Assignment7

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3   Sec:16(p)

4   B.tech (CSE)

```
[ ]: # importing libraries
```

```
[1]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
```

```
[3]: df=pd.read_csv('train.csv')
     df.head(30)
```

```
[3]:     Id  MSSubClass MSZoning  LotFrontage  LotArea Street Alley LotShape  \
     0    1          60       RL         65.0     8450   Pave   NaN      Reg
     1    2          20       RL         80.0     9600   Pave   NaN      Reg
     2    3          60       RL         68.0    11250   Pave   NaN      IR1
     3    4          70       RL         60.0     9550   Pave   NaN      IR1
     4    5          60       RL         84.0    14260   Pave   NaN      IR1
     5    6          50       RL         85.0    14115   Pave   NaN      IR1
     6    7          20       RL         75.0    10084   Pave   NaN      Reg
     7    8          60       RL          NaN    10382   Pave   NaN      IR1
     8    9          50       RM         51.0     6120   Pave   NaN      Reg
     9   10         190       RL         50.0     7420   Pave   NaN      Reg
     10  11          20       RL         70.0    11200   Pave   NaN      Reg
     11  12          60       RL         85.0    11924   Pave   NaN      IR1
     12  13          20       RL          NaN    12968   Pave   NaN      IR2
     13  14          20       RL         91.0    10652   Pave   NaN      IR1
     14  15          20       RL          NaN    10920   Pave   NaN      IR1
     15  16          45       RM         51.0     6120   Pave   NaN      Reg
     16  17          20       RL          NaN    11241   Pave   NaN      IR1
     17  18          90       RL         72.0    10791   Pave   NaN      Reg
     18  19          20       RL         66.0    13695   Pave   NaN      Reg
```

1

```
19  20          20   RL          70.0    7560   Pave    NaN        Reg
20  21          60   RL         101.0   14215   Pave    NaN        IR1
21  22          45   RM          57.0    7449   Pave   Grvl        Reg
22  23          20   RL          75.0    9742   Pave    NaN        Reg
23  24         120   RM          44.0    4224   Pave    NaN        Reg
24  25          20   RL           NaN    8246   Pave    NaN        IR1
25  26          20   RL         110.0   14230   Pave    NaN        Reg
26  27          20   RL          60.0    7200   Pave    NaN        Reg
27  28          20   RL          98.0   11478   Pave    NaN        Reg
28  29          20   RL          47.0   16321   Pave    NaN        IR1
29  30          30   RM          60.0    6324   Pave    NaN        IR1
```

	LandContour	Utilities	…	PoolArea	PoolQC	Fence	MiscFeature	MiscVal \
0	Lvl	AllPub	…	0	NaN	NaN	NaN	0
1	Lvl	AllPub	…	0	NaN	NaN	NaN	0
2	Lvl	AllPub	…	0	NaN	NaN	NaN	0
3	Lvl	AllPub	…	0	NaN	NaN	NaN	0
4	Lvl	AllPub	…	0	NaN	NaN	NaN	0
5	Lvl	AllPub	…	0	NaN	MnPrv	Shed	700
6	Lvl	AllPub	…	0	NaN	NaN	NaN	0
7	Lvl	AllPub	…	0	NaN	NaN	Shed	350
8	Lvl	AllPub	…	0	NaN	NaN	NaN	0
9	Lvl	AllPub	…	0	NaN	NaN	NaN	0
10	Lvl	AllPub	…	0	NaN	NaN	NaN	0
11	Lvl	AllPub	…	0	NaN	NaN	NaN	0
12	Lvl	AllPub	…	0	NaN	NaN	NaN	0
13	Lvl	AllPub	…	0	NaN	NaN	NaN	0
14	Lvl	AllPub	…	0	NaN	GdWo	NaN	0
15	Lvl	AllPub	…	0	NaN	GdPrv	NaN	0
16	Lvl	AllPub	…	0	NaN	NaN	Shed	700
17	Lvl	AllPub	…	0	NaN	NaN	Shed	500
18	Lvl	AllPub	…	0	NaN	NaN	NaN	0
19	Lvl	AllPub	…	0	NaN	MnPrv	NaN	0
20	Lvl	AllPub	…	0	NaN	NaN	NaN	0
21	Bnk	AllPub	…	0	NaN	GdPrv	NaN	0
22	Lvl	AllPub	…	0	NaN	NaN	NaN	0
23	Lvl	AllPub	…	0	NaN	NaN	NaN	0
24	Lvl	AllPub	…	0	NaN	MnPrv	NaN	0
25	Lvl	AllPub	…	0	NaN	NaN	NaN	0
26	Lvl	AllPub	…	0	NaN	NaN	NaN	0
27	Lvl	AllPub	…	0	NaN	NaN	NaN	0
28	Lvl	AllPub	…	0	NaN	NaN	NaN	0
29	Lvl	AllPub	…	0	NaN	NaN	NaN	0

	MoSold	YrSold	SaleType	SaleCondition	SalePrice
0	2	2008	WD	Normal	208500
1	5	2007	WD	Normal	181500

```
2          9    2008        WD         Normal      223500
3          2    2006        WD         Abnorml     140000
4         12    2008        WD         Normal      250000
5         10    2009        WD         Normal      143000
6          8    2007        WD         Normal      307000
7         11    2009        WD         Normal      200000
8          4    2008        WD         Abnorml     129900
9          1    2008        WD         Normal      118000
10         2    2008        WD         Normal      129500
11         7    2006        New        Partial     345000
12         9    2008        WD         Normal      144000
13         8    2007        New        Partial     279500
14         5    2008        WD         Normal      157000
15         7    2007        WD         Normal      132000
16         3    2010        WD         Normal      149000
17        10    2006        WD         Normal       90000
18         6    2008        WD         Normal      159000
19         5    2009        COD        Abnorml     139000
20        11    2006        New        Partial     325300
21         6    2007        WD         Normal      139400
22         9    2008        WD         Normal      230000
23         6    2007        WD         Normal      129900
24         5    2010        WD         Normal      154000
25         7    2009        WD         Normal      256300
26         5    2010        WD         Normal      134800
27         5    2010        WD         Normal      306000
28        12    2006        WD         Normal      207500
29         5    2008        WD         Normal       68500

[30 rows x 81 columns]
```

[5]: `df.shape`

[5]: (1460, 81)

4.1 Preprocessing (feature selection ,null value remove and encode the categotical values)

[7]:
```python
pd.set_option('display.max_columns', 500)
pd.set_option('display.max_rows', 500)
df.isnull().sum()
```

[7]:
```
Id                0
MSSubClass        0
MSZoning          0
LotFrontage     259
LotArea           0
```

```
Street             0
Alley           1369
LotShape           0
LandContour        0
Utilities          0
LotConfig          0
LandSlope          0
Neighborhood       0
Condition1         0
Condition2         0
BldgType           0
HouseStyle         0
OverallQual        0
OverallCond        0
YearBuilt          0
YearRemodAdd       0
RoofStyle          0
RoofMatl           0
Exterior1st        0
Exterior2nd        0
MasVnrType       872
MasVnrArea         8
ExterQual          0
ExterCond          0
Foundation         0
BsmtQual          37
BsmtCond          37
BsmtExposure      38
BsmtFinType1      37
BsmtFinSF1         0
BsmtFinType2      38
BsmtFinSF2         0
BsmtUnfSF          0
TotalBsmtSF        0
Heating            0
HeatingQC          0
CentralAir         0
Electrical         1
1stFlrSF           0
2ndFlrSF           0
LowQualFinSF       0
GrLivArea          0
BsmtFullBath       0
BsmtHalfBath       0
FullBath           0
HalfBath           0
BedroomAbvGr       0
```

```
KitchenAbvGr          0
KitchenQual           0
TotRmsAbvGrd          0
Functional            0
Fireplaces            0
FireplaceQu         690
GarageType           81
GarageYrBlt          81
GarageFinish         81
GarageCars            0
GarageArea            0
GarageQual           81
GarageCond           81
PavedDrive            0
WoodDeckSF            0
OpenPorchSF           0
EnclosedPorch         0
3SsnPorch             0
ScreenPorch           0
PoolArea              0
PoolQC             1453
Fence              1179
MiscFeature        1406
MiscVal               0
MoSold                0
YrSold                0
SaleType              0
SaleCondition         0
SalePrice             0
dtype: int64
```

[62]:
```python
df_filled = df.
  ↪dropna(subset=['MSZoning','Utilities','Exterior1st','Exterior2nd','KitchenQual','Functional
```

[79]:
```python
df_filled= df_filled.
  ↪fillna(df_filled[['LotFrontage','MasVnrArea','BsmtFinSF1','BsmtFinSF2','BsmtUnfSF','TotalBsm
  ↪mean())
```

[81]:
```python
df_filled = df_filled.dropna(subset=['Electrical'])
```

[127]:
```python
df_filled.dtypes
```

[127]:
```
Id              int64
MSSubClass      int64
MSZoning       object
LotFrontage   float64
LotArea         int64
```

```
Street          object
Alley            int64
LotShape        object
LandContour     object
Utilities       object
LotConfig       object
LandSlope       object
Neighborhood    object
Condition1      object
Condition2      object
BldgType        object
HouseStyle      object
OverallQual      int64
OverallCond      int64
YearBuilt        int64
YearRemodAdd     int64
RoofStyle       object
RoofMatl        object
Exterior1st     object
Exterior2nd     object
MasVnrType       int64
MasVnrArea     float64
ExterQual       object
ExterCond       object
Foundation      object
BsmtQual         int32
BsmtCond         int32
BsmtExposure     int32
BsmtFinType1     int32
BsmtFinSF1       int64
BsmtFinType2     int32
BsmtFinSF2       int64
BsmtUnfSF        int64
TotalBsmtSF      int64
Heating         object
HeatingQC       object
CentralAir      object
Electrical      object
1stFlrSF         int64
2ndFlrSF         int64
LowQualFinSF     int64
GrLivArea        int64
BsmtFullBath     int64
BsmtHalfBath     int64
FullBath         int64
HalfBath         int64
BedroomAbvGr     int64
```

```
KitchenAbvGr        int64
KitchenQual        object
TotRmsAbvGrd        int64
Functional         object
Fireplaces          int64
FireplaceQu         int32
GarageType          int32
GarageYrBlt       float64
GarageFinish        int32
GarageCars          int64
GarageArea          int64
GarageQual          int32
GarageCond          int32
PavedDrive         object
WoodDeckSF          int64
OpenPorchSF         int64
EnclosedPorch       int64
3SsnPorch           int64
ScreenPorch         int64
PoolArea            int64
PoolQC              int32
Fence               int32
MiscFeature         int32
MiscVal             int64
MoSold              int64
YrSold              int64
SaleType           object
SaleCondition      object
SalePrice           int64
dtype: object
```

[137]:
```python
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
df_filled['MSZoning']=le.fit_transform(df_filled['MSZoning'])
df_filled['Street']=le.fit_transform(df_filled['Street'])
df_filled['Alley']=le.fit_transform(df_filled['Alley'])
df_filled['MasVnrType']=le.fit_transform(df_filled['MasVnrType'])
df_filled['BsmtQual']=le.fit_transform(df_filled['BsmtQual'])
df_filled['BsmtCond']=le.fit_transform(df_filled['BsmtCond'])
df_filled['BsmtExposure']=le.fit_transform(df_filled['BsmtExposure'])
df_filled['BsmtFinType1']=le.fit_transform(df_filled['BsmtFinType1'])
df_filled['BsmtFinType2']=le.fit_transform(df_filled['BsmtFinType2'])
df_filled['FireplaceQu']=le.fit_transform(df_filled['FireplaceQu'])
df_filled['GarageType']=le.fit_transform(df_filled['GarageType'])
df_filled['GarageFinish']=le.fit_transform(df_filled['GarageFinish'])
df_filled['GarageQual']=le.fit_transform(df_filled['GarageQual'])
df_filled['GarageCond']=le.fit_transform(df_filled['GarageCond'])
```

```
df_filled['PoolQC']=le.fit_transform(df_filled['PoolQC'])
df_filled['Fence']=le.fit_transform(df_filled['Fence'])
df_filled['MiscFeature']=le.fit_transform(df_filled['MiscFeature'])
df_filled['LotShape']=le.fit_transform(df_filled['LotShape'])
df_filled['LandContour']=le.fit_transform(df_filled['LandContour'])
df_filled['Utilities']=le.fit_transform(df_filled['Utilities'])
df_filled['LotConfig']=le.fit_transform(df_filled['LotConfig'])
df_filled['LandSlope']=le.fit_transform(df_filled['LandSlope'])
df_filled['Neighborhood']=le.fit_transform(df_filled['Neighborhood'])
df_filled['Condition1']=le.fit_transform(df_filled['Condition1'])
df_filled['Condition2']=le.fit_transform(df_filled['Condition2'])
df_filled['BldgType']=le.fit_transform(df_filled['BldgType'])
df_filled['HouseStyle']=le.fit_transform(df_filled['HouseStyle'])
df_filled['RoofStyle']=le.fit_transform(df_filled['RoofStyle'])
df_filled['RoofMatl']=le.fit_transform(df_filled['RoofMatl'])
df_filled['Exterior1st']=le.fit_transform(df_filled['Exterior1st'])
df_filled['Exterior2nd']=le.fit_transform(df_filled['Exterior2nd'])
df_filled['ExterQual']=le.fit_transform(df_filled['ExterQual'])
df_filled['ExterCond']=le.fit_transform(df_filled['ExterCond'])
df_filled['Foundation']=le.fit_transform(df_filled['Foundation'])
df_filled['BldgType']=le.fit_transform(df_filled['BldgType'])
df_filled['Heating']=le.fit_transform(df_filled['Heating'])
df_filled['HeatingQC']=le.fit_transform(df_filled['HeatingQC'])
df_filled['CentralAir']=le.fit_transform(df_filled['CentralAir'])
df_filled['Electrical']=le.fit_transform(df_filled['Electrical'])
df_filled['KitchenQual']=le.fit_transform(df_filled['KitchenQual'])
df_filled['Functional']=le.fit_transform(df_filled['Functional'])
df_filled['PavedDrive']=le.fit_transform(df_filled['PavedDrive'])
df_filled['SaleType']=le.fit_transform(df_filled['SaleType'])
df_filled['SaleCondition']=le.fit_transform(df_filled['SaleCondition'])

df_filled
```

[137]:

	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	\
0	1	60	3	65.0	8450	1	2	
1	2	20	3	80.0	9600	1	2	
2	3	60	3	68.0	11250	1	2	
3	4	70	3	60.0	9550	1	2	
4	5	60	3	84.0	14260	1	2	
...	...	...	...	...	...	...	...	
1455	1456	60	3	62.0	7917	1	2	
1456	1457	20	3	85.0	13175	1	2	
1457	1458	70	3	66.0	9042	1	2	
1458	1459	20	3	68.0	9717	1	2	
1459	1460	20	3	75.0	9937	1	2	

	LotShape	LandContour	Utilities	LotConfig	LandSlope	Neighborhood	\

0	3	3	0	4	0	5
1	3	3	0	2	0	24
2	0	3	0	4	0	5
3	0	3	0	0	0	6
4	0	3	0	2	0	15
...	...	...	...	...	...	
1455	3	3	0	4	0	8
1456	3	3	0	4	0	14
1457	3	3	0	4	0	6
1458	3	3	0	4	0	12
1459	3	3	0	4	0	7

	Condition1	Condition2	BldgType	HouseStyle	OverallQual	OverallCond	\
0	2	2	0	5	7	5	
1	1	2	0	2	6	8	
2	2	2	0	5	7	5	
3	2	2	0	5	7	5	
4	2	2	0	5	8	5	
...	...	...	...	...	...	...	
1455	2	2	0	5	6	5	
1456	2	2	0	2	6	6	
1457	2	2	0	5	7	9	
1458	2	2	0	2	5	6	
1459	2	2	0	2	5	6	

	YearBuilt	YearRemodAdd	RoofStyle	RoofMatl	Exterior1st	Exterior2nd	\
0	2003	2003	1	1	12	13	
1	1976	1976	1	1	8	8	
2	2001	2002	1	1	12	13	
3	1915	1970	1	1	13	15	
4	2000	2000	1	1	12	13	
...	...	...	...	...	...	...	
1455	1999	2000	1	1	12	13	
1456	1978	1988	1	1	9	10	
1457	1941	2006	1	1	5	5	
1458	1950	1996	3	1	8	8	
1459	1965	1965	1	1	6	6	

	MasVnrType	MasVnrArea	ExterQual	ExterCond	Foundation	BsmtQual	\
0	1	196.0	2	4	2	2	
1	3	0.0	3	4	1	2	
2	1	162.0	2	4	2	2	
3	3	0.0	3	4	0	3	
4	1	350.0	2	4	2	2	
...	...	...	...	...	...	...	
1455	3	0.0	3	4	2	2	
1456	2	119.0	3	4	1	2	

```
1457            3          0.0          0           2            4           3
1458            3          0.0          3           4            1           3
1459            3          0.0          2           4            1           3

      BsmtCond  BsmtExposure  BsmtFinType1  BsmtFinSF1  BsmtFinType2  \
0            3             3             2         706             5
1            3             1             0         978             5
2            3             2             2         486             5
3            1             3             0         216             5
4            3             0             2         655             5
...        ...           ...           ...         ...           ...
1455         3             3             5           0             5
1456         3             3             0         790             4
1457         1             3             2         275             5
1458         3             2             2          49             4
1459         3             3             1         830             3

      BsmtFinSF2  BsmtUnfSF  TotalBsmtSF  Heating  HeatingQC  CentralAir  \
0              0        150          856        1          0           1
1              0        284         1262        1          0           1
2              0        434          920        1          0           1
3              0        540          756        1          2           1
4              0        490         1145        1          0           1
...          ...        ...          ...      ...        ...         ...
1455           0        953          953        1          0           1
1456         163        589         1542        1          4           1
1457           0        877         1152        1          0           1
1458        1029          0         1078        1          2           1
1459         290        136         1256        1          2           1

      Electrical  1stFlrSF  2ndFlrSF  LowQualFinSF  GrLivArea  BsmtFullBath  \
0              4       856       854             0       1710             1
1              4      1262         0             0       1262             0
2              4       920       866             0       1786             1
3              4       961       756             0       1717             1
4              4      1145      1053             0       2198             1
...          ...       ...       ...           ...        ...           ...
1455           4       953       694             0       1647             0
1456           4      2073         0             0       2073             1
1457           4      1188      1152             0       2340             0
1458           0      1078         0             0       1078             1
1459           4      1256         0             0       1256             1

      BsmtHalfBath  FullBath  HalfBath  BedroomAbvGr  KitchenAbvGr  \
0                0         2         1             3             1
1                1         2         0             3             1
2                0         2         1             3             1
```

3	0	1	0	3	1
4	0	2	1	4	1
...	...	...	...	...	...
1455	0	2	1	3	1
1456	0	2	0	3	1
1457	0	2	0	4	1
1458	0	1	0	2	1
1459	0	1	1	3	1

	KitchenQual	TotRmsAbvGrd	Functional	Fireplaces	FireplaceQu \
0	2	8	6	0	5
1	3	6	6	1	4
2	2	6	6	1	4
3	2	7	6	1	2
4	2	9	6	1	4
...	...	...	...	...	...
1455	3	7	6	1	4
1456	3	7	2	2	4
1457	2	9	6	2	2
1458	2	5	6	0	5
1459	3	6	6	0	5

	GarageType	GarageYrBlt	GarageFinish	GarageCars	GarageArea \
0	1	2003.0	1	2	548
1	1	1976.0	1	2	460
2	1	2001.0	1	2	608
3	5	1998.0	2	3	642
4	1	2000.0	1	3	836
...	...	...	...	...	...
1455	1	1999.0	1	2	460
1456	1	1978.0	2	2	500
1457	1	1941.0	1	1	252
1458	1	1950.0	2	1	240
1459	1	1965.0	0	1	276

	GarageQual	GarageCond	PavedDrive	WoodDeckSF	OpenPorchSF \
0	4	4	2	0	61
1	4	4	2	298	0
2	4	4	2	0	42
3	4	4	2	0	35
4	4	4	2	192	84
...	...	...	...	...	...
1455	4	4	2	0	40
1456	4	4	2	349	0
1457	4	4	2	0	60
1458	4	4	2	366	0
1459	4	4	2	736	68

```
        EnclosedPorch  3SsnPorch  ScreenPorch  PoolArea  PoolQC  Fence  \
0                   0          0            0         0       3      4
1                   0          0            0         0       3      4
2                   0          0            0         0       3      4
3                 272          0            0         0       3      4
4                   0          0            0         0       3      4
...               ...        ...          ...       ...     ...    ...
1455                0          0            0         0       3      4
1456                0          0            0         0       3      2
1457                0          0            0         0       3      0
1458              112          0            0         0       3      4
1459                0          0            0         0       3      4

        MiscFeature  MiscVal  MoSold  YrSold  SaleType  SaleCondition  SalePrice
0                 4        0       2    2008         8              4     208500
1                 4        0       5    2007         8              4     181500
2                 4        0       9    2008         8              4     223500
3                 4        0       2    2006         8              0     140000
4                 4        0      12    2008         8              4     250000
...             ...      ...     ...     ...       ...            ...        ...
1455              4        0       8    2007         8              4     175000
1456              4        0       2    2010         8              4     210000
1457              2     2500       5    2010         8              4     266500
1458              4        0       4    2010         8              4     142125
1459              4        0       6    2008         8              4     147500

[1459 rows x 81 columns]
```

[139]: `df_filled1=df_filled.fillna(0)`

[141]: `df_filled1.isnull().sum()`

[141]:
```
Id                0
MSSubClass        0
MSZoning          0
LotFrontage       0
LotArea           0
Street            0
Alley             0
LotShape          0
LandContour       0
Utilities         0
LotConfig         0
LandSlope         0
Neighborhood      0
Condition1        0
```

```
Condition2       0
BldgType         0
HouseStyle       0
OverallQual      0
OverallCond      0
YearBuilt        0
YearRemodAdd     0
RoofStyle        0
RoofMatl         0
Exterior1st      0
Exterior2nd      0
MasVnrType       0
MasVnrArea       0
ExterQual        0
ExterCond        0
Foundation       0
BsmtQual         0
BsmtCond         0
BsmtExposure     0
BsmtFinType1     0
BsmtFinSF1       0
BsmtFinType2     0
BsmtFinSF2       0
BsmtUnfSF        0
TotalBsmtSF      0
Heating          0
HeatingQC        0
CentralAir       0
Electrical       0
1stFlrSF         0
2ndFlrSF         0
LowQualFinSF     0
GrLivArea        0
BsmtFullBath     0
BsmtHalfBath     0
FullBath         0
HalfBath         0
BedroomAbvGr     0
KitchenAbvGr     0
KitchenQual      0
TotRmsAbvGrd     0
Functional       0
Fireplaces       0
FireplaceQu      0
GarageType       0
GarageYrBlt      0
GarageFinish     0
```

```
GarageCars       0
GarageArea       0
GarageQual       0
GarageCond       0
PavedDrive       0
WoodDeckSF       0
OpenPorchSF      0
EnclosedPorch    0
3SsnPorch        0
ScreenPorch      0
PoolArea         0
PoolQC           0
Fence            0
MiscFeature      0
MiscVal          0
MoSold           0
YrSold           0
SaleType         0
SaleCondition    0
SalePrice        0
dtype: int64
```

4.2 training and test on the given model using multiple linear regression

```
[143]: x=df_filled1.iloc[:, :-1].values
       y=df_filled1.iloc[:, -1].values
```

```
[145]: x
```

```
[145]: array([[1.000e+00, 6.000e+01, 3.000e+00, …, 2.008e+03, 8.000e+00,
               4.000e+00],
              [2.000e+00, 2.000e+01, 3.000e+00, …, 2.007e+03, 8.000e+00,
               4.000e+00],
              [3.000e+00, 6.000e+01, 3.000e+00, …, 2.008e+03, 8.000e+00,
               4.000e+00],
              …,
              [1.458e+03, 7.000e+01, 3.000e+00, …, 2.010e+03, 8.000e+00,
               4.000e+00],
              [1.459e+03, 2.000e+01, 3.000e+00, …, 2.010e+03, 8.000e+00,
               4.000e+00],
              [1.460e+03, 2.000e+01, 3.000e+00, …, 2.008e+03, 8.000e+00,
               4.000e+00]])
```

```
[147]: y
```

```
[147]: array([208500, 181500, 223500, …, 266500, 142125, 147500], dtype=int64)
```

```
[149]: 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=0)
```

```
[151]: x_train
```

```
[151]: array([[  93.,   30.,    3., …, 2009.,    8.,    4.],
              [ 839.,   20.,    3., …, 2008.,    8.,    4.],
              [ 361.,   85.,    3., …, 2007.,    8.,    4.],
              …,
              [1217.,   90.,    4., …, 2010.,    8.,    4.],
              [ 560.,  120.,    3., …, 2006.,    8.,    4.],
              [ 685.,   60.,    3., …, 2010.,    8.,    4.]])
```

```
[153]: y_train
```

```
[153]: array([163500, 144000, 156000, …, 112000, 234000, 221000], dtype=int64)
```

```
[155]: from sklearn.linear_model import LinearRegression
       regressor=LinearRegression()
       regressor.fit(x_train,y_train)
```

```
[155]: LinearRegression()
```

4.3 its showing near accurate results as we are compairing with given test values

```
[169]: y_pred=regressor.predict(x_test)
       np.set_printoptions(precision=2)
       print(np.concatenate((y_pred.reshape(len(y_pred),1),y_test.
         ↪reshape(len(y_test),1)),1))
```

```
[[174475.31 179900.  ]
 [130939.09  91300.  ]
 [ 82167.98  90000.  ]
 [132573.62 135960.  ]
 [151023.05 156000.  ]
 [106458.33 130000.  ]
 [173942.32 141000.  ]
 [198258.21 174000.  ]
 [ 67993.74  75000.  ]
 [ 95764.72 109008.  ]
 [103871.32  98300.  ]
 [315329.   325000.  ]
 [101018.86  91000.  ]
 [212435.35 226700.  ]
 [300461.62 301500.  ]
 [186390.21 155000.  ]
 [161533.9  173733.  ]
 [358240.24 415298.  ]
```

```
[289476.73 281213.  ]
[174901.78 177000.  ]
[370665.26 287000.  ]
[ 64435.46 100000.  ]
[131427.12 149350.  ]
[198265.77 208900.  ]
[180452.85  82500.  ]
[196166.82 175000.  ]
[160650.79 165000.  ]
[275323.52 324000.  ]
[ 49327.78  67000.  ]
[302546.37 403000.  ]
[116956.27 123600.  ]
[160545.97 142500.  ]
[151954.55 149900.  ]
[142070.1  137900.  ]
[238379.66 212900.  ]
[296760.75 277500.  ]
[140594.51  89471.  ]
[186988.88 190000.  ]
[ 94575.51  97000.  ]
[110985.57 119000.  ]
[ 74084.03 110000.  ]
[143993.69 151000.  ]
[227401.72 263000.  ]
[ 87113.37  84500.  ]
[126507.31 132500.  ]
[223167.85 243000.  ]
[197072.97 230000.  ]
[197647.17 213490.  ]
[145502.62 119900.  ]
[265888.41 320000.  ]
[305359.49 147000.  ]
[182922.24 151000.  ]
[ 44690.14  52500.  ]
[ 44708.84  72500.  ]
[123793.07 132000.  ]
[157931.84 139500.  ]
[245536.46 201000.  ]
[234609.72 235000.  ]
[349301.7  378500.  ]
[173968.72 127500.  ]
[233580.45 239900.  ]
[-18453.95 274970.  ]
[188686.48 190000.  ]
[290572.7  250000.  ]
[152982.06 117500.  ]
[147564.72 154000.  ]
```

```
[ 99124.64  82500.  ]
[234797.56 234000.  ]
[ 67790.64  87500.  ]
[220298.31 175900.  ]
[124909.32 118000.  ]
[199606.12 185000.  ]
[156084.23 180500.  ]
[117492.38 133000.  ]
[130431.27 132500.  ]
[122432.44 125500.  ]
[316810.46 318000.  ]
[162788.54 146500.  ]
[330311.58 313000.  ]
[179555.4  170000.  ]
[188146.43 192140.  ]
[ 92499.56 115000.  ]
[213511.28 192000.  ]
[267295.9  301000.  ]
[440364.32 538000.  ]
[157030.66 112000.  ]
[271704.6  239000.  ]
[238988.5  178400.  ]
[247878.41 260000.  ]
[206545.68 174000.  ]
[181260.42 191000.  ]
[ 97144.32 125000.  ]
[173638.87 161500.  ]
[112574.23 139000.  ]
[146618.77 157000.  ]
[121211.86 134000.  ]
[113238.43 129900.  ]
[204953.45 176000.  ]
[115166.21 100000.  ]
[165021.71 154000.  ]
[198437.06 175000.  ]
[160619.11 112000.  ]
[213779.26 207000.  ]
[231161.19 184000.  ]
[254849.26 260000.  ]
[164602.39 143000.  ]
[183288.69 173000.  ]
[290904.16 325000.  ]
[100978.37  86000.  ]
[260895.23 251000.  ]
[ 57233.62 106250.  ]
[160979.62 145000.  ]
[177070.44 165600.  ]
[173400.19 181000.  ]
```

```
[134847.44 136000.  ]
[168182.19 165500.  ]
[144053.37 139000.  ]
[210919.83 193500.  ]
[158773.43 181000.  ]
[280668.85 265000.  ]
[179462.05 175500.  ]
[168766.44 186000.  ]
[131530.98 131500.  ]
[225713.61 214000.  ]
[144093.8  124500.  ]
[236383.46 216837.  ]
[110624.97 118000.  ]
[ 96936.39  97000.  ]
[149034.93 176000.  ]
[ 85705.15 106000.  ]
[233594.37 235000.  ]
[123477.68 166000.  ]
[128488.73 148000.  ]
[ 67630.19  37900.  ]
[187640.06 183000.  ]
[111493.77  94000.  ]
[245230.9  255000.  ]
[122571.04 181000.  ]
[129847.31 116500.  ]
[ 90231.   110000.  ]
[224800.65 217000.  ]
[211159.47 180000.  ]
[125242.34 136500.  ]
[170229.56 210000.  ]
[217010.48 167500.  ]
[280485.74 316600.  ]
[305201.97 319900.  ]
[290651.23 283463.  ]
[179611.6  180500.  ]
[209569.59 187750.  ]
[244636.73 221500.  ]
[111439.68  86000.  ]
[258662.02 272000.  ]
[300748.62 250000.  ]
[ 90793.61 105000.  ]
[125974.44 135000.  ]
[119940.59 149900.  ]
[390689.37 412500.  ]
[134233.39 120000.  ]
[177566.96 187500.  ]
[165119.68 117000.  ]
[205982.32 215200.  ]
```

```
[140313.75 158500.  ]
[148279.24 115000.  ]
[121682.56 145000.  ]
[104490.52 119500.  ]
[155215.31 147400.  ]
[228847.2  232600.  ]
[105225.25 120500.  ]
[115765.37 128200.  ]
[120854.57 107500.  ]
[360001.23 337500.  ]
[176281.36 155000.  ]
[123949.24 108000.  ]
[214757.02 205000.  ]
[353379.09 314813.  ]
[320704.69 345000.  ]
[224000.5  224500.  ]
[128899.5  135000.  ]
[190567.95 155000.  ]
[114255.8  117000.  ]
[279584.31 306000.  ]
[407531.77 555000.  ]
[204710.35 190000.  ]
[404107.94 386250.  ]
[ 91061.45 108480.  ]
[138132.15 108959.  ]
[190689.7  175000.  ]
[ 88202.36 102776.  ]
[123147.12 134450.  ]
[143362.12 131400.  ]
[290688.32 293077.  ]
[158483.51 127000.  ]
[270129.16 270000.  ]
[265032.24 266000.  ]
[ 98026.64  81000.  ]
[214593.5  200000.  ]
[ 66330.04  80500.  ]
[111734.88 139000.  ]
[157426.7  152000.  ]
[ 84431.1   85000.  ]
[113380.22 119000.  ]
[130818.81 145000.  ]
[166357.14 122000.  ]
[131524.26 109900.  ]
[130460.28 138000.  ]
[201951.92 159895.  ]
[129105.21 128000.  ]
[151102.55 159000.  ]
[247842.32 190000.  ]
```

```
[207437.52 197000.  ]
[206445.92 200624.  ]
[378050.33 385000.  ]
[125717.02 136000.  ]
[146712.54 144000.  ]
[241663.51 269790.  ]
[257218.87 249700.  ]
[112326.42  79900.  ]
[122710.52 145000.  ]
[108625.08 128000.  ]
[139129.99 148000.  ]
[ 71622.2  106500.  ]
[210299.34 230000.  ]
[371635.37 310000.  ]
[219541.73 172500.  ]
[237185.77 275000.  ]
[143157.9  149900.  ]
[159006.39 158000.  ]
[195752.41 155000.  ]
[100516.76 115000.  ]
[214681.64 210000.  ]
[226945.59 185850.  ]
[162602.9  158000.  ]
[178602.94 172500.  ]
[172482.11 178740.  ]
[ 75073.42  82000.  ]
[143589.34 137500.  ]
[113210.41 110000.  ]
[142986.78 138500.  ]
[ 76038.24 112000.  ]
[213979.53 223500.  ]
[208815.67 181500.  ]
[102510.67 121600.  ]
[196228.09 137500.  ]
[160082.37 174000.  ]
[134038.69 110000.  ]
[219039.57 192000.  ]
[196496.47 202500.  ]
[ 92510.24 120500.  ]
[269490.6  359100.  ]
[420658.07 438780.  ]
[239407.97 266500.  ]
[224380.35 240000.  ]
[133428.14 110500.  ]
[119593.79 145000.  ]
[214268.68 207500.  ]
[141121.29 135000.  ]
[118649.75 119200.  ]
```

```
[216146.71 172500.   ]
[154736.47 155000.   ]
[187120.35 143000.   ]
[175688.21 164000.   ]
[154211.54 143500.   ]
[233511.51 226000.   ]
[162567.83 174500.   ]
[ 14172.6   68500.   ]
[107160.51 125500.   ]
[216642.65 233170.   ]
[205665.8  157000.   ]
[200001.03 188500.   ]
[169764.79 161000.   ]
[183938.4  181000.   ]
[117154.15 104000.   ]
[140197.46 128000.   ]
[208890.61 189000.   ]
[121579.81  92000.   ]
[172611.43 162000.   ]
[259568.83 284000.   ]
[263304.61 260000.   ]
[141781.2  140000.   ]
[232903.1  236000.   ]
[138918.17 127000.   ]
[204954.67 198500.   ]
[176766.01 143000.   ]
[129938.01 135000.   ]
[124640.59 105900.   ]
[299004.04 222000.   ]
[220498.67 213000.   ]
[212146.66 194000.   ]
[101240.54 101000.   ]
[109678.1  113000.   ]
[199027.6  195000.   ]]
```

4.4 predicting the house prices for the test set that given

```
[183]: test=pd.read_csv('test.csv')
       test
```

[183]:

	Id	MSSubClass	MSZoning	LotFrontage	LotArea	Street	Alley	LotShape	\
0	1461	20	RH	80.0	11622	Pave	NaN	Reg	
1	1462	20	RL	81.0	14267	Pave	NaN	IR1	
2	1463	60	RL	74.0	13830	Pave	NaN	IR1	
3	1464	60	RL	78.0	9978	Pave	NaN	IR1	
4	1465	120	RL	43.0	5005	Pave	NaN	IR1	
…	…	…	…	…	…	…	…	…	

```
1454  2915          160          RM        21.0    1936    Pave    NaN     Reg
1455  2916          160          RM        21.0    1894    Pave    NaN     Reg
1456  2917           20          RL       160.0   20000    Pave    NaN     Reg
1457  2918           85          RL        62.0   10441    Pave    NaN     Reg
1458  2919           60          RL        74.0    9627    Pave    NaN     Reg

     LandContour Utilities LotConfig LandSlope Neighborhood Condition1  \
0            Lvl    AllPub    Inside       Gtl        NAmes      Feedr
1            Lvl    AllPub    Corner       Gtl        NAmes       Norm
2            Lvl    AllPub    Inside       Gtl      Gilbert       Norm
3            Lvl    AllPub    Inside       Gtl      Gilbert       Norm
4            HLS    AllPub    Inside       Gtl      StoneBr       Norm
...          ...       ...       ...       ...          ...        ...
1454         Lvl    AllPub    Inside       Gtl      MeadowV       Norm
1455         Lvl    AllPub    Inside       Gtl      MeadowV       Norm
1456         Lvl    AllPub    Inside       Gtl      Mitchel       Norm
1457         Lvl    AllPub    Inside       Gtl      Mitchel       Norm
1458         Lvl    AllPub    Inside       Mod      Mitchel       Norm

     Condition2 BldgType HouseStyle  OverallQual  OverallCond  YearBuilt  \
0          Norm     1Fam     1Story            5            6       1961
1          Norm     1Fam     1Story            6            6       1958
2          Norm     1Fam     2Story            5            5       1997
3          Norm     1Fam     2Story            6            6       1998
4          Norm   TwnhsE     1Story            8            5       1992
...         ...      ...        ...          ...          ...        ...
1454       Norm    Twnhs     2Story            4            7       1970
1455       Norm   TwnhsE     2Story            4            5       1970
1456       Norm     1Fam     1Story            5            7       1960
1457       Norm     1Fam     SFoyer            5            5       1992
1458       Norm     1Fam     2Story            7            5       1993

     YearRemodAdd RoofStyle RoofMatl Exterior1st Exterior2nd MasVnrType  \
0            1961     Gable  CompShg     VinylSd     VinylSd        NaN
1            1958       Hip  CompShg     Wd Sdng     Wd Sdng    BrkFace
2            1998     Gable  CompShg     VinylSd     VinylSd        NaN
3            1998     Gable  CompShg     VinylSd     VinylSd    BrkFace
4            1992     Gable  CompShg     HdBoard     HdBoard        NaN
...           ...       ...      ...         ...         ...        ...
1454         1970     Gable  CompShg     CemntBd     CmentBd        NaN
1455         1970     Gable  CompShg     CemntBd     CmentBd        NaN
1456         1996     Gable  CompShg     VinylSd     VinylSd        NaN
1457         1992     Gable  CompShg     HdBoard     Wd Shng        NaN
1458         1994     Gable  CompShg     HdBoard     HdBoard    BrkFace

     MasVnrArea ExterQual ExterCond Foundation BsmtQual BsmtCond  \
0           0.0        TA        TA     CBlock       TA       TA
```

```
1         108.0        TA       TA     CBlock       TA       TA
2           0.0        TA       TA      PConc       Gd       TA
3          20.0        TA       TA      PConc       TA       TA
4           0.0        Gd       TA      PConc       Gd       TA
...         ...       ...      ...        ...      ...      ...
1454        0.0        TA       TA     CBlock       TA       TA
1455        0.0        TA       TA     CBlock       TA       TA
1456        0.0        TA       TA     CBlock       TA       TA
1457        0.0        TA       TA      PConc       Gd       TA
1458       94.0        TA       TA      PConc       Gd       TA

      BsmtExposure BsmtFinType1  BsmtFinSF1 BsmtFinType2  BsmtFinSF2  \
0               No          Rec       468.0          LwQ       144.0
1               No          ALQ       923.0          Unf         0.0
2               No          GLQ       791.0          Unf         0.0
3               No          GLQ       602.0          Unf         0.0
4               No          ALQ       263.0          Unf         0.0
...            ...          ...         ...          ...         ...
1454            No          Unf         0.0          Unf         0.0
1455            No          Rec       252.0          Unf         0.0
1456            No          ALQ      1224.0          Unf         0.0
1457            Av          GLQ       337.0          Unf         0.0
1458            Av          LwQ       758.0          Unf         0.0

      BsmtUnfSF  TotalBsmtSF Heating HeatingQC CentralAir Electrical  \
0         270.0        882.0    GasA        TA          Y      SBrkr
1         406.0       1329.0    GasA        TA          Y      SBrkr
2         137.0        928.0    GasA        Gd          Y      SBrkr
3         324.0        926.0    GasA        Ex          Y      SBrkr
4        1017.0       1280.0    GasA        Ex          Y      SBrkr
...         ...          ...     ...       ...        ...        ...
1454      546.0        546.0    GasA        Gd          Y      SBrkr
1455      294.0        546.0    GasA        TA          Y      SBrkr
1456        0.0       1224.0    GasA        Ex          Y      SBrkr
1457      575.0        912.0    GasA        TA          Y      SBrkr
1458      238.0        996.0    GasA        Ex          Y      SBrkr

      1stFlrSF  2ndFlrSF  LowQualFinSF  GrLivArea  BsmtFullBath  BsmtHalfBath  \
0          896         0             0        896           0.0           0.0
1         1329         0             0       1329           0.0           0.0
2          928       701             0       1629           0.0           0.0
3          926       678             0       1604           0.0           0.0
4         1280         0             0       1280           0.0           0.0
...        ...       ...           ...        ...           ...           ...
1454       546       546             0       1092           0.0           0.0
1455       546       546             0       1092           0.0           0.0
1456      1224         0             0       1224           1.0           0.0
```

```
1457       970           0            0          970          0.0              1.0
1458       996        1004            0         2000          0.0              0.0


       FullBath  HalfBath  BedroomAbvGr  KitchenAbvGr KitchenQual  \
0             1         0             2             1          TA
1             1         1             3             1          Gd
2             2         1             3             1          TA
3             2         1             3             1          Gd
4             2         0             2             1          Gd
...         ...       ...           ...           ...         ...
1454          1         1             3             1          TA
1455          1         1             3             1          TA
1456          1         0             4             1          TA
1457          1         0             3             1          TA
1458          2         1             3             1          TA


       TotRmsAbvGrd Functional  Fireplaces FireplaceQu GarageType  GarageYrBlt  \
0                 5        Typ           0         NaN     Attchd       1961.0
1                 6        Typ           0         NaN     Attchd       1958.0
2                 6        Typ           1          TA     Attchd       1997.0
3                 7        Typ           1          Gd     Attchd       1998.0
4                 5        Typ           0         NaN     Attchd       1992.0
...             ...        ...         ...         ...        ...          ...
1454              5        Typ           0         NaN        NaN          NaN
1455              6        Typ           0         NaN    CarPort       1970.0
1456              7        Typ           1          TA     Detchd       1960.0
1457              6        Typ           0         NaN        NaN          NaN
1458              9        Typ           1          TA     Attchd       1993.0


       GarageFinish  GarageCars  GarageArea GarageQual GarageCond PavedDrive  \
0               Unf         1.0       730.0         TA         TA          Y
1               Unf         1.0       312.0         TA         TA          Y
2               Fin         2.0       482.0         TA         TA          Y
3               Fin         2.0       470.0         TA         TA          Y
4               RFn         2.0       506.0         TA         TA          Y
...             ...         ...         ...        ...        ...        ...
1454            NaN         0.0         0.0        NaN        NaN          Y
1455            Unf         1.0       286.0         TA         TA          Y
1456            Unf         2.0       576.0         TA         TA          Y
1457            NaN         0.0         0.0        NaN        NaN          Y
1458            Fin         3.0       650.0         TA         TA          Y


       WoodDeckSF  OpenPorchSF  EnclosedPorch  3SsnPorch  ScreenPorch  \
0             140            0              0          0          120
1             393           36              0          0            0
2             212           34              0          0            0
3             360           36              0          0            0
```

```
4              0           82             0             0            144
...            ...         ...            ...           ...          ...
1454           0            0             0             0             0
1455           0           24             0             0             0
1456         474            0             0             0             0
1457          80           32             0             0             0
1458         190           48             0             0             0

      PoolArea PoolQC  Fence MiscFeature  MiscVal  MoSold  YrSold SaleType  \
0            0    NaN  MnPrv         NaN        0       6    2010       WD
1            0    NaN    NaN        Gar2    12500       6    2010       WD
2            0    NaN  MnPrv         NaN        0       3    2010       WD
3            0    NaN    NaN         NaN        0       6    2010       WD
4            0    NaN    NaN         NaN        0       1    2010       WD
...        ...    ...    ...         ...      ...     ...     ...      ...
1454         0    NaN    NaN         NaN        0       6    2006       WD
1455         0    NaN    NaN         NaN        0       4    2006       WD
1456         0    NaN    NaN         NaN        0       9    2006       WD
1457         0    NaN  MnPrv        Shed      700       7    2006       WD
1458         0    NaN    NaN         NaN        0      11    2006       WD

      SaleCondition
0            Normal
1            Normal
2            Normal
3            Normal
4            Normal
...             ...
1454         Normal
1455        Abnorml
1456        Abnorml
1457         Normal
1458         Normal

[1459 rows x 80 columns]
```

```python
[ ]: df_test = test.
     ↪dropna(subset=['MSZoning','Utilities','Exterior1st','Exterior2nd','KitchenQual','Functional
```

```python
[187]: df_test= df_test.
       ↪fillna(df_test[['LotFrontage','MasVnrArea','BsmtFinSF1','BsmtFinSF2','BsmtUnfSF','TotalBsmt
       ↪mean())
```

```python
[189]: df_test = df_test.dropna(subset=['Electrical'])
```

```python
[191]: from sklearn.preprocessing import LabelEncoder
       le1 = LabelEncoder()
```

```python
df_test['MSZoning']=le1.fit_transform(df_test['MSZoning'])
df_test['Street']=le1.fit_transform(df_test['Street'])
df_test['Alley']=le1.fit_transform(df_test['Alley'])
df_test['MasVnrType']=le1.fit_transform(df_test['MasVnrType'])
df_test['BsmtQual']=le1.fit_transform(df_test['BsmtQual'])
df_test['BsmtCond']=le1.fit_transform(df_test['BsmtCond'])
df_test['BsmtExposure']=le1.fit_transform(df_test['BsmtExposure'])
df_test['BsmtFinType1']=le1.fit_transform(df_test['BsmtFinType1'])
df_test['BsmtFinType2']=le1.fit_transform(df_test['BsmtFinType2'])
df_test['FireplaceQu']=le1.fit_transform(df_test['FireplaceQu'])
df_test['GarageType']=le1.fit_transform(df_test['GarageType'])
df_test['GarageFinish']=le1.fit_transform(df_test['GarageFinish'])
df_test['GarageQual']=le1.fit_transform(df_test['GarageQual'])
df_test['GarageCond']=le1.fit_transform(df_test['GarageCond'])
df_test['PoolQC']=le1.fit_transform(df_test['PoolQC'])
df_test['Fence']=le1.fit_transform(df_test['Fence'])
df_test['MiscFeature']=le1.fit_transform(df_test['MiscFeature'])
df_test['LotShape']=le1.fit_transform(df_test['LotShape'])
df_test['LandContour']=le1.fit_transform(df_test['LandContour'])
df_test['Utilities']=le1.fit_transform(df_test['Utilities'])
df_test['LotConfig']=le1.fit_transform(df_test['LotConfig'])
df_test['LandSlope']=le1.fit_transform(df_test['LandSlope'])
df_test['Neighborhood']=le1.fit_transform(df_test['Neighborhood'])
df_test['Condition1']=le1.fit_transform(df_test['Condition1'])
df_test['Condition2']=le1.fit_transform(df_test['Condition2'])
df_test['BldgType']=le1.fit_transform(df_test['BldgType'])
df_test['HouseStyle']=le1.fit_transform(df_test['HouseStyle'])
df_test['RoofStyle']=le1.fit_transform(df_test['RoofStyle'])
df_test['RoofMatl']=le1.fit_transform(df_test['RoofMatl'])
df_test['Exterior1st']=le1.fit_transform(df_test['Exterior1st'])
df_test['Exterior2nd']=le1.fit_transform(df_test['Exterior2nd'])
df_test['ExterQual']=le1.fit_transform(df_test['ExterQual'])
df_test['ExterCond']=le1.fit_transform(df_test['ExterCond'])
df_test['Foundation']=le1.fit_transform(df_test['Foundation'])
df_test['BldgType']=le1.fit_transform(df_test['BldgType'])
df_test['Heating']=le1.fit_transform(df_test['Heating'])
df_test['HeatingQC']=le1.fit_transform(df_test['HeatingQC'])
df_test['CentralAir']=le1.fit_transform(df_test['CentralAir'])
df_test['Electrical']=le1.fit_transform(df_test['Electrical'])
df_test['KitchenQual']=le1.fit_transform(df_test['KitchenQual'])
df_test['Functional']=le1.fit_transform(df_test['Functional'])
df_test['PavedDrive']=le1.fit_transform(df_test['PavedDrive'])
df_test['SaleType']=le1.fit_transform(df_test['SaleType'])
df_test['SaleCondition']=le1.fit_transform(df_test['SaleCondition'])

df_test
```

```
[191]:           Id  MSSubClass  MSZoning  LotFrontage  LotArea  Street  Alley  \
      0        1461          20         2         80.0    11622       1      2
      1        1462          20         3         81.0    14267       1      2
      2        1463          60         3         74.0    13830       1      2
      3        1464          60         3         78.0     9978       1      2
      4        1465         120         3         43.0     5005       1      2
      ...       ...         ...       ...          ...      ...     ...    ...
      1454     2915         160         4         21.0     1936       1      2
      1455     2916         160         4         21.0     1894       1      2
      1456     2917          20         3        160.0    20000       1      2
      1457     2918          85         3         62.0    10441       1      2
      1458     2919          60         3         74.0     9627       1      2

            LotShape  LandContour  Utilities  LotConfig  LandSlope  Neighborhood  \
      0            3            3          0          4          0            12
      1            0            3          0          0          0            12
      2            0            3          0          4          0             8
      3            0            3          0          4          0             8
      4            0            1          0          4          0            22
      ...        ...          ...        ...        ...        ...           ...
      1454         3            3          0          4          0            10
      1455         3            3          0          4          0            10
      1456         3            3          0          4          0            11
      1457         3            3          0          4          0            11
      1458         3            3          0          4          1            11

            Condition1  Condition2  BldgType  HouseStyle  OverallQual  OverallCond  \
      0              1           2         0           2            5            6
      1              2           2         0           2            6            6
      2              2           2         0           4            5            5
      3              2           2         0           4            6            6
      4              2           2         4           2            8            5
      ...          ...         ...       ...         ...          ...          ...
      1454           2           2         3           4            4            7
      1455           2           2         4           4            4            5
      1456           2           2         0           2            5            7
      1457           2           2         0           5            5            5
      1458           2           2         0           4            7            5

            YearBuilt  YearRemodAdd  RoofStyle  RoofMatl  Exterior1st  Exterior2nd  \
      0          1961          1961          1         0            9           12
      1          1958          1958          3         0           10           13
      2          1997          1998          1         0            9           12
      3          1998          1998          1         0            9           12
      4          1992          1992          1         0            5            6
      ...         ...           ...        ...       ...          ...          ...
      1454       1970          1970          1         0            4            5
```

1455	1970	1970	1	0	4	5
1456	1960	1996	1	0	9	12
1457	1992	1992	1	0	5	14
1458	1993	1994	1	0	5	6

	MasVnrType	MasVnrArea	ExterQual	ExterCond	Foundation	BsmtQual	\
0	3	0.0	3	4	1	3	
1	1	108.0	3	4	1	3	
2	3	0.0	3	4	2	2	
3	1	20.0	3	4	2	3	
4	3	0.0	2	4	2	2	
…	…	…	…	…	…	…	
1454	3	0.0	3	4	1	3	
1455	3	0.0	3	4	1	3	
1456	3	0.0	3	4	1	3	
1457	3	0.0	3	4	2	2	
1458	1	94.0	3	4	2	2	

	BsmtCond	BsmtExposure	BsmtFinType1	BsmtFinSF1	BsmtFinType2	\
0	3	3	4	468.0	3	
1	3	3	0	923.0	5	
2	3	3	2	791.0	5	
3	3	3	2	602.0	5	
4	3	3	0	263.0	5	
…	…	…	…	…	…	
1454	3	3	5	0.0	5	
1455	3	3	4	252.0	5	
1456	3	3	0	1224.0	5	
1457	3	0	2	337.0	5	
1458	3	0	3	758.0	5	

	BsmtFinSF2	BsmtUnfSF	TotalBsmtSF	Heating	HeatingQC	CentralAir	\
0	144.0	270.0	882.0	0	4	1	
1	0.0	406.0	1329.0	0	4	1	
2	0.0	137.0	928.0	0	2	1	
3	0.0	324.0	926.0	0	0	1	
4	0.0	1017.0	1280.0	0	0	1	
…	…	…	…	…	…	…	
1454	0.0	546.0	546.0	0	2	1	
1455	0.0	294.0	546.0	0	4	1	
1456	0.0	0.0	1224.0	0	0	1	
1457	0.0	575.0	912.0	0	4	1	
1458	0.0	238.0	996.0	0	0	1	

	Electrical	1stFlrSF	2ndFlrSF	LowQualFinSF	GrLivArea	BsmtFullBath	\
0	3	896	0	0	896	0.0	
1	3	1329	0	0	1329	0.0	

2	3	928	701	0	1629	0.0
3	3	926	678	0	1604	0.0
4	3	1280	0	0	1280	0.0
...	...	...	...	...	...	
1454	3	546	546	0	1092	0.0
1455	3	546	546	0	1092	0.0
1456	3	1224	0	0	1224	1.0
1457	3	970	0	0	970	0.0
1458	3	996	1004	0	2000	0.0

	BsmtHalfBath	FullBath	HalfBath	BedroomAbvGr	KitchenAbvGr \
0	0.0	1	0	2	1
1	0.0	1	1	3	1
2	0.0	2	1	3	1
3	0.0	2	1	3	1
4	0.0	2	0	2	1
...	...	...	...	...	...
1454	0.0	1	1	3	1
1455	0.0	1	1	3	1
1456	0.0	1	0	4	1
1457	1.0	1	0	3	1
1458	0.0	2	1	3	1

	KitchenQual	TotRmsAbvGrd	Functional	Fireplaces	FireplaceQu \
0	3	5	6	0	5
1	2	6	6	0	5
2	3	6	6	1	4
3	2	7	6	1	2
4	2	5	6	0	5
...	...	...	...	...	...
1454	3	5	6	0	5
1455	3	6	6	0	5
1456	3	7	6	1	4
1457	3	6	6	0	5
1458	3	9	6	1	4

	GarageType	GarageYrBlt	GarageFinish	GarageCars	GarageArea \
0	1	1961.0	2	1.0	730.0
1	1	1958.0	2	1.0	312.0
2	1	1997.0	0	2.0	482.0
3	1	1998.0	0	2.0	470.0
4	1	1992.0	1	2.0	506.0
...	...	...	...	...	...
1454	6	NaN	3	0.0	0.0
1455	4	1970.0	2	1.0	286.0
1456	5	1960.0	2	2.0	576.0
1457	6	NaN	3	0.0	0.0

```
1458            1        1993.0            0        3.0        650.0

        GarageQual  GarageCond  PavedDrive  WoodDeckSF  OpenPorchSF  \
0                3           4           2         140            0
1                3           4           2         393           36
2                3           4           2         212           34
3                3           4           2         360           36
4                3           4           2           0           82
...            ...         ...         ...         ...          ...
1454             4           5           2           0            0
1455             3           4           2           0           24
1456             3           4           2         474            0
1457             4           5           2          80           32
1458             3           4           2         190           48

        EnclosedPorch  3SsnPorch  ScreenPorch  PoolArea  PoolQC  Fence  \
0                   0          0          120         0       2      2
1                   0          0            0         0       2      4
2                   0          0            0         0       2      2
3                   0          0            0         0       2      4
4                   0          0          144         0       2      4
...               ...        ...          ...       ...     ...    ...
1454                0          0            0         0       2      4
1455                0          0            0         0       2      4
1456                0          0            0         0       2      4
1457                0          0            0         0       2      2
1458                0          0            0         0       2      4

        MiscFeature  MiscVal  MoSold  YrSold  SaleType  SaleCondition
0                 3        0       6    2010         8              4
1                 0    12500       6    2010         8              4
2                 3        0       3    2010         8              4
3                 3        0       6    2010         8              4
4                 3        0       1    2010         8              4
...             ...      ...     ...     ...       ...            ...
1454              3        0       6    2006         8              4
1455              3        0       4    2006         8              0
1456              3        0       9    2006         8              0
1457              2      700       7    2006         8              4
1458              3        0      11    2006         8              4

[1450 rows x 80 columns]
```

[195]: `df_test1=df_test.fillna(0)`

[215]:
```python
import sys
np.set_printoptions(threshold=sys.maxsize)
```

4.5 final output over the test dataset that was given

```
[217]: df_pred=regressor.predict(df_test1)
       df_pred.reshape(len(df_pred),1)
```

C:\Users\krupa\anaconda3\Lib\site-packages\sklearn\base.py:486: UserWarning: X
has feature names, but LinearRegression was fitted without feature names
  warnings.warn(

```
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