```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sea
import sklearn
from sklearn.ensemble import ExtraTreesClassifier
from sklearn.model selection import GridSearchCV
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.naive bayes import GaussianNB
from sklearn.linear model import LogisticRegression
from sklearn.svm import SVC
from sklearn.model selection import cross val score
from sklearn.model selection import train test split
from sklearn.metrics import accuracy score
import pandas as pd
data = pd.read csv("C:/Users/TAWFEEQ/Desktop/wine dataset.csv")
data.head()
data.describe()
       fixed acidity
                      volatile acidity
                                         citric acid
                                                      residual sugar \
         6487.000000
                           6489.000000
                                         6494.000000
                                                         6495.000000
count
            7.216579
                               0.339691
                                            0.318722
                                                             5.444326
mean
            1.296750
                               0.164649
                                                             4.758125
std
                                            0.145265
min
            3.800000
                              0.080000
                                            0.000000
                                                             0.600000
25%
            6.400000
                               0.230000
                                            0.250000
                                                             1.800000
50%
            7.000000
                               0.290000
                                            0.310000
                                                             3.000000
75%
            7,700000
                              0.400000
                                            0.390000
                                                             8.100000
                              1.580000
           15.900000
                                            1.660000
                                                           65.800000
max
         chlorides free sulfur dioxide total sulfur dioxide
density
count 6495.000000
                            6497.000000
                                                   6497.000000
6497.000000
          0.056042
                               30.525319
                                                    115.744574
mean
0.994697
                                                     56.521855
std
          0.035036
                              17.749400
0.002999
min
          0.009000
                                1.000000
                                                      6.000000
0.987110
                               17.000000
                                                     77.000000
25%
          0.038000
0.992340
50%
          0.047000
                               29.000000
                                                    118,000000
0.994890
75%
          0.065000
                              41.000000
                                                    156.000000
0.996990
```

```
0.611000
                              289.000000
                                                     440.000000
max
1.038980
                       sulphates
                                      alcohol
                                                    quality
                Hq
       6488.000000
                     6493.000000
                                                6497.000000
                                  6497.000000
count
          3.218395
                        0.531215
                                    10.491801
                                                   5.818378
mean
          0.160748
                        0.148814
                                     1.192712
                                                   0.873255
std
min
          2.720000
                        0.220000
                                     8.000000
                                                   3.000000
                                                   5.000000
25%
          3.110000
                        0.430000
                                     9.500000
                                                   6.000000
50%
          3.210000
                        0.510000
                                    10.300000
75%
          3.320000
                        0.600000
                                    11.300000
                                                   6.000000
          4.010000
                        2.000000
                                    14.900000
                                                   9.000000
max
data.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6497 entries, 0 to 6496
Data columns (total 13 columns):
type
                         6497 non-null object
fixed acidity
                         6487 non-null float64
volatile acidity
                         6489 non-null float64
citric acid
                         6494 non-null float64
                         6495 non-null float64
residual sugar
chlorides
                         6495 non-null float64
free sulfur dioxide
                         6497 non-null float64
total sulfur dioxide
                         6497 non-null float64
density
                         6497 non-null float64
                         6488 non-null float64
рН
sulphates
                         6493 non-null float64
alcohol
                         6497 non-null float64
quality
                         6497 non-null int64
dtypes: float64(11), int64(1), object(1)
memory usage: 659.9+ KB
data.isnull().sum()
type
                          0
fixed acidity
                         10
volatile acidity
                          8
citric acid
                          3
                          2
residual sugar
                          2
chlorides
free sulfur dioxide
                          0
total sulfur dioxide
                          0
                          0
density
                          9
рН
                          4
sulphates
                          0
alcohol
                          0
quality
dtype: int64
```

```
data['fixed acidity'].value_counts()
6.80
          354
          326
6.60
          305
6.40
7.00
          282
6.90
          279
7.20
          273
6.70
          264
          257
7.10
6.50
          242
7.40
          238
7.30
          222
6.20
          210
6.30
          201
7.60
          199
6.00
          197
7.50
          174
6.10
          169
7.80
          146
7.70
          141
5.80
          125
8.00
          122
7.90
          116
5.90
          111
8.20
          101
8.30
           92
5.70
           90
5.60
           85
8.10
           82
8.40
           61
8.60
            52
             4
12.60
12.20
             4
             4
12.40
             3 3 3 3 3 3 2 2 2 2 2 2 2 2 2
13.00
11.70
11.00
13.30
4.40
13.20
6.15
15.50
12.90
4.20
15.60
7.15
13.70
15.00
```

```
4.60
            2
13.40
            1
13.50
            1
3.80
            1
            1
4.50
12.10
            1
14.00
            1
3.90
            1
14.30
            1
15.90
            1
13.80
            1
            1
14.20
6.45
            1
Name: fixed acidity, Length: 106, dtype: int64
mean fa = data['fixed acidity'].mean()
data['fixed acidity'].fillna(mean fa, inplace = True)
data['fixed acidity'].isnull().sum()
0
data['volatile acidity'].value_counts()
0.280
         286
0.240
         265
0.260
         255
0.250
         238
0.220
         235
0.270
         232
0.230
         221
0.200
         217
0.300
         214
0.320
         205
0.210
         197
0.180
         187
0.310
         178
0.290
         176
0.190
         171
0.340
         164
0.330
         154
0.160
         143
0.360
         142
0.170
         140
0.350
         107
          98
0.380
          96
0.400
0.390
          95
0.370
          89
0.150
          88
0.410
          87
```

```
0.430
           78
0.440
           69
0.420
           67
0.890
            1
0.135
            1
0.090
            1
1.115
            1
            1
1.010
            1
0.215
0.355
            1
            1
0.955
1.240
            1
            1
1.070
0.930
            1
            1
1.580
            1
1.025
            1
0.920
            1
0.085
1.035
            1
            1
0.975
0.845
            1
            1
1.100
            1
0.905
0.950
            1
            1
0.825
0.175
            1
0.895
            1
0.405
            1
            1
0.805
1.130
            1
            1
1.185
0.565
            1
0.865
            1
Name: volatile acidity, Length: 187, dtype: int64
mean_va = data['volatile acidity'].mean()
data['volatile acidity'].fillna(mean_va, inplace = True)
data['volatile acidity'].isnull().sum()
0
data['citric acid'].value_counts()
0.30
        337
0.28
        301
0.32
        289
0.49
        283
0.26
        257
0.34
        249
```

0.20	244
0.29	
0.27	
0.24	232
0.31	
0.33	
0.36	
0.25	163
0.37	153
0.35	150
0.00	
0.40	
0.38	
0.22	131
0.39	129
0.42	
0.23	
0.23	
0.21	
0.41	
0.20	95
0.44	
0.18	
0.46	
0.19	69
0.45	68
0.66	21
0.68	
0.11	16
0.60	15
	15
0.62	15
0.65	
0.64	15
0.59	
0.63	
0.61	
0.01	11
0.71	10
0.69	9
0.67	9
0.73	8
0.72	6
1.00	6
0.70	
	2
0.78	3
0.76	3
0.79	3
0.80	2
0.91	2
0.81	2
0.82	2
	_

```
0.88
          1
1.66
          1
0.75
          1
0.86
          1
          1
0.99
1.23
          1
Name: citric acid, Length: 89, dtype: int64
mean ca = data['citric acid'].mean()
data['citric acid'].fillna(mean_ca, inplace = True)
data['citric acid'].isnull().sum()
0
data['residual sugar'].value_counts()
2.00
         235
1.80
         228
1.60
         223
1.40
         219
1.20
         195
2.20
         187
2.10
         179
1.90
         176
1.70
         175
1.50
         171
1.30
         152
2.30
         150
1.10
         146
2.40
         127
2.50
         124
2.60
         112
1.00
          93
2.80
          85
2.70
          77
2.90
          49
4.60
          46
5.00
          44
7.80
          43
3.20
          43
3.00
          42
4.80
          41
6.30
          41
0.90
          41
7.40
          40
6.40
          37
15.25
           1
19.90
           1
8.55
           1
```

```
5.55
            1
65.80
            1
18.50
            1
15.15
            1
            1
20.40
6.35
            1
11.45
            1
18.40
            1
7.95
            1
            1
17.35
20.15
            1
            1
3.65
8.45
            1
            1
19.10
16.45
            1
            1
9.05
16.55
            1
            1
19.60
            1
7.45
22,60
            1
            1
6.95
8.65
            1
            1
14.15
            1
14.05
3.15
            1
8.95
            1
20.30
            1
Name: residual sugar, Length: 316, dtype: int64
mean rs = data['residual sugar'].mean()
data['residual sugar'].fillna(mean_rs, inplace = True)
data['residual sugar'].isnull().sum()
data['chlorides'].value counts()
0.044
         206
0.036
         200
0.042
         187
0.046
         185
0.050
         182
0.048
         182
0.040
         182
0.047
         175
0.045
         174
0.034
         169
0.038
         168
0.039
         161
0.037
         160
```

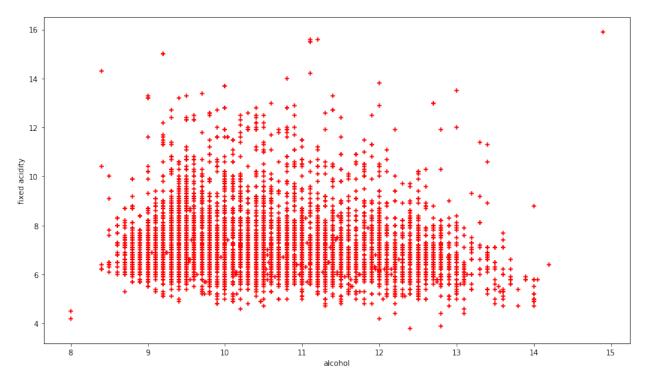
```
0.041
          151
0.043
          142
0.049
          141
0.053
          135
0.035
          130
0.033
          119
0.051
          116
0.052
          114
0.054
          112
0.032
          109
0.030
          108
0.031
          107
0.056
           97
0.028
           85
0.029
           81
0.057
           78
0.080
           70
0.143
            1
0.290
            1
            1
0.149
0.267
            1
            1
0.209
            1
0.464
0.403
            1
0.236
            1
            1
0.211
0.204
            1
0.156
            1
0.190
            1
            1
0.130
0.240
            1
            1
0.222
0.212
            1
0.301
            1
0.113
            1
            1
0.263
            1
0.611
            1
0.413
0.009
            1
0.239
            1
0.387
            1
0.343
            1
            1
0.213
            1
0.165
            1
0.150
0.144
            1
0.125
            1
Name: chlorides, Length: 214, dtype: int64
```

```
mean_c = data['chlorides'].mean()
data['chlorides'].fillna(mean_c, inplace = True)
data['chlorides'].isnull().sum()
0
data['pH'].value_counts()
3.16
        200
3.14
        193
3.22
        185
3.20
        176
3.19
        170
3.15
        170
3.18
        168
3.24
        160
3.12
        154
3.10
        154
3.17
        151
3.30
        150
3.26
        149
3.08
        147
3.23
        147
3.25
        140
3.36
        139
3.11
        135
3.21
        131
3.32
        131
3.13
        130
3.28
        129
3.29
        126
3.06
        124
3.27
        123
3.34
        122
3.31
        118
3.04
        107
3.38
        106
3.09
        103
3.63
          9
3.68
          7
3.69
          6
3.72
          6
          5
3.62
3.65
          4
          4
3.67
          4
2.83
          4
3.71
          3
3.74
2.79
          3
```

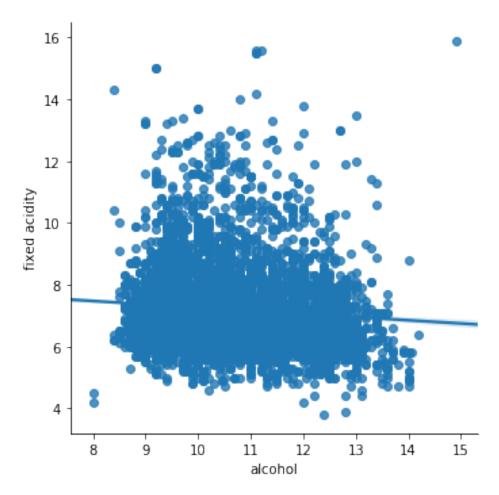
```
3.75
          3
          3
2.80
          2
3.77
          2
3.80
          2
2.74
3.70
          2
          2
3.78
3.76
          2
          2
3.90
          2
3.64
          2
4.01
           1
2.72
3.85
           1
           1
3.79
3.81
           1
2.77
           1
2.82
           1
2.84
           1
3.82
          1
Name: pH, Length: 108, dtype: int64
mean_pH = data['pH'].mean()
data['pH'].fillna(mean_pH, inplace = True)
data['pH'].isnull().sum()
0
data['sulphates'].value_counts()
0.50
        275
0.46
        243
0.54
        234
0.44
        232
0.38
        214
0.48
        208
0.52
        203
0.49
        197
0.47
        191
0.45
        190
0.42
        186
0.53
        186
0.40
        172
0.43
        169
0.56
        168
0.58
        167
0.51
        166
0.39
        157
0.60
        157
0.55
        152
0.59
        148
```

```
0.41
        139
0.57
        138
0.37
        131
0.62
        129
0.36
        120
0.64
        113
0.63
         96
0.61
         90
0.35
         85
          3
1.05
1.28
          2
1.10
          2
          2
1.13
1.01
          2
1.03
          2
1.95
          2
1.00
          2
1.04
          2
1.07
1.14
          2
1.34
          1
2.00
          1
          1
1.16
1.61
          1
1.15
          1
1.22
          1
1.31
          1
1.09
          1
0.23
          1
0.22
          1
1.11
          1
1.20
          1
1.98
          1
1.26
          1
1.59
          1
1.12
          1
          1
1.33
1.56
          1
1.62
          1
Name: sulphates, Length: 111, dtype: int64
mean_s = data['sulphates'].mean()
data['sulphates'].fillna(mean_s, inplace = True)
data['sulphates'].isnull().sum()
0
data.isnull().sum()
```

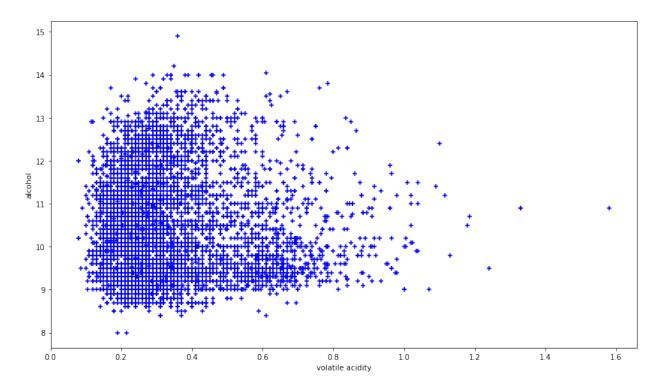
```
type
                         0
fixed acidity
                         0
volatile acidity
                         0
citric acid
                         0
residual sugar
                         0
chlorides
                         0
free sulfur dioxide
                         0
total sulfur dioxide
                         0
density
                         0
рН
                         0
sulphates
                         0
                         0
alcohol
                         0
quality
dtype: int64
Visualization of the data
x - alcohol
y - fixed acidity
plt.figure(figsize=(14, 8))
plt.scatter(x = 'alcohol', y = 'fixed acidity', data = data, marker =
'+', c='r')
plt.xlabel('alcohol')
plt.ylabel('fixed acidity')
#plt.show()
<matplotlib.text.Text at 0x2b39aef7ef0>
```



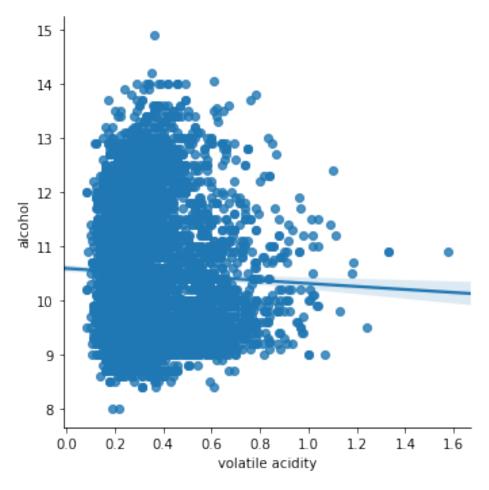
```
sea.lmplot(x='alcohol', y='fixed acidity', data = data)
#plt.show()
<seaborn.axisgrid.FacetGrid at 0x2b394faca58>
```



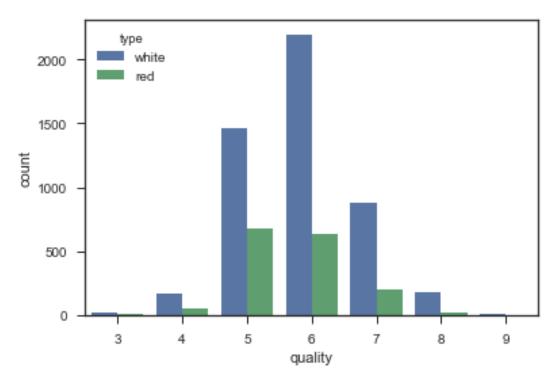
```
plt.figure(figsize=(14,8))
plt.scatter(x ='volatile acidity', y = 'alcohol', data = data, marker
= '+', c = 'b')
plt.xlabel('volatile acidity')
plt.ylabel('alcohol')
#plt.show()
<matplotlib.text.Text at 0x2b39b25ac88>
```



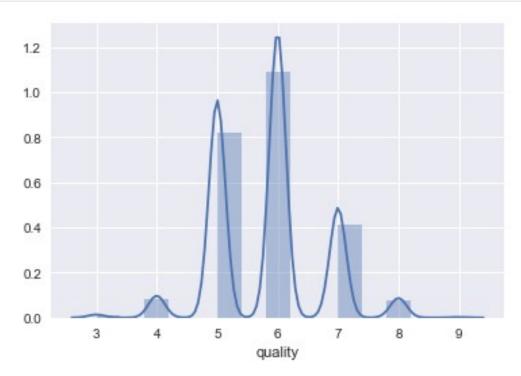
sea.lmplot(x='volatile acidity', y='alcohol', data = data)
#plt.plot()
<seaborn.axisgrid.FacetGrid at 0x2b39b2e7ef0>



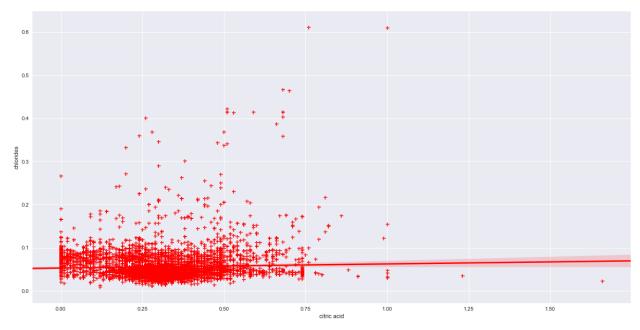
```
sea.set(style = 'ticks')
sea.countplot(data['quality'], hue = 'type', data = data)
#plt.show()
<matplotlib.axes._subplots.AxesSubplot at 0x2b39b25a828>
```



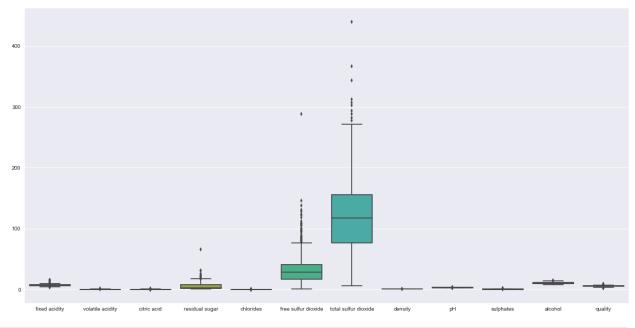
```
sea.set()
sea.distplot(data['quality'], bins = 15)
#plt.show()
<matplotlib.axes._subplots.AxesSubplot at 0x2b39b724320>
```



```
plt.figure(figsize = (20, 10))
sea.regplot(x = 'citric acid', y = 'chlorides', data = data, marker =
'+', color = 'r')
#plt.show()
<matplotlib.axes._subplots.AxesSubplot at 0x2b39b873d68>
```



```
sea.set()
plt.figure(figsize = (20, 10))
sea.boxplot(data = data)
#plt.show()
<matplotlib.axes._subplots.AxesSubplot at 0x2b39b878b70>
```



```
low = data['free sulfur dioxide'].mean() - 3*data['free sulfur
dioxide'].std()
high = data['free sulfur dioxide'].mean() + 3*data['free sulfur
dioxide'].std()
print('low = ', low)
print('high = ', high)
low = -22.722879937833156
high = 83.77351869418224
data copy = data[(data['free sulfur dioxide'] > low) & (data['free
sulfur dioxide'] < high)]</pre>
print(data copy)
       type fixed acidity volatile acidity citric acid residual
sugar \
      white
                  7.000000
                                     0.270000
                                                       0.36
20.70
      white
                  6.300000
                                     0.300000
                                                       0.34
1.60
2
      white
                  8.100000
                                     0.280000
                                                       0.40
6.90
3
      white
                  7.200000
                                     0.230000
                                                       0.32
8.50
                  7.200000
                                     0.230000
                                                       0.32
4
      white
8.50
      white
                  8.100000
                                     0.280000
                                                       0.40
5
6.90
      white
                  6.200000
                                     0.320000
                                                       0.16
7.00
7
      white
                  7.000000
                                     0.270000
                                                       0.36
```

20.70				
8	white	6.300000	0.300000	0.34
1.60	, do i to	0 100000	0. 220000	0.42
9 1.50	white	8.100000	0.220000	0.43
10	white	8.100000	0.270000	0.41
1.45 11	white	8.600000	0.230000	0.40
4.20	MILLE	3.00000	0.230000	0.40
12	white	7.900000	0.180000	0.37
1.20 13	white	6.600000	0.160000	0.40
1.50	WIIICC	0.00000	0.100000	0.40
14	white	8.300000	0.420000	0.62
19.25 15	white	6.600000	0.170000	0.38
1.50				
16	white	6.300000	0.480000	0.04
1.10 17	white	7.216579	0.660000	0.48
1.20				
18 1.10	white	7.400000	0.340000	0.42
19	white	6.500000	0.310000	0.14
7.50		5 200000	0.660000	0.40
20 1.20	white	6.200000	0.660000	0.48
21	white	6.400000	0.310000	0.38
2.90 22	, ,bi+o	6.800000	0.260000	0.42
22 1.70	white	0.000000	0.200000	0.42
23	white	7.600000	0.670000	0.14
1.50 24	white	6.600000	0.270000	0.41
1.30	MILLE	0.00000	0.270000	0.41
25	white	7.000000	0.250000	0.32
9.00 26	white	6.900000	0.240000	0.35
1.00	WIIICC	01300000	01210000	0.55
27	white	7.000000	0.280000	0.39
8.70 28	white	7.400000	0.270000	0.48
1.10				
29 2.00	white	7.200000	0.320000	0.36
6467 1.90	red	6.200000	0.510000	0.14
1.50				

6468	red	6.400000	0.360000	0.53
2.20		6 400000	0.200000	0 14
6469	red	6.400000	0.380000	0.14
2.20 6470	rod	7.300000	0.690000	0.32
2.20	red	7.300000	0.090000	0.32
6471	red	6.000000	0.580000	0.20
2.40	i eu	0.000000	0.500000	0.20
6472	red	5.600000	0.310000	0.78
13.90	i cu	3.000000	0.510000	0.76
6473	red	7.500000	0.520000	0.40
2.20	i cu	7.50000	01320000	0.10
6474	red	8.000000	0.300000	0.63
1.60			0.00000	0.00
6475	red	6.200000	0.700000	0.15
5.10				
6476	red	6.800000	0.670000	0.15
1.80				
6477	red	6.200000	0.560000	0.09
1.70				
6478	red	7.400000	0.350000	0.33
2.40				
6479	red	6.200000	0.560000	0.09
1.70				
6480	red	6.100000	0.715000	0.10
2.60	d	6 200000	0 460000	0.30
6481 2.10	red	6.200000	0.460000	0.29
6482	red	6.700000	0.320000	0.44
2.40	i eu	0.700000	0.320000	0.44
6483	red	7.200000	0.390000	0.44
2.60	i cu	7.20000	01550000	0.11
6484	red	7.500000	0.310000	0.41
2.40			0.02000	• • • •
6485	red	5.800000	0.610000	0.11
1.80				
6486	red	7.200000	0.339691	0.33
2.50				
6487	red	6.600000	0.725000	0.20
7.80				
6488	red	6.300000	0.550000	0.15
1.80				
6489	red	5.400000	0.740000	0.09
1.70	nod	6 200000	0 510000	0.12
6490	red	6.300000	0.510000	0.13
2.30 6491	red	6.800000	0.620000	0.08
1.90	leu	0.000000	0.020000	0.00
6492	red	6.200000	0.600000	0.08
0152	. cu	0.20000	0.00000	0.00

2.00							
6493	red	5.900000	0	.550000	9	0.10	
2.20 6494	red	6.300000	0	.510000	<b>.</b>	0.13	
2.30							
6495 2.00	red	5.900000	0	.645000	9	0.12	
6496	red	6.000000	0	.310000	9	0.47	
3.60							
	chlorides	free sulfur	dioxide	total	sulfur	dioxide	density
pH \ 0	0.045		45.0			170.0	1.00100
3.00	0 040		14.0			122.0	0.00400
1 3.30	0.049		14.0			132.0	0.99400
2 3.26	0.050		30.0			97.0	0.99510
3	0.058		47.0			186.0	0.99560
3.19 4	0.058		47.0			186.0	0.99560
3.19							
5 3.26	0.050		30.0			97.0	0.99510
6	0.045		30.0			136.0	0.99490
3.18 7	0.045		45.0			170.0	1.00100
3.00							
8 3.30	0.049		14.0			132.0	0.99400
9	0.044		28.0			129.0	0.99380
3.22 10	0.033		11.0			63.0	0.99080
2.99 11	0.035		17.0			100 0	0.99470
3.14							
12 3.18	0.040		16.0			75.0	0.99200
13	0.044		48.0			143.0	0.99120
3.54 14	0.040		41.0			172.0	1.00020
2.98							
15 3.25	0.032		28.0			112.0	0.99140
16	0.046		30.0			99.0	0.99280
3.24 17	0.029		29.0			75.0	0.98920
3.33							
18	0.033		17.0			171.0	0.99170

2 12				
3.12 19	0.044	34.0	133.0	0.99550
3.22				
20 3.33	0.029	29.0	75.0	0.98920
21 3.17	0.038	19.0	102.0	0.99120
22 3.47	0.049	41.0	122.0	0.99300
23	0.074	25.0	168.0	0.99370
24 3.42	0.052	16.0	142.0	0.99510
25 3.25	0.046	56.0	245.0	0.99550
26 3.45	0.052	35.0	146.0	0.99300
27 3.38	0.051	32.0	141.0	0.99610
28 3.19	0.047	17.0	132.0	0.99140
29 3.10	0.033	37.0	114.0	0.99060
5.10				
6467	0.056	15.0	34.0	0.99396
3.48 6468	0.230	19.0	35.0	0.99340
3.37 6469	0.038	15.0	25.0	0.99514
3.44 6470	0.069	35.0	104.0	0.99632
3.33 6471	0.075	15.0	50.0	0.99467
3.58 6472 3.39	0.074	23.0	92.0	0.99677
6473 3.26	0.060	12.0	20.0	0.99474
6474 3.30	0.081	16.0	29.0	0.99588
6475 3.54	0.076	13.0	27.0	0.99622
6476 3.42	0.118	13.0	20.0	0.99540
6477 3.54	0.053	24.0	32.0	0.99402
6478 3.36	0.068	9.0	26.0	0.99470
3.00				

6479	0.053		24.0	32.0	0.99402
3.54 6480	0.053		13.0	27.0	0.99362
3.57	0.055		13.0	27.0	0.55502
6481	0.074		32.0	98.0	0.99578
3.33					
6482	0.061		24.0	34.0	0.99484
3.29 6483	0.066		22.0	48.0	0.99494
3.30	0.000		22.0	40.0	0.99494
6484	0.065		34.0	60.0	0.99492
3.34					
6485	0.066		18.0	28.0	0.99483
3.55					
6486	0.068		34.0	102.0	0.99414
3.27 6487	0.073		29.0	79.0	0.99770
3.29	0.073		29.0	79.0	0.99770
6488	0.077		26.0	35.0	0.99314
3.32					
6489	0.089		16.0	26.0	0.99402
3.67					
6490	0.076		29.0	40.0	0.99574
3.42 6491	0.068		28.0	38.0	0.99651
3.42	0.000		20.0	30.0	0.99031
6492	0.090		32.0	44.0	0.99490
3.45					
6493	0.062		39.0	51.0	0.99512
3.52	0.076		20.0	40.0	0 00574
6494 3.42	0.076		29.0	40.0	0.99574
6495	0.075		32.0	44.0	0.99547
3.57	01075		3210	1110	0133317
6496	0.067		18.0	42.0	0.99549
3.39					
	cul phatos	alcohol	quality		
0	sulphates 0.450000	alcohol 8.8	quality 6		
	0.490000	9.5	6		
2	0.440000	10.1	6		
3	0.400000	9.9	6		
1 2 3 4 5 6 7	0.400000	9.9	6		
5	0.440000 0.470000	10.1 9.6	6		
7	0.450000	8.8	6 6		
8	0.490000	9.5	6		
9	0.450000	11.0	6		
10	0.560000	12.0	5		

11	0.530000	9.7	5
			5
12	0.630000	10.8	5 5 7
13	0.520000	12.4	
14	0.670000	9.7	5
15	0.550000	11.4	7
16	0.360000	9.6	6
17	0.390000	12.8	8
18	0.530000	11.3	6
19	0.500000	9.5	5
20	0.390000	12.8	8
21	0.350000	11.0	7
22	0.480000	10.5	8
23	0.510000	9.3	5
24	0.470000	10.0	6
25	0.500000	10.4	6
26	0.440000	10.0	6
27	0.530000	10.5	6
28	0.490000	11.6	6
29	0.710000	12.3	7
6467	0.570000	11.5	6
6468	0.930000	12.4	6
6469	0.650000	11.1	6
6470	0.510000	9.5	5
6471	0.670000	12.5	6
6472	0.480000	10.5	6
6473	0.640000	11.8	6
6474	0.780000	10.8	6
6475	0.600000	11.9	6
6476	0.670000	11.3	6
6477	0.600000	11.3	5
			5
6478	0.600000	11.9	6
6479	0.600000	11.3	5
6480	0.500000	11.9	5
6481	0.620000	9.8	5
6482	0.800000	11.6	7
6483	0.840000	11.5	6
6484	0.850000	11.4	6
6485	0.660000	10.9	6
6486	0.780000	12.8	6
6487	0.540000	9.2	5
6488	0.820000	11.6	6
6489			
	0.560000	11.6	6
6490	0.750000	11.0	6
6491	0.820000	9.5	6
6492	0.580000	10.5	5
6493	0.531215	11.2	6
6494	0.750000	11.0	6
6495	0.710000	10.2	5
6496	0.660000	11.0	6

```
[6461 rows x 13 columns]
data.shape[0]
6497
data_copy.shape[0]
6461
difference = data.shape[0] - data copy.shape[0]
difference
36
low = data copy['total sulfur dioxide'].mean() - 3*data copy['total
sulfur dioxide'].std()
high = data copy['total sulfur dioxide'].mean() + 3*data copy['total
sulfur dioxide'].std()
print('low = ', low)
print('high = ', high)
low = -53.15243132839596
high = 283.65436601342924
data_copy2 = data_copy[(data_copy['total sulfur dioxide'] > low) &
(data copy['total sulfur dioxide'] < high)]</pre>
print(data copy2)
       type fixed acidity volatile acidity citric acid residual
sugar \
      white
                  7.000000
                                     0.270000
                                                       0.36
20.70
                                                       0.34
1
      white
                  6.300000
                                     0.300000
1.60
      white
                                                       0.40
                  8.100000
                                     0.280000
6.90
                                                      0.32
      white
                  7.200000
                                     0.230000
8.50
      white
                  7.200000
                                     0.230000
                                                       0.32
8.50
5
      white
                  8.100000
                                     0.280000
                                                      0.40
6.90
                                                       0.16
      white
                  6.200000
                                     0.320000
7.00
                                                      0.36
      white
                  7.000000
                                     0.270000
20.70
      white
                  6.300000
                                     0.300000
                                                       0.34
8
1.60
      white
                  8.100000
                                     0.220000
                                                       0.43
1.50
```

10	white	8.100000	0.270000	0.41
1.45 11	white	8.600000	0.230000	0.40
4.20 12	white	7.900000	0.180000	0.37
1.20				
13 1.50	white	6.600000	0.160000	0.40
14	white	8.300000	0.420000	0.62
19.25 15	white	6.600000	0.170000	0.38
1.50 16	white	6.300000	0.480000	0.04
1.10	wiiice	0.30000	0.40000	0.04
17 1.20	white	7.216579	0.660000	0.48
18	white	7.400000	0.340000	0.42
1.10 19	white	6.500000	0.310000	0.14
7.50				
20 1.20	white	6.200000	0.660000	0.48
21	white	6.400000	0.310000	0.38
2.90 22	white	6.800000	0.260000	0.42
1.70 23	white	7.600000	0.670000	0.14
1.50				
24 1.30	white	6.600000	0.270000	0.41
25	white	7.000000	0.250000	0.32
9.00 26	white	6.900000	0.240000	0.35
1.00	white	7 000000	0.280000	0.20
27 8.70	wiite	7.000000	0.20000	0.39
28 1.10	white	7.400000	0.270000	0.48
29	white	7.200000	0.320000	0.36
2.00				
6467 1.90	red	6.200000	0.510000	0.14
6468	red	6.400000	0.360000	0.53
2.20 6469	red	6.400000	0.380000	0.14
2.20				
6470	red	7.300000	0.690000	0.32

2 20				
2.20 6471	rod	6.000000	0.580000	0.20
2.40	red	0.00000	0.300000	0.20
6472	red	5.600000	0.310000	0.78
13.90	Teu	3.000000	0.310000	0.70
6473	red	7.500000	0.520000	0.40
2.20	Teu	7.300000	0.320000	0.40
6474	red	8.000000	0.300000	0.63
1.60	Teu	8.00000	0.300000	0.03
6475	rod	6.200000	0.700000	0.15
5.10	red	0.20000	0.700000	0.13
6476	rod	6.800000	0.670000	0.15
	red	0.00000	0.070000	0.15
1.80		6 200000	0 560000	0.00
6477	red	6.200000	0.560000	0.09
1.70	and d	7 400000	0.350000	0. 22
6478	red	7.400000	0.350000	0.33
2.40		6 200000	0.50000	0.00
6479	red	6.200000	0.560000	0.09
1.70				
6480	red	6.100000	0.715000	0.10
2.60				
6481	red	6.200000	0.460000	0.29
2.10				
6482	red	6.700000	0.320000	0.44
2.40				
6483	red	7.200000	0.390000	0.44
2.60				
6484	red	7.500000	0.310000	0.41
2.40				
6485	red	5.800000	0.610000	0.11
1.80				
6486	red	7.200000	0.339691	0.33
2.50				
6487	red	6.600000	0.725000	0.20
7.80				
6488	red	6.300000	0.550000	0.15
1.80				
6489	red	5.400000	0.740000	0.09
1.70				
6490	red	6.300000	0.510000	0.13
2.30				
6491	red	6.800000	0.620000	0.08
1.90				
6492	red	6.200000	0.600000	0.08
2.00				
6493	red	5.900000	0.550000	0.10
2.20				
6494	red	6.300000	0.510000	0.13
2.30				

6495	red	5.900000	(	0.645000	9	0.12	
2.00 6496 3.60	red	6.000000	ı	0.31000	9	0.47	
-11 \	chlorides	free sulfur	dioxide	total	sulfur	dioxide	density
pH \ 0	0.045		45.0			170.0	1.00100
3.00 1	0.049		14.0			132.0	0.99400
3.30	0.050		30.0			97.0	0.99510
3.26 3	0.058		47.0			186.0	0.99560
3.19 4	0.058		47.0			186.0	0.99560
3.19 5	0.050		30.0			97.0	0.99510
3.26 6	0.045		30.0			136.0	0.99490
3.18 7	0.045		45.0			170.0	1.00100
3.00 8	0.049		14.0			132.0	0.99400
3.30 9	0.044		28.0			129.0	0.99380
3.22 10	0.033		11.0			63.0	0.99080
2.99 11	0.035		17.0			109.0	0.99470
3.14 12	0.040		16.0			75.0	0.99200
3.18 13	0.044		48.0			143.0	0.99120
3.54 14	0.040		41.0			172.0	1.00020
2.98 15	0.032		28.0			112.0	0.99140
3.25 16	0.046		30.0			99.0	0.99280
3.24 17	0.029		29.0			75.0	0.98920
3.33 18	0.029		17.0			171.0	0.99170
3.12							
19 3.22	0.044		34.0			133.0	0.99550
20 3.33	0.029		29.0			75.0	0.98920

21       0.038       19.0       102.0       0.99120         3.17       22       0.049       41.0       122.0       0.99300         3.47       23       0.074       25.0       168.0       0.99370         3.05       24       0.052       16.0       142.0       0.99510         3.42       25       0.046       56.0       245.0       0.99550         3.25       26       0.052       35.0       146.0       0.99300         3.45       27       0.051       32.0       141.0       0.99300         3.48       0.047       17.0       132.0       0.99140         3.19       29       0.033       37.0       114.0       0.99060         3.10              6467       0.056       15.0       34.0       0.99340         3.37       6468       0.230       19.0       35.0       0.99340         3.37       6469       0.038       15.0       25.0       0.99514         3.44       6470       0.069       35.0       104.0       0.99632         3.33       6471       0.075       15.0       50.0 <th></th> <th></th> <th></th> <th></th> <th></th>					
22     0.049     41.0     122.0     0.99300       3.47     23     0.074     25.0     168.0     0.99370       3.05     16.0     142.0     0.99510       24     0.052     16.0     142.0     0.99510       3.42     25     0.046     56.0     245.0     0.99550       3.25     32.0     146.0     0.99300       3.45     32.0     141.0     0.99610       3.38     8     0.047     17.0     132.0     0.99140       3.19     31.0     37.0     114.0     0.99060       3.19     31.0     37.0     114.0     0.99060       3.10		0.038	19.0	102.0	0.99120
3.47 23		0.049	41.0	122.0	0.99300
23       0.074       25.0       168.0       0.99370         3.05       16.0       142.0       0.99510         3.42       25       0.046       56.0       245.0       0.99550         3.25       3.25       35.0       146.0       0.99300         3.45       27       0.051       32.0       141.0       0.99610         3.38       8       0.047       17.0       132.0       0.99140         3.19              29       0.033       37.0       114.0       0.99060         3.10              6467       0.056       15.0       34.0       0.99396         3.48       6468       0.230       19.0       35.0       0.99340         3.37       6469       0.088       15.0       25.0       0.99340         3.44       6469       0.089       35.0       104.0       0.99632         3.33       6471       0.075       15.0       50.0       0.99467         3.58             6472       0.074					
24     0.052     16.0     142.0     0.99510       3.42     25     0.046     56.0     245.0     0.99550       3.25     26     0.052     35.0     146.0     0.99300       3.45     27     0.051     32.0     141.0     0.99610       3.38     28     0.047     17.0     132.0     0.99140       3.19     29     0.033     37.0     114.0     0.99060       3.10 <tr< td=""><td>23</td><td>0.074</td><td>25.0</td><td>168.0</td><td>0.99370</td></tr<>	23	0.074	25.0	168.0	0.99370
3.42       25       0.046       56.0       245.0       0.99550         3.25       3.26       0.052       35.0       146.0       0.99300         3.45       27       0.051       32.0       141.0       0.99610         3.38       28       0.047       17.0       132.0       0.99140         3.19       29       0.033       37.0       114.0       0.99060         3.10		0.052	16.0	142.0	0.99510
25     0.046     56.0     245.0     0.99550       3.25     35.0     146.0     0.99300       3.45     27     0.051     32.0     141.0     0.99610       3.38     38       28     0.047     17.0     132.0     0.99140       3.19     29     0.033     37.0     114.0     0.99060       3.10           6467     0.056     15.0     34.0     0.99396       3.48     6468     0.230     19.0     35.0     0.99340       3.37     6469     0.038     15.0     25.0     0.99514       3.44     6470     0.069     35.0     104.0     0.99632       3.33     6471     0.075     15.0     50.0     0.99467       3.58     6472     0.074     23.0     92.0     0.99677       3.39     6473     0.060     12.0     20.0     0.99474       3.26     6474     0.081     16.0     29.0     0.99588       3.30     6475     0.076     13.0     27.0     0.99622       3.54     6476     0.118     13.0     20.0     0.99402       3.54     6479     0.053     24.0					
26     0.052     35.0     146.0     0.99300       3.45     27     0.051     32.0     141.0     0.99610       3.38     28     0.047     17.0     132.0     0.99140       3.19     29     0.033     37.0     114.0     0.99060       3.10           6467     0.056     15.0     34.0     0.99396       3.48     6468     0.230     19.0     35.0     0.99340       3.37     6469     0.038     15.0     25.0     0.99340       3.44     6470     0.069     35.0     104.0     0.99632       3.33     6471     0.075     15.0     50.0     0.99467       3.58     6472     0.074     23.0     92.0     0.99677       3.39     6472     0.074     23.0     92.0     0.99474       3.26     6474     0.081     16.0     29.0     0.99488       3.30     6475     0.076     13.0     27.0     0.99622       3.54     6476     0.118     13.0     20.0     0.99402       3.54     6479     0.053     24.0     32.0     0.99402       3.54     6479     0.053     24.0 <td>25</td> <td>0.046</td> <td>56.0</td> <td>245.0</td> <td>0.99550</td>	25	0.046	56.0	245.0	0.99550
3.45       27       0.051       32.0       141.0       0.99610         3.38       28       0.047       17.0       132.0       0.99140         3.19       29       0.033       37.0       114.0       0.99060         3.10		0.053	35.0	146 0	0 00200
27       0.051       32.0       141.0       0.99610         3.38       28       0.047       17.0       132.0       0.99140         3.19       29       0.033       37.0       114.0       0.99060         3.10               6467       0.056       15.0       34.0       0.99396         3.48       6468       0.230       19.0       35.0       0.99340         3.37       6469       0.038       15.0       25.0       0.99340         3.44       6470       0.069       35.0       104.0       0.99632         3.33       6471       0.075       15.0       50.0       0.99467         3.58       6472       0.074       23.0       92.0       0.99677         3.39       6473       0.060       12.0       20.0       0.99474         3.26       6474       0.081       16.0       29.0       0.99588         3.30       6475       0.076       13.0       27.0       0.99622         3.54       6476       0.118       13.0       20.0       0.99402         3.54       6479       0.053		0.052	35.0	140.0	0.99300
3.38       28       0.047       17.0       132.0       0.99140         3.19       29       0.033       37.0       114.0       0.99060         3.10                 6467       0.056       15.0       34.0       0.99396         3.48       0.230       19.0       35.0       0.99340         3.37       0.038       15.0       25.0       0.99340         3.44       0.069       35.0       104.0       0.99632         3.33       0.075       15.0       50.0       0.99467         3.58       0.074       23.0       92.0       0.99477         3.39       0.074       23.0       92.0       0.99474         3.26       0.074       23.0       20.0       0.99474         3.26       0.074       13.0       27.0       0.99588         3.30       0.076       13.0       27.0       0.99588         3.42       0.076       13.0       27.0       0.99540         3.54       0.064       0.053       24.0       32.0 <td></td> <td>0.051</td> <td>32 A</td> <td>1/1 0</td> <td>0 00610</td>		0.051	32 A	1/1 0	0 00610
28       0.047       17.0       132.0       0.99140         3.19       29       0.033       37.0       114.0       0.99060         3.10                 6467       0.056       15.0       34.0       0.99396         3.48       6468       0.230       19.0       35.0       0.99340         3.37       6469       0.038       15.0       25.0       0.99514         3.44       6470       0.069       35.0       104.0       0.99632         3.33       6471       0.075       15.0       50.0       0.99467         3.58       6472       0.074       23.0       92.0       0.99677         3.39       6473       0.060       12.0       20.0       0.99474         3.26       6474       0.081       16.0       29.0       0.99588         3.30       6475       0.076       13.0       27.0       0.99622         3.54       6476       0.118       13.0       20.0 <td></td> <td>0.031</td> <td>32.0</td> <td>141.0</td> <td>0.99010</td>		0.031	32.0	141.0	0.99010
3.19 29 0.033 37.0 114.0 0.99060 3.10 6467 0.056 15.0 34.0 0.99396 3.48 6468 0.230 19.0 35.0 0.99340 3.37 6469 0.038 15.0 25.0 0.99514 3.44 6470 0.069 35.0 104.0 0.99632 3.33 6471 0.075 15.0 50.0 0.99467 3.58 6472 0.074 23.0 92.0 0.99677 3.39 6473 0.060 12.0 20.0 0.99474 3.26 6474 0.081 16.0 29.0 0.99588 3.30 6475 0.076 13.0 27.0 0.99580 3.42 6477 0.053 24.0 32.0 0.99402 3.54 6478 0.068 9.0 26.0 0.99470 3.36 6479 0.053 24.0 32.0 0.99402 3.54 6479 0.053 13.0 27.0 0.99362		0 047	17 0	132 0	0 99140
29       0.033       37.0       114.0       0.99060         3.10		0.1017	1710	132.0	0133110
3.10		0.033	37.0	114.0	0.99060
		0.000	5,10		0.0000
6467       0.056       15.0       34.0       0.99396         3.48       0.230       19.0       35.0       0.99340         3.37       0.038       15.0       25.0       0.99514         3.44       0.069       35.0       104.0       0.99632         3.33       0.075       15.0       50.0       0.99467         3.58       0.074       23.0       92.0       0.99677         3.39       0.060       12.0       20.0       0.99474         3.26       0.06474       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.018       13.0       27.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.05					
3.48 6468 0.230 19.0 35.0 0.99340 3.37 6469 0.038 15.0 25.0 0.99514 3.44 6470 0.069 35.0 104.0 0.99632 3.33 6471 0.075 15.0 50.0 0.99467 3.58 6472 0.074 23.0 92.0 0.99677 3.39 6473 0.060 12.0 20.0 0.99474 3.26 6474 0.081 16.0 29.0 0.99588 3.30 6475 0.076 13.0 27.0 0.99622 3.54 6476 0.118 13.0 20.0 0.99540 3.42 6477 0.053 24.0 32.0 0.99402 3.54 6478 0.068 9.0 26.0 0.99470 3.36 6479 0.053 24.0 32.0 0.99402 3.54 6479 0.053 13.0 27.0 0.99362 3.54 6480 0.053 13.0 27.0 0.99362					
6468       0.230       19.0       35.0       0.99340         3.37       6469       0.038       15.0       25.0       0.99514         3.44       6470       0.069       35.0       104.0       0.99632         3.33       0.074       15.0       50.0       0.99467         3.58       0.074       23.0       92.0       0.99677         3.39       0.060       12.0       20.0       0.99474         3.26       0.060       12.0       29.0       0.99474         3.26       0.076       13.0       27.0       0.99588         3.30       0.076       13.0       27.0       0.99522         3.54       0.018       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.54       0.068       9.0       26.0       0.99470         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57 <td></td> <td>0.056</td> <td>15.0</td> <td>34.0</td> <td>0.99396</td>		0.056	15.0	34.0	0.99396
3.37 6469 0.038 15.0 25.0 0.99514 3.44 6470 0.069 35.0 104.0 0.99632 3.33 6471 0.075 15.0 50.0 0.99467 3.58 6472 0.074 23.0 92.0 0.99677 3.39 6473 0.060 12.0 20.0 0.99474 3.26 6474 0.081 16.0 29.0 0.99588 3.30 6475 0.076 13.0 27.0 0.99622 3.54 6476 0.118 13.0 20.0 0.99540 3.42 6477 0.053 24.0 32.0 0.99402 3.54 6478 0.068 9.0 26.0 0.99470 3.36 6479 0.053 24.0 32.0 0.99402 3.54 6479 0.053 13.0 27.0 0.99362 3.54 6480 0.053 13.0 27.0 0.99362		0.000	10.0	25.0	0.00040
6469       0.038       15.0       25.0       0.99514         3.44       6470       0.069       35.0       104.0       0.99632         3.33       6471       0.075       15.0       50.0       0.99467         3.58       6472       0.074       23.0       92.0       0.99677         3.39       6473       0.060       12.0       20.0       0.99474         3.26       6474       0.081       16.0       29.0       0.99588         3.30       6475       0.076       13.0       27.0       0.99622         3.54       6476       0.118       13.0       20.0       0.99540         3.42       6477       0.053       24.0       32.0       0.99402         3.54       6478       0.068       9.0       26.0       0.99470         3.54       6479       0.053       24.0       32.0       0.99402         3.54       6480       0.053       13.0       27.0       0.99362         3.57		0.230	19.0	35.0	0.99340
3.44         6470       0.069       35.0       104.0       0.99632         3.33       6471       0.075       15.0       50.0       0.99467         3.58       8       8       92.0       0.99677         3.39       92.0       0.99677       92.0       0.99474         3.26       0.060       12.0       20.0       0.99474         3.26       0.074       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.076       13.0       27.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.079       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99362		0.000	15.0	25.0	0 00514
6470       0.069       35.0       104.0       0.99632         3.33       6471       0.075       15.0       50.0       0.99467         3.58       92.0       0.99467         6472       0.074       23.0       92.0       0.99677         3.39       20.0       0.99474         6473       0.060       12.0       20.0       0.99474         3.26       0.0474       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.047       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362		0.038	15.0	25.0	0.99514
3.33         6471       0.075       15.0       50.0       0.99467         3.58       0.074       23.0       92.0       0.99677         3.39       0.060       12.0       20.0       0.99474         3.26       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0.060	35.0	104.0	0.00633
6471       0.075       15.0       50.0       0.99467         3.58       92.0       0.99677         6472       0.074       23.0       92.0       0.99677         3.39       90.0       0.00       20.0       0.99474         3.26       90.0       0.99474         3.26       90.0       0.99588         3.30       90.0       27.0       0.99622         3.54       90.0       20.0       0.99540         3.42       90.0       32.0       0.99402         3.54       90.0       26.0       0.99470         3.36       90.0       26.0       0.99470         3.54       90.0       32.0       0.99402         3.54       90.0       32.0       0.99402         3.54       90.0       32.0       0.99402         3.54       90.0       32.0       0.99402         3.54       90.0       32.0       0.99402         3.54       90.0       90.0       90.0         6479       90.0       90.0       90.0       90.0       90.0         6480       90.0       90.0       90.0       90.0       90.0       90.0		0.009	35.0	104.0	0.99032
3.58         6472       0.074       23.0       92.0       0.99677         3.39       0.060       12.0       20.0       0.99474         3.26       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0.075	15 0	50.0	0.00467
6472       0.074       23.0       92.0       0.99677         3.39       0.060       12.0       20.0       0.99474         3.26       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0.075	13.0	30.0	0.99407
3.39         6473       0.060       12.0       20.0       0.99474         3.26       0.076       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0 074	23 0	02 A	0 00677
6473       0.060       12.0       20.0       0.99474         3.26       6474       0.081       16.0       29.0       0.99588         3.30       6475       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0.074	25.0	32.0	0.55077
3.26         6474       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0 060	12 A	20.0	0 00474
6474       0.081       16.0       29.0       0.99588         3.30       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0.000	12.0	20.0	0133474
3.30         6475       0.076       13.0       27.0       0.99622         3.54         6476       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57		0.081	16.0	29.0	0.99588
6475       0.076       13.0       27.0       0.99622         3.54       0.118       13.0       20.0       0.99540         3.42       0.053       24.0       32.0       0.99402         3.54       0.068       9.0       26.0       0.99470         3.36       0.053       24.0       32.0       0.99402         3.54       0.053       13.0       27.0       0.99362         3.57					
3.54         6476       0.118       13.0       20.0       0.99540         3.42         6477       0.053       24.0       32.0       0.99402         3.54         6478       0.068       9.0       26.0       0.99470         3.36         6479       0.053       24.0       32.0       0.99402         3.54         6480       0.053       13.0       27.0       0.99362         3.57		0.076	13.0	27.0	0.99622
3.42         6477       0.053       24.0       32.0       0.99402         3.54         6478       0.068       9.0       26.0       0.99470         3.36       32.0       0.99402         3.54       32.0       0.99402         6480       0.053       13.0       27.0       0.99362         3.57	3.54				
6477       0.053       24.0       32.0       0.99402         3.54       9.0       26.0       0.99470         3.36       9.0       32.0       0.99470         6479       0.053       24.0       32.0       0.99402         3.54       9.0       27.0       0.99362         3.57       9.0       27.0       0.99362	6476	0.118	13.0	20.0	0.99540
3.54 6478 0.068 9.0 26.0 0.99470 3.36 6479 0.053 24.0 32.0 0.99402 3.54 6480 0.053 13.0 27.0 0.99362 3.57	3.42				
6478       0.068       9.0       26.0       0.99470         3.36       32.0       0.99402         6479       0.053       24.0       32.0       0.99402         3.54       32.0       0.99362         6480       0.053       13.0       27.0       0.99362         3.57	6477	0.053	24.0	32.0	0.99402
3.36 6479 0.053 24.0 32.0 0.99402 3.54 6480 0.053 13.0 27.0 0.99362 3.57	3.54				
6479       0.053       24.0       32.0       0.99402         3.54         6480       0.053       13.0       27.0       0.99362         3.57		0.068	9.0	26.0	0.99470
3.54 6480 0.053 13.0 27.0 0.99362 3.57					
6480 0.053 13.0 27.0 0.99362 3.57		0.053	24.0	32.0	0.99402
3.57					
		0.053	13.0	27.0	0.99362
0481 0.074 32.0 98.0 0.99578		0.074	22.0	00.0	0.00570
	6481	0.0/4	32.0	98.0	0.995/8

2 22					
3.33 6482	0.061		24.0	34.0	0.99484
3.29	0.001		24.0	34.0	0.99404
6483	0.066		22.0	48.0	0.99494
3.30	0.000		2210	1010	0133131
6484	0.065		34.0	60.0	0.99492
3.34					
6485	0.066		18.0	28.0	0.99483
3.55					
6486	0.068		34.0	102.0	0.99414
3.27	0 072		20.0	70.0	0 00770
6487	0.073		29.0	79.0	0.99770
3.29 6488	0.077		26.0	35.0	0.99314
3.32	0.077		20.0	33.0	0.99314
6489	0.089		16.0	26.0	0.99402
3.67	0.005		20.0	20.0	0.00.02
6490	0.076		29.0	40.0	0.99574
3.42					
6491	0.068		28.0	38.0	0.99651
3.42					
6492	0.090		32.0	44.0	0.99490
3.45	0.002		20.0	F1 0	0.00513
6493 3.52	0.062		39.0	51.0	0.99512
6494	0.076		29.0	40.0	0.99574
3.42	0.070		2310	70.0	0.55574
6495	0.075		32.0	44.0	0.99547
3.57					
6496	0.067		18.0	42.0	0.99549
3.39					
		-1 1			
0	sulphates	alcohol			
0 1	0.450000 0.490000	8.8 9.5	6 6		
	0.440000	10.1	6		
2 3 4 5 6	0.400000	9.9	6		
4	0.400000	9.9	6		
5	0.440000	10.1	6		
6	0.470000	9.6	6		
7	0.450000	8.8	6		
8	0.490000	9.5	6		
9	0.450000	11.0	6 5 5 5 7		
10 11	0.560000	12.0 9.7	5		
12	0.530000 0.630000	10.8	5		
13	0.520000	12.4	7		
14	0.670000	9.7	5		
15	0.550000	11.4	7		

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16
        0.360000
                        9.6
                                     6
                                     8
17
        0.390000
                       12.8
                                     6
18
        0.530000
                       11.3
                                     5
19
                        9.5
        0.500000
                                     8
                       12.8
20
        0.390000
                                     7
21
        0.350000
                       11.0
22
                       10.5
                                     8
        0.480000
23
        0.510000
                        9.3
                                     5
                                    6
24
        0.470000
                       10.0
                                     6
25
        0.500000
                       10.4
26
                                     6
        0.440000
                       10.0
27
        0.530000
                       10.5
                                     6
28
                       11.6
                                     6
        0.490000
29
                       12.3
                                     7
        0.710000
6467
        0.570000
                       11.5
                                     6
6468
        0.930000
                       12.4
                                     6
                       11.1
                                     6
6469
        0.650000
                                     5
6470
                        9.5
        0.510000
6471
        0.670000
                       12.5
                                     6
6472
                       10.5
                                     6
        0.480000
                       11.8
                                     6
6473
        0.640000
                                     6
6474
        0.780000
                       10.8
                                     6
6475
        0.600000
                       11.9
        0.670000
                       11.3
                                     6
6476
                                     5
6477
        0.600000
                       11.3
6478
        0.600000
                       11.9
                                     6
                                     5
6479
                       11.3
        0.600000
                                     5
6480
        0.500000
                       11.9
                                     5
                        9.8
6481
        0.620000
                                    7
                       11.6
6482
        0.800000
6483
        0.840000
                       11.5
                                     6
                                     6
                       11.4
6484
        0.850000
                       10.9
                                     6
6485
        0.660000
                                     6
6486
        0.780000
                       12.8
                                     5
6487
        0.540000
                        9.2
6488
        0.820000
                       11.6
                                     6
        0.560000
                                     6
                       11.6
6489
6490
        0.750000
                       11.0
                                     6
                        9.5
                                     6
6491
        0.820000
                                     5
6492
        0.580000
                       10.5
                                     6
6493
        0.531215
                       11.2
6494
        0.750000
                       11.0
                                     6
                                     5
6495
        0.710000
                       10.2
6496
        0.660000
                       11.0
[6456 rows \times 13 columns]
data_copy.shape[0] - data_copy2.shape[0]
```

```
5
low = data copy2['residual sugar'].mean() - 3*data copy2['residual
sugar'].std()
high = data copy2['residual sugar'].mean() + 3*data copy2['residual
sugar'].std()
print('low = ', low)
print('high = ', high)
low = -8.835863630876144
high = 19.712440041288158
data copy3 = data copy2[(data copy2['residual sugar'] > low) &
(data_copy2['residual sugar'] < high)]</pre>
print(data copy3)
       type fixed acidity volatile acidity citric acid residual
sugar \
                                                       0.34
      white
                  6.300000
                                     0.300000
1
1.60
      white
                  8.100000
                                     0.280000
                                                       0.40
2
6.90
3
      white
                  7.200000
                                     0.230000
                                                       0.32
8.50
                  7.200000
                                     0.230000
                                                       0.32
      white
8.50
      white
                  8.100000
                                     0.280000
                                                       0.40
6.90
      white
                  6.200000
                                     0.320000
                                                       0.16
7.00
                  6.300000
                                                       0.34
8
      white
                                     0.300000
1.60
9
      white
                  8.100000
                                     0.220000
                                                       0.43
1.50
10
      white
                  8.100000
                                     0.270000
                                                       0.41
1.45
11
      white
                  8.600000
                                     0.230000
                                                       0.40
4.20
12
      white
                  7.900000
                                     0.180000
                                                       0.37
1.20
13
      white
                  6.600000
                                     0.160000
                                                       0.40
1.50
14
      white
                                                       0.62
                  8.300000
                                     0.420000
19.25
15
      white
                  6.600000
                                     0.170000
                                                       0.38
1.50
                                                       0.04
16
      white
                  6.300000
                                     0.480000
1.10
17
      white
                  7.216579
                                     0.660000
                                                       0.48
1.20
```

18	white	7.400000	0.340000	0.42
1.10 19	white	6.500000	0.310000	0.14
7.50	م المارية	6 200000	0.660000	0.40
20 1.20	white	6.200000	0.660000	0.48
21	white	6.400000	0.310000	0.38
2.90 22	white	6.800000	0.260000	0.42
1.70	WIIICC	0.00000	0.20000	0142
23	white	7.600000	0.670000	0.14
1.50 24	white	6.600000	0.270000	0.41
1.30				
25 9.00	white	7.000000	0.250000	0.32
26	white	6.900000	0.240000	0.35
1.00		7 000000	0. 200000	0. 20
27 8.70	white	7.000000	0.280000	0.39
28	white	7.400000	0.270000	0.48
1.10 29	white	7.200000	0.320000	0.36
2.00	WIIICC	7.200000	0.320000	0.50
30	white	8.500000	0.240000	0.39
10.40 31	white	8.300000	0.140000	0.34
1.10	-			
		• • • •		
6467	red	6.200000	0.510000	0.14
1.90 6468	rod	6 400000	0.260000	0 52
2.20	red	6.400000	0.360000	0.53
6469	red	6.400000	0.380000	0.14
2.20 6470	red	7.300000	0.690000	0.32
2.20	reu	7.300000	0.090000	0.52
6471	red	6.000000	0.580000	0.20
2.40 6472	red	5.600000	0.310000	0.78
13.90				
6473 2.20	red	7.500000	0.520000	0.40
6474	red	8.000000	0.300000	0.63
1.60				0.15
6475 5.10	red	6.200000	0.700000	0.15
6476	red	6.800000	0.670000	0.15

1.80					
6477	red	6.200000	0.560000	0.09	
1.70 6478	red	7.400000	0.350000	0.33	
2.40	i Cu	7.400000	0.550000	0.55	
6479	red	6.200000	0.560000	0.09	
1.70					
6480	red	6.100000	0.715000	0.10	
2.60 6481	red	6.200000	0.460000	0.29	
2.10	reu	0.20000	0.40000	0.29	
6482	red	6.700000	0.320000	0.44	
2.40					
6483	red	7.200000	0.390000	0.44	
2.60					
6484	red	7.500000	0.310000	0.41	
2.40 6485	red	5.800000	0.610000	0.11	
1.80	i eu	3.800000	0.010000	0.11	
6486	red	7.200000	0.339691	0.33	
2.50					
6487	red	6.600000	0.725000	0.20	
7.80		6 20000	0.55000	0.15	
6488 1.80	red	6.300000	0.550000	0.15	
6489	red	5.400000	0.740000	0.09	
1.70	1 Cu	31 100000	0.7.10000	0.03	
6490	red	6.300000	0.510000	0.13	
2.30					
6491	red	6.800000	0.620000	0.08	
1.90 6492	red	6.200000	0.600000	0.08	
2.00	i eu	0.20000	0.00000	0.00	
6493	red	5.900000	0.550000	0.10	
2.20					
6494	red	6.300000	0.510000	0.13	
2.30		F 000000	0.645000	0 12	
6495	red	5.900000	0.645000	0.12	
6496	red	6.000000	0.310000	0.47	
3.60	1 Cu	0.000000	0.510000	0.17	
. 11	chlorides	free sulfur	dioxide total sulfur	odioxide	density
pH \	0.049		14.0	132.0	0.99400
3.30	0.049		14.0	132.0	0.99400
2	0.050	30.0		97.0	0.99510
3.26					
3	0.058		47.0	186.0	0.99560

3.19	0.050	47.0	100.0	0.00560	
4 3.19	0.058	47.0	186.0	0.99560	
5	0.050	30.0	97.0	0.99510	
3.26	0.050	30.0	37.10	0.33310	
6	0.045	30.0	136.0	0.99490	
3.18					
8	0.049	14.0	132.0	0.99400	
3.30	0.044	28.0	129.0	0.99380	
3.22	0.044	20.0	129.0	0.99300	
10	0.033	11.0	63.0	0.99080	
2.99					
11	0.035	17.0	109.0	0.99470	
3.14	0.040	16.0	75.0	0.00000	
12 3.18	0.040	16.0	75.0	0.99200	
13	0.044	48.0	143.0	0.99120	
3.54	01044	40.0	143.0	0.33120	
14	0.040	41.0	172.0	1.00020	
2.98					
15	0.032	28.0	112.0	0.99140	
3.25 16	0.046	30.0	99.0	0.99280	
3.24	0.040	30.0	99.0	0.99200	
17	0.029	29.0	75.0	0.98920	
3.33					
18	0.033	17.0	171.0	0.99170	
3.12	0 044	24.0	122.0	0 00550	
19 3.22	0.044	34.0	133.0	0.99550	
20	0.029	29.0	75.0	0.98920	
3.33					
21	0.038	19.0	102.0	0.99120	
3.17	0.040	47.0	100.0	0.00000	
22 3.47	0.049	41.0	122.0	0.99300	
23	0.074	25.0	168.0	0.99370	
3.05	01074	23.0	100.0	0.33370	
24	0.052	16.0	142.0	0.99510	
3.42					
25	0.046	56.0	245.0	0.99550	
3.25 26	0.052	35.0	146.0	0.99300	
3.45	0.032	33.0	140.0	0.99300	
27	0.051	32.0	141.0	0.99610	
3.38					
28	0.047	17.0	132.0	0.99140	
3.19					

29	0.033	37.0	114.0	0.99060
3.10 30 3.20	0.044	20.0	142.0	0.99740
3.20 31 3.47	0.042	7.0	47.0	0.99340
		•••		
6467 3.48	0.056	15.0	34.0	0.99396
6468 3.37	0.230	19.0	35.0	0.99340
6469 3.44	0.038	15.0	25.0	0.99514
6470 3.33	0.069	35.0	104.0	0.99632
6471 3.58	0.075	15.0	50.0	0.99467
6472 3.39	0.074	23.0	92.0	0.99677
6473 3.26	0.060	12.0	20.0	0.99474
6474 3.30	0.081	16.0	29.0	0.99588
6475 3.54	0.076	13.0	27.0	0.99622
6476 3.42	0.118	13.0	20.0	0.99540
6477 3.54	0.053	24.0	32.0	0.99402
6478 3.36	0.068	9.0	26.0	0.99470
6479 3.54	0.053	24.0	32.0	0.99402
6480 3.57	0.053	13.0	27.0	0.99362
6481 3.33	0.074	32.0	98.0	0.99578
6482 3.29	0.061	24.0	34.0	0.99484
6483 3.30	0.066	22.0	48.0	0.99494
6484 3.34	0.065	34.0	60.0	0.99492
6485 3.55	0.066	18.0	28.0	0.99483
6486 3.27	0.068	34.0	102.0	0.99414
6487	0.073	29.0	79.0	0.99770

3.29 6488	0.077		26.0	35.0	0.99314
3.32	0.077		20.0	33.0	0.99314
6489	0.089		16.0	26.0	0.99402
3.67 6490	0 076		29.0	40.0	0.00574
3.42	0.076		29.0	40.0	0.99574
6491	0.068		28.0	38.0	0.99651
3.42	0.000		22.0	44.0	0.00400
6492 3.45	0.090		32.0	44.0	0.99490
6493	0.062		39.0	51.0	0.99512
3.52					
6494 3.42	0.076		29.0	40.0	0.99574
6495	0.075		32.0	44.0	0.99547
3.57					
6496	0.067		18.0	42.0	0.99549
3.39					
	sulphates	alcohol	quality		
1	0.490000	9.5	6		
2 3 4	0.440000	10.1	6		
3 1	0.400000 0.400000	9.9 9.9	6 6		
	0.440000	10.1	6		
6	0.470000	9.6	6		
5 6 8	0.490000	9.5	6		
9	0.450000	11.0			
10	0.560000	12.0	6 5 5 5 7 5 7		
11	0.530000	9.7	5		
12	0.630000	10.8	5		
13	0.520000	12.4	7		
14	0.670000	9.7	5		
15	0.550000	11.4			
16 17	0.360000 0.390000	9.6 12.8	6 8		
18	0.530000	11.3	6		
19	0.500000	9.5	5		
20	0.390000	12.8	5 8 7		
21	0.350000	11.0	7		
22	0.480000	10.5			
23	0.510000	9.3	8 5		
24	0.470000	10.0	6		
25	0.500000	10.4	6		
26	0.440000	10.0	6		
27	0.530000	10.5	6		
28	0.490000	11.6	6		
29	0.710000	12.3	7		

```
30
       0.530000
                      10.0
                                   6
       0.400000
                                   6
31
                      10.2
                       . . .
       0.570000
                      11.5
6467
                                   6
6468
       0.930000
                      12.4
                                   6
6469
       0.650000
                      11.1
                                   6
                       9.5
                                   5
6470
       0.510000
6471
       0.670000
                      12.5
                                   6
6472
       0.480000
                      10.5
                                   6
                                   6
6473
       0.640000
                      11.8
                                   6
6474
       0.780000
                      10.8
                                   6
6475
       0.600000
                      11.9
6476
                      11.3
                                   6
       0.670000
                                   5
6477
       0.600000
                      11.3
                                   6
6478
       0.600000
                      11.9
                                   5
6479
                      11.3
       0.600000
                                   5
6480
       0.500000
                      11.9
                                   5
                       9.8
6481
       0.620000
                                   7
6482
       0.800000
                      11.6
6483
                      11.5
                                   6
       0.840000
                      11.4
6484
                                   6
       0.850000
                      10.9
                                   6
6485
       0.660000
                                   6
6486
       0.780000
                      12.8
                                   5
6487
       0.540000
                       9.2
       0.820000
                      11.6
                                   6
6488
                                   6
6489
       0.560000
                      11.6
6490
       0.750000
                      11.0
                                   6
                                   6
6491
                       9.5
       0.820000
                                   5
       0.580000
                      10.5
6492
                                   6
6493
       0.531215
                      11.2
                      11.0
                                   6
6494
       0.750000
                                   5
6495
       0.710000
                      10.2
                                   6
6496
       0.660000
                      11.0
[6430 rows \times 13 columns]
data_copy2.shape[0] - data_copy3.shape[0]
26
data_copy3.isnull().sum()
                          0
type
fixed acidity
                          0
volatile acidity
                          0
                          0
citric acid
                          0
residual sugar
                          0
chlorides
free sulfur dioxide
                          0
total sulfur dioxide
                          0
```

```
density
                         0
                         0
рΗ
sulphates
                         0
alcohol
                         0
                         0
quality
dtype: int64
tmp = pd.get dummies(data copy3['type'], drop first = True)
data copy3 = pd.concat([data copy3, tmp], axis = 1)
data copy3.drop('type', axis = 1, inplace = True)
print(data copy3)
print('----')
data copy3.head()
      fixed acidity volatile acidity citric acid residual sugar
chlorides
          \
           6.300000
                              0.300000
                                                0.34
                                                                 1.60
0.049
2
           8.100000
                              0.280000
                                                0.40
                                                                 6.90
0.050
           7.200000
                              0.230000
                                                0.32
                                                                 8.50
3
0.058
           7.200000
                              0.230000
                                                0.32
                                                                 8.50
0.058
                              0.280000
           8.100000
                                                0.40
                                                                 6.90
0.050
                              0.320000
                                                                 7.00
           6.200000
                                                0.16
0.045
8
           6.300000
                              0.300000
                                                0.34
                                                                 1.60
0.049
9
           8.100000
                              0.220000
                                                0.43
                                                                 1.50
0.044
                              0.270000
10
           8.100000
                                                0.41
                                                                 1.45
0.033
                                                                 4.20
11
           8.600000
                              0.230000
                                                0.40
0.035
                                                                 1.20
12
           7.900000
                              0.180000
                                                0.37
0.040
13
           6.600000
                              0.160000
                                                0.40
                                                                 1.50
0.044
14
           8.300000
                              0.420000
                                                0.62
                                                                19.25
0.040
15
           6.600000
                              0.170000
                                                0.38
                                                                 1.50
0.032
                                                0.04
16
           6.300000
                              0.480000
                                                                 1.10
0.046
           7.216579
                              0.660000
                                                0.48
                                                                 1.20
17
0.029
                                                                 1.10
18
           7.400000
                              0.340000
                                                0.42
```

0 022				
0.033 19	6.500000	0.310000	0.14	7.50
0.044	0.500000	0.510000	0.14	7.50
20	6.200000	0.660000	0.48	1.20
0.029	C 400000	0.010000	0.00	2.00
21 0.038	6.400000	0.310000	0.38	2.90
22	6.800000	0.260000	0.42	1.70
0.049				
23	7.600000	0.670000	0.14	1.50
0.074	6.600000	0.270000	0 41	1 20
24 0.052	0.000000	0.270000	0.41	1.30
25	7.000000	0.250000	0.32	9.00
0.046				
26	6.900000	0.240000	0.35	1.00
0.052 27	7.000000	0.280000	0.39	8.70
0.051	7100000	0120000	0.33	0.70
28	7.400000	0.270000	0.48	1.10
0.047	7 200000	0 220000	0. 20	2.00
29 0.033	7.200000	0.320000	0.36	2.00
30	8.500000	0.240000	0.39	10.40
0.044				
31	8.300000	0.140000	0.34	1.10
0.042				
	•••	•••		
6467	6.200000	0.510000	0.14	1.90
0.056				
6468	6.400000	0.360000	0.53	2.20
0.230 6469	6.400000	0.380000	0.14	2.20
0.038	01100000	0.30000	0111	2120
6470	7.300000	0.690000	0.32	2.20
0.069	6 000000	0 500000	0.20	2 40
6471 0.075	6.000000	0.580000	0.20	2.40
6472	5.600000	0.310000	0.78	13.90
0.074				
6473	7.500000	0.520000	0.40	2.20
0.060 6474	8.000000	0.300000	0.63	1.60
0.081	0.00000	0.500000	0.05	1.00
6475	6.200000	0.700000	0.15	5.10
0.076				
6476	6.800000	0.670000	0.15	1.80
0.118				

6477	6.200000	0.560000	0.09	1.70
0.053	7 400000	0.250000	0.00	2 40
6478	7.400000	0.350000	0.33	2.40
0.068 6479	6.200000	0.560000	0.09	1.70
0.053	0.20000	0.500000	0.09	1.70
6480	6.100000	0.715000	0.10	2.60
0.053	0.20000	017 2000	0.120	
6481	6.200000	0.460000	0.29	2.10
0.074				
6482	6.700000	0.320000	0.44	2.40
0.061				
6483	7.200000	0.390000	0.44	2.60
0.066				
6484	7.500000	0.310000	0.41	2.40
0.065	Г 000000	0 61000	0 11	1 00
6485	5.800000	0.610000	0.11	1.80
0.066 6486	7.200000	0.339691	0.33	2.50
0.068	7.200000	0.559091	0.33	2.30
6487	6.600000	0.725000	0.20	7.80
0.073	01000000	01723000	0120	7100
6488	6.300000	0.550000	0.15	1.80
0.077				
6489	5.400000	0.740000	0.09	1.70
0.089				
6490	6.300000	0.510000	0.13	2.30
0.076				
6491	6.800000	0.620000	0.08	1.90
0.068 6492	6.200000	0.600000	0.08	2.00
0.090	0.200000	0.00000	0.00	2.00
6493	5.900000	0.550000	0.10	2.20
0.062	3.300000	0.550000	0.10	2120
6494	6.300000	0.510000	0.13	2.30
0.076				
6495	5.900000	0.645000	0.12	2.00
0.075				
6496	6.000000	0.310000	0.47	3.60
0.067				
free	sulfur dioxide	total sulfur	dioxide density	рН
sulphates	\		ĺ	•
1	14.0		132.0 0.99400	3.30
0.490000				
2	30.0		97.0 0.99510	3.26
0.440000	47.0		100 0 0 00500	2 10
3	47.0		186.0 0.99560	3.19
0.400000				

4	47.0	186.0 0.99560 3.19
0.400000 5	30.0	97.0 0.99510 3.26
0.440000	30.0	97.0 0.99510 5.20
6	30.0	136.0 0.99490 3.18
0.470000	14.0	122 0 0 00400 2 20
8 0.490000	14.0	132.0 0.99400 3.30
9	28.0	129.0 0.99380 3.22
0.450000		
10	11.0	63.0 0.99080 2.99
0.560000 11	17.0	109.0 0.99470 3.14
0.530000	17.10	103.0 0.33470 3.14
12	16.0	75.0 0.99200 3.18
0.630000	40.0	142 0 0 00120 2 54
13 0.520000	48.0	143.0 0.99120 3.54
14	41.0	172.0 1.00020 2.98
0.670000		2,2,0
15	28.0	112.0 0.99140 3.25
0.550000 16	30.0	99.0 0.99280 3.24
0.360000	30.0	99.0 0.99200 3.24
17	29.0	75.0 0.98920 3.33
0.390000		
18	17.0	171.0 0.99170 3.12
0.530000 19	34.0	133.0 0.99550 3.22
0.500000	3110	15510 0155550 5122
20	29.0	75.0 0.98920 3.33
0.390000	10.0	102 0 0 00120 2 17
21 0.350000	19.0	102.0 0.99120 3.17
22	41.0	122.0 0.99300 3.47
0.480000		
23	25.0	168.0 0.99370 3.05
0.510000 24	16.0	142.0 0.99510 3.42
0.470000	1010	11210 0133310 3112
25	56.0	245.0 0.99550 3.25
0.500000	25.0	146 0 0 00200 2 45
26 0.440000	35.0	146.0 0.99300 3.45
27	32.0	141.0 0.99610 3.38
0.530000		
28	17.0	132.0 0.99140 3.19
0.490000 29	37.0	114.0 0.99060 3.10
23	57.0	114.0 0.93000 3.10

0.710000	20.0	142.0	0 00740	2 20
30 0.530000	20.0	142.0	0.99740	3.20
31	7.0	47.0	0.99340	3.47
0.400000	7.0	1710	0133310	3117
6467	15.0	34.0	0.99396	3.48
0.570000				
6468	19.0	35.0	0.99340	3.37
0.930000 6469	15.0	25.0	0.99514	3.44
0.650000	13.0	23.0	0.99314	3.44
6470	35.0	104.0	0.99632	3.33
0.510000	55.10		0.0000	
6471	15.0	50.0	0.99467	3.58
0.670000				
6472	23.0	92.0	0.99677	3.39
0.480000	12.0	20.0	0 00474	2 26
6473 0.640000	12.0	20.0	0.99474	3.26
6474	16.0	29.0	0.99588	3.30
9.780000	10.0	2310	0.55500	3.30
6475	13.0	27.0	0.99622	3.54
0.600000				
6476	13.0	20.0	0.99540	3.42
9.670000				
5477	24.0	32.0	0.99402	3.54
0.600000 5478	9.0	26.0	0.99470	3.36
0.600000	9.0	20.0	0.99470	3.30
5479	24.0	32.0	0.99402	3.54
9.600000	•	50	0.00.00	
6480	13.0	27.0	0.99362	3.57
0.500000				
6481	32.0	98.0	0.99578	3.33
0.620000	24.0	24.0	0 00404	2 20
6482 0.800000	24.0	34.0	0.99484	3.29
6483	22.0	48.0	0.99494	3.30
9.840000	22.0	1010	0133131	3.30
6484	34.0	60.0	0.99492	3.34
9.850000				
5485	18.0	28.0	0.99483	3.55
0.660000	24.0	100.0	0 00414	2 27
6486 - 780000	34.0	102.0	0.99414	3.27
0.780000 6487	29.0	79.0	0.99770	3.29
0.540000	29.0	79.0	0.33110	3.29
01310000				

6488		26	5.0		35.0	0.99314	3.32
0.820000 6489		16	5.0		26.0	0.99402	3.67
0.560000		20			40.0	0 00574	2 42
6490 0.750000		29	0.0		40.0	0.99574	3.42
6491		28	3.0		38.0	0.99651	3.42
0.820000 6492		32	2.0		44.0	0.99490	3.45
0.580000		32				0.55450	J. <del>1</del> J
6493		39	0.0		51.0	0.99512	3.52
0.531215 6494		29	0.0		40.0	0.99574	3.42
0.750000							
6495 0.710000		32	2.0		44.0	0.99547	3.57
6496		18	3.0		42.0	0.99549	3.39
0.660000							
al	cohol	quality	white				
1	9.5	6	1				
2 3	$10.1 \\ 9.9$	6 6	1 1				
4	9.9	6	1				
5 6	10.1	6	1				
6	9.6	6	1				
8 9	$9.5 \\ 11.0$	6 6	1 1				
10	12.0	5	ī				
11	9.7	5 5	1				
12 13	10.8 12.4	5 7	1 1				
13 14	9.7	5	1				
15	11.4	5 7	1				
16	9.6	6	1				
17 18	12.8 11.3	8 6	1 1				
19	9.5	5	1				
20	12.8	5 8	1				
21	11.0	7	1				
22 23	10.5 9.3	8	1 1				
23 24	10.0	5 6	1				
25	10.4	6	1				
26	10.0	6	1				
27 28	$10.5 \\ 11.6$	6 6	1 1				
29	12.3	7	1				
30	10.0	6	1				

31	10.2	6	1
6467	11.5	6	0
6468	12.4	6	0
6469	11.1	6	0
6470	9.5	5	0
6471	12.5	6	0
6472	10.5	6	0
6473	11.8	6	0
6474	10.8	6	0
6475	11.9	6	0
6476	11.9 11.3 11.3	6	0
6477	11.3	5	0
6478	11.9	6	0
6479	11.3	5	0
6480	11.9	5	0
6481	9.8	5 7	0
6482	11.6	7	0
6483	11.5 11.4	6	0
6484	11.4	6	0
6485	10.9	6	0
6486	12.8	6	0
6487	9.2	5	0
6488	11.6	6	0
6489	11.6	6	0
6490	11.0 9.5	6	0
6491	9.5	6	0
6492	10.5	5	0
6493	11.2	6	0
6494	11.0	6	0
6495	10.2	5	0
6496	11.0	6	0

## [6430 rows x 13 columns]

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	fixed acidity	volatile acidity	citric acid	residual sugar
ch <sup>3</sup>	lorides \			
1	6.3	0.30	0.34	1.6
0.0	949			
2	8.1	0.28	0.40	6.9
0.0	950			
3	7.2	0.23	0.32	8.5
0.0	958			
4	7.2	0.23	0.32	8.5
0.0	958			
5	8.1	0.28	0.40	6.9
0.0	950			

free sulfur dioxide total sulfur dioxide density pH sulphates

\text{										
2 30.0 97.0 0.9951 3.26 0.44  3 47.0 186.0 0.9956 3.19 0.40  4 47.0 186.0 0.9956 3.19 0.40  5 30.0 97.0 0.9951 3.26 0.44  alcohol quality white 1 9.5 6 1 2 10.1 6 1 3 9.9 6 1 4 9.9 6 1 5 10.1 6 1 5 10.1 6 1  data_copy3.quality.value_counts() print(data_copy3)  fixed acidity volatile acidity citric acid residual sugar chlorides \ 1 6.300000 0.300000 0.34 1.60 0.049 2 8.100000 0.280000 0.30 0.32 8.50 0.058 4 7.200000 0.230000 0.32 8.50 0.058 5 8.100000 0.230000 0.32 8.50 0.058 6 6.200000 0.320000 0.40 6.90 0.045 8 6.300000 0.320000 0.40 6.90 0.045 8 6.300000 0.320000 0.31 1.60 0.045 8 6.300000 0.320000 0.31 1.60 0.049 9 8.100000 0.220000 0.31 1.50 0.041 10 8.100000 0.220000 0.41 1.45 0.033 11 8.600000 0.230000 0.40 4.20 0.035 12 7.900000 0.230000 0.40 4.20 0.035 12 7.900000 0.230000 0.40 4.20 0.035 12 7.900000 0.230000 0.40 4.20 0.035 12 7.900000 0.230000 0.40 4.20 0.036 13 6.600000 0.180000 0.37 1.20 0.044 10 0.035 12 7.900000 0.180000 0.40 1.50 0.044 13 6.600000 0.180000 0.40 1.50 0.044 14 8.30000 0.420000 0.42	1		14	. 0		132.0	0.994	0 3.30	(	1.49
3										
4 47.0 186.0 0.9956 3.19 0.40 5 30.0 97.0 0.9951 3.26 0.44    alcohol quality white										
30.0       97.0       0.9951       3.26       0.44         alcohol quality   9.5	3		47	. 0		186.0	0.995	6 3.19	(	).40
alcohol quality white 1 9.5 6 1 2 10.1 6 1 3 9.9 6 1 4 9.9 6 1 5 10.1 6 1  data_copy3.quality.value_counts() print(data_copy3)  fixed acidity volatile acidity citric acid residual sugar chlorides \ 1 6.300000 0.300000 0.34 1.60 0.049 2 8.100000 0.280000 0.40 6.90 0.050 3 7.200000 0.230000 0.32 8.50 0.058 4 7.200000 0.230000 0.32 8.50 0.058 5 8.100000 0.280000 0.40 6.90 0.050 6 6.200000 0.320000 0.40 6.90 0.045 8 6.300000 0.320000 0.40 6.90 0.045 8 6.300000 0.320000 0.40 6.90 0.045 8 6.300000 0.320000 0.40 1.60 0.045 8 6.300000 0.300000 0.40 1.60 0.045 8 6.300000 0.220000 0.41 1.50 0.044 10 8.100000 0.270000 0.41 1.45 0.033 11 8.600000 0.230000 0.40 4.20 0.035 12 7.900000 0.180000 0.37 1.20 0.044 13 6.600000 0.160000 0.40 1.50 0.044 13 6.600000 0.160000 0.40 1.50 0.044 13 6.600000 0.160000 0.40 1.50 0.044 14 8.300000 0.420000 0.62 19.25	4		47	. 0		186.0	0.995	6 3.19	0	9.40
1 9.5 6 1 2 10.1 6 1 3 9.9 6 1 4 9.9 6 1 5 10.1 6 1  data_copy3.quality.value_counts() print(data_copy3)  fixed acidity volatile acidity citric acid residual sugar chlorides \ 1 6.300000 0.300000 0.34 1.60 0.049 2 8.100000 0.280000 0.40 6.90 0.050 3 7.200000 0.230000 0.32 8.50 0.058 4 7.200000 0.230000 0.32 8.50 0.058 5 8.100000 0.280000 0.32 8.50 0.058 5 8.100000 0.320000 0.32 8.50 0.058 6 6.200000 0.320000 0.40 6.90 0.040 0.040 8 6.300000 0.320000 0.16 7.00 0.045 8 6.300000 0.320000 0.34 1.60 0.049 9 8.100000 0.220000 0.43 1.50 0.044 10 8.100000 0.220000 0.41 1.45 0.033 11 8.600000 0.230000 0.41 1.45 0.033 11 8.600000 0.230000 0.40 4.20 0.035 12 7.900000 0.180000 0.37 1.20 0.044 13 6.600000 0.160000 0.40 1.50 0.044 14 8.300000 0.420000 0.62 19.25	5		30	. 0		97.0	0.995	1 3.26	(	).44
1 9.5 6 1 2 10.1 6 1 3 9.9 6 1 4 9.9 6 1 5 10.1 6 1  data_copy3.quality.value_counts() print(data_copy3)  fixed acidity volatile acidity citric acid residual sugar chlorides \ 1 6.300000 0.049 2 8.100000 0.280000 0.40 6.90 0.050 3 7.200000 0.230000 0.32 8.50 0.058 4 7.200000 0.230000 0.32 8.50 0.058 5 8.100000 0.280000 0.32 8.50 0.058 5 8.100000 0.280000 0.32 8.50 0.058 6 6.200000 0.320000 0.32 8.50 0.058 8 6.300000 0.320000 0.40 6.90 0.040 0.040 1.60 0.041 1.60 0.042 9 8.100000 0.320000 0.34 1.60 0.044 10 8.100000 0.220000 0.41 1.45 0.033 11 8.600000 0.230000 0.41 1.45 0.033 11 8.600000 0.230000 0.40 4.20 0.035 12 7.900000 0.180000 0.37 1.20 0.044 10 8.300000 0.180000 0.37 1.20 0.044 11 8.300000 0.160000 0.40 1.50 0.044 12 7.900000 0.180000 0.40 1.50 0.044 13 6.600000 0.160000 0.40 1.50 0.044 14 8.300000 0.420000 0.62 19.25										
fixed acidity volatile acidity citric acid residual sugar chlorides \ 1	1 9 2 10 3 9 4 9	.5 .1 .9	6 6 6 6	1 1 1 1						
chlorides \ 1				alue_cou	nts()					
1       6.300000       0.300000       0.34       1.60         0.049       2       8.100000       0.280000       0.40       6.90         0.050       3       7.200000       0.230000       0.32       8.50         0.058       4       7.200000       0.230000       0.32       8.50         0.058       5       8.100000       0.280000       0.40       6.90         0.050       6       6.200000       0.320000       0.16       7.00         0.045       8       6.300000       0.300000       0.34       1.60         0.049       9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.040       1       0.040       1.50         13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25			dity	volatil	e acidity	citric	acid	residual	sugar	
2       8.100000       0.280000       0.40       6.90         0.050       3       7.200000       0.230000       0.32       8.50         0.058       4       7.200000       0.280000       0.40       6.90         0.050       6       6.200000       0.320000       0.16       7.00         0.045       8       6.300000       0.300000       0.34       1.60         0.049       9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	1	-	0000		0.300000		0.34		1.60	
3       7.200000       0.230000       0.32       8.50         0.058       4       7.200000       0.230000       0.32       8.50         0.058       5       8.100000       0.280000       0.40       6.90         0.050       6       6.200000       0.320000       0.16       7.00         0.045       8       6.300000       0.300000       0.34       1.60         0.049       9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	2	8.100	0000		0.280000		0.40		6.90	
4       7.200000       0.230000       0.32       8.50         0.058       8.100000       0.280000       0.40       6.90         0.050       6       6.200000       0.320000       0.16       7.00         0.045       8       6.300000       0.300000       0.34       1.60         0.049       9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	3	7.200	0000		0.230000		0.32		8.50	
5       8.100000       0.280000       0.40       6.90         0.050       6       6.200000       0.320000       0.16       7.00         0.045       8       6.300000       0.300000       0.34       1.60         0.049       9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25		7.200	0000		0.230000		0.32		8.50	
0.050         6       6.200000       0.320000       0.16       7.00         0.045       8       6.300000       0.300000       0.34       1.60         0.049       9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25		8 106	0000		0 280000		0 40		6 90	
0.045         8       6.300000       0.300000       0.34       1.60         0.049       9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	0.050									
0.049         9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25		6.200	9000		0.320000		0.16		7.00	
9       8.100000       0.220000       0.43       1.50         0.044       10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25		6.300	0000		0.300000		0.34		1.60	
10       8.100000       0.270000       0.41       1.45         0.033       11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	9	8.100	0000		0.220000		0.43		1.50	
11       8.600000       0.230000       0.40       4.20         0.035       12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	10	8.100	0000		0.270000		0.41		1.45	
12       7.900000       0.180000       0.37       1.20         0.040       13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	11	8.600	0000		0.230000		0.40		4.20	
13       6.600000       0.160000       0.40       1.50         0.044       14       8.300000       0.420000       0.62       19.25	12	7.900	0000		0.180000		0.37		1.20	
0.044 14 8.300000 0.420000 0.62 19.25		6.600	0000		0.160000		0.40		1.50	
	0.044 14									

15 0.032	6.600000	0.170000	0.38	1.50
16	6.300000	0.480000	0.04	1.10
0.046 17	7.216579	0.660000	0.48	1.20
0.029 18	7.400000	0.340000	0.42	1.10
0.033 19	6.500000	0.310000	0.14	7.50
0.044				
20 0.029	6.200000	0.660000	0.48	1.20
21	6.400000	0.310000	0.38	2.90
0.038 22	6.800000	0.260000	0.42	1.70
0.049 23	7.600000	0.670000	0.14	1.50
0.074	7.000000	0.070000	0.14	1.50
24 0.052	6.600000	0.270000	0.41	1.30
25	7.000000	0.250000	0.32	9.00
0.046 26	6.900000	0.240000	0.35	1.00
0.052 27	7.000000	0.280000	0.39	8.70
0.051 28	7.400000	0.270000	0.48	1.10
0.047 29	7.200000	0.320000	0.36	2.00
0.033		0.02000		
30	8.500000	0.240000	0.39	10.40
0.044 31	8.300000	0.140000	0.34	1.10
0.042				
	• • • •	• • •		• • • •
6467	6.200000	0.510000	0.14	1.90
0.056 6468	6.400000	0.360000	0.53	2.20
0.230 6469	6.400000	0.380000	0.14	2.20
0.038	7 200000	0.00000	0.22	2.20
6470 0.069	7.300000	0.690000	0.32	2.20
6471	6.000000	0.580000	0.20	2.40
0.075 6472	5.600000	0.310000	0.78	13.90
0.074 6473	7.500000	0.520000	0.40	2.20

0.000					
0.060 6474		8.000000	0.300000	0.63	1.60
0.081		0.000000	0.300000	0.03	1.00
6475		6.200000	0.70000	0.15	5.10
0.076		0.20000	0.70000	0.13	5.10
6476		6.800000	0.670000	0.15	1.80
0.118		0.000000	01070000	0113	1100
6477		6.200000	0.560000	0.09	1.70
0.053					
6478		7.400000	0.350000	0.33	2.40
0.068					
6479		6.200000	0.560000	0.09	1.70
0.053					
6480		6.100000	0.715000	0.10	2.60
0.053					
6481		6.200000	0.460000	0.29	2.10
0.074					
6482		6.700000	0.320000	0.44	2.40
0.061					2 22
6483		7.200000	0.390000	0.44	2.60
0.066		7 500000	0 210000	0 41	2 40
6484		7.500000	0.310000	0.41	2.40
0.065 6485		5.800000	0.610000	0.11	1.80
0.066		3.000000	0.010000	0.11	1.00
6486		7.200000	0.339691	0.33	2.50
0.068		7120000	0.555051	0.55	2150
6487		6.600000	0.725000	0.20	7.80
0.073			01.1 = 0000	V. = V	,
6488		6.300000	0.550000	0.15	1.80
0.077					
6489		5.400000	0.740000	0.09	1.70
0.089					
6490		6.300000	0.510000	0.13	2.30
0.076					
6491		6.800000	0.620000	0.08	1.90
0.068		C 200000	0 (00000	0.00	2.00
6492		6.200000	0.600000	0.08	2.00
0.090 6493		5.900000	0 550000	0.10	2 20
0.062		J. 900000	0.550000	0.10	2.20
6494		6.300000	0.510000	0.13	2.30
0.076		01500000	0151000	0115	2130
6495		5.900000	0.645000	0.12	2.00
0.075					
6496		6.000000	0.310000	0.47	3.60
0.067					
	_	7.6			
	tree	sultur dioxide	total sulfur die	oxide density	рН

sulphates 1	\	14.0	132.0	0.99400	3.30
0.490000					
2 0.440000		30.0	97.0	0.99510	3.26
3 0.400000		47.0	186.0	0.99560	3.19
4		47.0	186.0	0.99560	3.19
0.400000 5		30.0	97.0	0.99510	3.26
0.440000 6		30.0	136.0	0.99490	3.18
0.470000					
8 0.490000		14.0	132.0	0.99400	3.30
9 0.450000		28.0	129.0	0.99380	3.22
10		11.0	63.0	0.99080	2.99
0.560000 11		17.0	109.0	0.99470	3.14
0.530000 12		16.0	75.0	0.99200	3.18
0.630000					
13 0.520000		48.0	143.0	0.99120	3.54
14 0.670000		41.0	172.0	1.00020	2.98
15		28.0	112.0	0.99140	3.25
0.550000 16		30.0	99.0	0.99280	3.24
0.360000 17		29.0	75.0	0.98920	3.33
0.390000					
18 0.530000		17.0	171.0	0.99170	3.12
19 0.500000		34.0	133.0	0.99550	3.22
20		29.0	75.0	0.98920	3.33
0.390000 21		19.0	102.0	0.99120	3.17
0.350000 22		41.0	122.0	0.99300	3.47
0.480000 23		25.0	168.0	0.99370	3.05
0.510000					
24 0.470000		16.0	142.0	0.99510	3.42
25 0.500000		56.0	245.0	0.99550	3.25
0.500000					

26	35.0	146.0 0.99300 3.45
0.440000 27	32.0	141.0 0.99610 3.38
0.530000 28	17.0	132.0 0.99140 3.19
0.490000		
29 0.710000	37.0	114.0 0.99060 3.10
30 0.530000	20.0	142.0 0.99740 3.20
31	7.0	47.0 0.99340 3.47
0.400000		
6467 0.570000	15.0	34.0 0.99396 3.48
6468	19.0	35.0 0.99340 3.37
0.930000 6469	15.0	25.0 0.99514 3.44
0.650000		
6470 0.510000	35.0	104.0 0.99632 3.33
6471 0.670000	15.0	50.0 0.99467 3.58
6472	23.0	92.0 0.99677 3.39
0.480000 6473	12.0	20.0 0.99474 3.26
0.640000		
6474	16.0	29.0 0.99588 3.30
0.780000 6475	13.0	27.0 0.99622 3.54
0.600000 6476	13.0	20.0 0.99540 3.42
0.670000		
6477 0.600000	24.0	32.0 0.99402 3.54
6478 0.600000	9.0	26.0 0.99470 3.36
6479	24.0	32.0 0.99402 3.54
0.600000 6480	13.0	27.0 0.99362 3.57
0.500000		
6481 0.620000	32.0	98.0 0.99578 3.33
6482 0.800000	24.0	34.0 0.99484 3.29
6483	22.0	48.0 0.99494 3.30
0.840000 6484	34.0	60.0 0.99492 3.34

0.850000 6485	18.0		28.0	0.99483	3.55
0.660000	18.0		28.0	0.99483	3.33
6486	34.0		102.0	0.99414	3.27
0.780000	20.0		70.0	0 00770	2 20
6487 0.540000	29.0		79.0	0.99770	3.29
6488	26.0		35.0	0.99314	3.32
0.820000					
6489	16.0		26.0	0.99402	3.67
0.560000 6490	29.0		40.0	0.99574	3.42
0.750000	29.0		40.0	0.99374	3.42
6491	28.0		38.0	0.99651	3.42
0.820000					
6492	32.0		44.0	0.99490	3.45
0.580000 6493	39.0		51.0	0.99512	3.52
0.531215	33.0		31.0	0.55512	3.32
6494	29.0		40.0	0.99574	3.42
0.750000	22.0		44.0	0 00547	2 57
6495 0.710000	32.0		44.0	0.99547	3.57
6496	18.0		42.0	0.99549	3.39
0.660000					
alcohol	quality whi	to			
1 9.5	quatity will	1			
2 10.1	6	1			
3 9.9	6	1			
4 9.9	6	1			
5 10.1 6 9.6	6 6	1			
8 9.5	6	i			
9 11.0	6	1			
10 12.0	5 5	1			
11 9.7 12 10.8	5 5	1			
13 12.4	5 7	1			
14 9.7	5	1			
15 11.4	7	1			
16 9.6	6	1			
17 12.8 18 11.3	8 6	1			
	U	_			
	5	1			
19 9.5 20 12.8	5 8	1			
19 9.5 20 12.8 21 11.0	5 8 7	1			
19 9.5 20 12.8	5 8	1			

```
24
          10.0
                       6
                              1
25
          10.4
                       6
                              1
26
          10.0
                       6
                               1
          10.5
27
                       6
                               1
                               1
                       6
28
          11.6
29
                       7
                               1
          12.3
                              1
30
          10.0
                       6
31
          10.2
                       6
                               1
                     . . .
6467
          11.5
                       6
                              0
                               0
6468
          12.4
                       6
          11.1
                       6
                               0
6469
6470
          9.5
                       5
                               0
                       6
                               0
6471
          12.5
6472
          10.5
                       6
                               0
                              0
6473
          11.8
                       6
                               0
                       6
6474
          10.8
                       6
                               0
6475
          11.9
                       6
                              0
6476
         11.3
                       5
6477
          11.3
                               0
                       6
                              0
6478
          11.9
6479
         11.3
                       5
                               0
                       5
                               0
6480
          11.9
                       5
                               0
          9.8
6481
                       7
6482
          11.6
                               0
                       6
                              0
6483
          11.5
6484
          11.4
                       6
                               0
          10.9
                       6
                               0
6485
                       6
                               0
6486
          12.8
                       5
                              0
6487
          9.2
                       6
                               0
6488
          11.6
                       6
                               0
6489
          11.6
          11.0
                       6
                              0
6490
6491
          9.5
                       6
                               0
          10.5
                       5
                              0
6492
                       6
                               0
6493
          11.2
6494
          11.0
                       6
                               0
                               0
                       5
6495
          10.2
         11.0
                       6
                              0
6496
[6430 rows x 13 columns]
quality_map = { 3 : 'Low', 4 : 'Low', 5: 'Medium', 6 : 'Medium', 7:
'Medium', 8 : 'High', 9 : 'High'}
data copy3['quality'] = data copy3['quality'].map(quality map)
print(data copy3)
      fixed acidity volatile acidity citric acid residual sugar
chlorides \
```

1	6.300000	0.300000	0.34	1.60
0.049 2	8.100000	0.280000	0.40	6.90
0.050 3	7.200000	0.230000	0.32	8.50
0.058				
4 0.058	7.200000	0.230000	0.32	8.50
5 0.050	8.100000	0.280000	0.40	6.90
6	6.200000	0.320000	0.16	7.00
0.045 8	6.300000	0.300000	0.34	1.60
0.049				
9 0.044	8.100000	0.220000	0.43	1.50
10	8.100000	0.270000	0.41	1.45
0.033 11	8.600000	0.230000	0.40	4.20
0.035 12	7.900000	0.180000	0.37	1.20
0.040	7.90000	0.100000	0.57	1.20
13 0.044	6.600000	0.160000	0.40	1.50
14	8.300000	0.420000	0.62	19.25
0.040 15	6.600000	0.170000	0.38	1.50
0.032				
16 0.046	6.300000	0.480000	0.04	1.10
17	7.216579	0.660000	0.48	1.20
0.029 18	7.400000	0.340000	0.42	1.10
0.033	6 500000	0.210000	0.14	7 50
19 0.044	6.500000	0.310000	0.14	7.50
20 0.029	6.200000	0.660000	0.48	1.20
21	6.400000	0.310000	0.38	2.90
0.038 22	6.800000	0.260000	0.42	1.70
0.049				
23 0.074	7.600000	0.670000	0.14	1.50
24	6.600000	0.270000	0.41	1.30
0.052 25	7.000000	0.250000	0.32	9.00
0.046				
26	6.900000	0.240000	0.35	1.00

0.052	7 000000	0. 200000	0.20	0.70
27 0.051	7.000000	0.280000	0.39	8.70
28	7.400000	0.270000	0.48	1.10
0.047				
29	7.200000	0.320000	0.36	2.00
0.033 30	8.500000	0.240000	0.39	10.40
0.044	0.300000	0.240000	0.39	10.40
31	8.300000	0.140000	0.34	1.10
0.042				
6467	6.200000	0.510000	0.14	1.90
0.056	0.20000	0.510000	0.14	1.90
6468	6.400000	0.360000	0.53	2.20
0.230				
6469	6.400000	0.380000	0.14	2.20
0.038 6470	7.300000	0.690000	0.32	2.20
0.069	7.300000	0.090000	0.32	2.20
6471	6.000000	0.580000	0.20	2.40
0.075				
6472	5.600000	0.310000	0.78	13.90
0.074 6473	7.500000	0.520000	0.40	2.20
0.060	7.300000	0.32000	0.40	2.20
6474	8.000000	0.300000	0.63	1.60
0.081				
6475	6.200000	0.700000	0.15	5.10
0.076 6476	6.800000	0.670000	0.15	1.80
0.118	0.00000	0.070000	0.15	1.00
6477	6.200000	0.560000	0.09	1.70
0.053				
6478	7.400000	0.350000	0.33	2.40
0.068 6479	6.200000	0.560000	0.09	1.70
0.053	0.200000	0.50000	0.03	1.70
6480	6.100000	0.715000	0.10	2.60
0.053	6 20000	0.460000	0.00	2.10
6481 0.074	6.200000	0.460000	0.29	2.10
6482	6.700000	0.320000	0.44	2.40
0.061	31700000	0.52000	VI 11	2110
6483	7.200000	0.390000	0.44	2.60
0.066	7 500000	0.210000	0. 43	2 40
6484 0.065	7.500000	0.310000	0.41	2.40
0.003				

6485	5.80000	Θ	0.610000	(	9.11	1.80	
0.066 6486	7.20000	0	0.339691	(	0.33	2.50	
0.068							
6487 0.073	6.60000	0	0.725000		9.20	7.80	
6488	6.30000	0	0.550000	(	0.15	1.80	
0.077 6489	5.40000	O	0.740000	(	0.09	1.70	
0.089	3.40000	O	0.740000	'	0.09	1.70	
6490	6.30000	0	0.510000	(	9.13	2.30	
0.076 6491	6.80000	Θ	0.620000	(	0.08	1.90	
0.068							
6492 0.090	6.20000	0	0.600000	(	9.08	2.00	
6493	5.90000	0	0.550000	(	9.10	2.20	
0.062		•	0 510000			2 22	
6494 0.076	6.30000	0	0.510000		9.13	2.30	
6495	5.90000	0	0.645000	(	9.12	2.00	
0.075	6 00000	0	0.210000		0 47	2 60	
6496 0.067	6.00000	U	0.310000	(	9.47	3.60	
<b>.</b>	1	41					
	sultur \	dioxide	total sulfu	ir dioxide	e density	рН	
1	•	14.0		132.0	0.99400	3.30	
0.490000 2		30.0		97.0	0.99510	3.26	
0.440000		30.0		97.0	0.99510	3.20	
3		47.0		186.0	0.99560	3.19	
0.400000 4		47.0		186.0	0.99560	3.19	
0.400000							
5 0.440000		30.0		97.0	0.99510	3.26	
6		30.0		136.0	0.99490	3.18	
0.470000		14 0		122 (	0 00400	2 20	
8 0.490000		14.0		132.0	0.99400	3.30	
9		28.0		129.0	0.99380	3.22	
0.450000 10		11.0		63.0	0.99080	2.99	
0.560000							
11 0.530000		17.0		109.0	0.99470	3.14	
12							
		16.0		75.0	0.99200	3.18	
0.630000		16.0		75.0	0.99200	3.18	

13	48.0	143.0 0.99120 3.54
0.520000 14	41.0	172.0 1.00020 2.98
0.670000 15	28.0	112.0 0.99140 3.25
0.550000		
16 0.360000	30.0	99.0 0.99280 3.24
17	29.0	75.0 0.98920 3.33
0.390000 18	17.0	171.0 0.99170 3.12
0.530000		122 0 0 00550 2 22
19 0.500000	34.0	133.0 0.99550 3.22
20 0.390000	29.0	75.0 0.98920 3.33
21	19.0	102.0 0.99120 3.17
0.350000 22	41.0	122.0 0.99300 3.47
0.480000	41.0	
23 0.510000	25.0	168.0 0.99370 3.05
24	16.0	142.0 0.99510 3.42
0.470000 25	56.0	245.0 0.99550 3.25
0.500000		
26 0.440000	35.0	146.0 0.99300 3.45
27	32.0	141.0 0.99610 3.38
0.530000 28	17.0	132.0 0.99140 3.19
0.490000 29	37.0	114.0 0.99060 3.10
0.710000	-	
30 0.530000	20.0	142.0 0.99740 3.20
31	7.0	47.0 0.99340 3.47
0.400000		
6467 0.570000	15.0	34.0 0.99396 3.48
6468	19.0	35.0 0.99340 3.37
0.930000 6469	15.0	25.0 0.99514 3.44
0.650000 6470	35.0	104.0 0.99632 3.33
0.510000		104.0 0.99032 3.33
6471	15.0	50.0 0.99467 3.58

0.670000 6472	22.0	02.0.0	00677 2 20	
0.480000	23.0	92.0 0.	99677 3.39	
6473	12.0	20.0 0.	99474 3.26	
0.640000	16.0	20.0.0	00500 2 20	
6474 0.780000	16.0	29.0 0.	99588 3.30	
6475	13.0	27.0 0.	99622 3.54	
0.600000				
6476	13.0	20.0 0.	99540 3.42	
0.670000 6477	24.0	32.0 0.	99402 3.54	
0.600000	24.0	32.0 0.	99402 3.34	
6478	9.0	26.0 0.	99470 3.36	
0.600000				
6479	24.0	32.0 0.	99402 3.54	
0.600000	12.0	27.0.0	00262 2 57	
6480 0.500000	13.0	27.0 0.	99362 3.57	
6481	32.0	98.0 0.	99578 3.33	
0.620000				
6482	24.0	34.0 0.	99484 3.29	
0.800000	22.0	40.0.0	00404 2 20	
6483 0.840000	22.0	48.0 0.	99494 3.30	
6484	34.0	60.0 0.	99492 3.34	
0.850000				
6485	18.0	28.0 0.	99483 3.55	
0.660000 6486	34.0	102.0.0	99414 3.27	
0.780000	34.0	102.0 0.	99414 3.27	
6487	29.0	79.0 0.	99770 3.29	
0.540000				
6488	26.0	35.0 0.	99314 3.32	
0.820000 6489	16.0	26.0 0.	99402 3.67	
0.560000	10.0	20.0 0.	99402 3.07	
6490	29.0	40.0 0.	99574 3.42	
0.750000				
6491	28.0	38.0 0.	99651 3.42	
0.820000 6492	22.0	44.0.0	00400 2 45	
0.580000	32.0	44.0 0.	99490 3.45	
6493	39.0	51.0 0.	99512 3.52	
0.531215				
6494	29.0	40.0 0.	99574 3.42	
0.750000	22.0	44.0.0	00547 2 57	
6495 0.710000	32.0	44.0 0.	99547 3.57	
0171000				

6496 0.660	000	1	8.0	42.0	0.99549	3.39
0.660  1 2 3 4 5 6 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	alcohol 9.5 10.1 9.9 9.9 10.1 9.6 9.5 11.0 12.0 9.7 10.8 12.4 9.7 11.4 9.6 12.8 11.3 9.5 12.8 11.0 10.5 10.5 10.6 10.5 10.6 10.5	quality Medium	white 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	42.0	0.99549	3.39
30 31	10.0 10.2	Medium Medium Medium	1 1			
6467 6468 6469 6470 6471 6472 6473 6474 6475 6476 6477 6478 6479 6480	11.5 12.4 11.1 9.5 12.5 10.5 11.8 10.8 11.9 11.3 11.3	Medium	 0 0 0 0 0 0 0 0 0 0			

```
6481
          9.8
               Medium
                            0
6482
         11.6
               Medium
                            0
6483
         11.5
               Medium
                            0
6484
         11.4
               Medium
                            0
6485
         10.9
               Medium
                            0
6486
         12.8
               Medium
                            0
6487
          9.2
               Medium
                            0
6488
         11.6
               Medium
                            0
         11.6
                            0
6489
               Medium
               Medium
6490
         11.0
                            0
          9.5
6491
               Medium
                            0
6492
         10.5
               Medium
                            0
         11.2
                            0
6493
               Medium
         11.0
                            0
6494
               Medium
6495
         10.2
               Medium
                            0
         11.0 Medium
                            0
6496
[6430 rows x 13 columns]
data_copy3.quality.value_counts()
Medium
          5997
           239
Low
High
           194
Name: quality, dtype: int64
map quality = {'Low': 0, 'Medium': 1, 'High': 2}
data copy3['quality'] = data copy3['quality'].map(map quality)
print(data copy3)
      fixed acidity volatile acidity citric acid residual sugar
chlorides
           6.300000
                              0.300000
                                                0.34
                                                                 1.60
1
0.049
2
           8.100000
                              0.280000
                                                0.40
                                                                 6.90
0.050
3
           7.200000
                              0.230000
                                                0.32
                                                                 8.50
0.058
           7.200000
                              0.230000
                                                0.32
                                                                 8.50
0.058
           8.100000
                              0.280000
                                                0.40
                                                                 6.90
5
0.050
                                                0.16
                                                                 7.00
6
           6.200000
                              0.320000
0.045
           6.300000
                              0.300000
                                                0.34
                                                                 1.60
8
0.049
9
           8.100000
                              0.220000
                                                0.43
                                                                 1.50
0.044
                              0.270000
                                                                 1.45
10
           8.100000
                                                0.41
0.033
```

11	8.600000	0.230000	0.40	4.20
0.035 12	7.900000	0.180000	0.37	1.20
0.040				
13 0.044	6.600000	0.160000	0.40	1.50
14	8.300000	0.420000	0.62	19.25
0.040 15	6.600000	0.170000	0.38	1.50
0.032				
16 0.046	6.300000	0.480000	0.04	1.10
17	7.216579	0.660000	0.48	1.20
0.029	7 400000	0.240000	0.42	1 10
18 0.033	7.400000	0.340000	0.42	1.10
19	6.500000	0.310000	0.14	7.50
0.044 20	6.200000	0.660000	0.48	1.20
0.029				
21 0.038	6.400000	0.310000	0.38	2.90
22	6.800000	0.260000	0.42	1.70
0.049 23	7.600000	0.670000	0.14	1.50
0.074	7.000000	0.070000	0.14	1.50
24	6.600000	0.270000	0.41	1.30
0.052 25	7.000000	0.250000	0.32	9.00
0.046				
26 0.052	6.900000	0.240000	0.35	1.00
27	7.000000	0.280000	0.39	8.70
0.051 28	7.400000	0.270000	0.48	1.10
0.047				
29 0.033	7.200000	0.320000	0.36	2.00
30	8.500000	0.240000	0.39	10.40
0.044 31	8.300000	0 140000	0.24	1 10
0.042	0.300000	0.140000	0.34	1.10
6467	6.200000	0.510000	0.14	1.90
0.056				
6468 0.230	6.400000	0.360000	0.53	2.20
6469	6.400000	0.380000	0.14	2.20

0.038 6470 7.300000 0.690000 0.32 2.20 0.069 6471 6.000000 0.580000 0.20 2.40 0.075 6472 5.600000 0.310000 0.78 13.90 0.074 6473 7.500000 0.520000 0.40 2.20 0.060 6474 8.000000 0.300000 0.63 1.60 0.081 6475 6.200000 0.700000 0.15 5.10 0.076 6476 6.800000 0.670000 0.15 1.80 0.118 6477 6.200000 0.560000 0.09 1.70 0.053 6478 7.400000 0.350000 0.33 2.40 0.068 6479 6.200000 0.715000 0.09 1.70 0.053 6480 6.100000 0.715000 0.10 2.60 0.053 6481 6.200000 0.460000 0.29 2.10 0.074 6482 6.700000 0.320000 0.44 2.40 0.061 6483 7.200000 0.310000 0.44 2.60 0.066 6484 7.500000 0.310000 0.41 2.40 0.065 6485 5.800000 0.610000 0.11 1.80 0.066 6486 7.200000 0.339691 0.33 2.50 0.068 6487 6.600000 0.725000 0.20 7.80
0.069       6471       6.000000       0.580000       0.20       2.40         0.075       6472       5.600000       0.310000       0.78       13.90         0.074       6473       7.500000       0.520000       0.40       2.20         0.060       6474       8.00000       0.300000       0.63       1.60         0.081       6475       6.200000       0.700000       0.15       5.10         0.076       6476       6.800000       0.670000       0.15       1.80         0.118       6477       6.200000       0.560000       0.09       1.70         0.053       6478       7.400000       0.350000       0.33       2.40         0.068       6479       6.200000       0.560000       0.09       1.70         0.053       6481       6.200000       0.715000       0.10       2.60         0.053       6481       6.200000       0.320000       0.44       2.40         0.074       6482       6.700000       0.330000       0.44       2.40         0.066       6483       7.200000       0.310000       0.41       2.40         0.065       6485       5.80000       0.610000       0.1
6471 6.000000 0.580000 0.20 2.40 0.075 6472 5.600000 0.310000 0.78 13.90 0.074 6473 7.500000 0.520000 0.40 2.20 0.060 6474 8.000000 0.300000 0.63 1.60 0.081 6475 6.200000 0.700000 0.15 5.10 0.076 6476 6.800000 0.560000 0.09 1.70 0.018 6477 6.200000 0.350000 0.33 2.40 0.063 6478 7.400000 0.350000 0.33 2.40 0.068 6479 6.200000 0.715000 0.09 1.70 0.053 6480 6.100000 0.715000 0.10 2.60 0.053 6481 6.200000 0.40000 0.29 2.10 0.076 6482 6.700000 0.320000 0.44 2.40 0.061 6483 7.200000 0.310000 0.41 2.40 0.065 6484 7.500000 0.310000 0.41 2.40 0.065 6485 5.800000 0.610000 0.11 1.80 0.066 6486 7.200000 0.339691 0.33 2.50
0.075       6472       5.600000       0.310000       0.78       13.90         0.074       6473       7.500000       0.520000       0.40       2.20         0.060       6474       8.000000       0.300000       0.63       1.60         0.081       6475       6.200000       0.700000       0.15       5.10         0.076       6476       6.800000       0.670000       0.15       1.80         0.118       6.200000       0.560000       0.09       1.70         0.053       0.053       0.053       2.40         6479       6.200000       0.560000       0.09       1.70         0.053       0.6480       6.100000       0.715000       0.10       2.60         0.053       0.064       0.29       2.10       0.074         6482       6.700000       0.320000       0.44       2.40         0.061       0.6483       7.200000       0.310000       0.41       2.40         0.065       0.485       5.80000       0.610000       0.11       1.80         0.066       0.6485       5.80000       0.610000       0.11       1.80         0.066       0.6486       7.200000       0.33
6472       5.600000       0.310000       0.78       13.90         0.074       7.500000       0.520000       0.40       2.20         0.060       0.060       0.300000       0.63       1.60         0.081       6475       6.200000       0.700000       0.15       5.10         0.076       6476       6.800000       0.670000       0.15       1.80         0.118       6477       6.200000       0.560000       0.09       1.70         0.053       6478       7.400000       0.350000       0.33       2.40         0.068       6.200000       0.560000       0.09       1.70         0.053       6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.310000       0.41       2.40         0.065       6484       7.500000       0.610000       0.11       1.80         0.066       6485       5.800000       0.610000       0.11       1.80         0.066       0.068
0.074         6473       7.500000       0.520000       0.40       2.20         0.060       8.000000       0.300000       0.63       1.60         0.081       6.200000       0.700000       0.15       5.10         0.076       6.800000       0.670000       0.15       1.80         0.118       6.200000       0.560000       0.09       1.70         0.053       6.200000       0.350000       0.33       2.40         0.068       6.200000       0.560000       0.09       1.70         0.053       6.200000       0.715000       0.10       2.60         0.053       6.200000       0.460000       0.29       2.10         0.074       6.200000       0.320000       0.44       2.40         0.061       6.200000       0.390000       0.44       2.60         0.065       6484       7.500000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6485       7.200000       0.339691       0.33       2.50
6473       7.500000       0.520000       0.40       2.20         0.060       8.000000       0.300000       0.63       1.60         0.081       6.200000       0.700000       0.15       5.10         0.076       6.200000       0.670000       0.15       1.80         0.118       6.200000       0.560000       0.09       1.70         0.053       6478       7.400000       0.350000       0.33       2.40         0.068       6479       6.200000       0.560000       0.09       1.70         0.053       6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.310000       0.41       2.40         0.065       6484       7.500000       0.310000       0.41       2.40         0.066       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50
0.060         6474       8.000000       0.300000       0.63       1.60         0.081       6.200000       0.700000       0.15       5.10         0.076       6.800000       0.670000       0.15       1.80         0.118       6.200000       0.560000       0.09       1.70         0.053       6.200000       0.350000       0.33       2.40         0.068       6.200000       0.560000       0.09       1.70         0.053       6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.066       6483       7.200000       0.310000       0.41       2.40         0.065       6485       5.80000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50
6474       8.000000       0.300000       0.63       1.60         0.081       6475       6.200000       0.700000       0.15       5.10         0.076       6476       6.800000       0.670000       0.15       1.80         0.118       6477       6.200000       0.560000       0.09       1.70         0.053       6478       7.400000       0.350000       0.33       2.40         0.068       6479       6.200000       0.560000       0.09       1.70         0.053       6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.310000       0.41       2.40         0.065       6484       7.500000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
0.081       6475       6.200000       0.700000       0.15       5.10         0.076       6476       6.800000       0.670000       0.15       1.80         0.118       6477       6.200000       0.560000       0.09       1.70         0.053       6478       7.400000       0.350000       0.33       2.40         0.068       6479       6.200000       0.560000       0.09       1.70         0.053       6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50
0.076         6476       6.800000       0.670000       0.15       1.80         0.118       6.200000       0.560000       0.09       1.70         0.053       0.063       0.350000       0.33       2.40         0.068       0.068       0.09       1.70         0.053       0.09       1.70       0.05         6480       0.100000       0.715000       0.10       2.60         0.053       0.053       0.00       0.29       2.10         0.074       0.074       0.320000       0.44       2.40         0.061       0.061       0.390000       0.44       2.60         0.066       0.065       0.310000       0.41       2.40         0.065       0.6485       5.800000       0.610000       0.11       1.80         0.066       0.6486       7.200000       0.339691       0.33       2.50
6476       6.800000       0.670000       0.15       1.80         0.118       6477       6.200000       0.560000       0.09       1.70         0.053       7.400000       0.350000       0.33       2.40         0.068       6.200000       0.560000       0.09       1.70         0.053       6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.390000       0.41       2.40         0.065       6484       7.500000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50
0.118         6477       6.200000       0.560000       0.09       1.70         0.053       0.350000       0.33       2.40         0.068       0.068       0.560000       0.09       1.70         0.053       0.053       0.010       0.260         6481       0.200000       0.460000       0.29       0.10         0.074       0.061       0.320000       0.44       0.40         0.061       0.066       0.390000       0.44       0.40         0.065       0.066       0.310000       0.41       0.40         0.065       0.066       0.066       0.061       0.061       0.061       0.066         6486       7.200000       0.339691       0.33       2.50
6477       6.200000       0.560000       0.09       1.70         0.053       7.400000       0.350000       0.33       2.40         0.068              6479       6.200000       0.560000       0.09       1.70         0.053              6480       6.100000       0.715000       0.10       2.60          0.053 <td< td=""></td<>
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
6478       7.400000       0.350000       0.33       2.40         0.068       6479       6.200000       0.560000       0.09       1.70         0.053       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.390000       0.41       2.40         0.066       6484       7.500000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
0.068         6479       6.200000       0.560000       0.09       1.70         0.053       6.480       6.100000       0.715000       0.10       2.60         0.053       6.200000       0.460000       0.29       2.10         0.074       6.700000       0.320000       0.44       2.40         0.061       6.700000       0.390000       0.44       2.60         0.066       6484       7.500000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
6479       6.200000       0.560000       0.09       1.70         0.053       6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.390000       0.44       2.60         0.066       6484       7.500000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
0.053         6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.390000       0.44       2.60         0.066       6484       7.500000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
6480       6.100000       0.715000       0.10       2.60         0.053       6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.390000       0.44       2.60         0.066       6484       7.500000       0.310000       0.41       2.40         0.065       0.6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
0.053         6481       6.200000       0.460000       0.29       2.10         0.074         6482       6.700000       0.320000       0.44       2.40         0.061       0.066       0.44       2.60         0.483       7.500000       0.310000       0.41       2.40         0.065       0.065       0.610000       0.11       1.80         0.066       0.066       0.339691       0.33       2.50         0.068       0.068       0.339691       0.33       2.50
6481       6.200000       0.460000       0.29       2.10         0.074       6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.390000       0.44       2.60         0.066       6484       7.500000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
0.074         6482       6.700000       0.320000       0.44       2.40         0.061       0.065       0.390000       0.44       2.60         0.065       0.065       0.41       2.40         0.066       0.066       0.310000       0.11       1.80         0.066       0.066       0.339691       0.33       2.50         0.068       0.068       0.068       0.339691       0.33       2.50
6482       6.700000       0.320000       0.44       2.40         0.061       6483       7.200000       0.390000       0.44       2.60         0.066       6484       7.500000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068       0.068       0.339691       0.33       2.50
0.061         6483       7.200000       0.390000       0.44       2.60         0.066       0.065       0.41       2.40         6485       5.800000       0.610000       0.11       1.80         0.066       0.068       0.339691       0.33       2.50
6483       7.200000       0.390000       0.44       2.60         0.066       6484       7.500000       0.310000       0.41       2.40         0.065       6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
0.066         6484       7.500000       0.310000       0.41       2.40         0.065         6485       5.800000       0.610000       0.11       1.80         0.066         6486       7.200000       0.339691       0.33       2.50         0.068
0.065         6485       5.800000       0.610000       0.11       1.80         0.066         6486       7.200000       0.339691       0.33       2.50         0.068
6485       5.800000       0.610000       0.11       1.80         0.066       6486       7.200000       0.339691       0.33       2.50         0.068
0.066 6486 7.200000 0.339691 0.33 2.50 0.068
6486 7.200000 0.339691 0.33 2.50 0.068
0.068
6/18/ 6 6000000 6 725000 6 76
0.073
6488 6.300000 0.550000 0.15 1.80 0.077
6489 5.400000 0.740000 0.09 1.70
0.089
6490 6.300000 0.510000 0.13 2.30
0.076
6.800000 0.620000 0.08 1.90
0.068
6.200000 0.600000 0.08 2.00
0.090
6493 5.900000 0.550000 0.10 2.20
0.062

6494 0.076	6.300000	0.510000	0.	13	2.30
6495	5.900000	0.645000	0.	12	2.00
0.075 6496	6.000000	0.310000	0.	47	3.60
0.067					
	sulfur dioxide	total sulfur o	dioxide	density	рН
1	14.0		132.0	0.99400	3.30
0.490000	30.0		97.0	0.99510	3.26
0.440000 3	47.0		186.0	0.99560	3.19
0.400000 4	47.0		186.0	0.99560	3.19
0.400000 5	30.0		97.0	0.99510	3.26
0.440000					
6 0.470000	30.0		136.0	0.99490	3.18
8 0.490000	14.0		132.0	0.99400	3.30
9 0.450000	28.0		129.0	0.99380	3.22
10	11.0		63.0	0.99080	2.99
0.560000 11	17.0		109.0	0.99470	3.14
0.530000 12	16.0		75.0	0.99200	3.18
0.630000 13	48.0		143.0	0.99120	3.54
0.520000 14	41.0		172.0	1.00020	2.98
0.670000					
15 0.550000	28.0		112.0	0.99140	3.25
16 0.360000	30.0		99.0	0.99280	3.24
17 0.390000	29.0		75.0	0.98920	3.33
18	17.0		171.0	0.99170	3.12
0.530000 19	34.0		133.0	0.99550	3.22
0.500000 20	29.0		75.0	0.98920	3.33
0.390000 21	19.0		102.0	0.99120	3.17
0.350000	_,,,			,	- 1 - 1

22	41.0	122.0 0.99300 3.47
0.480000 23	25.0	168.0 0.99370 3.05
0.510000	23.0	
24	16.0	142.0 0.99510 3.42
0.470000 25	56.0	245.0 0.99550 3.25
0.500000	3010	21310 0133330 3123
26	35.0	146.0 0.99300 3.45
0.440000 27	22.0	141 0 0 00610 2 20
0.530000	32.0	141.0 0.99610 3.38
28	17.0	132.0 0.99140 3.19
0.490000	2- 4	
29 0.710000	37.0	114.0 0.99060 3.10
30	20.0	142.0 0.99740 3.20
0.530000		
31	7.0	47.0 0.99340 3.47
0.400000		
6467	15.0	34.0 0.99396 3.48
0.570000	10.0	25 0 0 00240 2 27
6468 0.930000	19.0	35.0 0.99340 3.37
6469	15.0	25.0 0.99514 3.44
0.650000		
6470	35.0	104.0 0.99632 3.33
0.510000 6471	15.0	50.0 0.99467 3.58
0.670000	23.0	30.0 0.33.0, 3.30
6472	23.0	92.0 0.99677 3.39
0.480000 6473	12.0	20.0 0.99474 3.26
0.640000	12.0	20.0 0.33474 3.20
6474	16.0	29.0 0.99588 3.30
0.780000	12.0	27.0.0.00622.2.54
6475 0.600000	13.0	27.0 0.99622 3.54
6476	13.0	20.0 0.99540 3.42
0.670000		
6477	24.0	32.0 0.99402 3.54
0.600000 6478	9.0	26.0 0.99470 3.36
0.600000	5.0	
6479	24.0	32.0 0.99402 3.54
0.600000 6480	13.0	27.0 0.99362 3.57
0+00	13.0	27.0 0.99302 3.37

0.500000 6481		32.0		98.0	0.99578	3.33	
0.620000		32.0		90.0	0.99370	٠. ي	
6482		24.0		34.0	0.99484	3.29	
0.800000						2 22	
6483		22.0		48.0	0.99494	3.30	
0.840000 6484		34.0		60.0	0.99492	3.34	
0.850000		54.0		00.0	0.99492	3.34	
6485		18.0		28.0	0.99483	3.55	
0.660000							
6486		34.0		102.0	0.99414	3.27	
0.780000							
6487		29.0		79.0	0.99770	3.29	
0.540000 6488		26.0		35.0	0.99314	3.32	
0.820000		20.0		33.0	0.99314	3.32	
6489		16.0		26.0	0.99402	3.67	
0.560000		10.0		2010	0133102	3.07	
6490		29.0		40.0	0.99574	3.42	
0.750000							
6491		28.0		38.0	0.99651	3.42	
0.820000		22.0		44.0	0 00400	2 45	
6492 0.580000		32.0		44.0	0.99490	3.45	
6493		39.0		51.0	0.99512	3.52	
0.531215		33.0		31.0	0.55512	3.32	
6494		29.0		40.0	0.99574	3.42	
0.750000							
6495		32.0		44.0	0.99547	3.57	
0.710000		10.0		42.0	0.99549	2 20	
6496 0.660000		18.0		42.0	0.99549	3.39	
0.00000							
alo	cohol	quality whi	te				
1	9.5	1	1				
2	10.1	1	1				
2 3 4 5 6	9.9	1	1				
4	9.9 10.1	1 1	1 1				
6	9.6	1	1				
8	9.5	1	1				
8 9	11.0	1	1				
10	12.0	1	1				
11	9.7	1	1				
12	10.8	1	1				
13	12.4	1	1				
14 15	9.7 11.4	1 1	1 1				
10	11.4	1					

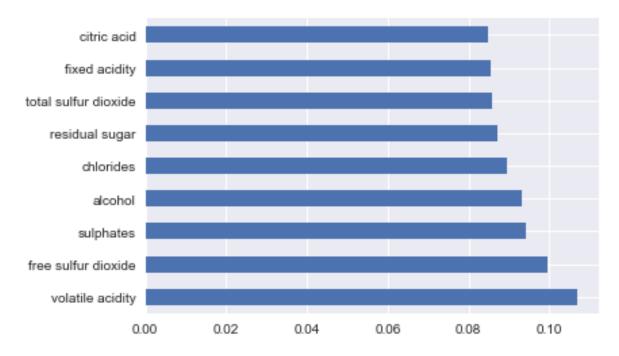
16	9.6	1	1
17	12.8	1 2	1
18	11.3	1	1
19	9.5	1	1
20	12.8	2 1 2	1
21	11.0	1	1
22	10.5	2	1
23	9.3	1	1
24	10.0	1	1
25	10.4	1	1
26	10.0	1	1
27	10.5	1	1
28	11.6	1	1
29	12.3	1	1
30	10.0	ī	1
31	10.2	ī	1
		_	
6467	11.5	1	0
6468	12.4	1	0
6469	11.1	1	0
6479	9.5	1	0
6471	12.5	1	0
6471		1	
	10.5		0
6473	11.8	1	0
6474	10.8	1	0
6475	11.9	1	0
6476	11.3	1	0
6477	11.3	1	0
6478	11.9	1	0
6479	11.3	1	0
6480	11.9	1	0
6481	9.8	1	0
6482	11.6	1	0
6483	11.5	1	0
6484	11.4	1	0
6485	10.9	1	0
6486	12.8	1	0
6487	9.2	1	0
6488	11.6	1	0
6489	11.6	1	0
6490	11.0	ī	0
6491	9.5	1	0
6492	10.5	i	0
6493	11.2	i	0
6494	11.0	1	0
6495	10.2	1	0
6496	11.0	1	0
0430	11.0	1	U
[6/30	rows x 13 co	lumnel	
[0430	10M2 Y T2 C0	culli15]	

```
x = data_copy3.drop('quality',axis=1)
y = data_copy3['quality']

model = ExtraTreesClassifier()
model.fit(x, y)
print(model.feature_importances_)

[ 0.08564838    0.10677143    0.08485914    0.0872269    0.08955658
0.09949098
    0.08592203    0.08216449    0.08405464    0.09414621    0.09330975
0.00684946]

imp_features = pd.Series(model.feature_importances_, index = x.columns)
imp_features.nlargest(9).plot(kind = 'barh')
plt.show()
```



```
Using SVC - Support Vector Classifier, Decision Tree Classifier,
Random Forest Classifier,
Gaussian Naive Bayes, and Logistic Regression.

model_params = {
    'svm' : {
        'model':SVC(gamma='auto'),
        'params':{
            'C' : [1,10,20],
            'kernel':['rbf']
      }
```

```
},
    'decision tree':{
        'model': DecisionTreeClassifier(),
        'params':{
            'criterion':['entropy','gini'],
            'max depth':[5,8,9]
        }
    },
    'random forest':{
        'model': RandomForestClassifier(),
        'params':{
            'n estimators':[1,5,10],
            'max_depth':[5,8,9]
        }
    },
    'naive bayes':{
        'model': GaussianNB(),
        'params':{}
    },
    'logistic regression' : {
        'model' : LogisticRegression(solver='newton-cg',multi class =
'multinomial'),
        'params': {
            "C" : [1,5,10]
        }
    }
}
score = []
for model name,mp in model params.items():
    clf = GridSearchCV(mp['model'],mp['params'], cv=8,
return train score=False, refit=True)
    clf.fit(x,y)
    score.append({
        'Model' : model name,
        'Best_Score': clf.best_score_,
        'Best Params': clf.best params
    })
print('The scikit-learn version is {}.'.format(sklearn. version ))
The scikit-learn version is 0.18.2.
data copy4 = pd.DataFrame(score, columns = ['Model', 'Best Score',
'Best Params'])
```

```
data copy4
                Model
                       Best Score
Best Params
                        0.932193
                                              {'C': 1, 'kernel':
0
                  svm
'rbf'}
                        0.921773 {'criterion': 'gini', 'max_depth':
1
        decision tree
5}
                                   {'max depth': 5, 'n estimators':
        random forest
                        0.932504
10}
3
          naive bayes
                        0.726905
{}
                                                             {'C':
4 logistic regression
                        0.932815
10}
1.1.1
Using SVM - Support Vector Machine
clf svm = SVC(kernel = 'rbf', C = 1)
scores = cross_val_score(clf_svm, x, y, cv = 8, scoring = 'accuracy')
scores
array([ 0.93167702, 0.93043478, 0.93159204, 0.93159204,
0.9340796 ,
       0.93275218, 0.93275218, 0.93266833
scores.mean()
0.93219352133329703
x train, x test, y train, y test = train test split(x, y, test size =
0.2, random state = 0)
print(x train)
print('-----x train complete-----')
print(x test)
print('-----')
print(y_train)
print('-----y train complete-----')
print(y test)
print('-----')
     fixed acidity volatile acidity citric acid residual sugar
chlorides
2660
               6.7
                              0.330
                                            0.34
                                                           6.60
0.067
               5.9
                              0.200
                                            0.28
3354
                                                          12.80
0.038
               7.7
                              0.275
                                            0.30
                                                           1.00
1041
0.039
3490
               7.6
                              0.310
                                            0.24
                                                           1.80
0.037
```

2746	7.0	0.340	0.30	1.80
0.045	6 6	0 150	0.24	Г 10
193 0.055	6.6	0.150	0.34	5.10
5920	7.0	0.510	0.09	2.10
0.062	7.0	0.510	0.03	2.10
6339	7.4	0.785	0.19	5.20
0.094				
1391	6.2	0.160	0.47	1.40
0.029				
5113	7.0	0.490	0.49	5.60
0.060	7.0	0.070	0.00	1 20
3934	7.3	0.270	0.30	1.30
0.040 3686	7.6	0.300	0.37	1.60
0.087	7.0	0.300	0.37	1.00
2025	7.5	0.300	0.71	1.30
0.160	, 15	01300	0171	1130
6363	6.8	0.590	0.10	1.70
0.063				
2030	9.5	0.420	0.41	2.30
0.034				
2844	8.0	0.220	0.31	5.60
0.049	7.0	0 540	0.24	2 50
6018 0.076	7.9	0.540	0.34	2.50
3895	7.0	0.250	0.33	2.10
0.021	710	01230	0.55	2110
3017	5.9	0.340	0.30	3.80
0.035				
4787	3.9	0.225	0.40	4.20
0.030				
2036	5.7	0.270	0.32	1.20
0.046	7.5	0.290	0.36	15 70
3320 0.050	7.5	0.290	0.30	15.70
6055	5.1	0.510	0.18	2.10
0.042	311	01310	0.120	2110
3647	6.4	0.290	0.24	3.20
0.037				
3576	7.4	0.280	0.36	14.60
0.048				
142	7.9	0.210	0.40	1.20
0.039 1434	7.4	0.250	0.49	1.10
0.042	7.4	0.230	0.49	1.10
5373	9.6	0.680	0.24	2.20
0.087	5.0	0.000	<u>.</u> .	2.23
4493	6.8	0.310	0.25	10.50

0.043				
2795	6.4	0.220	0.32	7.20
0.028				
	•••	•••		
2027	6.9	0.320	0.15	8.10
0.046				
101	7.1	0.120	0.32	9.60
0.054	7 5	0.410	0.22	14 00
2520 0.054	7.5	0.410	0.23	14.80
1889	7.6	0.150	0.40	1.30
0.036	,	0.250	0.10	2.50
2065	7.8	0.270	0.28	1.80
0.050				
4917	7.9	0.320	0.51	1.80
0.341 5138	8.9	0 625	0.37	1.70
0.263	0.9	0.635	0.37	1.70
2183	6.3	0.300	0.24	6.60
0.040				
6103	7.2	0.360	0.46	2.10
0.074	0.0	0.010	0.05	2 40
6283	8.0	0.810	0.25	3.40
0.076 2930	5.6	0.210	0.40	1.30
0.041	3.0	01210	0.10	1.50
546	6.3	0.260	0.24	7.20
0.039				
1718	9.3	0.200	0.33	1.70
0.050 2934	5.3	0.210	0.29	0.70
0.028	3.3	0.210	0.29	0.70
2242	6.1	0.230	0.45	10.60
0.094				
2155	7.8	0.290	0.33	8.75
0.035	0 0	0.240	0.26	1 70
2626 0.033	8.0	0.240	0.26	1.70
715	6.2	0.210	0.27	1.70
0.038	V. =	V. = = V	0.27	21.70
3517	6.6	0.290	0.29	1.80
0.036	0.0	0.210	0.26	2.26
5991 0.079	9.2	0.310	0.36	2.20
5940	8.9	0.500	0.21	2.20
0.088	015	0.500	0121	2120
4436	6.7	0.280	0.28	4.50
0.051				

1043	7.5	0.330	0.	48	19.45	
0.048 5893	7.7	0.600	0.	06	2.00	
0.079		0.000	0.		2.00	
4925	7.9	0.430	0.	21	1.60	
0.106	0 1	0 545	0	10	1 00	
4997 0.080	8.1	0.545	0.	18	1.90	
3306	6.0	0.320	0.	30	1.90	
0.033	7 1	0.210	0	20	1 20	
1669 0.036	7.1	0.310	0.	38	1.20	
2634	8.7	0.310	0.	73	14.35	
0.044						
2764	7.9	0.160	0.	30	7.40	
0.050						
	e sulfur dioxide	total sulfur	dioxide	density	рН	
sulphates 2660	35.0		156.0	0.99542	3.11	
0.48						
3354	29.0		132.0	0.99426	3.31	
0.57 1041	19.0		75.0	0.99200	3.01	
0.56			,5.0		3.01	
3490	39.0		150.0	0.99130	3.05	
0.44 2746	44.0		142.0	0.99140	2.99	
0.45	7710		14210	0.55140	2.33	
193	34.0		125.0	0.99420	3.36	
0.42	4.0		0 0	0 00504	2 25	
5920 0.54	4.0		9.0	0.99584	3.35	
6339	19.0		98.0	0.99713	3.16	
0.52	22.0		01.0	0.00000	2.26	
1391 0.42	23.0		81.0	0.99000	3.26	
5113	26.0		121.0	0.99740	3.34	
0.76	26.0		04.0	0 00000	2. 20	
3934 0.53	26.0		84.0	0.99222	3.28	
3686	27.0		177.0	0.99438	3.09	
0.50						
2025	44.0		149.0	0.99480	3.08	
0.42 6363	34.0		53.0	0.99580	3.41	
0.67	34.0		33.0	0.55500	3171	
2030	22.0		145.0	0.99510	3.06	
0.52						

2844	24.0	97.0	0.99300	3.10
0.42 6018	8.0	17.0	0.99235	3.20
0.72				2.22
3895 0.45	17.0	76.0	0.99021	3.26
3017	57.0	135.0	0.99016	3.09
0.34				
4787 0.36	29.0	118.0	0.98900	3.57
2036	20.0	155.0	0.99340	3.80
0.41				
3320	29.0	124.0	0.99680	3.06
0.54 6055	16.0	101.0	0.99240	3.46
0.87	10.0	101.0	0.99240	3.40
3647	31.0	95.0	0.98942	2.90
0.66				
3576	35.0	161.0	0.99680	3.14
0.56 142	38.0	107.0	0.99200	3.21
0.54	30.0	107.0	0.99200	3.21
1434	35.0	156.0	0.99170	3.13
0.55				
5373	5.0	28.0	0.99880	3.14
0.60	20.0	165.0	0 00720	2.20
4493 0.55	30.0	165.0	0.99720	3.36
2795	15.0	83.0	0.99300	3.13
0.55	13.10	05.0	0.00000	3.13
2027	F1 0	100.0	0.00500	2 12
2027 0.45	51.0	180.0	0.99580	3.13
101	64.0	162.0	0.99620	3.40
0.41	0110	10210	0133020	31.10
2520	28.0	174.0	0.99898	3.18
0.49	24.0	110.0	0 00000	2.14
1889	24.0	112.0	0.99320	3.14
0.76 2065	21.0	127.0	0.99340	3.15
0.44	21.0	127.0	0.33340	3.13
4917	17.0	56.0	0.99690	3.04
1.08				
5138	5.0	62.0	0.99710	3.00
1.09	20 0	141 0	0 00500	2 22
2183 0.47	38.0	141.0	0.99500	3.22
6103	24.0	44.0	0.99534	3.40
3.3.3		0		J J

0.85 6283		34.0	85.0	0.99668	3.19	
0.42		34.0	03.0	0.99000	5.19	
2930		81.0	147.0	0.99010	3.22	
0.95						
546		38.0	172.0	0.99580	3.49	
0.64						
1718		28.0	178.0	0.99540	3.16	
0.43		11.0	66.0	0 00015	2. 20	
2934		11.0	66.0	0.99215	3.30	
0.40 2242		49.0	169.0	0.99699	3.05	
0.54		49.0	109.0	0.99099	3.03	
2155		33.0	181.0	0.99620	3.11	
0.46		33.0	10110	0.33020	3.11	
2626		36.0	136.0	0.99316	3.44	
0.51						
715		41.0	150.0	0.99330	3.49	
0.71		20.0	100.0	0 00010	2.00	
3517		38.0	102.0	0.98819	3.08	
0.42 5991		11.0	31.0	0.99615	3.33	
0.86		11.0	31.0	0.99013	3.33	
5940		21.0	39.0	0.99692	3.33	
0.83						
4436		14.0	92.0	0.99224	3.36	
0.58						
1043		55.0	243.0	1.00100	2.95	
0.40		10.0	41.0	0.00007	2 20	
5893 0.62		19.0	41.0	0.99697	3.39	
4925		10.0	37.0	0.99660	3.17	
0.91		10.0	37.0	0.55000	3.17	
4997		13.0	35.0	0.99720	3.30	
0.59						
3306		41.0	142.0	0.98912	3.29	
0.42						
1669		10.0	124.0	0.99240	3.14	
0.44		27.0	101 0	1 00012	2.06	
2634 0.88		27.0	191.0	1.00013	2.96	
2764		58.0	152.0	0.99612	3.12	
0.37		3010	13210	0.00012	3.12	
	alcohol	white				
2660	9.300000	1				
3354	11.800000	1				
1041 3490	10.700000 11.800000	1 1				
3490	11.000000	1				

```
2746
       10.800000
                        1
193
        9.600000
                        1
5920
       10.500000
                        0
6339
        9.566667
                        0
                        1
1391
       12,200000
5113
       10.500000
                        0
3934
                        1
       10.700000
3686
        9.800000
                        1
2025
                        1
        8.900000
6363
        9.700000
                        0
                        1
2030
       11.000000
2844
       10.900000
                        1
6018
       13.100000
                        0
3895
                        1
       12.300000
3017
       12.000000
                        1
4787
                        1
       12.800000
2036
                        1
       10.200000
3320
                        1
       10.400000
                        0
6055
       12.900000
3647
       12.600000
                        1
3576
                        1
       10.600000
142
       10.800000
                        1
1434
       11.300000
                        1
5373
                        0
       10.200000
4493
       10.550000
                        1
2795
                        1
       10.900000
. . .
                       . .
        8.900000
2027
                        1
        9.400000
101
                        1
2520
        9.700000
                        1
1889
                        1
       10.000000
2065
        9.900000
                        1
                        0
4917
        9.200000
5138
                        0
        9.300000
                        1
2183
        9.500000
6103
       11.000000
                        0
6283
        9.200000
                        0
                        1
2930
       11.600000
                        1
546
        9.700000
1718
                        1
        9.000000
2934
                        1
        9.800000
2242
                        1
        8.800000
2155
       10.700000
                        1
2626
       10.400000
                        1
                        1
715
       10.500000
3517
       13.700000
                        1
5991
                        0
       12.000000
5940
       11.100000
                        0
4436
       11.900000
                        1
```

1043 5893 4925 4997 3306 1669 2634 2764	8.800000 10.100000 9.500000 9.000000 12.800000 9.900000 8.700000 9.500000		1 0 0 0 1 1 1						
		comple		cidity	citric	acid	residual	sugar	
1935	iucs (	8.8		0.340		0.33		9.70	
0.036 1106 0.027		5.2		0.240		0.45		3.80	
2932		6.4		0.250		0.32		11.30	
0.038		• • •		0.120		0.01			
743		5.9		0.260		0.25		12.50	
0.034		<b>-</b> 1		0 200		0.00		11 60	
2230 0.042		7.1		0.200		0.36		11.60	
1584		6.4		0.250		0.74		7.80	
0.045		0.4		0.230		0.74		7.00	
4583		6.4		0.230		0.37		7.90	
0.050									
567		6.0		0.260		0.50		2.20	
0.048		7 2		0 100		0 27		12.00	
4333 0.057		7.3		0.190		0.27		13.90	
4414		7.1		0.270		0.27		10.40	
0.041				0.270		0.2,		201.0	
4966		9.3		0.320		0.57		2.00	
0.074									
2992		6.6		0.200		0.27		10.90	
0.038 2730		6.8		0.300		0.22		6.20	
0.060		0.0		0.300		0.22		0.20	
5699		8.6		0.550		0.09		3.30	
0.068									
3860		7.3		0.250		0.26		7.20	
0.048									
4397		7.4		0.270		0.26		11.80	
0.053 3539		7.2		0.270		0.31		1.20	
0.031		1.2		0.270		0.51		1.20	
2261		6.5		0.360		0.31		4.10	
0.061									

1873	5.8	0.330	0.20	16.05
0.047 2671	5.9	0.300	0.30	2.00
0.030	5.9	0.500	0.50	2.00
5898	7.5	0.430	0.30	2.20
0.062				
5922	7.7	0.580	0.01	1.80
0.088 476	7.4	0.280	0.36	1.10
0.028	7.7	0.200	0.50	1.10
1182	7.4	0.220	0.33	2.00
0.045				
4972	9.7	0.320	0.54	2.50
0.094 4994	6.8	0.775	0.00	3.00
0.102	0.0	0.775	0.00	3.00
638	5.6	0.350	0.14	5.00
0.046				
3456	6.0	0.390	0.13	1.20
0.042	7 -	0.200	0 56	0.70
4182 0.055	7.5	0.380	0.56	9.70
4315	6.7	0.410	0.24	5.40
0.035	017	01.120	0.2.	31.10
4705	5.7	0.270	0.16	9.00
0.053	5.7	0.270	0.10	3.00
3695	6.4	0.150	0.40	1.30
0.053		0.400	0.00	2 22
6288	6.0	0.490	0.00	2.30
0.068 4615	6.1	0.440	0.28	4.25
0.032	0.1	01440	0.20	4123
1258	6.9	0.290	0.16	6.80
0.034				
3912	6.5	0.330	0.30	3.80
0.036 406	5.8	0.280	0.34	4.00
0.031	3.0	0.200	0.54	4.00
2237	6.4	0.340	0.20	14.90
0.060				
5637	9.0	0.690	0.00	2.40
0.088 1234	7.7	0.260	0.31	1.30
0.043	1.1	0.200	0.31	1.30
972	6.8	0.220	0.35	17.50
0.039				
4719	6.7	0.150	0.32	7.90

0.034					
4080	5.7	0.250	0.	27	10.80
0.050 5876	7.0	0.400	Θ	32	3.60
0.061	710	01400	0.	<i>J</i> 2	3.00
3303	6.3	0.220	0.	34	5.00
0.032			_		
178	6.0	0.670	0.	07	1.20
0.060	0.2	0.270	0	26	1 00
1216 0.034	8.2	0.370	υ.	36	1.00
3965	7.3	0.380	Θ.	23	6.50
0.050	, 13	0.500	0.		0.50
4760	6.6	0.170	0.	26	7.40
0.052					
2162	9.9	0.490	0.	23	2.40
0.087			_		
3859	7.3	0.250	0.	26	7.20
0.048	6 0	0 200	0	24	1 60
877 0.119	6.0	0.280	₩.	34	1.60
4993	4.7	0.600	0	17	2.30
0.058	117	01000	0.	_,	2130
5865	8.5	0.660	0.	20	2.10
0.097					
1108	6.1	0.290	0.	27	1.70
0.024					
2579	6.4	0.280	0.	56	1.70
0.156 5825	8.4	0.670	0	19	2.20
0.093	0.4	0.070	0.	19	2.20
5782	8.8	0.610	0.	19	4.00
0.094		0.020			
4435	6.5	0.290	0.	30	9.15
0.051					
5416	10.9	0.210	0.	49	2.80
0.088					
free	sulfur dioxide	total sulfur d	invide	density	рН
	\	totat satiai a	IOXIUC	uchisicy	ρп
1935	46.0		172.0	0.99660	3.080000
0.40					
1106	21.0		128.0	0.99200	3.550000
0.49					
2932	69.0		192.0	0.99573	3.140000
0.50	20.0		152.0	0 00770	2 220000
743 0.43	38.0		152.0	0.99770	3.330000
2230	45.0		124.0	0.99700	2.920000
2230	75.0		14-7.0	0.55700	2132000

0.59					
1584	52.0	209.0	0.99560	3.210000	
0.42	60.0	150.0	0.00400	2 060000	
4583	60.0	150.0	0.99488	2.860000	
0.49	FO 0	152.0	0.00000	2 000000	
567	59.0	153.0	0.99280	3.080000	
0.61	45.0	155.0	0 00007	2 040000	
4333 0.41	45.0	155.0	0.99807	2.940000	
4414	26.0	114.0	0.99335	3.040000	
0.52	20.0	114.0	0.99333	3.040000	
4966	27.0	65.0	0.99690	3.280000	
0.79	27.0	05.0	0.99090	3.200000	
2992	29.0	130.0	0.99496	3.110000	
0.44	23.0	150.0	0.33430	3.110000	
2730	41.0	190.0	0.99858	3.180000	
0.51	1110	15010	0.33030	3.100000	
5699	8.0	17.0	0.99735	3.230000	
0.44	0.0	27.10	0.00700	3.23000	
3860	52.0	207.0	0.99587	3.120000	
0.37					
4397	55.0	173.0	0.99699	3.110000	
0.60					
3539	27.0	80.0	0.98892	3.030000	
0.33					
2261	20.0	134.0	0.99475	3.180000	
0.45					
1873	26.0	166.0	0.99760	3.090000	
0.46					
2671	38.0	142.0	0.98892	3.410000	
0.41	6.0	12.0	0.00405	2 440000	
5898	6.0	12.0	0.99495	3.440000	
0.72	12.0	10.0	0.005.00	2 220000	
5922	12.0	18.0	0.99568	3.320000	
0.56 476	42.0	105.0	0.98930	2.990000	
0.39	42.0	103.0	0.96930	2.990000	
1182	31.0	101.0	0.99310	3.420000	
0.55	31.0	101.0	0.99510	3.420000	
4972	28.0	83.0	0.99840	3.280000	
0.82	20.0	05.0	0.33040	3.20000	
4994	8.0	23.0	0.99650	3.450000	
0.56	0.0				
638	48.0	198.0	0.99370	3.300000	
0.71					
3456	60.0	172.0	0.99114	3.060000	
0.52					
4182	15.0	170.0	0.99605	3.130000	
0.65					
4315	33.0	115.0	0.99010	3.120000	

0.44					
4705 32.0 111.0 0.99474 3.360000 0.37 3695 61.0 146.0 0.99112 3.170000 0.68 0.59 4615 43.0 132.0 0.99160 3.260000 0.47 1258 65.0 212.0 0.99550 3.080000 0.63 3912 34.0 88.0 0.99028 3.250000 0.63 406 40.0 99.0 0.98960 3.390000 0.39 2237 37.0 162.0 0.99830 3.130000 0.39 2237 37.0 162.0 0.99830 3.130000 0.39 2237 37.0 162.0 0.99830 3.250000 0.45 5637 19.0 38.0 0.99900 3.350000 0.60 1234 47.0 155.0 0.99370 3.420000 0.50 972 38.0 153.0 0.99940 3.218395 0.42 4710 17.0 81.0 0.99512 3.290000 0.31 4880 58.0 116.0 0.99512 3.290000 0.50 5876 9.0 29.0 0.99416 3.280000 0.50 5876 9.0 29.0 0.99416 3.280000 0.36 178 9.0 108.0 0.99310 3.1100000 0.32 3303 36.0 93.0 0.99060 3.040000 0.35 178 9.0 108.0 0.99310 3.1100000 0.36 178 9.0 108.0 0.99310 3.1100000 0.35 178 9.0 108.0 0.99310 3.1100000 0.35 179 93.0 0.99060 3.040000 0.32 33965 18.0 102.0 0.99388 3.160000 0.37 2162 19.0 115.0 0.99480 2.7700000 0.37 2162 19.0 115.0 0.99480 2.770000 0.37 277 33.0 104.0 0.99210 3.190000	0.44				
4705       32.0       111.0       0.99474       3.360000         0.37       3695       61.0       146.0       0.99112       3.170000         0.68       15.0       33.0       0.99292       3.580000         0.59       4615       43.0       132.0       0.99160       3.260000         0.47       1258       65.0       212.0       0.99550       3.080000         0.39       3912       34.0       88.0       0.99028       3.250000         0.63       406       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.39       37.0       162.0       0.99830       3.130000         0.39       37.0       162.0       0.99830       3.130000         0.45       38.0       0.99900       3.350000         0.50       38.0       0.99930       3.218395         0.50       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.50       38.0       160.0       0.99592       3.100000       3.00000       3.00000       3.00000 <td></td> <td></td> <td></td> <td></td> <td></td>					
0.37         3695       61.0       146.0       0.99112       3.170000         0.68       15.0       33.0       0.99292       3.580000         0.59       132.0       0.99160       3.260000         0.47       1258       65.0       212.0       0.99550       3.080000         0.39       3912       34.0       88.0       0.99028       3.250000         0.63       40.0       99.0       0.98960       3.390000         0.39       2237       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       5876       9.0       29.0       0.99416       3.280000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0 <td></td> <td></td> <td></td> <td></td> <td></td>					
3695       61.0       146.0       0.99112       3.170000         0.68       15.0       33.0       0.99292       3.580000         0.59       4615       43.0       132.0       0.99160       3.260000         0.47       1258       65.0       212.0       0.99550       3.080000         0.39       34.0       88.0       0.99028       3.250000         0.63       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       38.0       0.99900       3.350000         0.45       38.0       0.99970       3.420000         0.50       47.0       155.0       0.99370       3.420000         972       38.0       153.0       0.99940       3.218395         0.42       47.1       17.0       81.0       0.99512       3.290000         9.1       17.0       81.0       0.99512       3.290000         0.31       4000       93.0       0.99012       3.270000         0.86       10.0       0.99592       3.100000         0.87       9.0       29.0       0.99416       3.280000		32.0	111.0	0.99474	3.360000
0.68       15.0       33.0       0.99292       3.580000         0.59       4615       43.0       132.0       0.99160       3.260000         0.47       1258       65.0       212.0       0.99550       3.080000         0.39       3912       34.0       88.0       0.99028       3.250000         0.63       406       40.0       99.0       0.98960       3.390000         0.39       2237       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       972       38.0       153.0       0.99940       3.218395         972       38.0       153.0       0.99940       3.218395         972       38.0       153.0       0.99940       3.218395         972       38.0       153.0       0.99940       3.218395         973       7.0       81.0       0.99592       3.10000         0.31       4080       58.0       116.0       0.99592       3.10000         0.50       5876       9.0       29.0					
6288       15.0       33.0       0.99292       3.580000         0.59       43.0       132.0       0.99160       3.260000         0.47       1258       65.0       212.0       0.99550       3.080000         0.39       34.0       88.0       0.99028       3.250000         0.63       406       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       38.0       0.99900       3.350000         0.45       38.0       0.99900       3.350000         0.50       38.0       0.99940       3.218395         0.50       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.50       58.0       116.0       0.99592       3.100000         0.50       58.0       116.0       0.99592       3.100000         0.50       33.0       0.99012       3.270000       3.270000         0.50       36.0       93.0       0.99310       3.110000         0.70       45.0       108.0       0.99388       3.160000		61.0	146.0	0.99112	3.170000
0.59       4615       43.0       132.0       0.99160       3.260000         0.47       1258       65.0       212.0       0.99550       3.080000         0.39       34.0       88.0       0.99028       3.250000         0.63       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       38.0       0.99900       3.350000         0.42       47.0       155.0       0.99370       3.420000         0.50       972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.50       88.0       106.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.50       9.0       29.0       0.99416       3.280000         0.50       9.0       108.0       0.99310       3.110000         0.36       17.0       93					
4615       43.0       132.0       0.99160       3.260000         0.47       1258       65.0       212.0       0.99550       3.080000         0.39       3912       34.0       88.0       0.99028       3.250000         0.63       406       40.0       99.0       0.98960       3.390000         0.39       2237       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4719       17.0       81.0       0.99512       3.290000         0.50       5876       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.35       17.0       93.0       0.99310       3.110000         0.35       12.0       0.99388       3.160000         0.55       10.0       0.99388       3.1600		15.0	33.0	0.99292	3.580000
0.47         1258       65.0       212.0       0.99550       3.080000         0.39       3912       34.0       88.0       0.99028       3.250000         0.63       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       38.0       0.99900       3.350000         0.60       19.0       38.0       0.99970       3.420000         0.50       38.0       153.0       0.99940       3.218395         972       38.0       153.0       0.99940       3.218395         9.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       5876       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.32       3965       18.0       102.0       0.99304       3.100000         0.37       2162       19.0       115.0       0.99380<	0.59				
1258       65.0       212.0       0.99550       3.080000         0.39       3912       34.0       88.0       0.99028       3.250000         0.63       406       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       972       38.0       153.0       0.99940       3.218395         972       38.0       153.0       0.99940       3.218395         4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.42       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.10000         0.35       1216       17.0       93.0       0.99360       3.040000         0.37       200.0       128.0       0.99388 </td <td>4615</td> <td>43.0</td> <td>132.0</td> <td>0.99160</td> <td>3.260000</td>	4615	43.0	132.0	0.99160	3.260000
0.39       3912       34.0       88.0       0.99028       3.250000         0.63       40.0       99.0       0.98960       3.390000         0.39       2237       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.50       9.0       29.0       0.99416       3.280000         0.50       9.0       29.0       0.99416       3.280000         0.36       17.0       93.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99304       3.100000         0.32       3965       18.0       102.0       0.99304       3.100000         0.37       19.0       115.0       0.99480 </td <td>0.47</td> <td></td> <td></td> <td></td> <td></td>	0.47				
3912       34.0       88.0       0.99028       3.250000         0.63       406       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99388       3.160000         0.37       19.0       115.0       0.99480       2.770000         0.37       20.0       207.0 <td>1258</td> <td>65.0</td> <td>212.0</td> <td>0.99550</td> <td>3.080000</td>	1258	65.0	212.0	0.99550	3.080000
0.63         406       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.55       45.0       128.0       0.99388       3.160000         0.55       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.37       37	0.39				
406       40.0       99.0       0.98960       3.390000         0.39       37.0       162.0       0.99830       3.130000         0.45       5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       19.0       115.0       0.99480       2.770000         0.37       277       33.0       207.0       0.99587       3.120000         0.38       4993       17.0	3912	34.0	88.0	0.99028	3.250000
0.39 2237 37.0 162.0 0.99830 3.130000 0.45 5637 19.0 38.0 0.99900 3.350000 0.60 1234 47.0 155.0 0.99370 3.420000 0.50 972 38.0 153.0 0.99940 3.218395 0.42 4719 17.0 81.0 0.99512 3.290000 0.31 4080 0.50 5876 9.0 29.0 0.99416 3.280000 0.49 3303 36.0 93.0 0.99012 3.270000 0.36 178 9.0 108.0 0.99310 3.110000 0.35 1216 17.0 93.0 0.99060 3.040000 0.35 1216 17.0 93.0 0.99060 3.040000 0.35 1216 17.0 93.0 0.99388 3.160000 0.55 4760 45.0 128.0 0.99388 3.160000 0.37 2162 19.0 115.0 0.99480 2.770000 0.44 3859 52.0 207.0 0.99210 3.190000 0.37 877 33.0 104.0 0.99320 3.850000	0.63				
2237       37.0       162.0       0.99830       3.130000         0.45       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.55       45.0       128.0       0.99388       3.160000         0.55       45.0       128.0       0.99388       3.160000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       877       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.993	406	40.0	99.0	0.98960	3.390000
0.45         5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       7       207.0       0.99587       3.120000         0.37       877       33.0       207.0       0.99587       3.120000         0.38       4993       17.0       106.0       0.99320       3.850000	0.39				
5637       19.0       38.0       0.99900       3.350000         0.60       1234       47.0       155.0       0.99370       3.420000         0.50       38.0       153.0       0.99940       3.218395         0.42       37.0       38.0       0.99940       3.218395         4719       17.0       81.0       0.99512       3.290000         0.31       30.0       116.0       0.99592       3.100000         0.50       5876       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.55       4760       45.0       15.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       877       33.0       104.0       0.99210	2237	37.0	162.0	0.99830	3.130000
0.60         1234       47.0       155.0       0.99370       3.420000         0.50       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       5876       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       45.0       128.0       0.99388       3.160000         0.37       102.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000	0.45				
1234       47.0       155.0       0.99370       3.420000         0.50       38.0       153.0       0.99940       3.218395         0.42       3.24       3.290000       3.290000       3.290000         4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       5876       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       17.0       93.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99360       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       1	5637	19.0	38.0	0.99900	3.350000
0.50         972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       87       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000	0.60				
972       38.0       153.0       0.99940       3.218395         0.42       4719       17.0       81.0       0.99512       3.290000         0.31       4080       58.0       116.0       0.99592       3.100000         0.50       5876       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000	1234	47.0	155.0	0.99370	3.420000
0.42         4719       17.0       81.0       0.99512       3.290000         0.31       31       31       3.290000       3.100000         0.50       3.0       0.99592       3.100000       3.280000         0.50       3.0       0.99416       3.280000       3.280000         0.49       3.0       0.99012       3.270000       3.270000         0.36       17       93.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000	0.50				
4719       17.0       81.0       0.99512       3.290000         0.31       31       4080       58.0       116.0       0.99592       3.100000         0.50       5876       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       45.0       128.0       0.99388       3.160000         0.37       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000	972	38.0	153.0	0.99940	3.218395
0.31 4080 58.0 116.0 0.99592 3.100000 0.50 5876 9.0 29.0 0.99416 3.280000 0.49 3303 36.0 93.0 0.99012 3.270000 0.36 178 9.0 108.0 0.99310 3.110000 0.35 1216 17.0 93.0 0.99060 3.040000 0.32 3965 18.0 102.0 0.99304 3.100000 0.55 4760 45.0 128.0 0.99388 3.160000 0.37 2162 19.0 115.0 0.99480 2.770000 0.44 3859 52.0 207.0 0.99587 3.120000 0.37 877 33.0 104.0 0.99210 3.190000 0.38 4993 17.0 106.0 0.99320 3.850000	0.42				
4080       58.0       116.0       0.99592       3.100000         0.50       9.0       29.0       0.99416       3.280000         0.49       3303       36.0       93.0       0.99012       3.270000         0.36       178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000	4719	17.0	81.0	0.99512	3.290000
0.50         5876       9.0       29.0       0.99416       3.280000         0.49         3303       36.0       93.0       0.99012       3.270000         0.36         178       9.0       108.0       0.99310       3.110000         0.35         1216       17.0       93.0       0.99060       3.040000         0.32         3965       18.0       102.0       0.99304       3.100000         0.55         4760       45.0       128.0       0.99388       3.160000         0.37         2162       19.0       115.0       0.99480       2.770000         0.44         3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000					
5876       9.0       29.0       0.99416       3.280000         0.49         3303       36.0       93.0       0.99012       3.270000         0.36         178       9.0       108.0       0.99310       3.110000         0.35         1216       17.0       93.0       0.99060       3.040000         0.32         3965       18.0       102.0       0.99304       3.100000         0.55         4760       45.0       128.0       0.99388       3.160000         0.37         2162       19.0       115.0       0.99480       2.770000         0.44         3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000		58.0	116.0	0.99592	3.100000
0.49         3303       36.0       93.0       0.99012       3.270000         0.36         178       9.0       108.0       0.99310       3.110000         0.35         1216       17.0       93.0       0.99060       3.040000         0.32         3965       18.0       102.0       0.99304       3.100000         0.55         4760       45.0       128.0       0.99388       3.160000         0.37         2162       19.0       115.0       0.99480       2.770000         0.44         3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000					
3303       36.0       93.0       0.99012       3.270000         0.36         178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000		9.0	29.0	0.99416	3.280000
0.36         178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000					
178       9.0       108.0       0.99310       3.110000         0.35       1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000		36.0	93.0	0.99012	3.270000
0.35         1216       17.0       93.0       0.99060       3.040000         0.32         3965       18.0       102.0       0.99304       3.100000         0.55         4760       45.0       128.0       0.99388       3.160000         0.37         2162       19.0       115.0       0.99480       2.770000         0.44         3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000					
1216       17.0       93.0       0.99060       3.040000         0.32       3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       2162       19.0       115.0       0.99480       2.770000         0.44       3859       52.0       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       4993       17.0       106.0       0.99320       3.850000		9.0	108.0	0.99310	3.110000
0.32         3965       18.0       102.0       0.99304       3.100000         0.55         4760       45.0       128.0       0.99388       3.160000         0.37         2162       19.0       115.0       0.99480       2.770000         0.44         3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000					
3965       18.0       102.0       0.99304       3.100000         0.55       4760       45.0       128.0       0.99388       3.160000         0.37       115.0       0.99480       2.770000         0.44       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       17.0       106.0       0.99320       3.850000		17.0	93.0	0.99060	3.040000
0.55         4760       45.0       128.0       0.99388       3.160000         0.37         2162       19.0       115.0       0.99480       2.770000         0.44         3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000					
4760       45.0       128.0       0.99388       3.160000         0.37       115.0       0.99480       2.770000         0.44       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       30.0       106.0       0.99320       3.850000		18.0	102.0	0.99304	3.100000
0.37         2162       19.0       115.0       0.99480       2.770000         0.44         3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000					
2162       19.0       115.0       0.99480       2.770000         0.44       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       31.0       106.0       0.99320       3.850000		45.0	128.0	0.99388	3.160000
0.44         3859       52.0       207.0       0.99587       3.120000         0.37       33.0       104.0       0.99210       3.190000         0.38       31.0       106.0       0.99320       3.850000					
3859       52.0       207.0       0.99587       3.120000         0.37         877       33.0       104.0       0.99210       3.190000         0.38         4993       17.0       106.0       0.99320       3.850000		19.0	115.0	0.99480	2.770000
0.37 877 33.0 104.0 0.99210 3.190000 0.38 4993 17.0 106.0 0.99320 3.850000					
877 33.0 104.0 0.99210 3.190000 0.38 4993 17.0 106.0 0.99320 3.850000		52.0	207.0	0.99587	3.120000
0.38 4993 17.0 106.0 0.99320 3.850000					
4993 17.0 106.0 0.99320 3.850000		33.0	104.0	0.99210	3.190000
0.60		17.0	106.0	0.99320	3.850000
	0.60				

10.48 1108 13.0 76.0 0.98930 3.210000 0.51 2579 49.0 106.0 0.99354 3.100000 0.59 5782 30.0 0.59 5782 30.0 0.50 4435 25.0 166.0 0.99787 3.220000 0.56 5416 11.0 32.0 0.99720 3.220000 0.68  25.0 166.0 0.99339 3.240000 0.66 31.0 0.99720 3.220000 0.50 4333 10.200000 1 106 11.200000 1 1230 9.500000 1 14583 9.400000 1 4583 9.300000 1 4583 9.300000 1 4583 9.300000 1 4583 9.300000 1 4584 9.200000 1 4586 0.700000 0 1 4333 8.800000 1 4414 11.500000 1 4333 8.800000 1 4344 11.500000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2731 9.200000 1 2731 9.2000000 1 2732 9.200000 1 2733 9.200000 1 2734 9.2000000 1 2735 9.200000 1 2736 9.200000 1 2737 9.200000 1 2738 9.200000 1 2739 9.200000 1 2741 1444 1444 1444 1444 1444 1444 14	5865		23.0	113.0	0.99733	3.130000	
0.51 2579	0.48						
2579			13.0	76.0	0.98930	3.210000	
0.37 5825 0.59 5782 30.0 69.0 9.99787 3.220000 0.50 4435 25.0 166.0 0.99339 3.240000 0.68  alcohol white 1335 10.200000 1 1106 11.200000 1 1230 9.500000 1 1384 9.200000 1 4583 9.300000 1 4414 11.500000 1 4414 11.500000 1 4414 11.500000 1 2730 9.200000 1 4333 8.800000 1 4414 11.500000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2731 9.800000 1 2732 9.800000 1 2734 9.800000 1 2735 9.800000 1 2737 9.800000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2731 9.800000 1 2732 9.800000 1 2733 9.800000 1 2734 9.800000 1 2735 9.800000 1 2737 9.800000 1 2737 9.800000 1 2738 9.800000 1 2741 275 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.8000000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.800000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000 1 277 9.8000000000000000000000000000000000000			49.0	106.0	0.99354	3.100000	
0.59 5782 0.50 0.50 4435 0.56 5416 0.68   alcohol white 1935 10.200000 1 11.00 32.0 0.99720 3.220000  1106 11.200000 1 2932 10.200000 1 2932 10.200000 1 1584 9.200000 1 1584 9.200000 1 4333 8.800000 1 4414 11.500000 1 4936 10.700000 0 2992 10.500000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2731 9.800000 1 2732 9.800000 1 2730 9.200000 1 2731 9.800000 1 2732 9.800000 1 2733 9.200000 1 2730 9.200000 1 2730 9.200000 1 2731 9.800000 1 2731 9.800000 1 2732 9.800000 1 2733 9.200000 1 2734 9.800000 1 2735 9.800000 1 274 9.800000 1 275 9.800000 1 277 9.800000 1			11.0		0.00726	2 200000	
5782       30.0       69.0       0.99787       3.220000         0.50       25.0       166.0       0.99339       3.240000         0.56       11.0       32.0       0.99720       3.220000         0.68       11.0       32.0       0.99720       3.220000         1106       11.200000       1       11.0 <td></td> <td></td> <td>11.0</td> <td>/5.0</td> <td>0.99736</td> <td>3.200000</td> <td></td>			11.0	/5.0	0.99736	3.200000	
4435	5782		30.0	69.0	0.99787	3.220000	
0.56 5416 0.68    11.0   32.0   0.99720   3.220000			25 0	166 A	0 99339	3 240000	
alcohol white  1935	0.56						
alcohol white  1935    10.200000    1  1106    11.200000    1  2932    10.200000    1  743    9.400000    1  1584    9.200000    1  4583    9.300000    1  4414    11.500000    1  4414    11.500000    1  4966    10.700000    0  2992    10.500000    1  5699    10.000000    1  3339    12.700000    1  3539    12.700000    1  2261    9.00000    1  1873    8.900000    1  2873    9.200000    1  1873    8.900000    1  1873    8.900000    1  1873    8.900000    1  1873    1.500000    1  2898    11.500000    0  476    12.400000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4872    9.600000    1  4873    10.400000    1  4874    10.400000    1  4875    10.400000    1			11.0	32.0	0.99720	3.220000	
1935 10.200000 1 1106 11.200000 1 2932 10.200000 1 743 9.400000 1 1584 9.200000 1 4583 9.300000 1 4414 11.500000 1 4966 10.700000 0 2992 10.500000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2730 9.200000 1 2699 10.000000 0 2992 10.500000 1 2699 10.000000 1 2730 9.200000 1 2730 9.200000 1 2731 8.900000 1 1833 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 2671 12.900000 0 5922 10.500000 0 476 12.400000 1 1182 11.400000 1 1182 11.400000 1 1482 9.900000 1 3456 10.600000 1 4815 12.893333 1 4705 10.400000 1	0.00						
1106 11.200000 1 2932 10.200000 1 743 9.400000 1 1230 9.500000 1 1584 9.200000 1 4583 9.300000 1 4333 8.800000 1 4414 11.500000 1 4966 10.700000 0 2992 10.500000 1 2730 9.200000 1 2730 9.200000 1 2860 9.200000 1 3539 12.700000 1 2873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 1873 8.900000 1 2671 12.900000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1 1882 11.500000 0 476 12.400000 1	1935						
743  9.400000  1 2230  9.500000  1 1584  9.200000  1 4583  9.300000  1 4583  9.300000  1 4333  8.800000  1 4414  11.500000  1 4966  10.700000  0 2992  10.500000  1 2730  9.200000  1 2730  9.200000  1 3539  12.700000  1 3539  12.700000  1 2261  9.00000  1 1873  8.90000  1 1873  8.90000  1 1873  8.90000  1 1873  8.90000  1 1873  8.90000  1 1873  8.90000  1 1873  8.90000  1 2671  12.900000  0 476  12.40000  1 1182  11.40000  1 4972  9.600000  0 4994  10.700000  0 638  10.300000  1 3456  10.600000  1 4182  9.900000  1 4182  9.900000  1 4315  12.893333  1 4705  10.400000  1	1106	11.200000	1				
2230							
4583       9.300000       1         567       9.800000       1         4333       8.800000       1         4414       11.500000       1         4966       10.700000       0         2992       10.500000       1         5699       10.000000       0         3860       9.200000       1         4397       9.800000       1         2261       9.00000       1         1873       8.90000       1         2671       12.90000       1         5898       11.50000       0         476       12.40000       1         1182       11.40000       1         4972       9.60000       0         4994       10.70000       0         638       10.30000       1         4482       9.900000       1         4315       12.893333       1              4705       10.400000       1							
567							
4333       8.800000       1         4414       11.500000       0         2992       10.500000       1         2730       9.200000       1         5699       10.000000       0         3860       9.200000       1         4397       9.800000       1         2261       9.00000       1         1873       8.90000       1         2671       12.900000       1         5898       11.500000       0         5922       10.500000       0         476       12.40000       1         1182       11.40000       1         4972       9.60000       0         4994       10.70000       0         638       10.30000       1         4182       9.90000       1         4182       9.90000       1         4315       12.893333       1              4705       10.400000       1							
4966       10.700000       0         2992       10.500000       1         2730       9.200000       1         5699       10.000000       0         3860       9.200000       1         4397       9.800000       1         2261       9.000000       1         1873       8.900000       1         2671       12.900000       1         5898       11.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1	4333	8.800000	1				
2992       10.500000       1         2730       9.200000       1         5699       10.000000       0         3860       9.200000       1         4397       9.800000       1         2261       9.000000       1         1873       8.900000       1         2671       12.900000       1         5898       11.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1							
5699       10.000000       0         3860       9.200000       1         4397       9.800000       1         3539       12.700000       1         2261       9.000000       1         1873       8.900000       1         2671       12.900000       1         5898       11.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1			1				
3860       9.200000       1         4397       9.800000       1         3539       12.700000       1         2261       9.000000       1         1873       8.900000       1         2671       12.900000       1         5898       11.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1							
4397       9.800000       1         3539       12.700000       1         2261       9.000000       1         1873       8.900000       1         2671       12.900000       0         5898       11.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1							
2261       9.000000       1         1873       8.900000       1         2671       12.900000       1         5898       11.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1			1				
1873       8.900000       1         2671       12.900000       1         5898       11.500000       0         5922       10.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         4182       9.900000       1         4315       12.8933333       1              4705       10.400000       1							
5898       11.500000       0         5922       10.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1	1873	8.900000	1				
5922       10.500000       0         476       12.400000       1         1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1							
1182       11.400000       1         4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1             4705       10.400000       1							
4972       9.600000       0         4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1             4705       10.400000       1							
4994       10.700000       0         638       10.300000       1         3456       10.600000       1         4182       9.900000       1         4315       12.893333       1              4705       10.400000       1							
3456 10.600000 1 4182 9.900000 1 4315 12.893333 1 	4994	10.700000	0				
4182 9.900000 1 4315 12.893333 1  4705 10.400000 1							
4705 10.400000 1	4182	9.900000	1				
4705 10.400000 1		12.893333	1				
3695 11.000000 1		10.400000	1				
	3695	11.000000	1				

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6288
       12.500000
                       0
4615
                       1
       11.266667
1258
       9.000000
                       1
3912
                       1
       12.500000
                       1
406
       12.800000
2237
                       1
       9.000000
5637
                       0
       9.300000
1234
       10.100000
                        1
972
       9.000000
                       1
                       1
4719
      10.000000
4080
                       1
       9.800000
5876
                       0
      11.300000
3303
       13.500000
                       1
                       1
178
       8.700000
1216
      11.700000
                       1
                       1
3965
      11.200000
4760
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      10.000000
2162
       9.400000
                        1
                       1
3859
       9.200000
877
      10.200000
                       1
4993
      12.900000
                       0
5865
       9.200000
                       0
1108
       12.600000
                       1
                       1
2579
       9.200000
5825
       9.200000
                       0
                       0
5782
      10.000000
4435
      11.333333
                       1
                       0
5416
      11.700000
[1286 rows x 12 columns]
-----x_test complete------2660 1
2660
3354
         1
1041
         1
3490
         1
         1
2746
193
         1
5920
         1
6339
         1
1391
         1
5113
         1
3934
         1
3686
         1
2025
         1
6363
         1
2030
         1
2844
         1
         2
6018
3895
         1
```

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3017
        1
4787
        2
2036
        1
3320
        1
        1
6055
3647
        1
        1
3576
142
        1
        1
1434
        1
5373
        1
4493
        2
2795
2027
       1
101
        1
2520
        1
1889
        1
2065
        1
        1
4917
5138
        1
        1
2183
6103
        1
        1
6283
        2
2930
546
        1
        0
1718
2934
        1
2242
        1
2155
        1
2626
        1
715
        1
3517
        1
5991
        1
5940
        1
4436
        1
1043
        1
5893
        1
        1
4925
4997
        1
        1
3306
        1
1669
2634
        1
2764
        1
Name: quality, Length: 5144, dtype: int64
1106
        2
2932
        1
743
        1
```

2230	1
1584	1
4583	1
567	1
4333	2
	2 1
4414	1
4966	1
2992	1
2730	1
5699	1
	1
3860	1
4397	1
3539	1
2261	1
1873	1
2671	1
	1
5898	1
5922	1
476	1
1182	1
4972	1
	1
4994	1
638	1
3456	1
4182	1
4315	1
4313	
4705	
4705	1
3695	1
6288	1
4615	1
1258	1
3912	1
406	1
2237	0
5637	1
1234	1
972	1
4719	1
4080	1
5876	1
3303	1
178	0
	3
1216	2
3965	0
4760	1
2162	1
3859	1
877	1
=	

```
4993
        1
5865
        1
1108
        1
2579
        1
5825
        0
5782
        1
        1
4435
5416
Name: quality, Length: 1286, dtype: int64
----y test complete-----
clf svm1 = SVC(kernel='rbf', C = 1)
clf_svm1.fit(x_train, y_train)
SVC(C=1, cache size=200, class weight=None, coef0=0.0,
 decision function shape=None, degree=3, gamma='auto', kernel='rbf',
  max iter=-1, probability=False, random state=None, shrinking=True,
 tol=0.001, verbose=False)
y_pred = clf_svm1.predict(x_test)
accuracy = accuracy score(y test, y pred)
accuracy
0.93779160186625199
Testing on the split test-data
accuracy_dataframe = pd.DataFrame({"y_test": y_test, "y_pred":
y pred})
accuracy dataframe.head(n = 100)
      y_pred y_test
1935
           1
                   1
                   2
           1
1106
           1
                   1
2932
743
           1
                   1
           1
2230
                   1
1584
           1
                   1
           1
                   1
4583
567
           1
                   1
           2
                   2
4333
           1
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4414
4966
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                   1
2992
2730
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                   1
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                   1
5699
           1
                   1
3860
           1
                   1
4397
           1
                   1
3539
```

2261 1873 2671 5898 5922 476 1182	1 1 1 1 1	1 1 1 1 1 1
4972 4994 638 3456 4182 4315	1 1 1 1 1 1	1 1 1 1 1
150 650 2863 2841	1 1 1 1 1 1	1 1 1 1 1 1
4272 5485 2669 4317 4026 5033 6474	1 1 1 1	1 1 1
316 210 1713 4568 5391 206 557	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1
4053 890 5439 5386 6317 1105 1181 3039	1 1 1 1 1 1 1	1 1 1 1 1 1 1
5039 4461 542 4517 5953	1 1 1 1	1 1 1 1

[100 rows x 2 columns]