```
import pandas as pd
import numpy as nm


a=pd.read_csv("/content/drive/MyDrive/DSBDA/HousingData.csv")


a.columns
```

```
Index(['CRIM', 'ZN', 'INDUS', 'CHAS', 'NOX', 'RM', 'AGE', 'DIS', 'RAD', 'TAX',
       'PTRATIO', 'B', 'LSTAT', 'MEDV'],
      dtype='object')
```

```
a.shape
```

```
(506, 14)
```

```
a.isna().sum()
```

```
CRIM       20
ZN         20
INDUS      20
CHAS       20
NOX         0
RM          0
AGE        20
DIS         0
RAD         0
TAX         0
PTRATIO     0
B           0
LSTAT      20
MEDV        0
dtype: int64
```

```
a['CRIM']=a['CRIM'].fillna(a['CRIM'].mean())
a['ZN']=a['ZN'].fillna(a['ZN'].mean())
a['AGE']=a['AGE'].fillna(a['AGE'].mean())
a['INDUS']=a['INDUS'].fillna(a['INDUS'].mean())
a['CHAS']=a['CHAS'].fillna(a['CHAS'].mean())
a['LSTAT']=a['LSTAT'].fillna(a['LSTAT'].mean())
```

```
x=a.iloc[:,:-1].values
y=a.iloc[:,-1].values
x
```

```
array([[6.3200e-03, 1.8000e+01, 2.3100e+00, ..., 1.5300e+01, 3.9690e+02,
        4.9800e+00],
       [2.7310e-02, 0.0000e+00, 7.0700e+00, ..., 1.7800e+01, 3.9690e+02,
        9.1400e+00],
```

```
       [2.7290e-02, 0.0000e+00, 7.0700e+00, ..., 1.7800e+01, 3.9283e+02,
        4.0300e+00],
       ...,
       [6.0760e-02, 0.0000e+00, 1.1930e+01, ..., 2.1000e+01, 3.9690e+02,
        5.6400e+00],
       [1.0959e-01, 0.0000e+00, 1.1930e+01, ..., 2.1000e+01, 3.9345e+02,
        6.4800e+00],
       [4.7410e-02, 0.0000e+00, 1.1930e+01, ..., 2.1000e+01, 3.9690e+02,
        7.8800e+00]])
```

y

```
array([24. , 21.6, 34.7, 33.4, 36.2, 28.7, 22.9, 27.1, 16.5, 18.9, 15. ,
       18.9, 21.7, 20.4, 18.2, 19.9, 23.1, 17.5, 20.2, 18.2, 13.6, 19.6,
       15.2, 14.5, 15.6, 13.9, 16.6, 14.8, 18.4, 21. , 12.7, 14.5, 13.2,
       13.1, 13.5, 18.9, 20. , 21. , 24.7, 30.8, 34.9, 26.6, 25.3, 24.7,
       21.2, 19.3, 20. , 16.6, 14.4, 19.4, 19.7, 20.5, 25. , 23.4, 18.9,
       35.4, 24.7, 31.6, 23.3, 19.6, 18.7, 16. , 22.2, 25. , 33. , 23.5,
       19.4, 22. , 17.4, 20.9, 24.2, 21.7, 22.8, 23.4, 24.1, 21.4, 20. ,
       20.8, 21.2, 20.3, 28. , 23.9, 24.8, 22.9, 23.9, 26.6, 22.5, 22.2,
       23.6, 28.7, 22.6, 22. , 22.9, 25. , 20.6, 28.4, 21.4, 38.7, 43.8,
       33.2, 27.5, 26.5, 18.6, 19.3, 20.1, 19.5, 19.5, 20.4, 19.8, 19.4,
       21.7, 22.8, 18.8, 18.7, 18.5, 18.3, 21.2, 19.2, 20.4, 19.3, 22. ,
       20.3, 20.5, 17.3, 18.8, 21.4, 15.7, 16.2, 18. , 14.3, 19.2, 19.6,
       23. , 18.4, 15.6, 18.1, 17.4, 17.1, 13.3, 17.8, 14. , 14.4, 13.4,
       15.6, 11.8, 13.8, 15.6, 14.6, 17.8, 15.4, 21.5, 19.6, 15.3, 19.4,
       17. , 15.6, 13.1, 41.3, 24.3, 23.3, 27. , 50. , 50. , 50. , 22.7,
       25. , 50. , 23.8, 23.8, 22.3, 17.4, 19.1, 23.1, 23.6, 22.6, 29.4,
       23.2, 24.6, 29.9, 37.2, 39.8, 36.2, 37.9, 32.5, 26.4, 29.6, 50. ,
       32. , 29.8, 34.9, 37. , 30.5, 36.4, 31.1, 29.1, 50. , 33.3, 30.3,
       34.6, 34.9, 32.9, 24.1, 42.3, 48.5, 50. , 22.6, 24.4, 22.5, 24.4,
       20. , 21.7, 19.3, 22.4, 28.1, 23.7, 25. , 23.3, 28.7, 21.5, 23. ,
       26.7, 21.7, 27.5, 30.1, 44.8, 50. , 37.6, 31.6, 46.7, 31.5, 24.3,
       31.7, 41.7, 48.3, 29. , 24. , 25.1, 31.5, 23.7, 23.3, 22. , 20.1,
       22.2, 23.7, 17.6, 18.5, 24.3, 20.5, 24.5, 26.2, 24.4, 24.8, 29.6,
       42.8, 21.9, 20.9, 44. , 50. , 36. , 30.1, 33.8, 43.1, 48.8, 31. ,
       36.5, 22.8, 30.7, 50. , 43.5, 20.7, 21.1, 25.2, 24.4, 35.2, 32.4,
       32. , 33.2, 33.1, 29.1, 35.1, 45.4, 35.4, 46. , 50. , 32.2, 22. ,
       20.1, 23.2, 22.3, 24.8, 28.5, 37.3, 27.9, 23.9, 21.7, 28.6, 27.1,
       20.3, 22.5, 29. , 24.8, 22. , 26.4, 33.1, 36.1, 28.4, 33.4, 28.2,
       22.8, 20.3, 16.1, 22.1, 19.4, 21.6, 23.8, 16.2, 17.8, 19.8, 23.1,
       21. , 23.8, 23.1, 20.4, 18.5, 25. , 24.6, 23. , 22.2, 19.3, 22.6,
       19.8, 17.1, 19.4, 22.2, 20.7, 21.1, 19.5, 18.5, 20.6, 19. , 18.7,
       32.7, 16.5, 23.9, 31.2, 17.5, 17.2, 23.1, 24.5, 26.6, 22.9, 24.1,
       18.6, 30.1, 18.2, 20.6, 17.8, 21.7, 22.7, 22.6, 25. , 19.9, 20.8,
       16.8, 21.9, 27.5, 21.9, 23.1, 50. , 50. , 50. , 50. , 50. , 13.8,
       13.8, 15. , 13.9, 13.3, 13.1, 10.2, 10.4, 10.9, 11.3, 12.3,  8.8,
        7.2, 10.5,  7.4, 10.2, 11.5, 15.1, 23.2,  9.7, 13.8, 12.7, 13.1,
       12.5,  8.5,  5. ,  6.3,  5.6,  7.2, 12.1,  8.3,  8.5,  5. , 11.9,
       27.9, 17.2, 27.5, 15. , 17.2, 17.9, 16.3,  7. ,  7.2,  7.5, 10.4,
        8.8,  8.4, 16.7, 14.2, 20.8, 13.4, 11.7,  8.3, 10.2, 10.9, 11. ,
        9.5, 14.5, 14.1, 16.1, 14.3, 11.7, 13.4,  9.6,  8.7,  8.4, 12.8,
       10.5, 17.1, 18.4, 15.4, 10.8, 11.8, 14.9, 12.6, 14.1, 13. , 13.4,
       15.2, 16.1, 17.8, 14.9, 14.1, 12.7, 13.5, 14.9, 20. , 16.4, 17.7,
       19.5, 20.2, 21.4, 19.9, 19. , 19.1, 19.1, 20.1, 19.9, 19.6, 23.2,
       29.8, 13.8, 13.3, 16.7, 12. , 14.6, 21.4, 23. , 23.7, 25. , 21.8,
       20.6, 21.2, 19.1, 20.6, 15.2,  7. ,  8.1, 13.6, 20.1, 21.8, 24.5,
       23.1, 19.7, 18.3, 21.2, 17.5, 16.8, 22.4, 20.6, 23.9, 22. , 11.9])
```

```
from sklearn.model_selection import train_test_split


x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=12)


x_train
```

```
     array([[7.85700000e-01, 1.12119342e+01, 3.97000000e+00, ...,
             1.30000000e+01, 3.84070000e+02, 1.47900000e+01],
            [6.26300000e-02, 0.00000000e+00, 1.19300000e+01, ...,
             2.10000000e+01, 3.91990000e+02, 1.27154321e+01],
            [1.41030000e-01, 0.00000000e+00, 1.10839918e+01, ...,
             1.60000000e+01, 3.96900000e+02, 1.58400000e+01],
            ...,
            [6.96215000e+00, 0.00000000e+00, 1.81000000e+01, ...,
             2.02000000e+01, 3.94430000e+02, 1.71100000e+01],
            [3.53501000e+00, 0.00000000e+00, 1.95800000e+01, ...,
             1.47000000e+01, 8.80100000e+01, 1.50200000e+01],
            [5.02300000e-02, 3.50000000e+01, 6.06000000e+00, ...,
             1.69000000e+01, 3.94020000e+02, 1.24300000e+01]])
```

```
x_test
```

```
     array([[3.73800000e-02, 0.00000000e+00, 5.19000000e+00, ...,
             2.02000000e+01, 3.89400000e+02, 6.75000000e+00],
            [3.61187397e+00, 0.00000000e+00, 1.81000000e+01, ...,
             2.02000000e+01, 3.96900000e+02, 1.63500000e+01],
            [4.15292000e+01, 0.00000000e+00, 1.81000000e+01, ...,
             2.02000000e+01, 3.29460000e+02, 2.73800000e+01],
            ...,
            [5.58107000e+00, 0.00000000e+00, 1.81000000e+01, ...,
             2.02000000e+01, 1.00190000e+02, 1.62200000e+01],
            [9.60400000e-02, 4.00000000e+01, 6.41000000e+00, ...,
             1.76000000e+01, 3.96900000e+02, 2.98000000e+00],
            [2.81838000e+00, 0.00000000e+00, 1.81000000e+01, ...,
             2.02000000e+01, 3.92920000e+02, 1.04200000e+01]])
```

```
y_train
```

```
     array([30.7, 22.4, 20.3, 10.2, 12. , 18.5, 25. , 29.8, 35.1, 23.2, 23.9,
            13.9, 24. , 21.9, 50. , 16.1, 30.8, 48.8, 33.4, 17.8, 24.4, 46.7,
            29. , 24.1, 22.2, 17.2, 33. , 18.4, 22.9, 19.9,  8.4, 20.5, 15.6,
            24.6,  7.4, 20.5, 42.3, 17.9, 15.3, 22.3, 19.7, 19.1, 14.1, 19.4,
            17.2, 15.6, 18.2, 21.9, 50. , 20.9, 24.8, 19.9, 17.1, 22.1, 11.9,
            24.7, 31.7, 17.6, 22.6, 36. , 20.6, 16.2, 17.8, 21.4, 21.2, 10.2,
            13.8, 26.2,  8.3, 39.8, 24.4, 26.6, 11.8, 22.8, 14.6, 19.5, 10.9,
            12.5, 22. , 12.3,  7.2, 24.3, 41.3, 23.9, 23.2, 19.6, 23.9, 21. ,
            19.3, 21.4, 27.1, 19.5, 16.6, 23.1, 21.4, 24.8, 25. , 28.7, 17.8,
            22. , 25. , 28.5, 15.7, 22.5, 16.2, 16.4, 33.4, 24.5,  8.3, 13.4,
            22.2, 16.5, 50. , 19. , 16.5, 24.7, 22. , 28.4, 20.5, 28. , 33.2,
            15.4, 20.1, 20.2, 13.6, 29.6,  7. , 36.2, 14.5,  5. , 22.9, 13.5,
            14.5, 10.4, 27.5, 16. , 14.5, 45.4, 15. , 22.9, 50. , 16.6, 20.8,
            25. , 30.1, 20.2, 10.8, 17.7, 22.8, 33.1, 34.9, 21.7, 18.7, 11. ,
            23.6, 13.4, 20.1, 17.4, 23.7, 23.4, 24.7, 31.2, 28.1, 20.6, 27.9,
            22.8, 13.8, 22.7, 20.6, 19.2,  8.5, 15.2, 30.5, 20.4, 10.5, 13.2,
            17.1, 12.7, 22.6, 33.1, 18.4, 44.8, 20. , 22.2,  5. , 15. , 22.7,
```

```
       20. , 41.7, 22.6, 20.4, 34.9, 27.9, 35.4, 14.3, 29.6, 26.6, 13.1,
       17.4, 23.7,  8.7, 43.8, 18.2, 20.1, 21.7, 28.7, 13.8, 16.8, 23.8,
       23. , 23.7, 50. , 14.1, 43.1, 25.2, 19.1, 14.9, 48.3, 14.6, 23.1,
       13.8, 18.3, 36.5, 22.8, 27.1, 19.9, 33.2, 19.3, 23.1, 13.1, 19.9,
       17.2, 35.2,  8.1, 28.6, 24.5, 17.5, 19.1, 29.9, 50. , 18.7, 28.4,
       21.4, 19.8, 21.5, 29.1, 20.8,  5.6, 30.1, 10.9, 21.2, 36.4, 25. ,
       19.8, 13.3, 23.3, 23. , 13. , 24. , 46. ,  6.3, 32.2,  9.7, 23. ,
       20.3, 17.5, 13.4, 23.1, 50. , 17. , 19.3, 19.3, 20. , 13.3, 20. ,
       18.9, 18.3, 22.2, 50. , 33.3, 23.9, 24.5, 34.7, 18.4, 22. , 14.1,
       18.9, 24.6, 19.6, 19.4, 38.7, 23.3, 18.6, 26.4, 31.6, 25. , 19.5,
       17.8, 25. , 18.8, 44. ,  9.5, 12.8, 16.7, 22. , 18.5, 24.2, 21.2,
       16.1, 20.3, 32.4,  7.2, 15.2, 29. , 37.2, 30.3, 19.5, 16.3, 13.6,
       31.5, 22.4, 32.5, 37.9, 13.3, 20.6, 23.9, 19.6, 23.3, 13.1, 16.8,
       21.4, 23. , 34.6, 17.4, 18.7, 29.4, 20.4, 20.3, 11.8, 36.2, 25. ,
       50. , 18.5, 48.5, 14.2, 24.8, 23.5, 33.8, 19.4, 50. , 24.3, 13.9,
       21.1, 12.7, 32. , 14.8, 21.7, 27. , 22. ,  7. , 23.6, 23.4, 19.4,
       17.3, 15.6, 24.4, 11.7, 15.6, 18.6, 12.6, 19.3, 24.3, 10.4,  8.4,
       27.5, 14.9, 37.3, 28.7, 24.8, 20.7, 50. , 20.1, 13.8,  8.8, 24.1,
       20.4, 20. ,  8.8, 29.8, 14.4, 11.5,  9.6, 19.4, 29.1, 16.1, 19.4,
       15.2, 30.1, 19.2, 20.1, 42.8, 15.1, 15.6, 17.1])
```

```
y_test
```

```
array([20.7, 12.7,  8.5, 25.1, 28.2, 22.5, 18.2, 43.5, 36.1, 23.8, 22.6,
       22.6, 22. , 22.9, 35.4, 50. , 17.8, 24.1, 21.7, 20.6, 26.7, 19.7,
       21.2, 13.4, 23.1, 18.8, 20.9, 11.7, 21.6, 37.6, 26.5, 26.6, 23.2,
       31.6, 50. ,  7.2, 18.9, 50. , 15.4, 21.6, 22.5, 25.3, 21.7, 34.9,
       20.8, 17.5, 21.8, 27.5, 50. , 21.7, 23.3, 21.5, 10.2, 23.1, 12.1,
       18.1, 11.9, 21.7, 27.5, 13.1, 16.7, 32.7, 23.2, 19.8, 19.6, 22.2,
       22.3, 13.5, 18.9, 50. , 14. ,  7.5, 20.6, 18.5, 19.6, 23.7, 21.1,
       10.5, 21. , 32.9, 15. , 19. , 31.5, 19.1, 11.3, 23.1, 26.4, 21.9,
       23.8, 21. , 23.8, 18. , 31.1, 14.4, 37. , 21.2, 24.4, 14.9, 31. ,
       14.3, 32. , 21.8])
```

```
from sklearn.linear_model import LinearRegression
lr=LinearRegression()
```

```
lr.fit(x_train,y_train)
```

▾ LinearRegression

LinearRegression()

```
y_pred = lr.predict(x_test)
```

```
pd.DataFrame(data={'Actual':y_test,'Pred':y_pred})
```

	Actual	Pred
0	20.7	22.196478
1	12.7	18.800242
2	8.5	7.930067
3	25.1	30.671459
4	28.2	32.850040
...	...	...
97	14.9	18.017252
98	31.0	34.078322
99	14.3	17.101172

```
from sklearn.metrics import r2_score

r2_score(y_test,y_pred)
```

```
0.7505873749912734
```

```
from sklearn.metrics import mean_squared_error
mse=mean_squared_error(y_test,y_pred)
mse
```

```
20.379579425572718
```

Start coding or generate with AI.