```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
import matplotlib as mpl
from mpl_toolkits.mplot3d import Axes3D
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.preprocessing import StandardScaler,QuantileTransformer
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error, r2_score

%matplotlib inline
```

## Working on Train dataframe

```
from google.colab import files
uploaded = files.upload()
```

Choose Files house price…iction - 1.zip

- **house prices prediction - 1.zip**(application/x-zip-compressed) - 96191 bytes, last modified: 12/7/2024 - 100% done

```
Saving house prices prediction - 1.zip to house prices prediction - 1.zip
```

```
import os
os.listdir('/content/')
```

```
['.config',
 'drive',
 'house prices prediction (1).zip',
 'house prices prediction.zip',
 'house prices prediction - 1.zip',
 'sample_data']
```

```
traindf = pd.read_csv('/content/house prices prediction - 1.zip')
traindf.head()
```

| | Id | MSSubClass | MSZoning | LotFrontage | LotArea | Street | Alley | LotShape | LandContour | Utilities | ... | PoolArea | PoolQC | Fence | Mis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 60 | RL | 65.0 | 8450 | Pave | NaN | Reg | Lvl | AllPub | ... | 0 | NaN | NaN | |
| **1** | 2 | 20 | RL | 80.0 | 9600 | Pave | NaN | Reg | Lvl | AllPub | ... | 0 | NaN | NaN | |
| **2** | 3 | 60 | RL | 68.0 | 11250 | Pave | NaN | IR1 | Lvl | AllPub | ... | 0 | NaN | NaN | |
| **3** | 4 | 70 | RL | 60.0 | 9550 | Pave | NaN | IR1 | Lvl | AllPub | ... | 0 | NaN | NaN | |
| **4** | 5 | 60 | RL | 84.0 | 14260 | Pave | NaN | IR1 | Lvl | AllPub | ... | 0 | NaN | NaN | |

5 rows × 81 columns

```
traindf.columns
```

```
Index(['Id', 'MSSubClass', 'MSZoning', 'LotFrontage', 'LotArea', 'Street',
       'Alley', 'LotShape', 'LandContour', 'Utilities', 'LotConfig',
       'LandSlope', 'Neighborhood', 'Condition1', 'Condition2', 'BldgType',
       'HouseStyle', 'OverallQual', 'OverallCond', 'YearBuilt', 'YearRemodAdd',
       'RoofStyle', 'RoofMatl', 'Exterior1st', 'Exterior2nd', 'MasVnrType',
       'MasVnrArea', 'ExterQual', 'ExterCond', 'Foundation', 'BsmtQual',
       'BsmtCond', 'BsmtExposure', 'BsmtFinType1', 'BsmtFinSF1',
       'BsmtFinType2', 'BsmtFinSF2', 'BsmtUnfSF', 'TotalBsmtSF', 'Heating',
       'HeatingQC', 'CentralAir', 'Electrical', '1stFlrSF', '2ndFlrSF',
       'LowQualFinSF', 'GrLivArea', 'BsmtFullBath', 'BsmtHalfBath', 'FullBath',
       'HalfBath', 'BedroomAbvGr', 'KitchenAbvGr', 'KitchenQual',
       'TotRmsAbvGrd', 'Functional', 'Fireplaces', 'FireplaceQu', 'GarageType',
       'GarageYrBlt', 'GarageFinish', 'GarageCars', 'GarageArea', 'GarageQual',
       'GarageCond', 'PavedDrive', 'WoodDeckSF', 'OpenPorchSF',
       'EnclosedPorch', '3SsnPorch', 'ScreenPorch', 'PoolArea', 'PoolQC',
       'Fence', 'MiscFeature', 'MiscVal', 'MoSold', 'YrSold', 'SaleType',
       'SaleCondition', 'SalePrice'],
      dtype='object')
```

```
numeric_df = traindf.select_dtypes(include='number')
correlation_matrix = numeric_df.corr()
correlation_matrix['SalePrice'].sort_values(ascending = False)
```

```
SalePrice        1.000000
OverallQual      0.790982
```

```
GrLivArea        0.708624
GarageCars       0.640409
GarageArea       0.623431
TotalBsmtSF      0.613581
1stFlrSF         0.605852
FullBath         0.560664
TotRmsAbvGrd     0.533723
YearBuilt        0.522897
YearRemodAdd     0.507101
GarageYrBlt      0.486362
MasVnrArea       0.477493
Fireplaces       0.466929
BsmtFinSF1       0.386420
LotFrontage      0.351799
WoodDeckSF       0.324413
2ndFlrSF         0.319334
OpenPorchSF      0.315856
HalfBath         0.284108
LotArea          0.263843
BsmtFullBath     0.227122
BsmtUnfSF        0.214479
BedroomAbvGr     0.168213
ScreenPorch      0.111447
PoolArea         0.092404
MoSold           0.046432
3SsnPorch        0.044584
BsmtFinSF2      -0.011378
BsmtHalfBath    -0.016844
MiscVal         -0.021190
Id              -0.021917
LowQualFinSF    -0.025606
YrSold          -0.028923
OverallCond     -0.077856
MSSubClass      -0.084284
EnclosedPorch   -0.128578
KitchenAbvGr    -0.135907
Name: SalePrice, dtype: float64
```

```
req_tr = ["GarageArea","OverallQual","TotalBsmtSF","1stFlrSF","2ndFlrSF","LowQualFinSF","GrLivArea","BsmtFullBath","BsmtHalfBath","FullB
selected_tr = traindf[req_tr]
```

```
selected_tr.loc[:, 'TotalBath'] = (selected_tr['BsmtFullBath'].fillna(0) +
                                   selected_tr['BsmtHalfBath'].fillna(0) +
                                   selected_tr['FullBath'].fillna(0) +
                                   selected_tr['HalfBath'].fillna(0))

selected_tr.loc[:, 'TotalSF'] = (selected_tr['TotalBsmtSF'].fillna(0) +
                                 selected_tr['1stFlrSF'].fillna(0) +
                                 selected_tr['2ndFlrSF'].fillna(0) +
                                 selected_tr['LowQualFinSF'].fillna(0) +
                                 selected_tr['GrLivArea'].fillna(0))
```

```
<ipython-input-32-530500eb8649>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus
  selected_tr.loc[:, 'TotalBath'] = (selected_tr['BsmtFullBath'].fillna(0) +
<ipython-input-32-530500eb8649>:6: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus
  selected_tr.loc[:, 'TotalSF'] = (selected_tr['TotalBsmtSF'].fillna(0) +
```

```
selected_tr
```

| | GarageArea | OverallQual | TotalBsmtSF | 1stFlrSF | 2ndFlrSF | LowQualFinSF | GrLivArea | BsmtFullBath | BsmtHalfBath | FullBath | HalfB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 548 | 7 | 856 | 856 | 854 | 0 | 1710 | 1 | 0 | 2 | |
| **1** | 460 | 6 | 1262 | 1262 | 0 | 0 | 1262 | 0 | 1 | 2 | |
| **2** | 608 | 7 | 920 | 920 | 866 | 0 | 1786 | 1 | 0 | 2 | |
| **3** | 642 | 7 | 756 | 961 | 756 | 0 | 1717 | 1 | 0 | 1 | |
| **4** | 836 | 8 | 1145 | 1145 | 1053 | 0 | 2198 | 1 | 0 | 2 | |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| **1455** | 460 | 6 | 953 | 953 | 694 | 0 | 1647 | 0 | 0 | 2 | |
| **1456** | 500 | 6 | 1542 | 2073 | 0 | 0 | 2073 | 1 | 0 | 2 | |
| **1457** | 252 | 7 | 1152 | 1188 | 1152 | 0 | 2340 | 0 | 0 | 2 | |
| **1458** | 240 | 5 | 1078 | 1078 | 0 | 0 | 1078 | 1 | 0 | 1 | |
| **1459** | 276 | 5 | 1256 | 1256 | 0 | 0 | 1256 | 1 | 0 | 1 | |

1460 rows × 15 columns

Next steps: Generate code with `selected_tr` View recommended plots

**Keeping only the necessary columns**

```
train_df = selected_tr[['TotRmsAbvGrd','TotalBath','GarageArea','TotalSF','OverallQual','SalePrice']]

train_df
```

| | TotRmsAbvGrd | TotalBath | GarageArea | TotalSF | OverallQual | SalePrice |
|---|---|---|---|---|---|---|
| **0** | 8 | 4 | 548 | 4276 | 7 | 208500 |
| **1** | 6 | 3 | 460 | 3786 | 6 | 181500 |
| **2** | 6 | 4 | 608 | 4492 | 7 | 223500 |
| **3** | 7 | 2 | 642 | 4190 | 7 | 140000 |
| **4** | 9 | 4 | 836 | 5541 | 8 | 250000 |
| **...** | ... | ... | ... | ... | ... | ... |
| **1455** | 7 | 3 | 460 | 4247 | 6 | 175000 |
| **1456** | 7 | 3 | 500 | 5688 | 6 | 210000 |
| **1457** | 9 | 2 | 252 | 5832 | 7 | 266500 |
| **1458** | 5 | 2 | 240 | 3234 | 5 | 142125 |
| **1459** | 6 | 3 | 276 | 3768 | 5 | 147500 |

1460 rows × 6 columns

Next steps: Generate code with `train_df` View recommended plots

## Splitting the dataset and Creating Pipeline

```
from sklearn.model_selection import train_test_split
train_set,test_set =train_test_split(train_df,test_size = 0.2,random_state = 42)
print(f"Rows in train set: {len(train_set)}\nRows in test set:{len(test_set)}\n")
```

```
Rows in train set: 1168
Rows in test set:292
```

```
housing = train_set.drop("SalePrice",axis=1)
housing_labels = train_set["SalePrice"].copy()
```

```
from sklearn.impute import SimpleImputer
from sklearn.pipeline import Pipeline
from sklearn.preprocessing import StandardScaler
my_pipeline = Pipeline([
    ('imputer',SimpleImputer(strategy="median")),
    ('std_scaler',StandardScaler())
])


X_train = my_pipeline.fit_transform(housing)

X_train
```

```
array([[-0.96456591, -0.48377079, -0.86383727, -0.13352109, -0.82044456],
       [ 0.27075534,  0.61127627, -0.45626397, -0.13428593, -0.08893368],
       [-1.58222654, -1.57881784, -2.25716927, -1.32207838, -0.82044456],
       ...,
       [-0.96456591, -0.48377079,  0.45366713, -1.16605156, -0.82044456],
       [ 0.27075534, -0.48377079, -1.23349678, -0.26966215,  0.64257719],
       [ 0.27075534, -0.48377079,  0.87071888,  0.28025593,  0.64257719]])
```

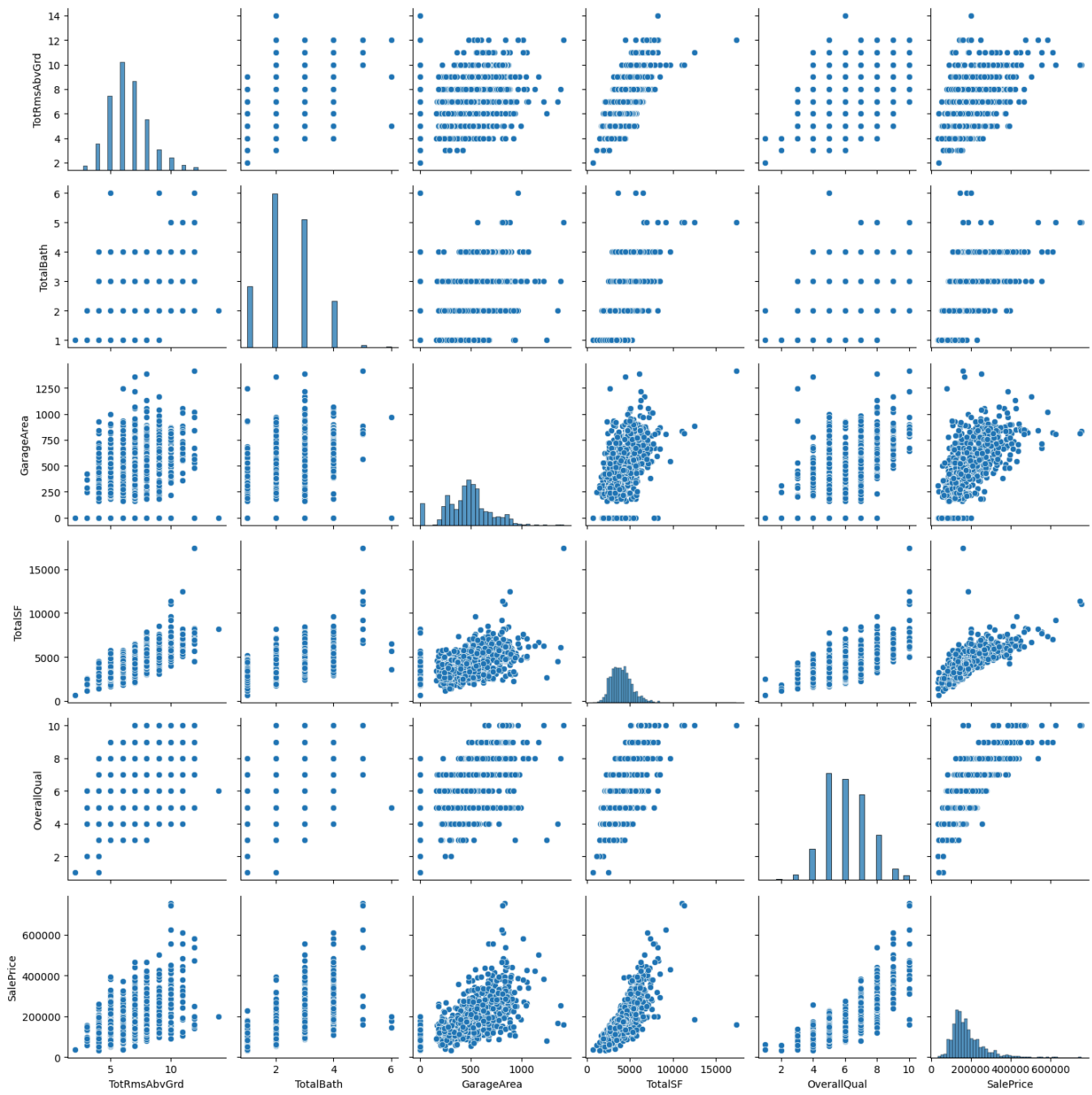
```
Y_train = housing_labels

Y_train
```

```
254     145000
1066    178000
638      85000
799     175000
380     127000
         ...
1095    176432
1130    135000
1294    115000
860     189950
1126    174000
Name: SalePrice, Length: 1168, dtype: int64
```

## Correlations

```
import warnings
warnings.filterwarnings("ignore", category=UserWarning)
%matplotlib inline
sns.pairplot(train_df)
plt.tight_layout()
plt.show()
```



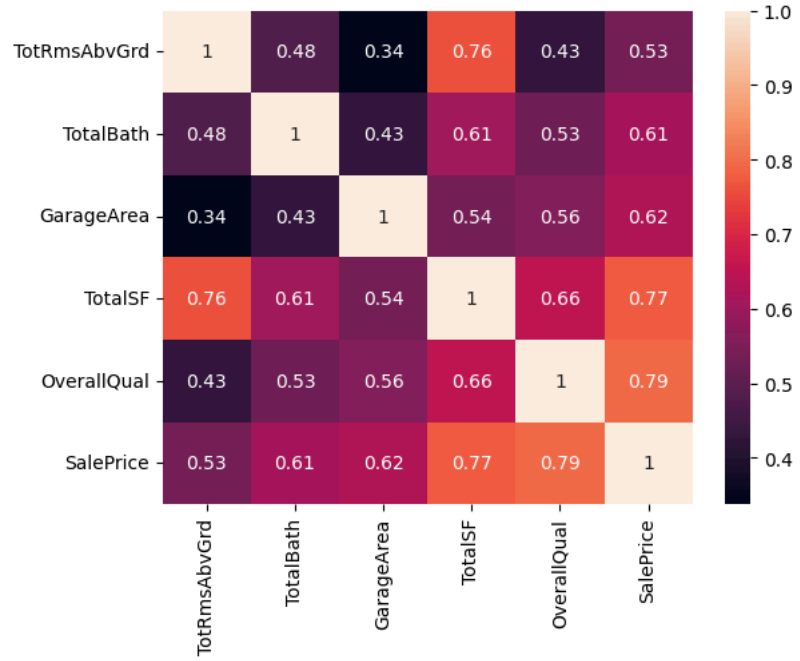

```
corr_matrix = train_df.corr()
corr_matrix['SalePrice'].sort_values(ascending = False)
```

```
SalePrice       1.000000
OverallQual     0.790982
TotalSF         0.773909
GarageArea      0.623431
```

```
TotalBath       0.613005
TotRmsAbvGrd    0.533723
Name: SalePrice, dtype: float64
```

```
sns.heatmap(train_df.corr(),annot = True)
```

```
<Axes: >
```




## Working with Test Dataframe

```
from google.colab import files
uploaded = files.upload()
```

```
Choose Files house price…iction - 2.zip
• house prices prediction - 2.zip(application/x-zip-compressed) - 87192 bytes, last modified: 12/7/2024 - 100% done
Saving house prices prediction - 2.zip to house prices prediction - 2.zip
```

```
import os
os.listdir('/content/')
```

```
['.config',
 'drive',
 'house prices prediction (1).zip',
 'house prices prediction.zip',
 'house prices prediction - 2.zip',
 'house prices prediction - 1.zip',
 'sample_data']
```

```
testdf = pd.read_csv('/content/house prices prediction - 2.zip')
```

```
testdf.head()
```

| | Id | MSSubClass | MSZoning | LotFrontage | LotArea | Street | Alley | LotShape | LandContour | Utilities | ... | ScreenPorch | PoolArea | Poo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1461 | 20 | RH | 80.0 | 11622 | Pave | NaN | Reg | Lvl | AllPub | ... | 120 | 0 | I |
| 1 | 1462 | 20 | RL | 81.0 | 14267 | Pave | NaN | IR1 | Lvl | AllPub | ... | 0 | 0 | I |
| 2 | 1463 | 60 | RL | 74.0 | 13830 | Pave | NaN | IR1 | Lvl | AllPub | ... | 0 | 0 | I |
| 3 | 1464 | 60 | RL | 78.0 | 9978 | Pave | NaN | IR1 | Lvl | AllPub | ... | 0 | 0 | I |
| 4 | 1465 | 120 | RL | 43.0 | 5005 | Pave | NaN | IR1 | HLS | AllPub | ... | 144 | 0 | I |

5 rows × 80 columns

```
req_tst = ["GarageArea","OverallQual","TotalBsmtSF","1stFlrSF","2ndFlrSF","LowQualFinSF","GrLivArea","BsmtFullBath","BsmtHalfBath","Ful
```

```
selected_tst = testdf[req_tst]
```

```
selected_tst.loc[:, 'TotalBath'] = (selected_tst['BsmtFullBath'].fillna(0) +
                                    selected_tst['BsmtHalfBath'].fillna(0) +
                                    selected_tst['FullBath'].fillna(0) +
                                    selected_tst['HalfBath'].fillna(0))

selected_tst.loc[:, 'TotalSF'] = (selected_tst['TotalBsmtSF'].fillna(0) +
                                  selected_tst['1stFlrSF'].fillna(0) +
                                  selected_tst['2ndFlrSF'].fillna(0) +
                                  selected_tst['LowQualFinSF'].fillna(0) +
                                  selected_tst['GrLivArea'].fillna(0))
```

```
<ipython-input-51-88b69dcf1189>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus
  selected_tst.loc[:, 'TotalBath'] = (selected_tst['BsmtFullBath'].fillna(0) +
<ipython-input-51-88b69dcf1189>:6: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus
  selected_tst.loc[:, 'TotalSF'] = (selected_tst['TotalBsmtSF'].fillna(0) +
```

```
selected_tst
```

| | GarageArea | OverallQual | TotalBsmtSF | 1stFlrSF | 2ndFlrSF | LowQualFinSF | GrLivArea | BsmtFullBath | BsmtHalfBath | FullBath | HalfB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 730.0 | 5 | 882.0 | 896 | 0 | 0 | 896 | 0.0 | 0.0 | 1 | |
| **1** | 312.0 | 6 | 1329.0 | 1329 | 0 | 0 | 1329 | 0.0 | 0.0 | 1 | |
| **2** | 482.0 | 5 | 928.0 | 928 | 701 | 0 | 1629 | 0.0 | 0.0 | 2 | |
| **3** | 470.0 | 6 | 926.0 | 926 | 678 | 0 | 1604 | 0.0 | 0.0 | 2 | |
| **4** | 506.0 | 8 | 1280.0 | 1280 | 0 | 0 | 1280 | 0.0 | 0.0 | 2 | |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| **1454** | 0.0 | 4 | 546.0 | 546 | 546 | 0 | 1092 | 0.0 | 0.0 | 1 | |
| **1455** | 286.0 | 4 | 546.0 | 546 | 546 | 0 | 1092 | 0.0 | 0.0 | 1 | |
| **1456** | 576.0 | 5 | 1224.0 | 1224 | 0 | 0 | 1224 | 1.0 | 0.0 | 1 | |
| **1457** | 0.0 | 5 | 912.0 | 970 | 0 | 0 | 970 | 0.0 | 1.0 | 1 | |
| **1458** | 650.0 | 7 | 996.0 | 996 | 1004 | 0 | 2000 | 0.0 | 0.0 | 2 | |

1459 rows × 14 columns

Next steps: Generate code with `selected_tst` View recommended plots

```
test_df_unproc = selected_tst[['TotRmsAbvGrd','TotalBath','GarageArea','TotalSF','OverallQual']]
```

```
test_df_unproc
```

| | TotRmsAbvGrd | TotalBath | GarageArea | TotalSF | OverallQual |
|---|---|---|---|---|---|
| **0** | 5 | 1.0 | 730.0 | 2674.0 | 5 |
| **1** | 6 | 2.0 | 312.0 | 3987.0 | 6 |
| **2** | 6 | 3.0 | 482.0 | 4186.0 | 5 |
| **3** | 7 | 3.0 | 470.0 | 4134.0 | 6 |
| **4** | 5 | 2.0 | 506.0 | 3840.0 | 8 |
| **...** | ... | ... | ... | ... | ... |
| **1454** | 5 | 2.0 | 0.0 | 2730.0 | 4 |
| **1455** | 6 | 2.0 | 286.0 | 2730.0 | 4 |
| **1456** | 7 | 2.0 | 576.0 | 3672.0 | 5 |
| **1457** | 6 | 2.0 | 0.0 | 2852.0 | 5 |
| **1458** | 9 | 3.0 | 650.0 | 4996.0 | 7 |

1459 rows × 5 columns

Next steps: Generate code with `test_df_unproc` View recommended plots

```
test_df = test_df_unproc.fillna(test_df_unproc.mean())
```

```
x_test = my_pipeline.transform(test_df[['TotRmsAbvGrd','TotalBath','GarageArea','TotalSF','OverallQual']].values)
```

```
x_test
```

```
array([[-0.96456591, -1.57881784,  1.2024646 , -1.10333489, -0.82044456],
       [-0.34690528, -0.48377079, -0.77853123, -0.09910341, -0.08893368],
       [-0.34690528,  0.61127627,  0.02713693,  0.05309923, -0.82044456],
       ...,
       [ 0.27075534, -0.48377079,  0.47262403, -0.34002719, -0.82044456],
       [-0.34690528, -0.48377079, -2.25716927, -0.96719384, -0.82044456],
       [ 1.50607659,  0.61127627,  0.82332664,  0.67261751,  0.64257719]])
```

## Model Selection

```
model = LinearRegression()
#model = DecisionTreeRegressor()
#model = RandomForestRegressor()
model.fit(X_train,Y_train)
```

```
LinearRegression
LinearRegression()
```

```
y_train_pred = model.predict(X_train)
```

```
y_train_pred[:5]
```

```
array([137667.57956441, 175034.19941421,  79632.65207176, 149652.98819495,
       146674.06395314])
```

```
some_data = housing.iloc[:5]
some_labels = housing_labels.iloc[:5]
```

```
proc_data = my_pipeline.transform(some_data)
```

```
model.predict(proc_data)
```

```
array([137667.57956441, 175034.19941421,  79632.65207176, 149652.98819495,
       146674.06395314])
```

```
list(some_labels)
```

```
[145000, 178000, 85000, 175000, 127000]
```

```
train_mse = mean_squared_error(Y_train,y_train_pred)
```

```
train_rmse = np.sqrt(train_mse)
```

```
print(f"Training MSE: {train_mse:.2f}, Training RMSE: {train_rmse:.2f}")
```

```
Training MSE: 1460715662.52, Training RMSE: 38219.31
```

## Cross - Validation

```
from sklearn.model_selection import cross_val_score
scores = cross_val_score(model,X_train,Y_train,scoring="neg_mean_squared_error",cv = 200)
rmse_scores = np.sqrt(-scores)
```

```
rmse_scores
```

```
array([ 16599.40639047,  18325.22018653,  29307.41492256,  30900.62181786,
        42713.28158503,  13517.92728875,  28466.43684333,  26159.1789478 ,
        16694.35747291,  44185.04242239,  14432.4514348 ,  29621.4888739 ,
        15288.08646946,  20343.83312791,  26928.48898473,  30286.90600734,
        27591.27659228,  49704.26333128,  48966.56719948,  24506.05029869,
        51513.14668133,  16136.46039114,  18384.50681523,  28433.24926957,
        55483.42476232,  13885.14122222,  40018.30732342,  22655.21809999,
       122894.24572375,  36980.15773466,  16527.48051189,  26495.91857289,
        40892.94110057,  26980.63750536,  67733.44140093,  13173.00917782,
        17673.54848644,  28785.9566716 ,  34551.83798472,  37734.44853911,
        23765.3506236 ,  19538.738731  ,  29343.3959128 ,  32180.98454967,
        35319.05373078,  38228.16511844,  26372.59349178,  28064.67081093,
```

```
            36009.27109903,  26029.75222025,  22669.10866239,  37583.20518266,
            27672.46756544,  26860.18618909,  25473.16521999,  21242.95056337,
            20053.45561874,  30889.23473073,  52117.08856944,  36544.31900032,
           133524.62025163,  42636.85773552,  33816.59478726,  44585.1371374 ,
            42323.63535859,  21634.77565968,  41502.66165963,  30636.54557842,
            26746.16642826,  15309.84320432,  54226.73045149,  33988.79845478,
            47823.05327476,  25585.65094945,  45620.12007825,  49937.324193  ,
            52677.22772022,  17932.7405338 ,  39969.26806934,  31599.91071606,
            17807.77621148,  35954.46526772, 222456.2247121 ,  29094.22010999,
            41529.46627467,  27720.37789678,  19879.42245214,  19675.41805076,
            27383.1292489 , 121547.27719409,  26427.98421929,  26079.76589143,
            24510.70593577,  26086.37349027,  21568.58923443,  20429.16535944,
            18474.26446438,  21666.68595951,  94822.5377186 ,  32141.09120185,
             8609.78735922,  41595.17941681,  33000.48070685,  58430.66413254,
            24607.56247791,  19281.14045192,  48953.28952053,  21346.29508891,
            33273.25058659,  21946.70716609,  23678.86240679,  20746.75417475,
            21033.03402566,  23193.73512545,  45194.85383363,  36114.70313285,
            63940.04213846,  24185.33375536,  49971.70176585,  23553.19770034,
            28356.19941834,  31601.84917239,  19743.02818178,  17925.67263047,
            34345.32569996,  38262.53910803,  23418.1606015 ,  64217.99081748,
            41955.49432203,  13247.58126398,  18706.70154528,  14929.35502952,
            22986.02338424,  26476.05190717,  29223.71986739,  36860.45324045,
            53228.19467845,  26809.73400444,  17945.13852327,  13424.19020028,
            38847.92761809,  18784.0050538 ,  23201.64372092,  26436.65261068,
            34499.10132104,  22410.38113845,  44522.02672058,  35721.51276097,
            23316.23467097,  19451.35764774,  16880.77324834,  26453.2948389 ,
            19300.88970697,  52027.66249345,  39417.73705746,  25123.5414658 ,
            27711.68996535,  23370.47417554,  23421.00277133,  19624.96789495,
            53322.45020398,  21718.09001705,  32640.1271753 ,  19244.51215297,
            46049.03252092,  16703.9195712 ,  19728.41459881,  66589.43304565,
            23503.5915548 ,  40376.68920578,  21942.97964157,  26392.09561029,
            15193.36709344,  19879.70112264,  18899.08624785,  15821.45950323,
            23143.73085732,  16814.75337692,  45032.51530946,   9162.69902713,
            34188.77514645,  18846.8667917 ,   9098.06239376,  15607.68522491,
            25658.10246257,  50905.34291163,  28106.85449056,  10840.69989811,
            19224.05599128,  29592.35328826,  23886.98660851,  41962.2412104 ,
            23032.83632699,  17362.50355856,  10380.08339328,  25285.63428966,
            99149.81938064,  16461.75020861,  33451.89182822,  23785.07005972])


def print_scores(scores):
    print("Scores:",scores)
    print("Mean:",scores.mean())
    print("Standard Deviation",scores.std())


print_scores(rmse_scores)

 Scores: [ 16599.40639047  18325.22018653  29307.41492256  30900.62181786
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   16694.35747291  44185.04242239  14432.4514348   29621.4888739
   15288.08646946  20343.83312791  26928.48898473  30286.90600734
   27591.27659228  49704.26333128  48966.56719948  24506.05029869
   51513.14668133  16136.46039114  18384.50681523  28433.24926957
   55483.42476232  13885.14122222  40018.30732342  22655.21809999
  122894.24572375  36980.15773466  16527.48051189  26495.91857289
   40892.94110057  26980.63750536  67733.44140093  13173.00917782
   17673.54848644  28785.9566716   34551.83798472  37734.44853911
   23765.3506236   19538.738731    29343.3959128   32180.98454967
   35319.05373078  38228.16511844  26372.59349178  28064.67081093
   36009.27109903  26029.75222025  22669.10866239  37583.20518266
   27672.46756544  26860.18618909  25473.16521999  21242.95056337
   20053.45561874  30889.23473073  52117.08856944  36544.31900032
  133524.62025163  42636.85773552  33816.59478726  44585.1371374
   42323.63535859  21634.77565968  41502.66165963  30636.54557842
   26746.16642826  15309.84320432  54226.73045149  33988.79845478
   47823.05327476  25585.65094945  45620.12007825  49937.324193
   52677.22772022  17932.7405338   39969.26806934  31599.91071606
   17807.77621148  35954.46526772 222456.2247121   29094.22010999
   41529.46627467  27720.37789678  19879.42245214  19675.41805076
   27383.1292489  121547.27719409  26427.98421929  26079.76589143
   24510.70593577  26086.37349027  21568.58923443  20429.16535944
   18474.26446438  21666.68595951  94822.5377186   32141.09120185
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   24607.56247791  19281.14045192  48953.28952053  21346.29508891
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   21033.03402566  23193.73512545  45194.85383363  36114.70313285
   63940.04213846  24185.33375536  49971.70176585  23553.19770034
   28356.19941834  31601.84917239  19743.02818178  17925.67263047
   34345.32569996  38262.53910803  23418.1606015   64217.99081748
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