
11/11  0s 13ms/step - loss: 25.2873 - mae: 3.6921 - val_loss:
17.5223 - val_mae: 2.6868
Epoch 86/100
11/11  0s 12ms/step - loss: 29.4325 - mae: 4.0511 - val_loss:
17.8347 - val_mae: 2.6960
Epoch 87/100
11/11  0s 13ms/step - loss: 34.3019 - mae: 4.0862 - val_loss:
17.9644 - val_mae: 2.7125
Epoch 88/100
11/11  0s 12ms/step - loss: 24.4708 - mae: 3.5611 - val_loss:
17.8572 - val_mae: 2.7085
Epoch 89/100
11/11  0s 13ms/step - loss: 27.3857 - mae: 3.8969 - val_loss:
17.7995 - val_mae: 2.7061
Epoch 90/100
11/11  0s 13ms/step - loss: 25.5272 - mae: 3.7095 - val_loss:
17.5541 - val_mae: 2.6841
Epoch 91/100
11/11  0s 27ms/step - loss: 32.9923 - mae: 3.9508 - val_loss:
17.0446 - val_mae: 2.6532
Epoch 92/100
11/11  0s 12ms/step - loss: 32.3397 - mae: 4.1510 - val_loss:
17.0776 - val_mae: 2.6470
Epoch 93/100
11/11  0s 12ms/step - loss: 29.6447 - mae: 3.9633 - val_loss:
17.2919 - val_mae: 2.6416
Epoch 94/100
11/11  0s 12ms/step - loss: 28.9523 - mae: 3.9382 - val_loss:
17.6788 - val_mae: 2.6498
Epoch 95/100
11/11  0s 12ms/step - loss: 28.3079 - mae: 3.7446 - val_loss:
17.7298 - val_mae: 2.6255
Epoch 96/100
11/11  0s 12ms/step - loss: 28.8443 - mae: 3.8571 - val_loss:
17.4928 - val_mae: 2.6058
Epoch 97/100
11/11  0s 12ms/step - loss: 30.2985 - mae: 3.9391 - val_loss:
17.2650 - val_mae: 2.6127
Epoch 98/100
11/11  0s 12ms/step - loss: 29.1911 - mae: 3.9848 - val_loss:
17.2140 - val_mae: 2.6335
Epoch 99/100
11/11  0s 12ms/step - loss: 25.6021 - mae: 3.6510 - val_loss:
17.0497 - val_mae: 2.6137
Epoch 100/100
11/11  0s 15ms/step - loss: 22.5702 - mae: 3.3344 - val_loss:

```


17.5113 - val_mae: 2.6693

Test MAE: 2.5464



In []: