Problem statement

predicting the house price in USA.To create a model to help him estimate of what the house would sell for.

In [1]:

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

In [2]:

```
df=pd.read_csv("wine")
```

To display top 10 rows

In [3]:

```
df.head(10)
```

Out[3]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
0	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9.4	5
1	7.8	0.88	0.00	2.6	0.098	25.0	67.0	0.9968	3.20	0.68	9.8	5
2	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.9970	3.26	0.65	9.8	5
3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	9.8	6
4	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9.4	5
5	7.4	0.66	0.00	1.8	0.075	13.0	40.0	0.9978	3.51	0.56	9.4	5
6	7.9	0.60	0.06	1.6	0.069	15.0	59.0	0.9964	3.30	0.46	9.4	5
7	7.3	0.65	0.00	1.2	0.065	15.0	21.0	0.9946	3.39	0.47	10.0	7
8	7.8	0.58	0.02	2.0	0.073	9.0	18.0	0.9968	3.36	0.57	9.5	7
9	7.5	0.50	0.36	6.1	0.071	17.0	102.0	0.9978	3.35	0.80	10.5	5

Data Cleaning And Pre-Processing

In [4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1599 entries, 0 to 1598
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   fixed acidity         1599 non-null   float64
 1   volatile acidity      1599 non-null   float64
 2   citric acid           1599 non-null   float64
 3   residual sugar        1599 non-null   float64
 4   chlorides             1599 non-null   float64
 5   free sulfur dioxide   1599 non-null   float64
 6   total sulfur dioxide  1599 non-null   float64
 7   density               1599 non-null   float64
 8   pH                    1599 non-null   float64
 9   sulphates             1599 non-null   float64
 10  alcohol               1599 non-null   float64
 11  quality               1599 non-null   int64  
dtypes: float64(11), int64(1)
memory usage: 150.0 KB
```

In [5]:
```python
# Display the statistical summary
df.describe()
```

Out[5]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphat
count	1599.000000	1599.000000	1599.000000	1599.000000	1599.000000	1599.000000	1599.000000	1599.000000	1599.000000	1599.0000
mean	8.319637	0.527821	0.270976	2.538806	0.087467	15.874922	46.467792	0.996747	3.311113	0.6581
std	1.741096	0.179060	0.194801	1.409928	0.047065	10.460157	32.895324	0.001887	0.154386	0.1695
min	4.600000	0.120000	0.000000	0.900000	0.012000	1.000000	6.000000	0.990070	2.740000	0.3300
25%	7.100000	0.390000	0.090000	1.900000	0.070000	7.000000	22.000000	0.995600	3.210000	0.5500
50%	7.900000	0.520000	0.260000	2.200000	0.079000	14.000000	38.000000	0.996750	3.310000	0.6200
75%	9.200000	0.640000	0.420000	2.600000	0.090000	21.000000	62.000000	0.997835	3.400000	0.7300
max	15.900000	1.580000	1.000000	15.500000	0.611000	72.000000	289.000000	1.003690	4.010000	2.0000

In [6]:
```python
# To display the col headings
df.columns
```

Out[6]:
```
Index(['fixed acidity', 'volatile acidity', 'citric acid', 'residual sugar',
       'chlorides', 'free sulfur dioxide', 'total sulfur dioxide', 'density',
       'pH', 'sulphates', 'alcohol', 'quality'],
      dtype='object')
```

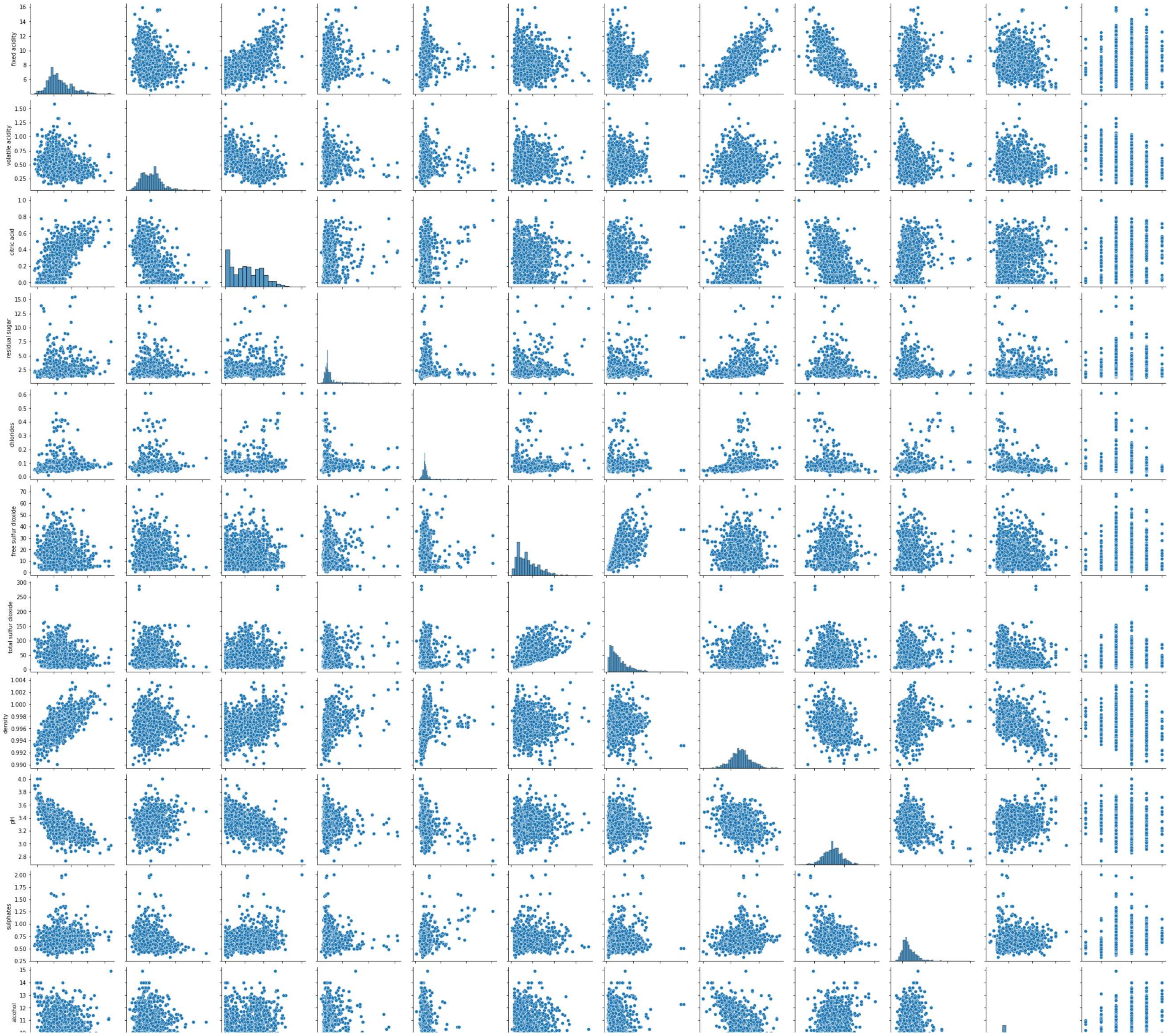
In [7]:
```python
cols=df.dropna(axis=1)
```

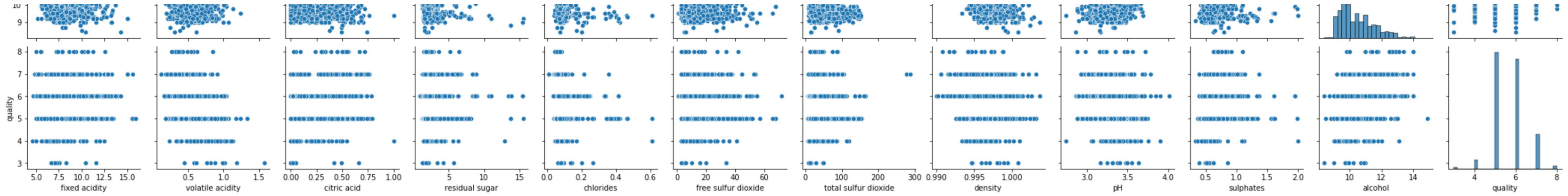
In [8]:
```python
cols.columns
```

Out[8]:
```
Index(['fixed acidity', 'volatile acidity', 'citric acid', 'residual sugar',
       'chlorides', 'free sulfur dioxide', 'total sulfur dioxide', 'density',
       'pH', 'sulphates', 'alcohol', 'quality'],
      dtype='object')
```

EDA and Visualization

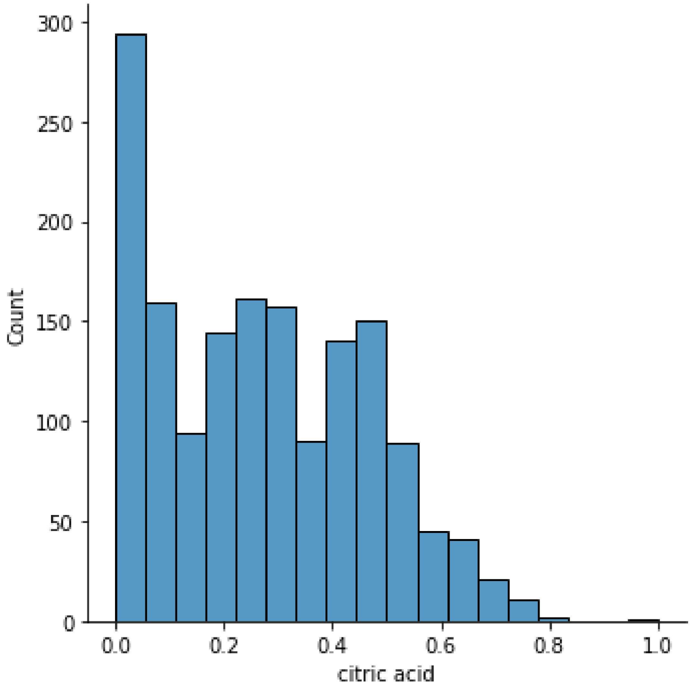
```
In [11]: sns.pairplot(cols)

Out[11]: <seaborn.axisgrid.PairGrid at 0x1deb9488f10>
```


fixed acidity
16
14
12
10
8
6
volatile acidity
1.50
1.25
1.00
0.75
0.50
0.25
citric acid
1.0
0.8
0.6
0.4
0.2
0.0
residual sugar
15.0
12.5
10.0
7.5
5.0
2.5
chlorides
0.6
0.5
0.4
0.3
0.2
0.1
0.0
free sulfur dioxide
70
60
50
40
30
20
10
0
total sulfur dioxide
300
250
200
150
100
50
0
density
1.004
1.002
1.000
0.998
0.996
0.994
0.992
0.990
pH
4.0
3.8
3.6
3.4
3.2
3.0
2.8
sulphates
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
alcohol
15
14
13
12
11
10



In [12]:
```
sns.displot(df['citric acid'])
```

Out[12]:
```
<seaborn.axisgrid.FacetGrid at 0x1debf249850>
```



In [ ]:
```
# We use displot in older version we get distplot use displot
sns.distplot(df['citric acid'])
```

In [13]:

```
df1=cols[['fixed acidity', 'volatile acidity', 'citric acid', 'residual sugar']]
df1
```

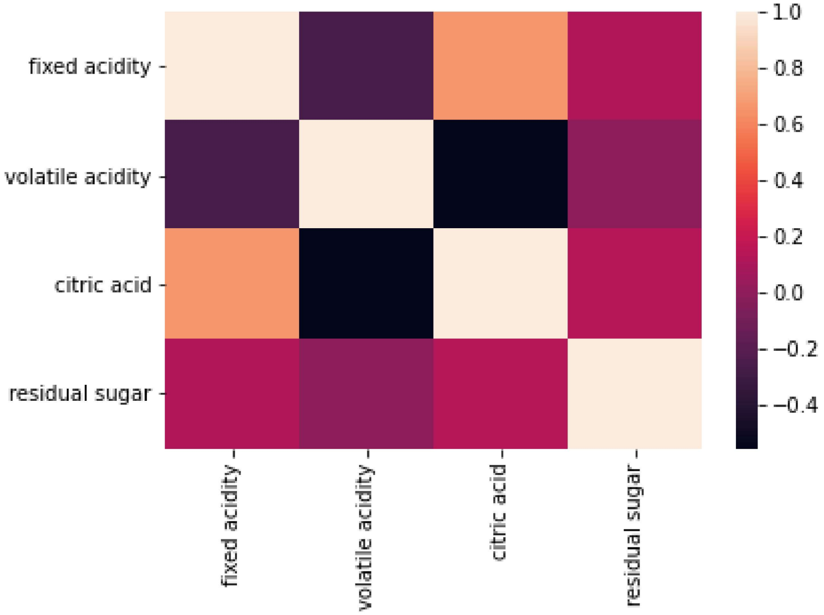
Out[13]:

	fixed acidity	volatile acidity	citric acid	residual sugar
0	7.4	0.700	0.00	1.9
1	7.8	0.880	0.00	2.6
2	7.8	0.760	0.04	2.3
3	11.2	0.280	0.56	1.9
4	7.4	0.700	0.00	1.9
...	...	...	...	...
1594	6.2	0.600	0.08	2.0
1595	5.9	0.550	0.10	2.2
1596	6.3	0.510	0.13	2.3
1597	5.9	0.645	0.12	2.0
1598	6.0	0.310	0.47	3.6

1599 rows × 4 columns

```
In [14]: sns.heatmap(df1.corr())
```

```
Out[14]: <AxesSubplot:>
```



To train the model - MODEL BUILD

Going to train linear regression model;We split our data into 2 variables x and y where x is independent var(input) and y is dependent on x(output), we could ignore address col as it is not required for our model

```
In [15]: x=df1[['fixed acidity', 'volatile acidity', 'citric acid', 'residual sugar']]
         y=df1[['volatile acidity']]
```

To split the dataset into test data

```
In [16]: # importing lib for splitting test data
         from sklearn.model_selection import train_test_split
```

In [17]:

```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.3)
```

In [18]:

```
from sklearn.linear_model import LinearRegression

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

Out[18]:

```
LinearRegression()
```

In [19]:

```
print(lr.intercept_)
```

```
[0.]
```

In [20]:

```
print(lr.score(x_test,y_test))
```

```
1.0
```

In [21]:

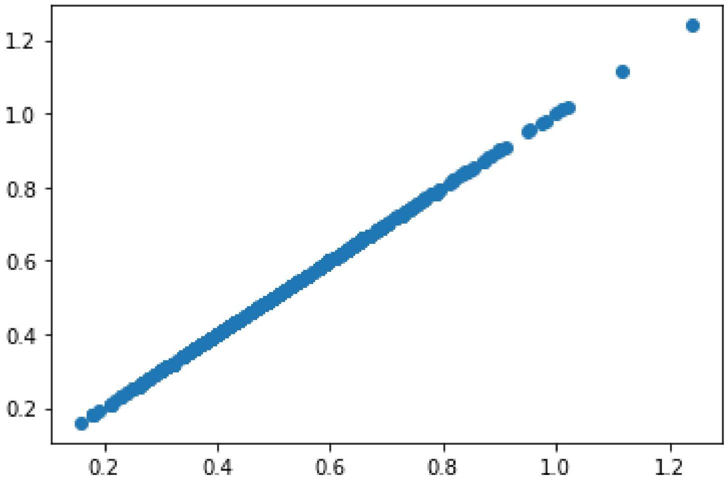
```
coeff=pd.DataFrame(lr.coef_)
coeff
```

Out[21]:

	0	1	2	3
0	7.169813e-17	1.0	-3.765794e-16	-2.208131e-16

```
In [22]: pred = lr.predict(x_test)
         plt.scatter(y_test,pred)
```

```
Out[22]: <matplotlib.collections.PathCollection at 0x1dec2ce7a00>
```



```
In [ ]:
```