WINE QUALITY

WINE QUALITY

WINE QUALITY

WINE QUALITY

OUR TEAM

KRITTAYA CHIMBUNYOO
650510653

PRAKIT BUATHONG
650510669

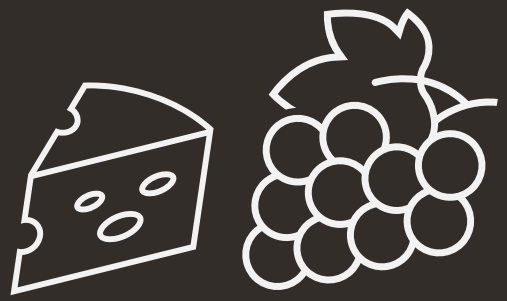
WORADA SAJAI
650510679

DATA SET

CLEAN DATA

VISUA LIZE

CONCLU SION



DATA SET

kaggle

winequality-red

fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
7.4	0.7	0	1.9	0.076	11	34	0.9978	3.51	0.56	9.4	5
7.8	0.88	0	2.6	0.098	25	67	0.9968	3.2	0.68	9.8	5
7.8	0.76	0.04	2.3	0.092	15	54	0.997	3.26	0.65	9.8	5
11.2	0.28	0.56	1.9	0.075	17	60	0.998	3.16	0.58	9.8	6
7.4	0.7	0	1.9	0.076	11	34	0.9978	3.51	0.56	9.4	5
7.4	0.66	0	1.8	0.075	13	40	0.9978	3.51	0.56	9.4	5
7.9	0.6	0.06	1.6	0.069	15	59	0.9964	3.3	0.46	9.4	5
7.3	0.65	0	1.2	0.065	15	21	0.9946	3.39	0.47	10	7
7.8	0.58	0.02	2	0.073	9	18	0.9968	3.36	0.57	9.5	7
7.5	0.5	0.36	6.1	0.071	17	102	0.9978	3.35	0.8	10.5	5
6.7	0.58	0.08	1.8	0.097	15	65	0.9959	3.28	0.54	9.2	5
7.5	0.5	0.36	6.1	0.071	17	102	0.9978	3.35	0.8	10.5	5
5.6	0.615	0	1.6	0.089	16	59	0.9943	3.58	0.52	9.9	5
7.8	0.61	0.29	1.6	0.114	9	29	0.9974	3.26	1.56	9.1	5
8.9	0.62	0.18	3.8	0.176	52	145	0.9986	3.16	0.88	9.2	5
8.9	0.62	0.19	3.9	0.17	51	148	0.9986	3.17	0.93	9.2	5
8.5	0.28	0.56	1.8	0.092	35	103	0.9969	3.3	0.75	10.5	7
8.1	0.56	0.28	1.7	0.368	16	56	0.9968	3.11	1.28	9.3	5
7.4	0.59	0.08	4.4	0.086	6	29	0.9974	3.38	0.5	9	4
7.9	0.32	0.51	1.8	0.341	17	56	0.9969	3.04	1.08	9.2	6
8.9	0.22	0.48	1.8	0.077	29	60	0.9968	3.39	0.53	9.4	6
7.6	0.39	0.31	2.3	0.082	23	71	0.9982	3.52	0.65	9.7	5
7.9	0.43	0.21	1.6	0.106	10	37	0.9966	3.17	0.91	9.5	5
8.5	0.49	0.11	2.3	0.084	9	67	0.9968	3.17	0.53	9.4	5
6.9	0.4	0.14	2.4	0.085	21	40	0.9968	3.43	0.63	9.7	6
6.3	0.39	0.16	1.4	0.08	11	23	0.9955	3.34	0.56	9.3	5
7.6	0.41	0.24	1.8	0.08	4	11	0.9962	3.28	0.59	9.5	5
7.9	0.43	0.21	1.6	0.106	10	37	0.9966	3.17	0.91	9.5	5
7.1	0.71	0	1.9	0.08	14	35	0.9972	3.47	0.55	9.4	5

ที่มาภาพ : https://www.kaggle.com/datasets/joebeachcapital/wine-quality?select=winequality-white.csv

CLEAN DATA

1. Duplicate Value

winequality-red

fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
7.4	0.7	0	1.9	0.076	11	34	0.9978	3.51	0.56	9.4	5
7.8	0.88	0	2.6	0.098	25	67	0.9968	3.2	0.68	9.8	5
7.8	0.76	0.04	2.3	0.092	15	54	0.997	3.26	0.65	9.8	5
11.2	0.28	0.56	1.9	0.075	17	60	0.998	3.16	0.58	9.8	6
7.4	0.7	0	1.9	0.076	11	34	0.9978	3.51	0.56	9.4	5
7.4	0.66	0	1.8	0.075	13	40	0.9978	3.51	0.56	9.4	5
7.9	0.6	0.06	1.6	0.069	15	59	0.9964	3.3	0.46	9.4	5
7.3	0.65	0	1.2	0.065	15	21	0.9946	3.39	0.47	10	7
7.8	0.58	0.02	2	0.073	9	18	0.9968	3.36	0.57	9.5	7
7.5	0.5	0.36	6.1	0.071	17	102	0.9978	3.35	0.8	10.5	5
6.7	0.58	0.08	1.8	0.097	15	65	0.9959	3.28	0.54	9.2	5
7.5	0.5	0.36	6.1	0.071	17	102	0.9978	3.35	0.8	10.5	5
5.6	0.615	0	1.6	0.089	16	59	0.9943	3.58	0.52	9.9	5
7.8	0.61	0.29	1.6	0.114	9	29	0.9974	3.26	1.56	9.1	5
8.9	0.62	0.18	3.8	0.176	52	145	0.9986	3.16	0.88	9.2	5
8.9	0.62	0.19	3.9	0.17	51	148	0.9986	3.17	0.93	9.2	5
8.5	0.28	0.56	1.8	0.092	35	103	0.9969	3.3	0.75	10.5	7
8.1	0.56	0.28	1.7	0.368	16	56	0.9968	3.11	1.28	9.3	5
7.4	0.59	0.08	4.4	0.086	6	29	0.9974	3.38	0.5	9	4
7.9	0.32	0.51	1.8	0.341	17	56	0.9969	3.04	1.08	9.2	6
8.9	0.22	0.48	1.8	0.077	29	60	0.9968	3.39	0.53	9.4	6
7.6	0.39	0.31	2.3	0.082	23	71	0.9982	3.52	0.65	9.7	5
7.9	0.43	0.21	1.6	0.106	10	37	0.9966	3.17	0.91	9.5	5
8.5	0.49	0.11	2.3	0.084	9	67	0.9968	3.17	0.53	9.4	5
6.9	0.4	0.14	2.4	0.085	21	40	0.9968	3.43	0.63	9.7	6
6.3	0.39	0.16	1.4	0.08	11	23	0.9955	3.34	0.56	9.3	5
7.6	0.41	0.24	1.8	0.08	4	11	0.9962	3.28	0.59	9.5	5
7.9	0.43	0.21	1.6	0.106	10	37	0.9966	3.17	0.91	9.5	5
7.1	0.71	0	1.9	0.08	14	35	0.9972	3.47	0.55	9.4	5

2.Outlier Value

11.1	0.31	0.53	2.2	0.06	3	10	0.99572	3.02	0.83	10.9	7
11.1	0.31	0.53	2.2	0.06	3	10	0.99572	3.02	0.83	10.9	7
8	0.62	0.35	2.8	0.086	28	52	0.997	3.31	0.62	10.8	5
9.3	0.33	0.45	1.5	0.057	19	37	0.99498	3.18	0.89	11.1	7
7.5	0.77	0.2	8.1	0.098	30	92	0.99892	3.2	0.58	9.2	5
7.2	0.35	0.26	1.8	0.083	33	75	0.9968	3.4	0.58	9.5	6
8	0.62	0.33	2.7	0.088	16	37	0.9972	3.31	0.58	10.7	6
7.5	0.77	0.2	8.1	0.098	30	92	0.99892	3.2	0.58	9.2	5
9.1	0.25	0.34	2	0.071	45	67	0.99769	3.44	0.86	10.2	7
9.9	0.32	0.56	2	0.073	3	8	0.99534	3.15	0.73	11.4	6
8.6	0.37	0.65	6.4	0.08	3	8	0.99817	3.27	0.58	11	5
8.6	0.37	0.65	6.4	0.08	3	8	0.99817	3.27	0.58	11	5
7.9	0.3	0.68	8.3	0.05	37.5	278	0.99316	3.01	0.51	12.3	7
10.3	0.27	0.56	1.4	0.047	3	8	0.99471	3.16	0.51	11.8	6
7.9	0.3	0.68	8.3	0.05	37.5	289	0.99316	3.01	0.51	12.3	7
7.2	0.38	0.3	1.8	0.073	31	70	0.99685	3.42	0.59	9.5	6
8.7	0.42	0.45	2.4	0.072	32	59	0.99617	3.33	0.77	12	6
7.2	0.38	0.3	1.8	0.073	31	70	0.99685	3.42	0.59	9.5	6
6.8	0.48	0.08	1.8	0.074	40	64	0.99529	3.12	0.49	9.6	5
8.5	0.34	0.4	4.7	0.055	3	9	0.99738	3.38	0.66	11.6	7
7.9	0.19	0.42	1.6	0.057	18	30	0.994	3.29	0.69	11.2	6
11.6	0.41	0.54	1.5	0.095	22	41	0.99735	3.02	0.76	9.9	7
11.6	0.41	0.54	1.5	0.095	22	41	0.99735	3.02	0.76	9.9	7
10	0.26	0.54	1.9	0.083	42	74	0.99451	2.98	0.63	11.8	8
7.9	0.34	0.42	2	0.086	8	19	0.99546	3.35	0.6	11.4	6
7	0.54	0.09	2	0.081	10	16	0.99479	3.43	0.59	11.5	6
9.2	0.31	0.36	2.2	0.079	11	31	0.99615	3.33	0.86	12	7

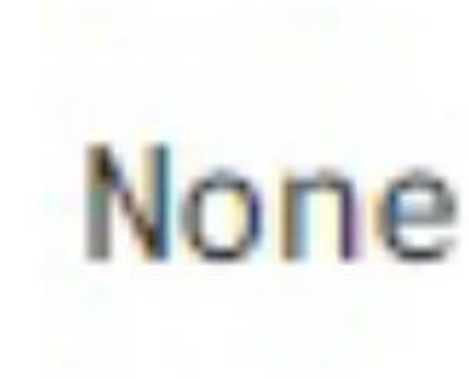
3.Missing Value

7. Attribute information:

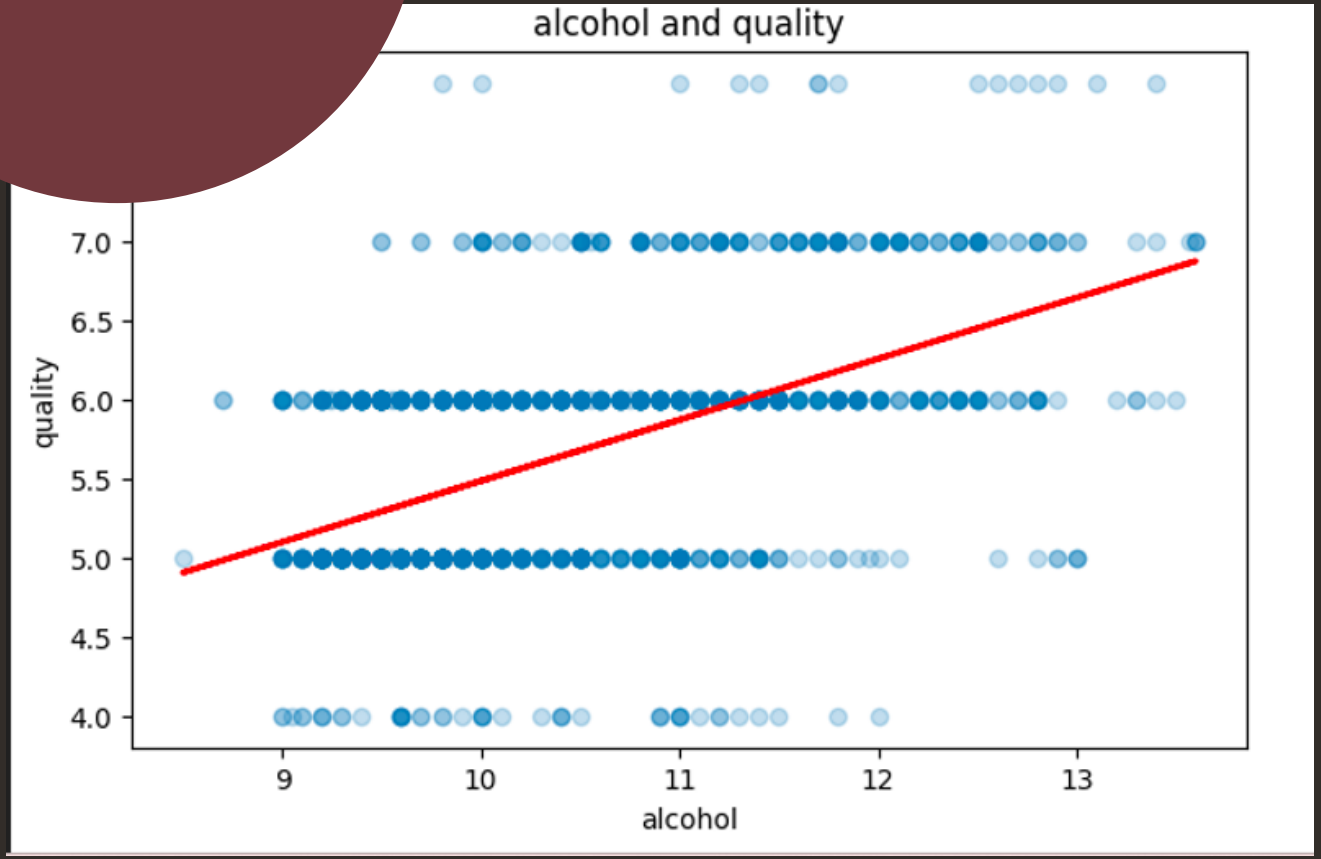
   For more information, read [Cortez et al., 2009].

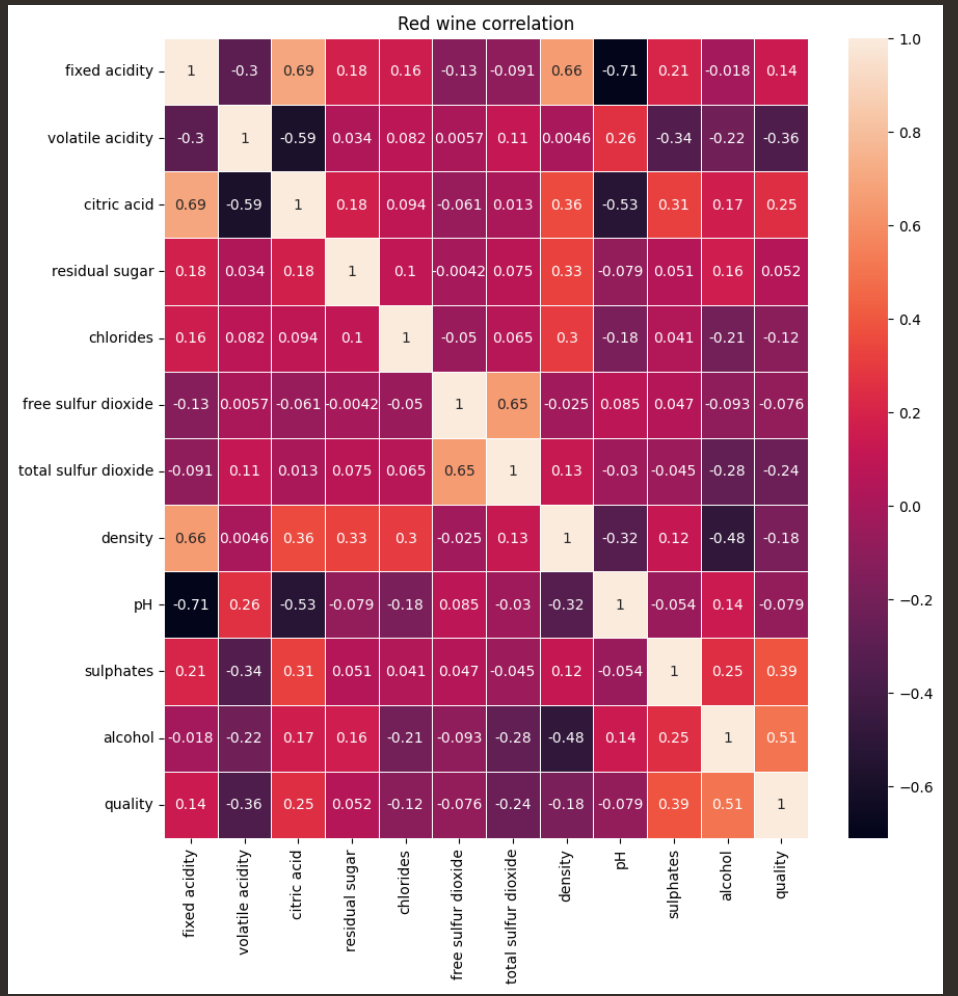
   Input variables (based on physicochemical tests):
   1 - fixed acidity
   2 - volatile acidity
   3 - citric acid
   4 - residual sugar
   5 - chlorides
   6 - free sulfur dioxide
   7 - total sulfur dioxide
   8 - density
   9 - pH
   10 - sulphates
   11 - alcohol
   Output variable (based on sensory data):
   12 - quality (score between 0 and 10)

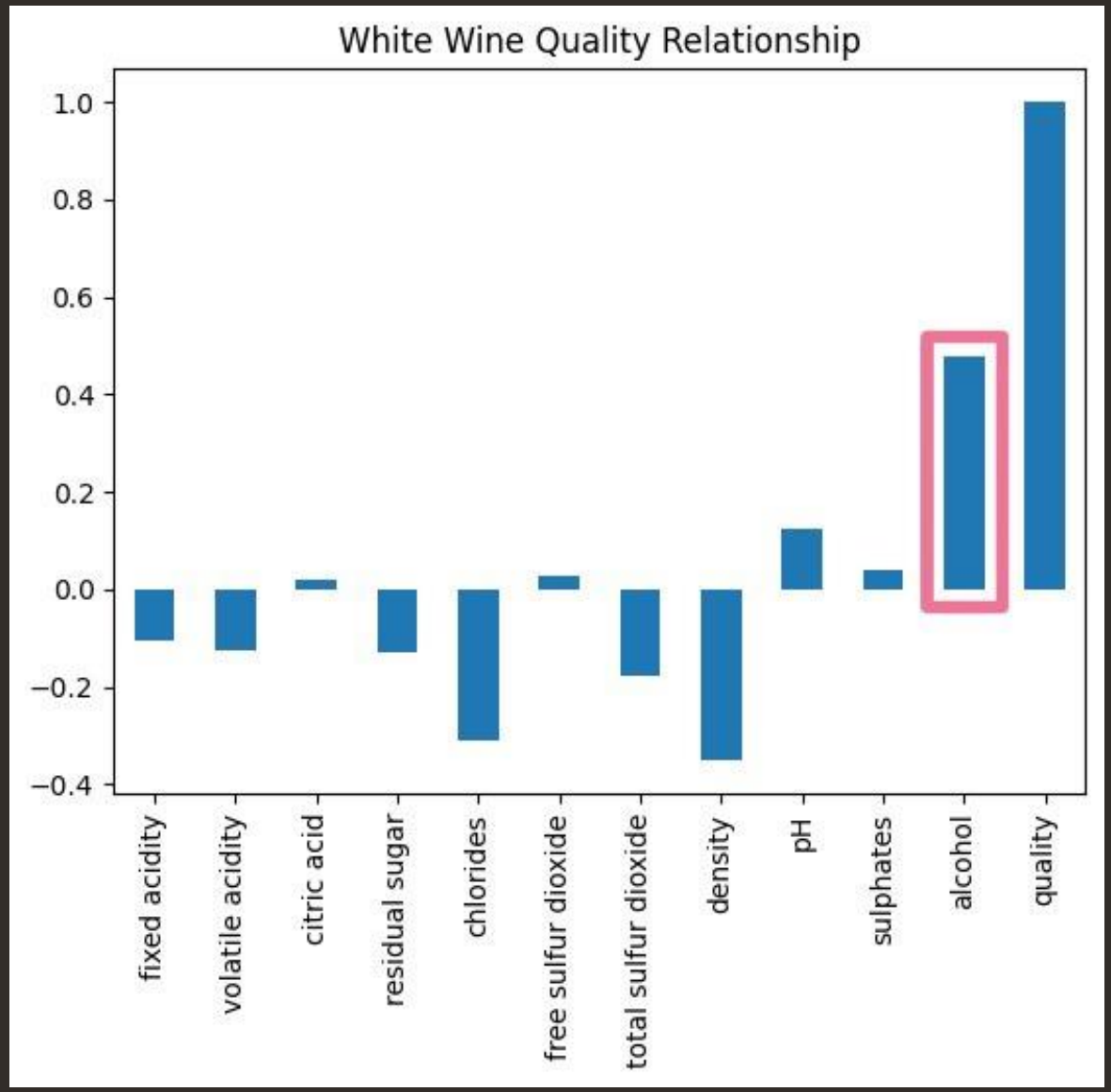
8. Missing Attribute Values: None

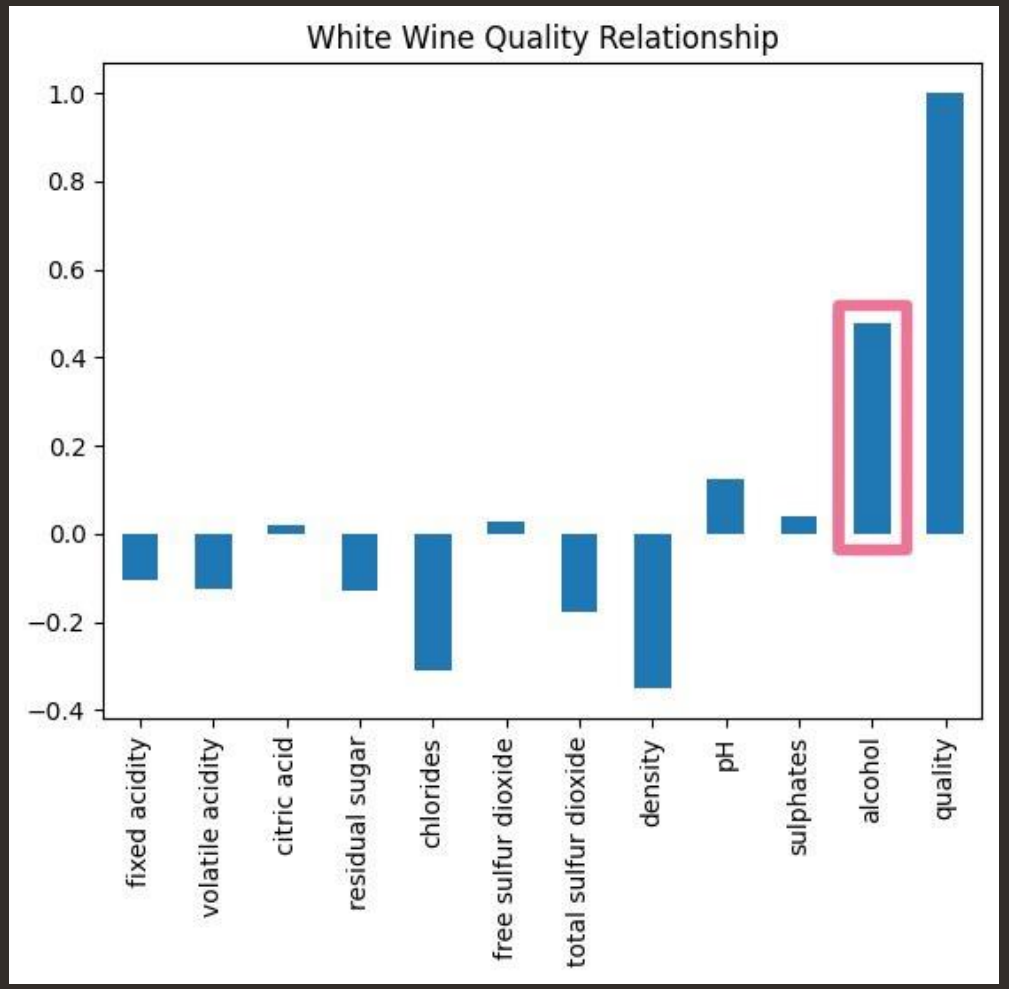


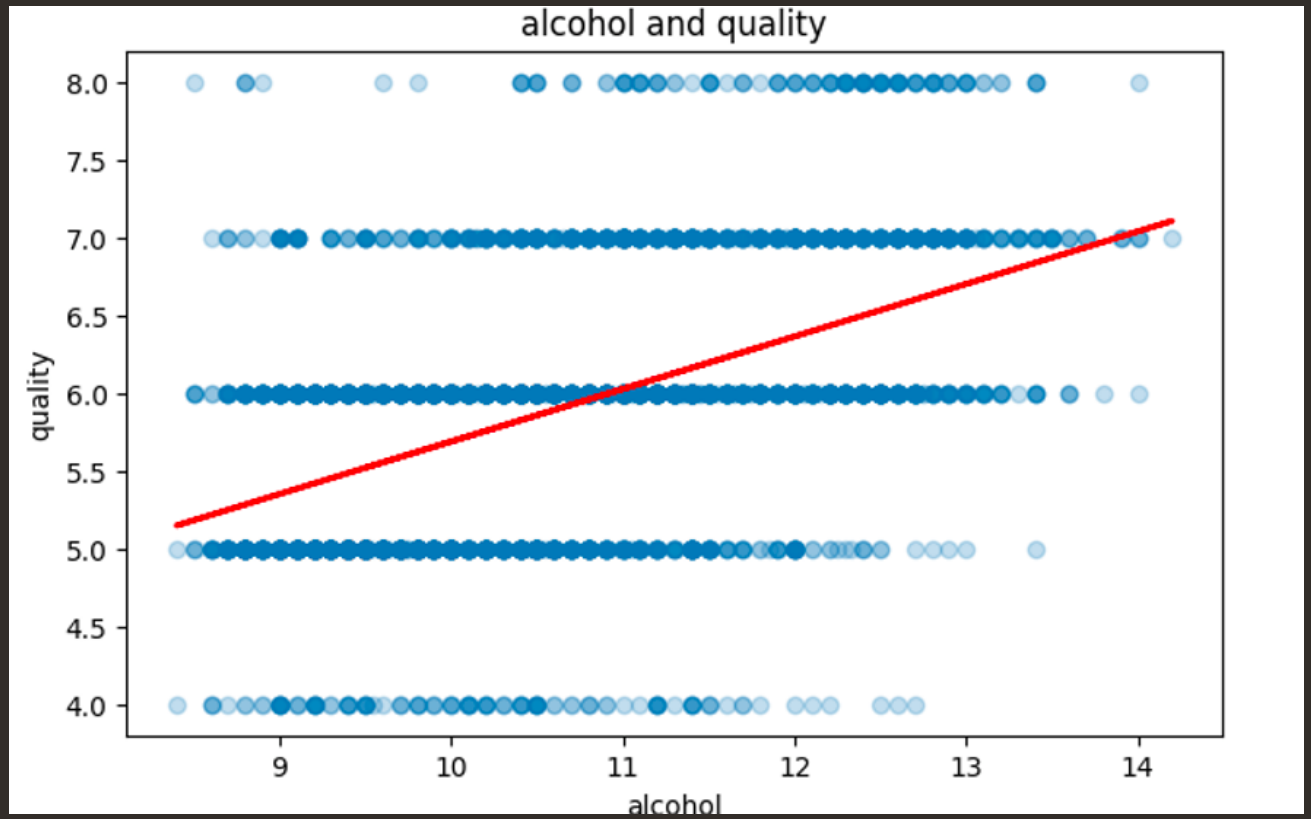
VISUALIZE

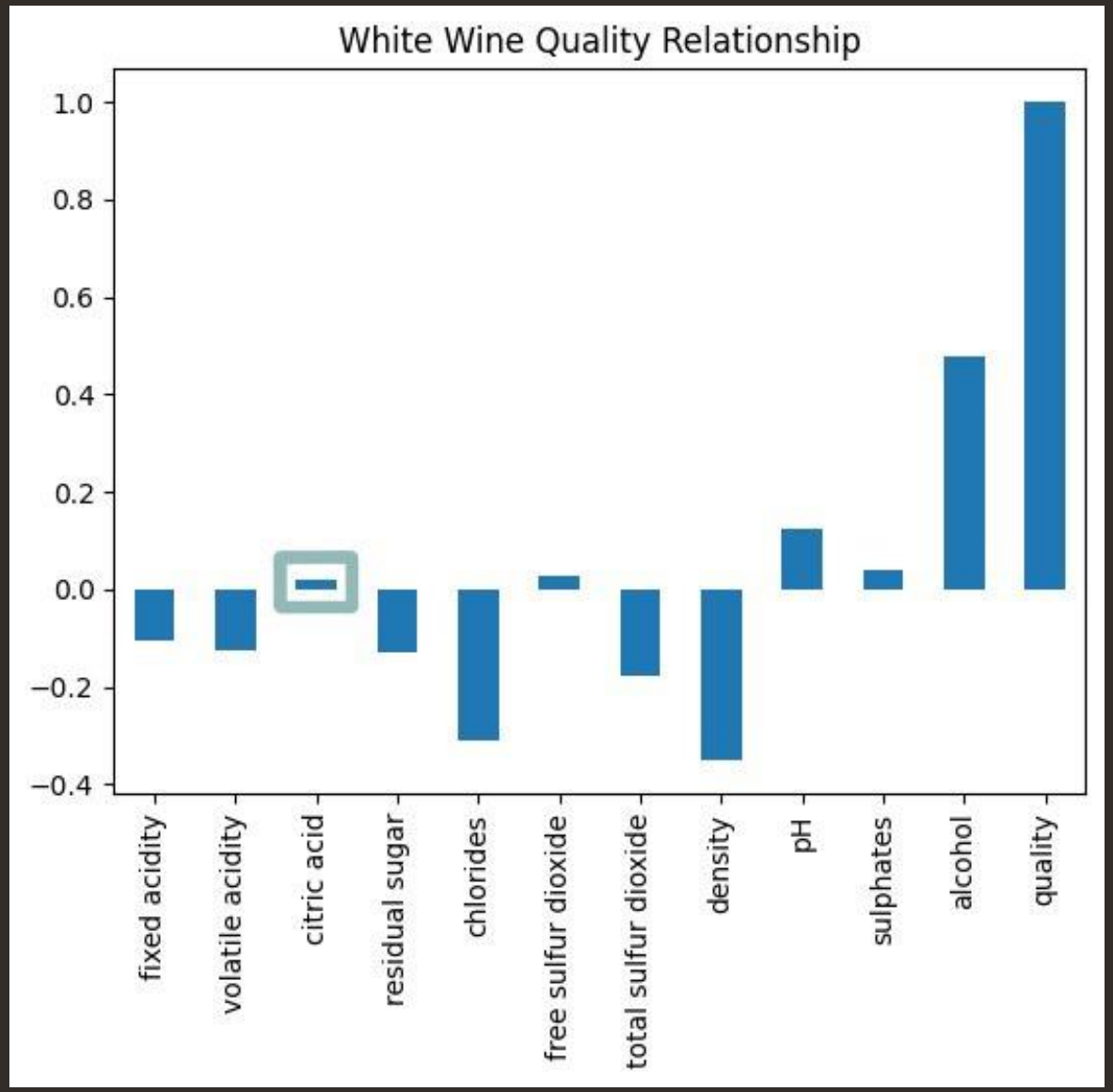

alcohol and quality
quality
alcohol
7.0
6.5
6.0
5.5
5.0
4.5
4.0
9
10
11
12
13

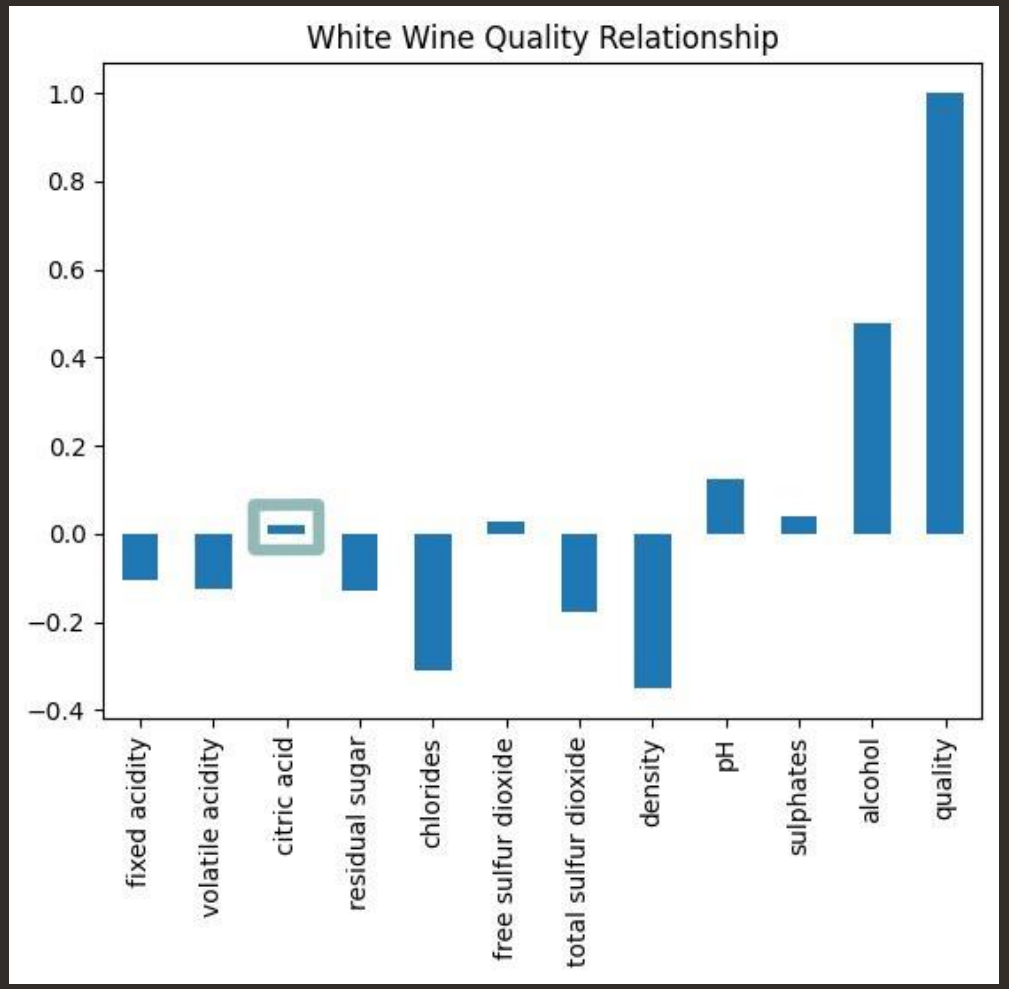

Red wine correlation
fixed acidity 1 -0.3 0.69 0.18 0.16 -0.13 -0.091 0.66 -0.71 0.21 -0.018 0.14
volatile acidity -0.3 1 -0.59 0.034 0.082 0.0057 0.11 0.0046 0.26 -0.34 -0.22 -0.36
citric acid 0.69 -0.59 1 0.18 0.094 -0.061 0.013 0.36 -0.53 0.31 0.17 0.25
residual sugar 0.18 0.034 0.18 1 0.1 -0.0042 0.075 0.33 -0.079 0.051 0.16 0.052
chlorides 0.16 0.082 0.094 0.1 1 -0.05 0.065 0.3 -0.18 0.041 -0.21 -0.12
free sulfur dioxide -0.13 0.0057 -0.061 -0.0042 -0.05 1 0.65 -0.025 0.085 0.047 -0.093 -0.076
total sulfur dioxide -0.091 0.11 0.013 0.075 0.065 0.65 1 0.13 -0.03 -0.045 -0.28 -0.24
density 0.66 0.0046 0.36 0.33 0.3 -0.025 0.13 1 -0.32 0.12 -0.48 -0.18
pH -0.71 0.26 -0.53 -0.079 -0.18 0.085 -0.03 -0.32 1 -0.054 0.14 -0.079
sulphates 0.21 -0.34 0.31 0.051 0.041 0.047 -0.045 0.12 -0.054 1 0.25 0.39
alcohol -0.018 -0.22 0.17 0.16 -0.21 -0.093 -0.28 -0.48 0.14 0.25 1 0.51
quality 0.14 -0.36 0.25 0.052 -0.12 -0.076 -0.24 -0.18 -0.079 0.39 0.51 1
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6

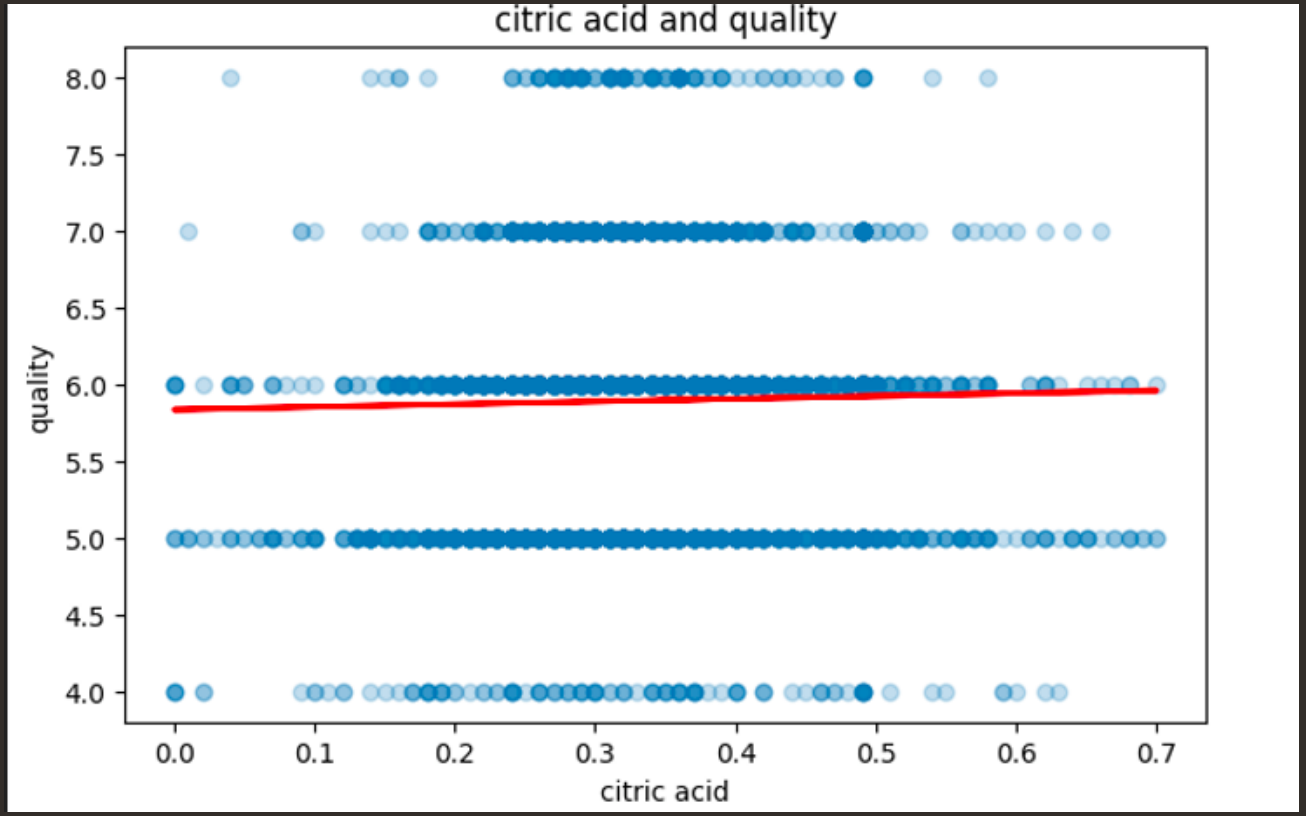

White Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality

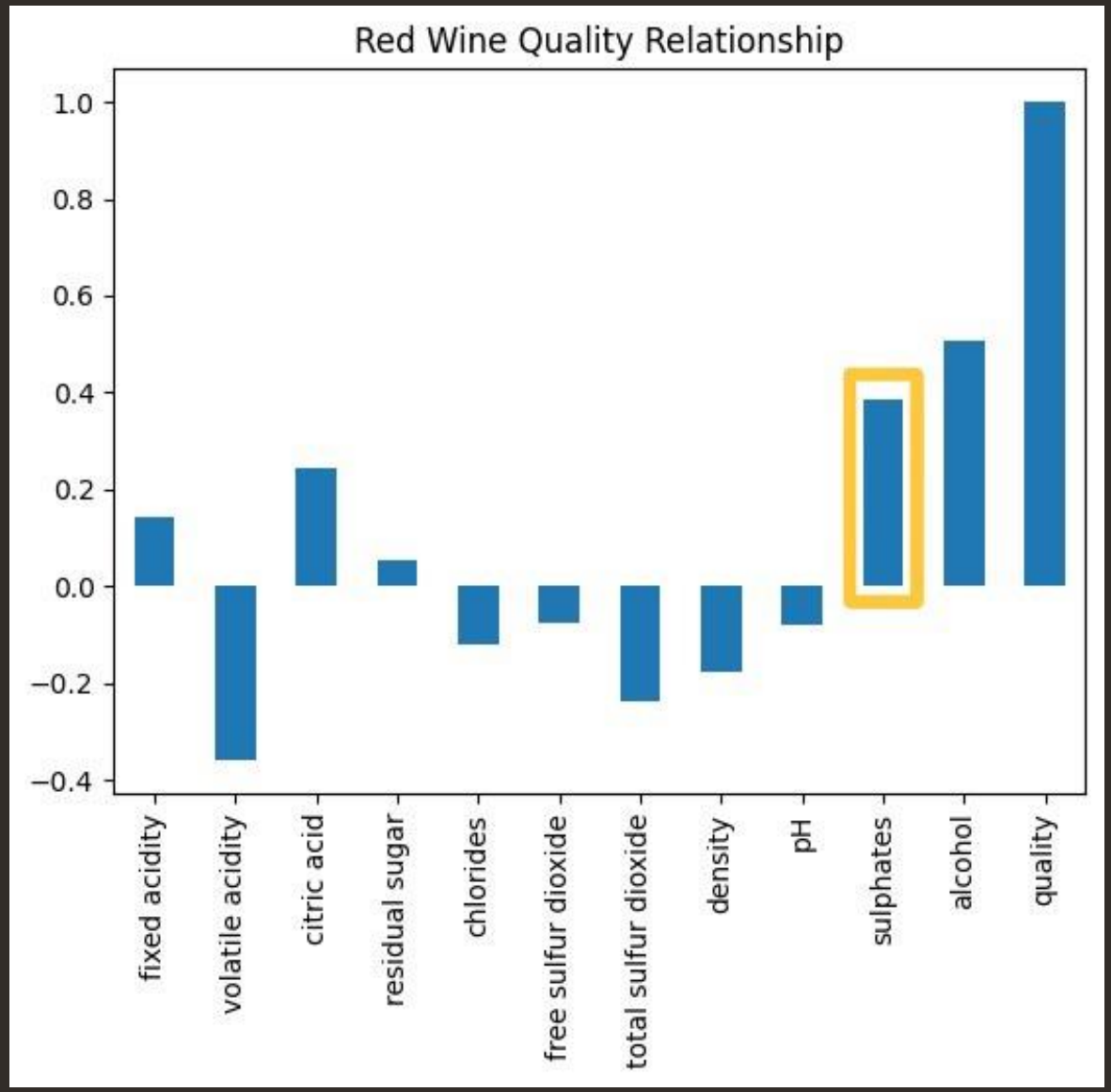

White Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality

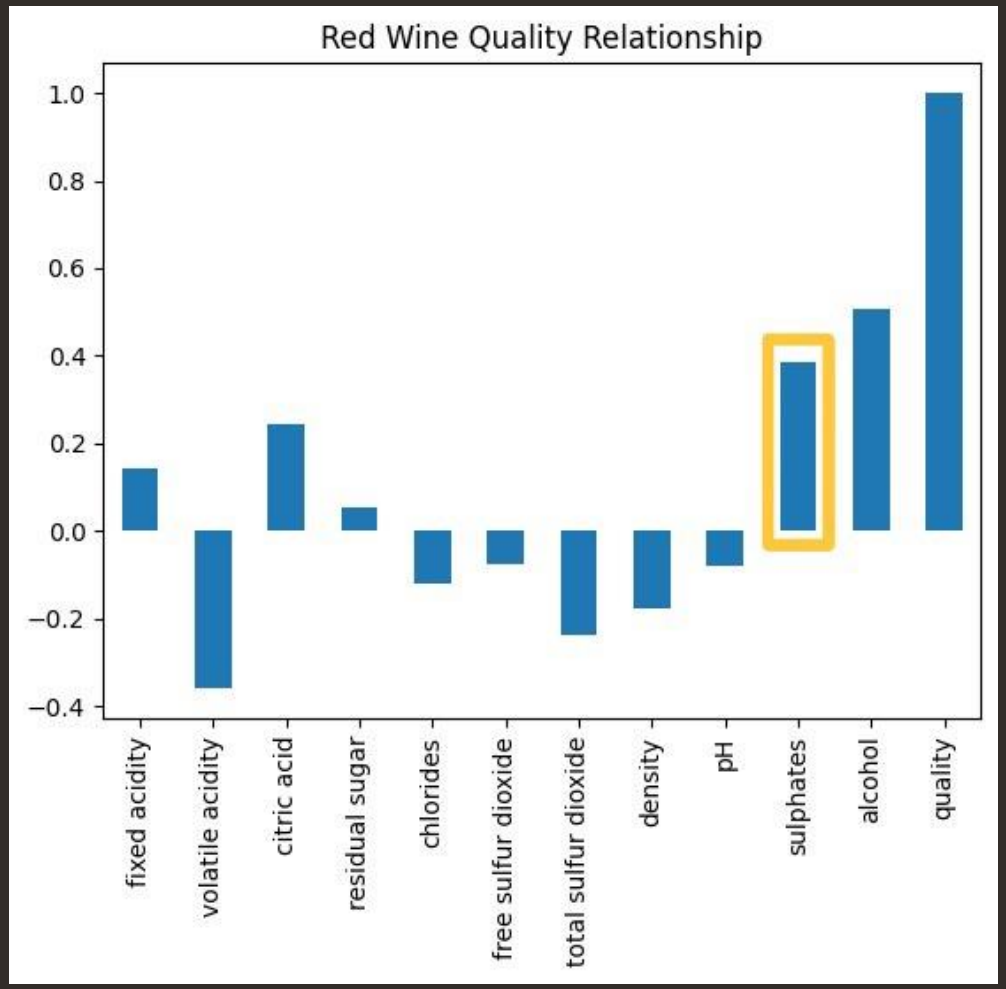

alcohol and quality
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
quality
9
10
11
12
13
14
alcohol

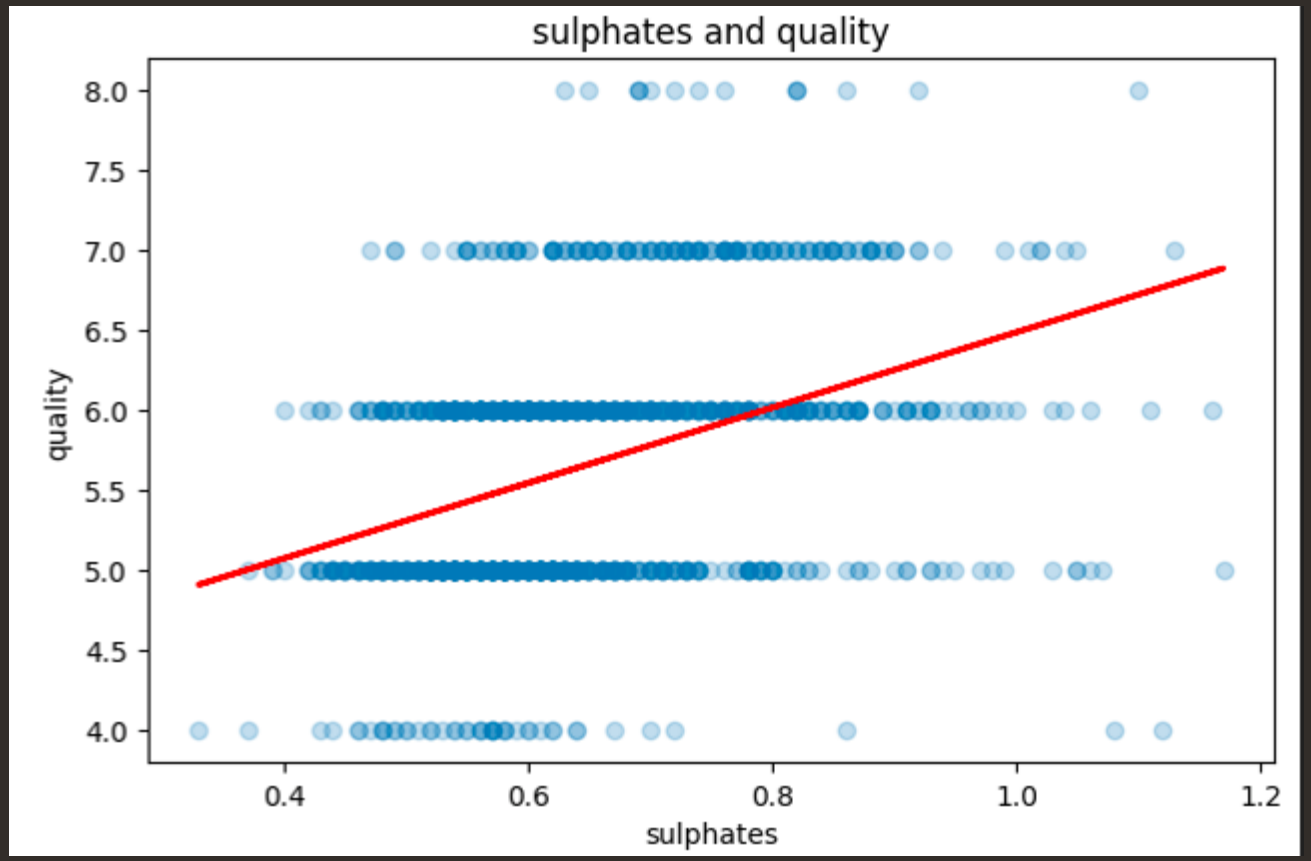

White Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality

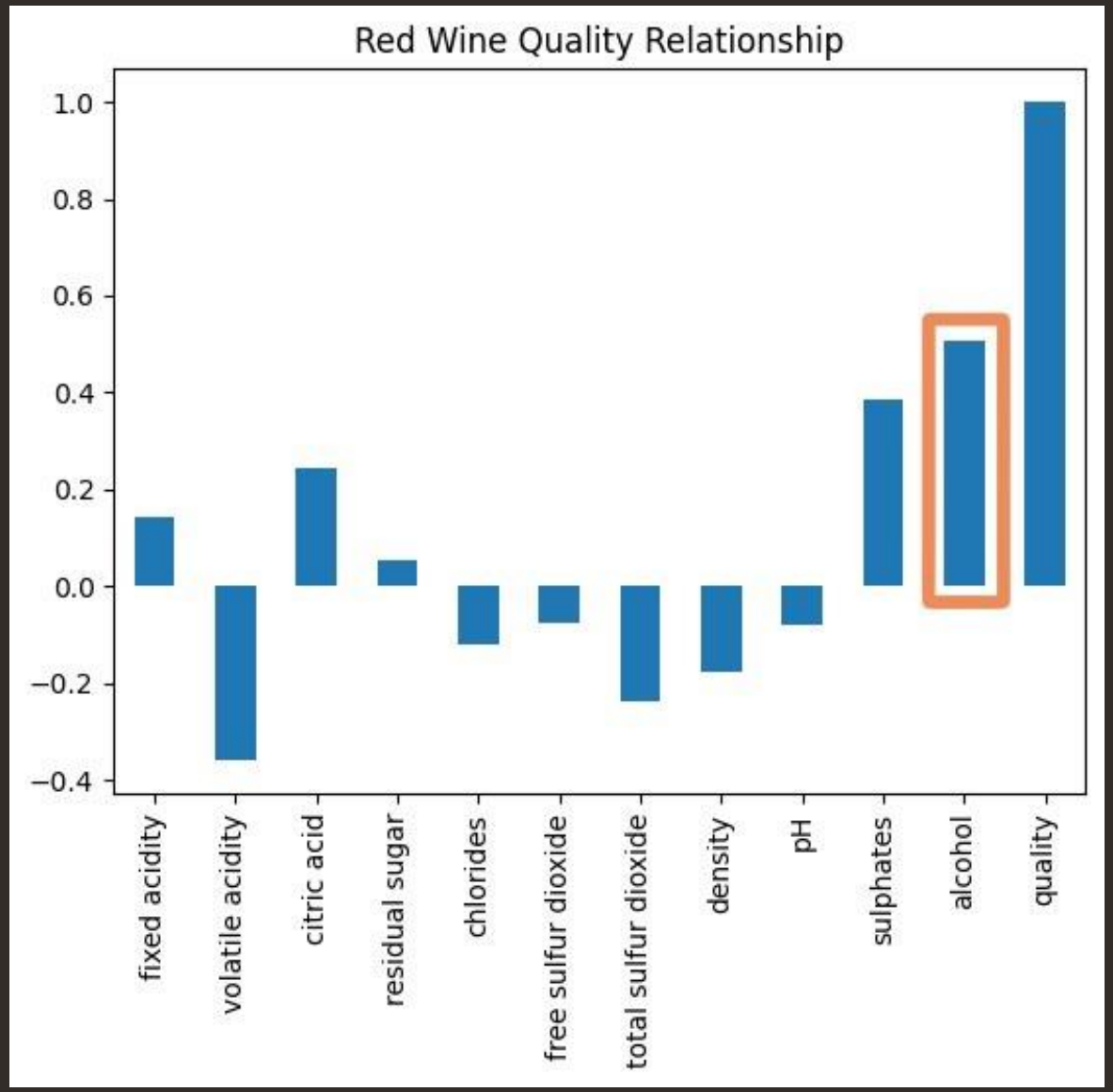

White Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality

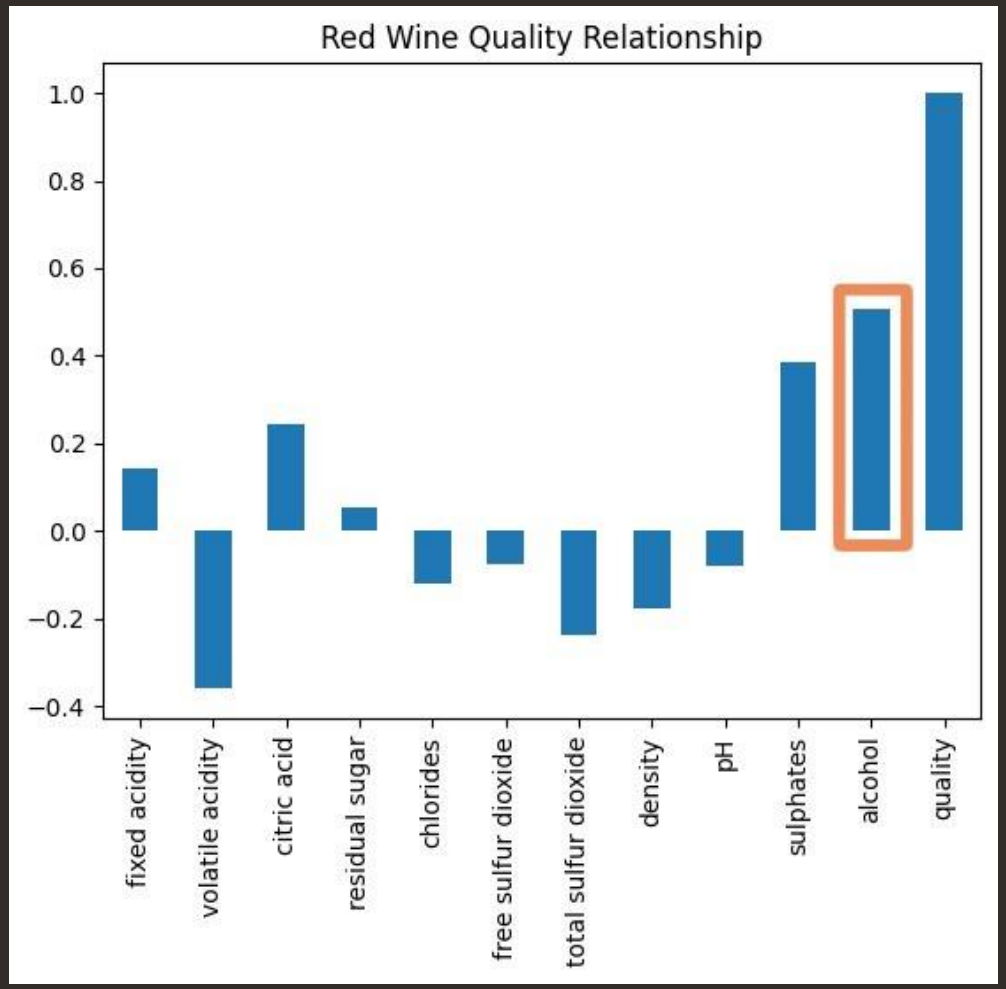

citric acid and quality
quality
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
citric acid

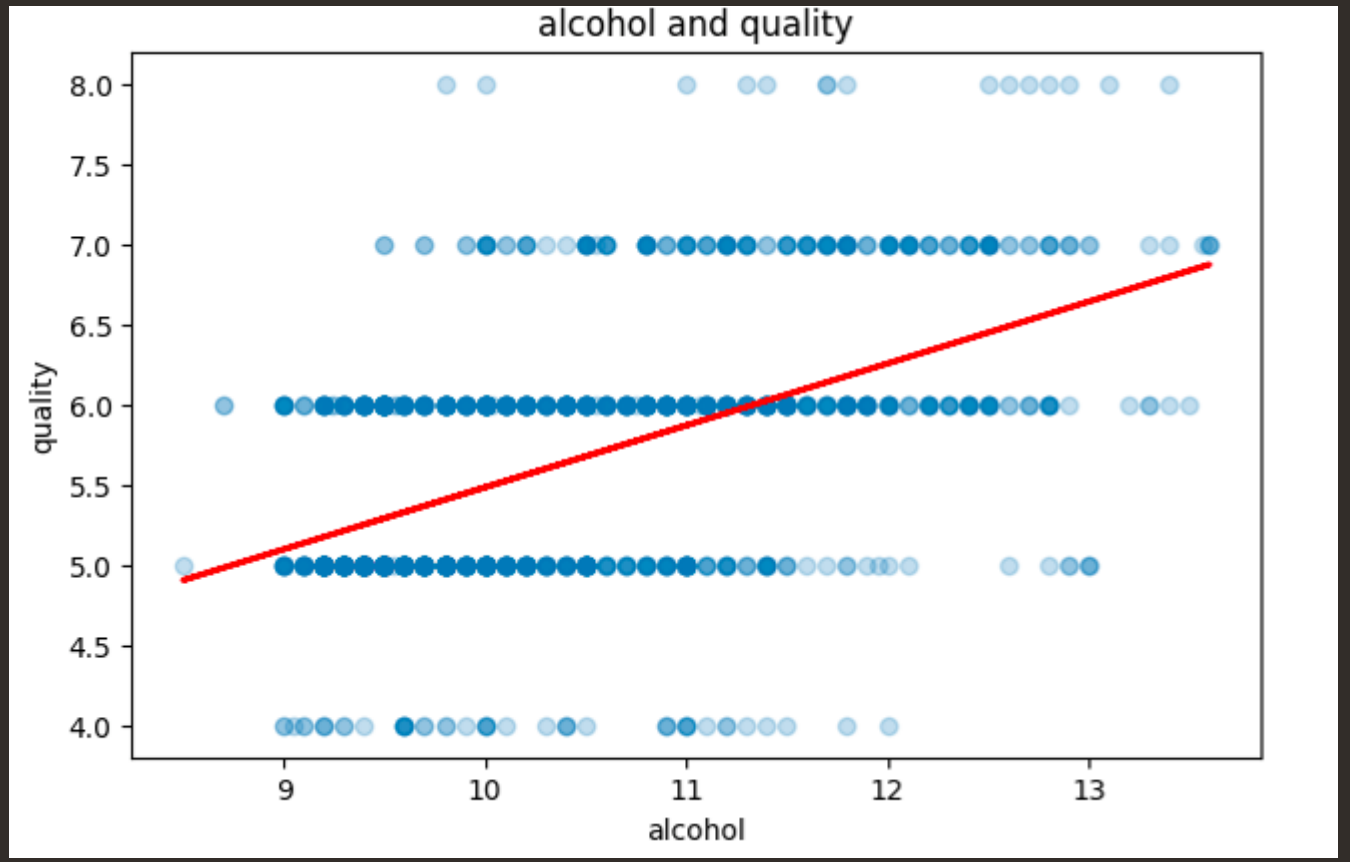

Red Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality

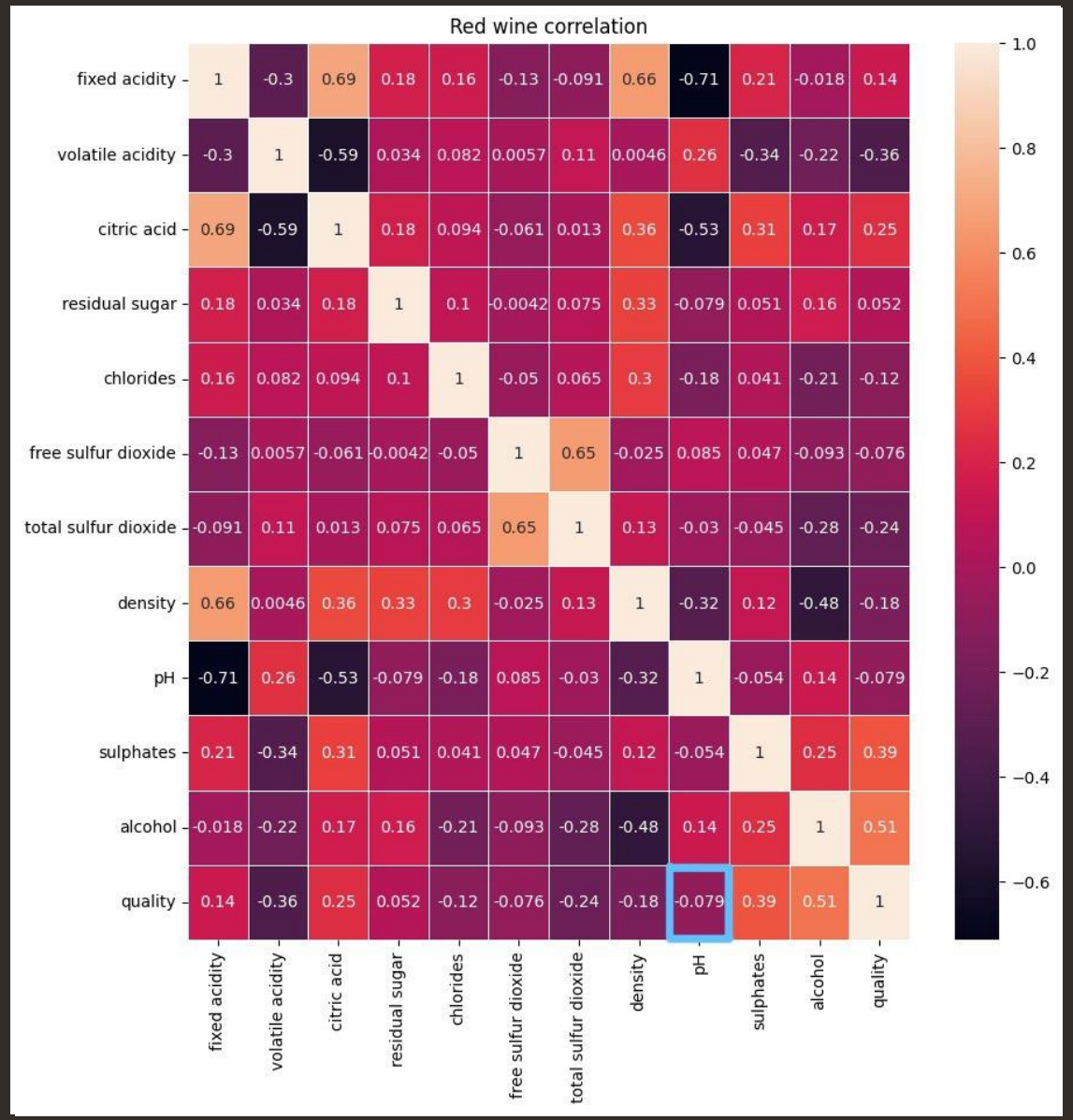

Red Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality

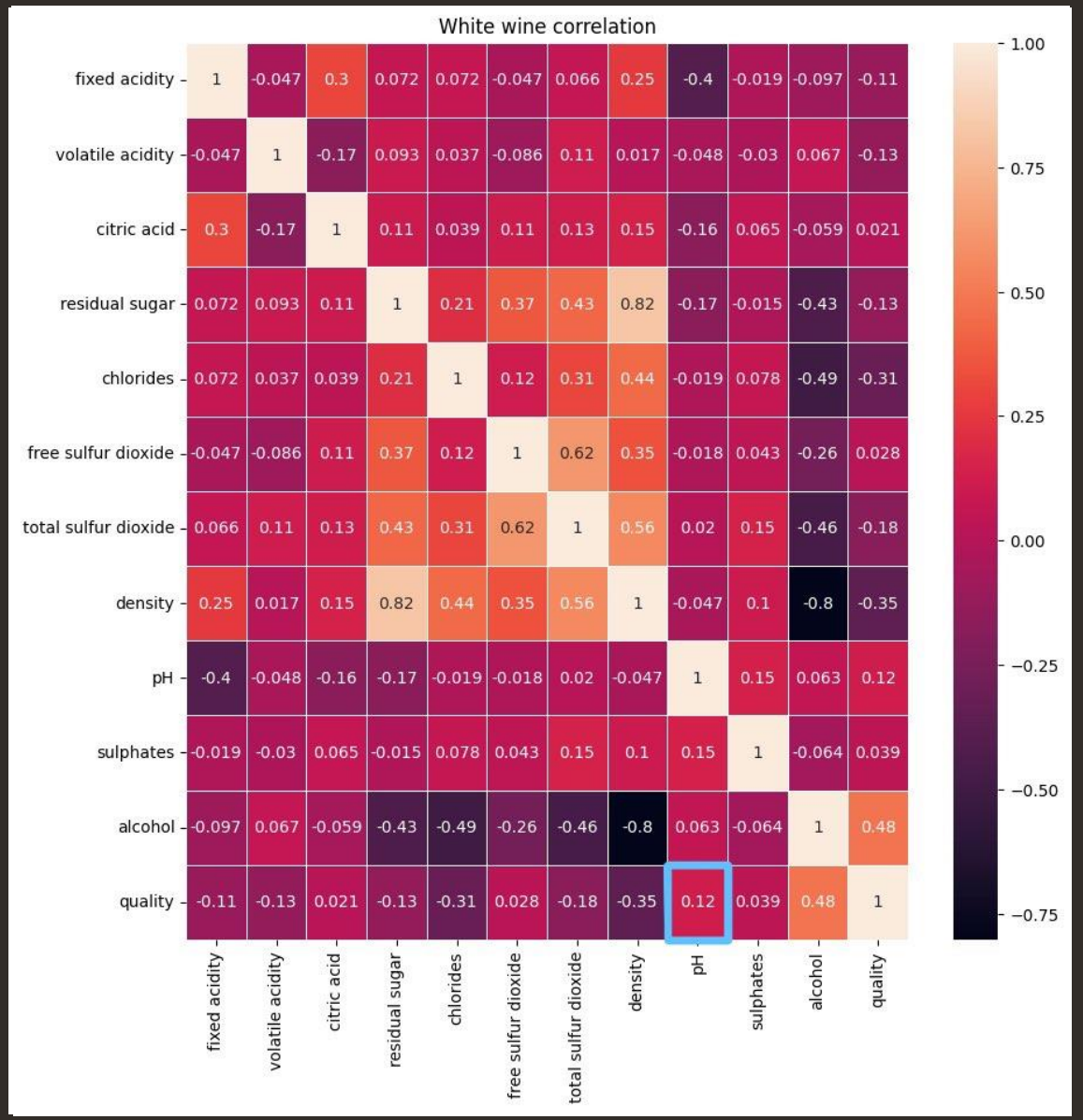

sulphates and quality
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
quality
0.4
0.6
0.8
1.0
1.2
sulphates


Red Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality

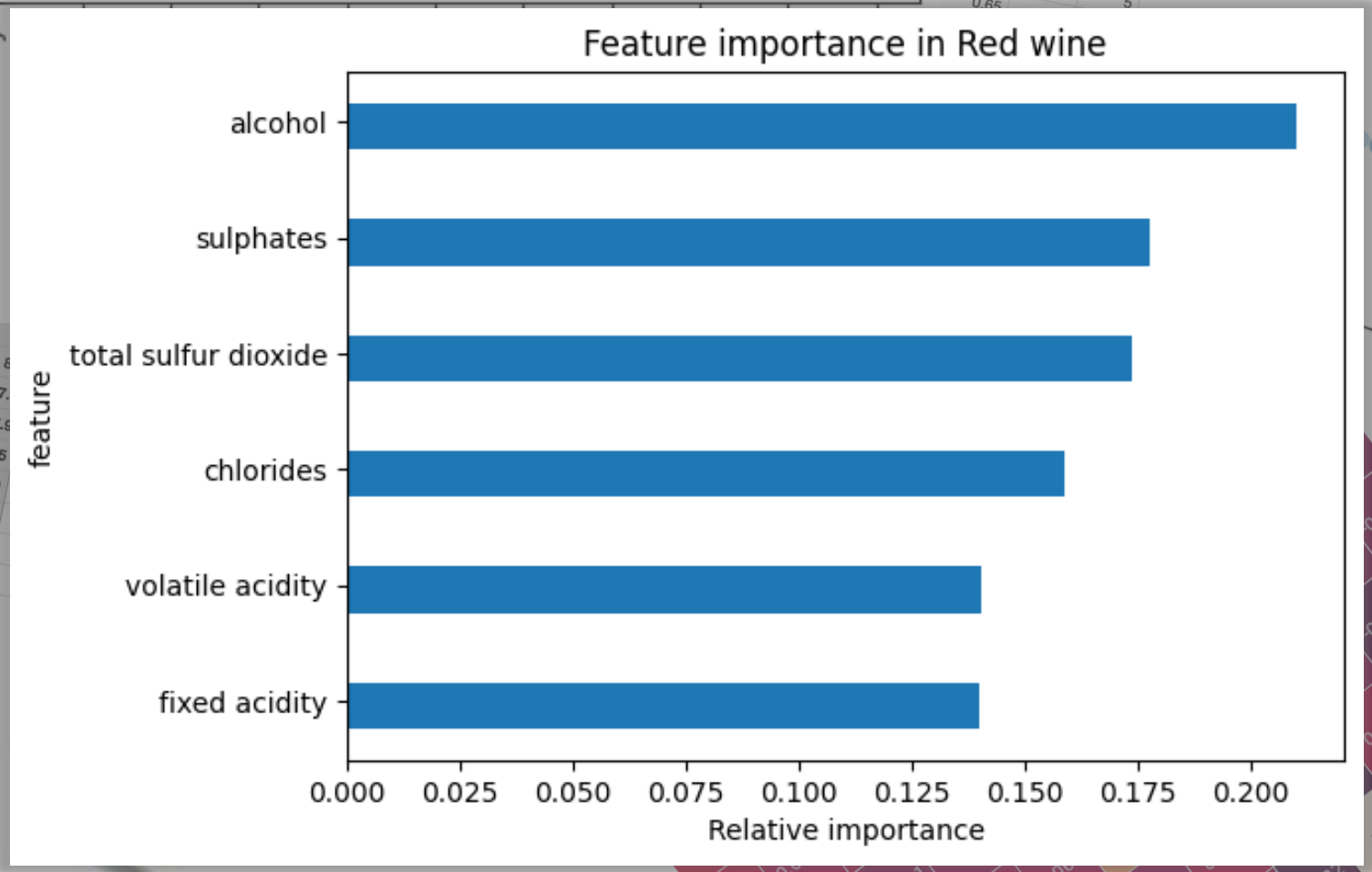

Red Wine Quality Relationship
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality


alcohol and quality
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
quality
9
10
11
12
13
alcohol


Red wine correlation
fixed acidity 1 -0.3 0.69 0.18 0.16 -0.13 -0.091 0.66 -0.71 0.21 -0.018 0.14
volatile acidity -0.3 1 -0.59 0.034 0.082 0.0057 0.11 0.0046 0.26 -0.34 -0.22 -0.36
citric acid 0.69 -0.59 1 0.18 0.094 -0.061 0.013 0.36 -0.53 0.31 0.17 0.25
residual sugar 0.18 0.034 0.18 1 0.1 -0.0042 0.075 0.33 -0.079 0.051 0.16 0.052
chlorides 0.16 0.082 0.094 0.1 1 -0.05 0.065 0.3 -0.18 0.041 -0.21 -0.12
free sulfur dioxide -0.13 0.0057 -0.061 -0.0042 -0.05 1 0.65 -0.025 0.085 0.047 -0.093 -0.076
total sulfur dioxide -0.091 0.11 0.013 0.075 0.065 0.65 1 0.13 -0.03 -0.045 -0.28 -0.24
density 0.66 0.0046 0.36 0.33 0.3 -0.025 0.13 1 -0.32 0.12 -0.48 -0.18
pH -0.71 0.26 -0.53 -0.079 -0.18 0.085 -0.03 -0.32 1 -0.054 0.14 -0.079
sulphates 0.21 -0.34 0.31 0.051 0.041 0.047 -0.045 0.12 -0.054 1 0.25 0.39
alcohol -0.018 -0.22 0.17 0.16 -0.21 -0.093 -0.28 -0.48 0.14 0.25 1 0.51
quality 0.14 -0.36 0.25 0.052 -0.12 -0.076 -0.24 -0.18 -0.079 0.39 0.51 1
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6


White wine correlation
fixed acidity 1 -0.047 0.3 0.072 0.072 -0.047 0.066 0.25 -0.4 -0.019 -0.097 -0.11
volatile acidity -0.047 1 -0.17 0.093 0.037 -0.086 0.11 0.017 -0.048 -0.03 0.067 -0.13
citric acid 0.3 -0.17 1 0.11 0.039 0.11 0.13 0.15 -0.16 0.065 -0.059 0.021
residual sugar 0.072 0.093 0.11 1 0.21 0.37 0.43 0.82 -0.17 -0.015 -0.43 -0.13
chlorides 0.072 0.037 0.039 0.21 1 0.12 0.31 0.44 -0.019 0.078 -0.49 -0.31
free sulfur dioxide -0.047 -0.086 0.11 0.37 0.12 1 0.62 0.35 -0.018 0.043 -0.26 0.028
total sulfur dioxide 0.066 0.11 0.13 0.43 0.31 0.62 1 0.56 0.02 0.15 -0.46 -0.18
density 0.25 0.017 0.15 0.82 0.44 0.35 0.56 1 -0.047 0.1 -0.8 -0.35
pH -0.4 -0.048 -0.16 -0.17 -0.019 -0.018 0.02 -0.047 1 0.15 0.063 0.12
sulphates -0.019 -0.03 0.065 -0.015 0.078 0.043 0.15 0.1 0.15 1 -0.064 0.039
alcohol -0.097 0.067 -0.059 -0.43 -0.49 -0.26 -0.46 -0.8 0.063 -0.064 1 0.48
quality -0.11 -0.13 0.021 -0.13 -0.31 0.028 -0.18 -0.35 0.12 0.039 0.48 1
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75

CONCLUSION


Feature importance in Red wine
alcohol
sulphates
total sulfur dioxide
chlorides
volatile acidity
fixed acidity
feature
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
Relative importance