```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

df=pd.read_csv('housing.csv')

df.head()
```

```
   longitude  latitude  housing_median_age  total_rooms
total_bedrooms  \
0    -122.23     37.88                  41          880
129.0
1    -122.22     37.86                  21         7099
1106.0
2    -122.24     37.85                  52         1467
190.0
3    -122.25     37.85                  52         1274
235.0
4    -122.25     37.85                  52         1627
280.0

   population  households  median_income ocean_proximity
median_house_value
0         322         126         8.3252        NEAR BAY
452600
1        2401        1138         8.3014        NEAR BAY
358500
2         496         177         7.2574        NEAR BAY
352100
3         558         219         5.6431        NEAR BAY
341300
4         565         259         3.8462        NEAR BAY
342200
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20640 entries, 0 to 20639
Data columns (total 10 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   longitude           20640 non-null  float64
 1   latitude            20640 non-null  float64
 2   housing_median_age  20640 non-null  int64
 3   total_rooms         20640 non-null  int64
 4   total_bedrooms      20433 non-null  float64
 5   population          20640 non-null  int64
 6   households          20640 non-null  int64
 7   median_income       20640 non-null  float64
 8   ocean_proximity     20640 non-null  object
 9   median_house_value  20640 non-null  int64
```

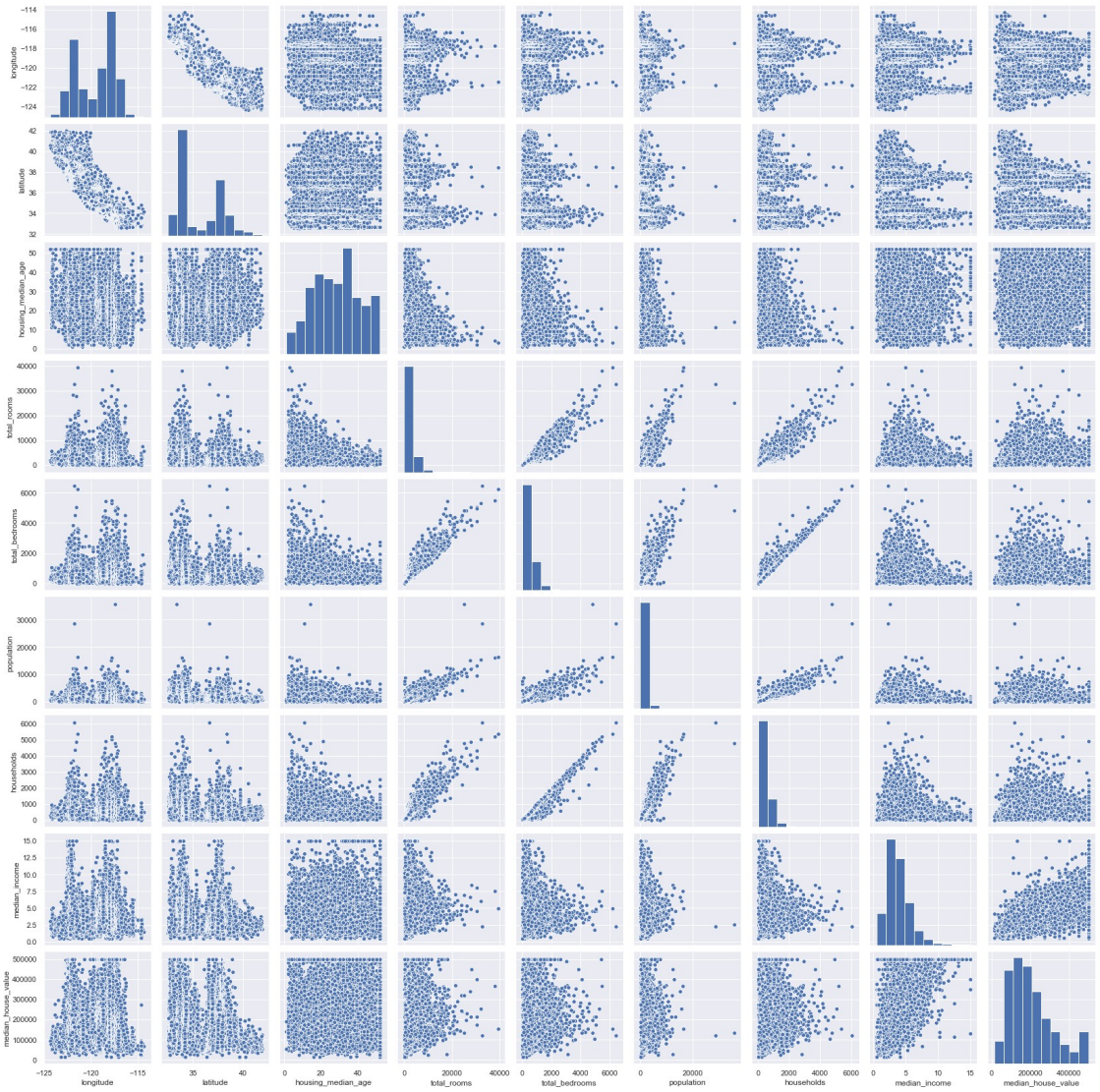
```
dtypes: float64(4), int64(5), object(1)
memory usage: 1.6+ MB
```

```
df.describe()
```

```
          longitude      latitude  housing_median_age   total_rooms  \
count  20640.000000  20640.000000        20640.000000  20640.000000
mean    -119.569704     35.631861           28.639486   2635.763081
std        2.003532      2.135952           12.585558   2181.615252
min     -124.350000     32.540000            1.000000      2.000000
25%     -121.800000     33.930000           18.000000   1447.750000
50%     -118.490000     34.260000           29.000000   2127.000000
75%     -118.010000     37.710000           37.000000   3148.000000
max     -114.310000     41.950000           52.000000  39320.000000

       total_bedrooms    population    households  median_income  \
count    20433.000000  20640.000000  20640.000000   20640.000000
mean       537.870553   1425.476744    499.539680       3.870671
std        421.385070   1132.462122    382.329753       1.899822
min          1.000000      3.000000      1.000000       0.499900
25%        296.000000    787.000000    280.000000       2.563400
50%        435.000000   1166.000000    409.000000       3.534800
75%        647.000000   1725.000000    605.000000       4.743250
max       6445.000000  35682.000000   6082.000000      15.000100

       median_house_value
count        20640.000000
mean        206855.816909
std         115395.615874
min          14999.000000
25%         119600.000000
50%         179700.000000
75%         264725.000000
max         500001.000000
```

```
import seaborn as sns
sns.set()
sns.pairplot(df)
```

```
<seaborn.axisgrid.PairGrid at 0x260e57f72c8>
```




```
X=df.drop(['median_house_value'],axis=1)
```

```
y=df['median_house_value']
```

```
X.isnull().sum()
```

```
longitude               0
latitude                0
housing_median_age      0
total_rooms             0
total_bedrooms        207
population              0
households              0
median_income           0
ocean_proximity         0
dtype: int64
```

```
X = X.fillna(value=df["total_bedrooms"].mean())
```

```
X.isnull().sum()
```

```
longitude             0
latitude              0
housing_median_age    0
total_rooms           0
total_bedrooms        0
population            0
households            0
median_income         0
ocean_proximity       0
dtype: int64
```

```
X['ocean_proximity'].value_counts()
```

```
<1H OCEAN     9136
INLAND        6551
NEAR OCEAN    2658
NEAR BAY      2290
ISLAND           5
Name: ocean_proximity, dtype: int64
```

```
X['ocean_proximity']=pd.Categorical(X['ocean_proximity'])
```

```
X['ocean_proximity'] = X['ocean_proximity'].cat.codes
```

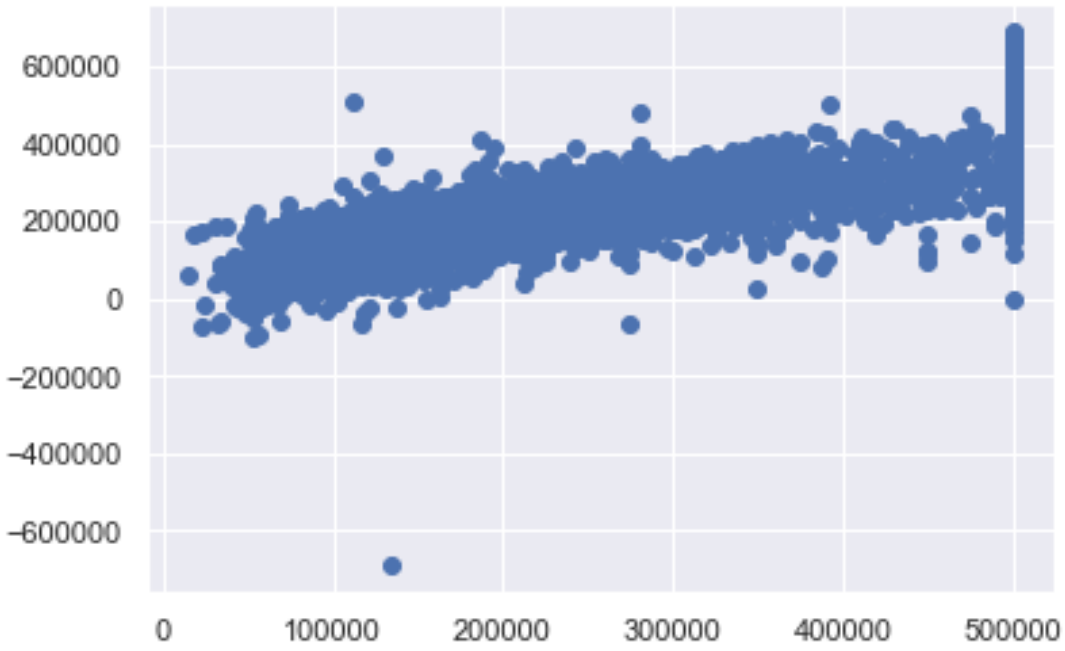
```
X.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20640 entries, 0 to 20639
Data columns (total 9 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   longitude           20640 non-null  float64
 1   latitude            20640 non-null  float64
 2   housing_median_age  20640 non-null  int64  
 3   total_rooms         20640 non-null  int64  
 4   total_bedrooms      20640 non-null  float64
 5   population          20640 non-null  int64  
 6   households          20640 non-null  int64  
 7   median_income       20640 non-null  float64
 8   ocean_proximity     20640 non-null  int8   
dtypes: float64(4), int64(4), int8(1)
memory usage: 1.3 MB
```

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y , test_size
=0.25, random_state =21)
```

```
from sklearn.preprocessing import StandardScaler
sdt=StandardScaler()
```

```
X_train=sdt.fit_transform(X_train)
X_test=sdt.fit_transform(X_test)

from sklearn.linear_model import LinearRegression

lin_reg = LinearRegression() #instantiating the estimator object
lin_reg.fit(X_train,y_train)

LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None,
normalize=False)

print(lin_reg.intercept_)

206380.58184754493

print(lin_reg.coef_)

[-85407.15973848 -90838.00145392  14196.52030491 -11765.98943956
  28165.41665322 -49944.73060374  38453.16929897  74734.66320139
   -128.63253185]

y_pred = lin_reg.predict(X_test)

import numpy as np
from sklearn.metrics import mean_squared_error

RMSE = np.sqrt(mean_squared_error(y_test,y_pred))
print("The root mean suqared error value of my model is :", RMSE)

The root mean suqared error value of my model is : 71510.93561991809

plt.scatter(y_test,y_pred)

<matplotlib.collections.PathCollection at 0x260e6586dc8>
```




```
from sklearn.metrics import mean_absolute_error,mean_squared_error

print(f'MAE: {mean_absolute_error(y_pred,y_test)}\n\nMSE:
{mean_squared_error(y_pred,y_test)}\n\nRMSE:
{np.sqrt(mean_squared_error(y_pred,y_test))}')
```

```
MAE: 52023.731467916754

MSE: 5113813913.236071

RMSE: 71510.93561991809
```

```
print(f"MIN : {df['median_house_value'].min()}\n\nMAX:
{df['median_house_value'].max()}")
```

```
MIN : 14999

MAX: 500001
```

Decision Tree Reggressor

```
from sklearn.tree import DecisionTreeRegressor
regressor = DecisionTreeRegressor(random_state=0)
regressor.fit(X_train,y_train)
```

```
DecisionTreeRegressor(ccp_alpha=0.0, criterion='mse', max_depth=None,
                      max_features=None, max_leaf_nodes=None,
                      min_impurity_decrease=0.0,
min_impurity_split=None,
                      min_samples_leaf=1, min_samples_split=2,
```

```
                      min_weight_fraction_leaf=0.0,
presort='deprecated',
                      random_state=0, splitter='best')

y_pred1 = lin_reg.predict(X_test)

from sklearn.metrics import mean_absolute_error,mean_squared_error

print(f'MAE: {mean_absolute_error(y_pred1,y_test)}\n\nMSE:
{mean_squared_error(y_pred1,y_test)}\n\nRMSE:
{np.sqrt(mean_squared_error(y_pred1,y_test))}')
```

```
MAE: 52023.731467916754

MSE: 5113813913.236071

RMSE: 71510.93561991809
```

Random Forest Regressor

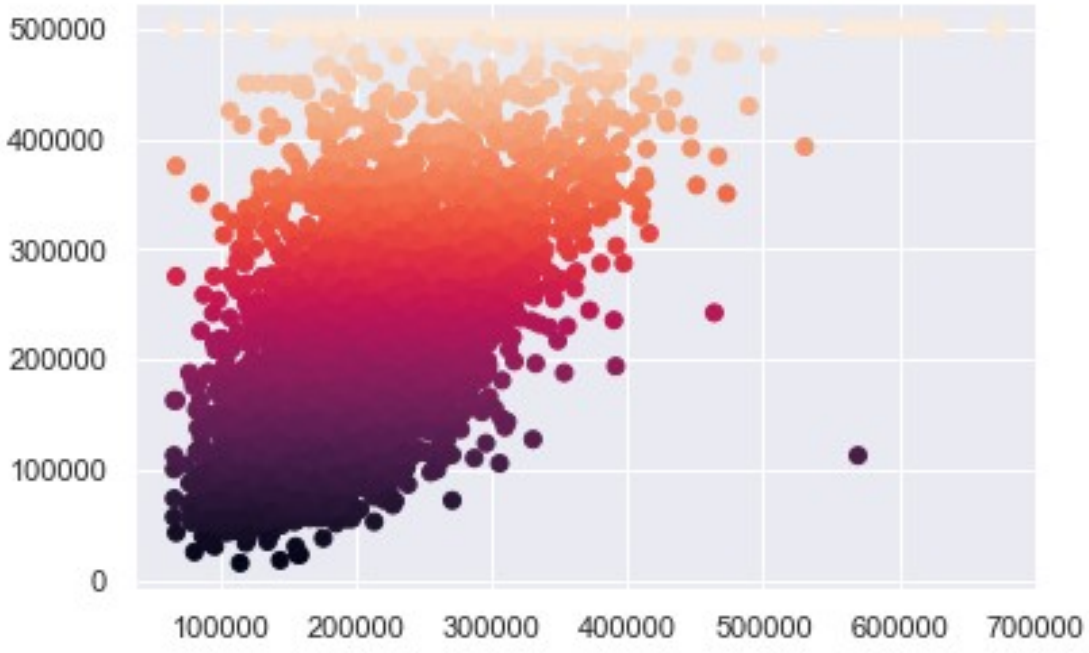
```
from sklearn.ensemble import RandomForestRegressor
regr = RandomForestRegressor(max_depth=2, random_state=0)
regr.fit(X_train, y_train)

RandomForestRegressor(bootstrap=True, ccp_alpha=0.0, criterion='mse',
                      max_depth=2, max_features='auto',
max_leaf_nodes=None,
                      max_samples=None, min_impurity_decrease=0.0,
                      min_impurity_split=None, min_samples_leaf=1,
                      min_samples_split=2,
min_weight_fraction_leaf=0.0,
                      n_estimators=100, n_jobs=None, oob_score=False,
                      random_state=0, verbose=0, warm_start=False)

y_pred2 = regr.predict(X_test)

from sklearn.metrics import mean_absolute_error,mean_squared_error

print(f'MAE: {mean_absolute_error(y_pred2,y_test)}\n\nMSE:
{mean_squared_error(y_pred2,y_test)}\n\nRMSE:
{np.sqrt(mean_squared_error(y_pred2,y_test))}')
```

```
MAE: 52023.731467916754

MSE: 5113813913.236071

RMSE: 71510.93561991809
```

Linear Regresion withe on variable

```
X_train=X_train[['median_income']].values
```

```
X_train = X_train.reshape(-1,1)

X_train.shape

(15480, 1)

X_test=X_test[['median_income']].values
X_test = X_test.reshape(-1,1)

lin_reg1 = LinearRegression() #instantiating the estimator object

lin_reg.fit(X_train,y_train)

LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None,
normalize=False)

y_pred3=lin_reg.predict(X_test)

print(f'MAE: {mean_absolute_error(y_pred3,y_test)}\n\nMSE:
{mean_squared_error(y_pred3,y_test)}\n\nRMSE:
{np.sqrt(mean_squared_error(y_pred3,y_test))}')

MAE: 63747.365245467125

MSE: 7184550626.157208

RMSE: 84761.7285463033

t=y_test
plt.scatter(y_pred3, y_test, c=t)

<matplotlib.collections.PathCollection at 0x260e84e4588>
```



```
import pandas as pd
data = {'Predicted': y_pred3,'Actual': y_test}
df = pd.DataFrame(data)
df.head()
```

```
           Predicted  Actual
18726  112075.751235   98800
1046   150666.089562  157200
15508  222290.795838  160900
828    281086.946551  206500
19007  146814.173400  101700
```

```
sns.lmplot(x='median_income',y='median_house_value',data=df)
```

```
<seaborn.axisgrid.FacetGrid at 0x260e7fbc948>
```