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import numpy as np  
import pandas as pd  
from sklearn.model\_selection import train\_test\_split  
from sklearn.preprocessing import StandardScaler, OneHotEncoder  
from sklearn.compose import ColumnTransformer  
from sklearn.pipeline import Pipeline  
from sklearn.linear\_model import LinearRegression  
from sklearn.metrics import mean\_squared\_error  
import tensorflow as tf  
from tensorflow.keras.models import Sequential  
from tensorflow.keras.layers import Dense  
import matplotlib.pyplot as plt  
from sklearn.datasets import fetch\_openml  
from sklearn.impute import SimpleImputer  
housing = fetch\_openml(name="house\_prices", as\_frame=True)  
data = housing.data

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data['PRICE'] = housing.target  
print(data.head())  
x = data.drop('PRICE', axis=1)  
y = data['PRICE']  
numerical\_cols = X.select\_dtypes(include=['int64', 'float64']).columns  
categorical\_cols = X.select\_dtypes(include=['object']).columns  
numerical\_transformer = Pipeline(steps=[  
 ('imputer', SimpleImputer(strategy='mean')),  
 ('scaler', StandardScaler())  
])  
categorical\_transformer = Pipeline(steps=[  
 ('imputer', SimpleImputer(strategy='most\_frequent')),  
 ('onehot', OneHotEncoder(handle\_unknown='ignore'))  
])  
preprocessor = ColumnTransformer(  
 transformers=[  
 ('num', numerical\_transformer, numerical\_cols),  
 ('cat', categorical\_transformer, categorical\_cols)  
 ]  
)

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```
})
X_processed = preprocessor.fit_transform(X)

X_train, X_test, y_train, y_test = train_test_split(X_processed, y, test_size=0.2, random_state=42)

lin_reg = LinearRegression()
lin_reg.fit(X_train, y_train)

y_pred = lin_reg.predict(X_test)

mse = mean_squared_error(y_test, y_pred)

print(f'Mean Squared Error (Linear Regression): {mse}')

X_train_dense = X_train.toarray()
X_test_dense = X_test.toarray()
model = Sequential([

Dense(64, activation='relu', input_shape=(X_train_dense.shape[1],)),

Dense(64, activation='relu'),

Dense(1)

])

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

history = model.fit(X_train_dense, y_train, epochs=100, validation_split=0.2, verbose=1)
```

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```
mse_tf = model.evaluate(X_test_dense, y_test)

print(f'TensorFlow Mean Squared Error: {mse_tf}')

plt.plot(history.history['loss'])

plt.plot(history.history['val_loss'])

plt.title('Model loss')

plt.ylabel('Loss')

plt.xlabel('Epoch')

plt.legend(['Train', 'Validation'], loc='upper right')

plt.show()

model.save('house_price_model.h5')

print(f'scikit-learn Linear Regression MSE: {mse}')

print(f'TensorFlow Neural Network MSE: {mse_tf}')
```

/usr/local/lib/python3.10/dist-packages/sklearn/datasets/\_openml.py:968: FutureWarning: The default value of `parser` will change from `warn` to `raise` in version 1.5. To silence this warning, you need to explicitly set `parser` to 'warn' in the call to `fetch\_openml` to keep the current behavior unchanged. Please refer to: https://scikit-learn.org/stable/changes.html#future-warnings-v1.5 for more information.

	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	
0	1	60	RL	65.0	8450	Pave	None	Reg	
1	2	20	RL	80.0	9600	Pave	None	Reg	
2	3	60	RL	68.0	11250	Pave	None	IR1	

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36s

30/30 [=====] - 1s 11ms/step - loss: 39145570304.0000 - val\_loss: 37837484032.0000

Epoch 2/100

30/30 [=====] - 0s 4ms/step - loss: 39133106176.0000 - val\_loss: 37811499008.0000

Epoch 3/100

30/30 [=====] - 0s 4ms/step - loss: 39082840064.0000 - val\_loss: 37728657408.0000

Epoch 4/100

30/30 [=====] - 0s 4ms/step - loss: 38954708992.0000 - val\_loss: 37545603072.0000

Epoch 5/100

30/30 [=====] - 0s 4ms/step - loss: 38702448640.0000 - val\_loss: 37217525760.0000

Epoch 6/100

30/30 [=====] - 0s 4ms/step - loss: 38282629120.0000 - val\_loss: 36700053504.0000

Epoch 7/100

30/30 [=====] - 0s 3ms/step - loss: 37649895424.0000 - val\_loss: 35953401856.0000

Epoch 8/100

30/30 [=====] - 0s 4ms/step - loss: 36771958784.0000 - val\_loss: 34943782912.0000

Epoch 9/100

30/30 [=====] - 0s 5ms/step - loss: 35603382272.0000 - val\_loss: 33637216256.0000

Epoch 10/100

30/30 [=====] - 0s 4ms/step - loss: 34141081600.0000 - val\_loss: 32041494528.0000

Epoch 11/100

30/30 [=====] - 0s 4ms/step - loss: 32383072256.0000 - val\_loss: 30169552896.0000

Epoch 12/100

30/30 [=====] - 0s 4ms/step - loss: 30333882368.0000 - val\_loss: 28026562560.0000

Epoch 13/100

30/30 [=====] - 0s 4ms/step - loss: 28025198592.0000 - val\_loss: 25629265920.0000

Epoch 14/100

30/30 [=====] - 0s 4ms/step - loss: 25511536640.0000 - val\_loss: 23047499776.0000

Epoch 15/100

30/30 [=====] - 0s 4ms/step - loss: 22816073728.0000 - val\_loss: 20344788992.0000

Epoch 16/100

30/30 [=====] - 0s 4ms/step - loss: 20029691904.0000 - val\_loss: 17601685504.0000

Epoch 17/100

30/30 [=====] - 0s 6ms/step - loss: 17264533504.0000 - val\_loss: 14922190848.0000

Epoch 18/100

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30/30 [=====] - 0s 5ms/step - loss: 14592230400.0000 - val\_loss: 12349583360.0000  
Epoch 19/100  
30/30 [=====] - 0s 6ms/step - loss: 12087493632.0000 - val\_loss: 10017199104.0000  
Epoch 20/100  
30/30 [=====] - 0s 6ms/step - loss: 9830067200.0000 - val\_loss: 7980138496.0000  
Epoch 21/100  
30/30 [=====] - 0s 5ms/step - loss: 7874783232.0000 - val\_loss: 6309144064.0000  
Epoch 22/100  
30/30 [=====] - 0s 6ms/step - loss: 6279999488.0000 - val\_loss: 4875406336.0000  
Epoch 23/100  
30/30 [=====] - 0s 6ms/step - loss: 4996545536.0000 - val\_loss: 3840713728.0000  
Epoch 24/100  
30/30 [=====] - 0s 5ms/step - loss: 4053360128.0000 - val\_loss: 3041963008.0000  
Epoch 25/100  
30/30 [=====] - 0s 5ms/step - loss: 3365407744.0000 - val\_loss: 2504934912.0000  
Epoch 26/100  
30/30 [=====] - 0s 6ms/step - loss: 2892352256.0000 - val\_loss: 2143528704.0000  
Epoch 27/100  
30/30 [=====] - 0s 6ms/step - loss: 2572082176.0000 - val\_loss: 1896555520.0000  
Epoch 28/100  
30/30 [=====] - 0s 8ms/step - loss: 2342972928.0000 - val\_loss: 1742969088.0000  
Epoch 29/100  
30/30 [=====] - 0s 8ms/step - loss: 2198323456.0000 - val\_loss: 1625387904.0000  
Epoch 30/100  
30/30 [=====] - 0s 6ms/step - loss: 2087264256.0000 - val\_loss: 1548972544.0000  
Epoch 31/100  
30/30 [=====] - 0s 5ms/step - loss: 2006259712.0000 - val\_loss: 1478532096.0000  
Epoch 32/100  
30/30 [=====] - 0s 6ms/step - loss: 1941190272.0000 - val\_loss: 1430107392.0000  
Epoch 33/100  
30/30 [=====] - 0s 6ms/step - loss: 1891218560.0000 - val\_loss: 1386052352.0000  
Epoch 34/100  
30/30 [=====] - 0s 5ms/step - loss: 1845535744.0000 - val\_loss: 1347710720.0000  
Epoch 35/100  
30/30 [=====] - 0s 5ms/step - loss: 1805334144.0000 - val\_loss: 1312206208.0000

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Epoch 35/100

[=====]

- 0s 5ms/step

- loss: 1805334144.0000

- val\_loss: 1312206208.0000

30/30

Epoch 36/100

[=====]

- 0s 6ms/step

- loss: 1768171392.0000

- val\_loss: 1282675200.0000

30/30

Epoch 37/100

[=====]

- 0s 5ms/step

- loss: 1737335936.0000

- val\_loss: 1254055168.0000

30/30

Epoch 38/100

[=====]

- 0s 3ms/step

- loss: 1705667456.0000

- val\_loss: 1226467328.0000

30/30

Epoch 39/100

[=====]

- 0s 4ms/step

- loss: 1679164288.0000

- val\_loss: 1201384960.0000

30/30

Epoch 40/100

[=====]

- 0s 4ms/step

- loss: 1655805824.0000

- val\_loss: 1178106624.0000

30/30

Epoch 41/100

[=====]

- 0s 4ms/step

- loss: 1631207040.0000

- val\_loss: 1156834432.0000

30/30

Epoch 42/100

[=====]

- 0s 4ms/step

- loss: 1610947840.0000

- val\_loss: 1139142912.0000

30/30

Epoch 43/100

[=====]

- 0s 4ms/step

- loss: 1592009088.0000

- val\_loss: 1119614976.0000

30/30

Epoch 44/100

[=====]

- 0s 4ms/step

- loss: 1574502656.0000

- val\_loss: 1101374464.0000

30/30

Epoch 45/100

[=====]

- 0s 4ms/step

- loss: 1556230912.0000

- val\_loss: 1087245184.0000

30/30

Epoch 46/100

[=====]

- 0s 4ms/step

- loss: 1538896896.0000

- val\_loss: 1070403648.0000

30/30

Epoch 47/100

[=====]

- 0s 4ms/step

- loss: 1524133120.0000

- val\_loss: 1055507456.0000

30/30

Epoch 48/100

[=====]

- 0s 4ms/step

- loss: 1512419072.0000

- val\_loss: 1043415040.0000

30/30

Epoch 49/100

[=====]

- 0s 4ms/step

- loss: 1497343616.0000

- val\_loss: 1027588608.0000

30/30

Epoch 50/100

[=====]

- 0s 4ms/step

- loss: 1484396672.0000

- val\_loss: 1014691072.0000

30/30

Epoch 51/100

[=====]

- 0s 4ms/step

- loss: 1472107904.0000

- val\_loss: 1001660288.0000

30/30

Epoch 52/100

[=====]

- 0s 4ms/step

- loss: 1472107904.0000

- val\_loss: 1001660288.0000

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Epoch 53/100  
30/30 [=====] - 0s 3ms/step - loss: 1447367808.0000 - val\_loss: 976486528.0000  
Epoch 54/100  
30/30 [=====] - 0s 4ms/step - loss: 1436883712.0000 - val\_loss: 964817280.0000  
Epoch 55/100  
30/30 [=====] - 0s 4ms/step - loss: 1429260032.0000 - val\_loss: 956168704.0000  
Epoch 56/100  
30/30 [=====] - 0s 4ms/step - loss: 1416463232.0000 - val\_loss: 944221504.0000  
Epoch 57/100  
30/30 [=====] - 0s 4ms/step - loss: 1403371392.0000 - val\_loss: 931102016.0000  
Epoch 58/100  
30/30 [=====] - 0s 5ms/step - loss: 1398165504.0000 - val\_loss: 920377216.0000  
Epoch 59/100  
30/30 [=====] - 0s 4ms/step - loss: 1386102912.0000 - val\_loss: 909976000.0000  
Epoch 60/100  
30/30 [=====] - 0s 4ms/step - loss: 1378363008.0000 - val\_loss: 899930624.0000  
Epoch 61/100  
30/30 [=====] - 0s 4ms/step - loss: 1369505152.0000 - val\_loss: 890662464.0000  
Epoch 62/100  
30/30 [=====] - 0s 4ms/step - loss: 1360287232.0000 - val\_loss: 882795392.0000  
Epoch 63/100  
30/30 [=====] - 0s 3ms/step - loss: 1354549120.0000 - val\_loss: 872732224.0000  
Epoch 64/100  
30/30 [=====] - 0s 4ms/step - loss: 1346936960.0000 - val\_loss: 863774144.0000  
Epoch 65/100  
30/30 [=====] - 0s 4ms/step - loss: 1339795840.0000 - val\_loss: 859114240.0000  
Epoch 66/100  
30/30 [=====] - 0s 4ms/step - loss: 1329062400.0000 - val\_loss: 850219520.0000  
Epoch 67/100  
30/30 [=====] - 0s 4ms/step - loss: 1322305408.0000 - val\_loss: 842952512.0000  
Epoch 68/100  
30/30 [=====] - 0s 4ms/step - loss: 1315583616.0000 - val\_loss: 833837568.0000  
Epoch 69/100  
30/30 [=====] - 0s 4ms/step - loss: 1309934848.0000 - val\_loss: 827163840.0000

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Epoch 70/100  
30/30 [=====] - 0s 4ms/step - loss: 1303148160.0000 - val\_loss: 818065216.0000  
Epoch 71/100  
30/30 [=====] - 0s 4ms/step - loss: 1295479296.0000 - val\_loss: 811359424.0000  
Epoch 72/100  
30/30 [=====] - 0s 4ms/step - loss: 1287544704.0000 - val\_loss: 804735488.0000  
Epoch 73/100  
30/30 [=====] - 0s 4ms/step - loss: 1280205568.0000 - val\_loss: 798157760.0000  
Epoch 74/100  
30/30 [=====] - 0s 4ms/step - loss: 1273032960.0000 - val\_loss: 791640832.0000  
Epoch 75/100  
30/30 [=====] - 0s 5ms/step - loss: 1268410496.0000 - val\_loss: 784712192.0000  
Epoch 76/100  
30/30 [=====] - 0s 4ms/step - loss: 1261552384.0000 - val\_loss: 778522368.0000  
Epoch 77/100  
30/30 [=====] - 0s 4ms/step - loss: 1255847680.0000 - val\_loss: 773013632.0000  
Epoch 78/100  
30/30 [=====] - 0s 4ms/step - loss: 1248626944.0000 - val\_loss: 766536192.0000  
Epoch 79/100  
30/30 [=====] - 0s 4ms/step - loss: 1243462400.0000 - val\_loss: 761340864.0000  
Epoch 80/100  
30/30 [=====] - 0s 4ms/step - loss: 1237158912.0000 - val\_loss: 755245632.0000  
Epoch 81/100  
30/30 [=====] - 0s 4ms/step - loss: 1233235712.0000 - val\_loss: 748010880.0000  
Epoch 82/100  
30/30 [=====] - 0s 4ms/step - loss: 1226715008.0000 - val\_loss: 743470784.0000  
Epoch 83/100  
30/30 [=====] - 0s 4ms/step - loss: 1223866880.0000 - val\_loss: 736870336.0000  
Epoch 84/100  
30/30 [=====] - 0s 4ms/step - loss: 1215606016.0000 - val\_loss: 732762944.0000  
Epoch 85/100  
30/30 [=====] - 0s 4ms/step - loss: 1210306048.0000 - val\_loss: 727651008.0000  
Epoch 86/100  
30/30 [=====] - 0s 4ms/step - loss: 1205515136.0000 - val\_loss: 722172992.0000  
Epoch 87/100

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Epoch 86/100  
30/30 [=====] - 0s 4ms/step - loss: 1210300046.0000 - val\_loss: 727051008.0000  
Epoch 87/100  
30/30 [=====] - 0s 4ms/step - loss: 1205515136.0000 - val\_loss: 722172992.0000  
Epoch 88/100  
30/30 [=====] - 0s 4ms/step - loss: 1203436032.0000 - val\_loss: 715478528.0000  
Epoch 89/100  
30/30 [=====] - 0s 4ms/step - loss: 1194950400.0000 - val\_loss: 711137408.0000  
Epoch 90/100  
30/30 [=====] - 0s 4ms/step - loss: 1190913152.0000 - val\_loss: 707157760.0000  
Epoch 91/100  
30/30 [=====] - 0s 4ms/step - loss: 1186092544.0000 - val\_loss: 703137152.0000  
Epoch 92/100  
30/30 [=====] - 0s 5ms/step - loss: 1181405440.0000 - val\_loss: 698403456.0000  
Epoch 93/100  
30/30 [=====] - 0s 4ms/step - loss: 1177636480.0000 - val\_loss: 692938240.0000  
Epoch 94/100  
30/30 [=====] - 0s 4ms/step - loss: 1171680000.0000 - val\_loss: 687461760.0000  
Epoch 95/100  
30/30 [=====] - 0s 4ms/step - loss: 1168051584.0000 - val\_loss: 682507392.0000  
Epoch 96/100  
30/30 [=====] - 0s 4ms/step - loss: 1162269184.0000 - val\_loss: 677947136.0000  
Epoch 97/100  
30/30 [=====] - 0s 4ms/step - loss: 1159047808.0000 - val\_loss: 674957824.0000  
Epoch 98/100  
30/30 [=====] - 0s 4ms/step - loss: 1153262592.0000 - val\_loss: 670296256.0000  
Epoch 99/100  
30/30 [=====] - 0s 4ms/step - loss: 1153906048.0000 - val\_loss: 666515456.0000  
Epoch 100/100  
30/30 [=====] - 0s 4ms/step - loss: 1145547904.0000 - val\_loss: 661976128.0000  
10/10 [=====] - 0s 3ms/step - loss: 1258868736.0000  
TensorFlow Mean Squared Error: 1258868736.0

AttributeError

Traceback (most recent call last)

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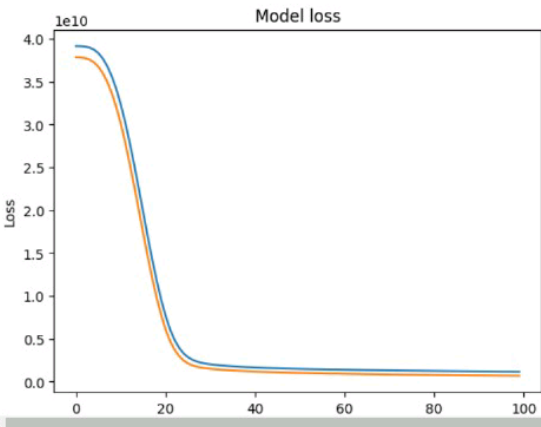
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AttributeError: module 'matplotlib.pyplot' has no attribute 'xlabel'

Model loss



Next steps: [Explain error](#)

[ ] Start coding or [generate](#) with AI.

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24s

completed at 6:36 PM

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