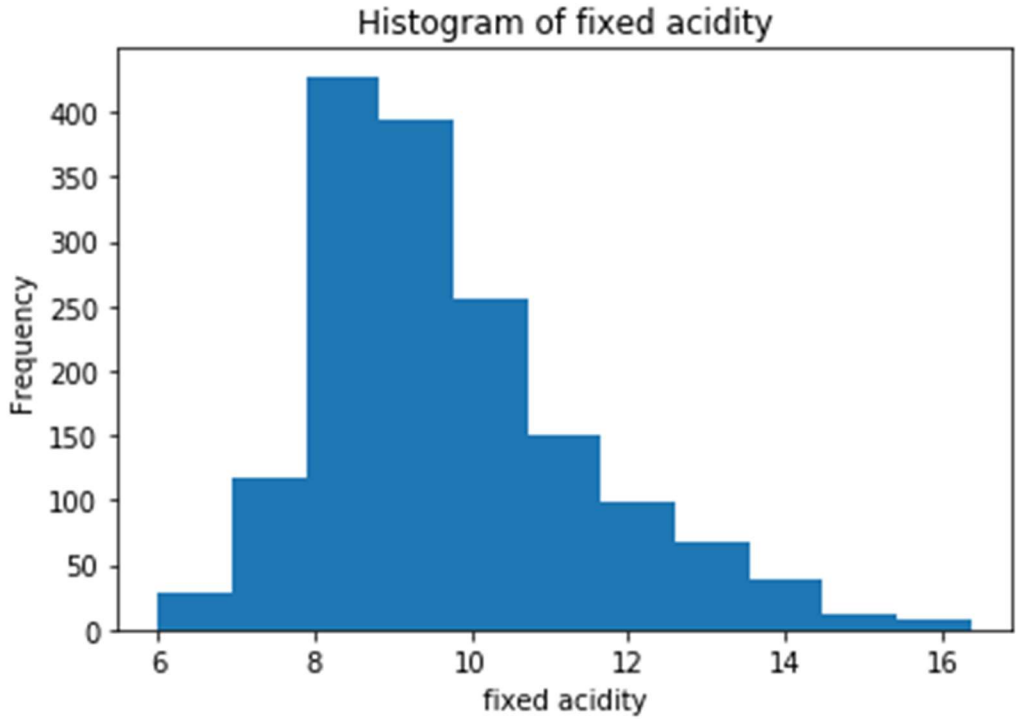
```
Checking whether there is an H2O instance running at http://localhost:54321 . connected.
```

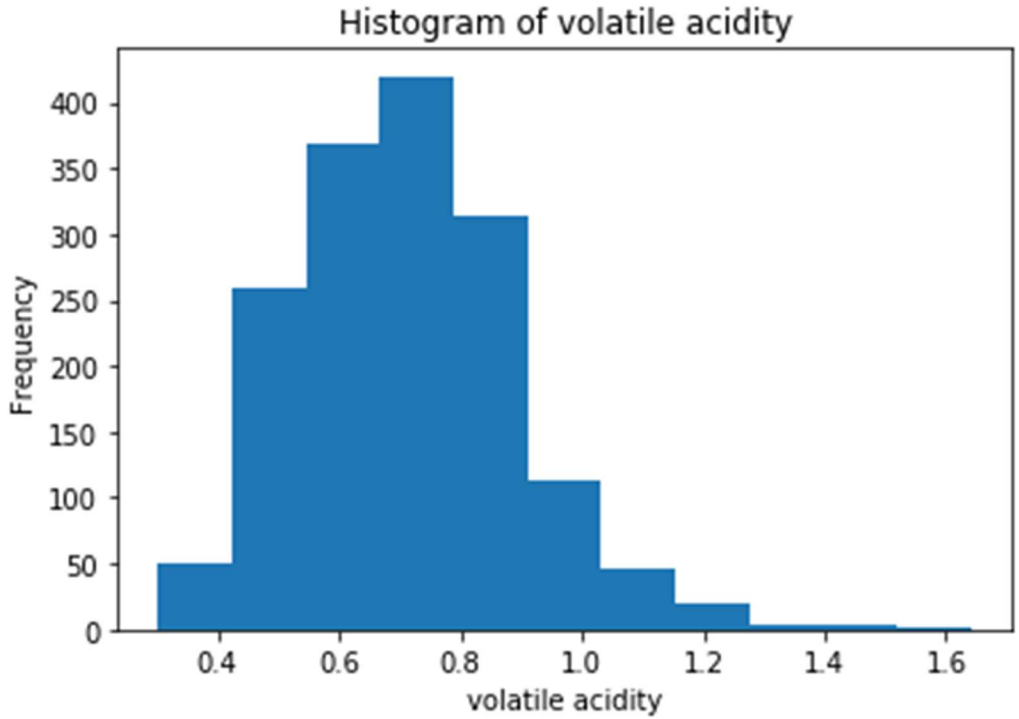
H2O cluster uptime:	11 mins 37 secs
H2O cluster timezone:	America/New_York
H2O data parsing timezone:	UTC
H2O cluster version:	3.26.0.6
H2O cluster version age:	19 days
H2O cluster name:	H2O_from_python_ssafini_hdwmo5
H2O cluster total nodes:	1
H2O cluster free memory:	701 Mb
H2O cluster total cores:	4
H2O cluster allowed cores:	4
H2O cluster status:	locked, healthy
H2O connection url:	http://localhost:54321
H2O connection proxy:	None
H2O internal security:	False
H2O API Extensions:	Amazon S3, Algos, AutoML, Core V3, TargetEncoder, Core V4
Python version:	3.7.3 final

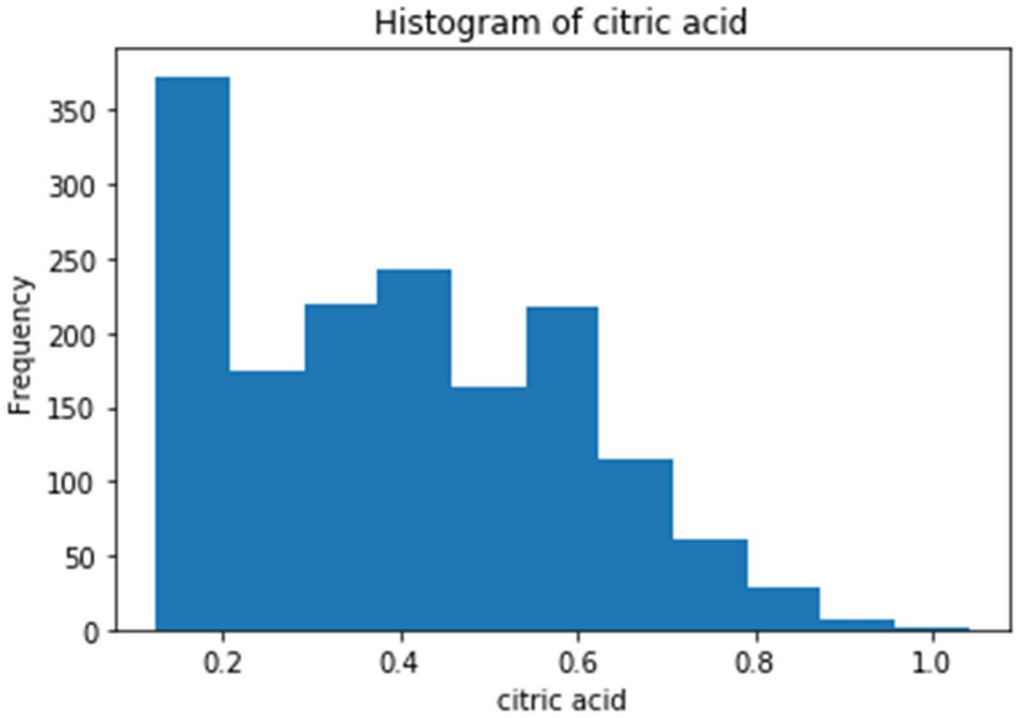
```
Parse progress: |████████████████████████████████████████████████████████████| 100%
```

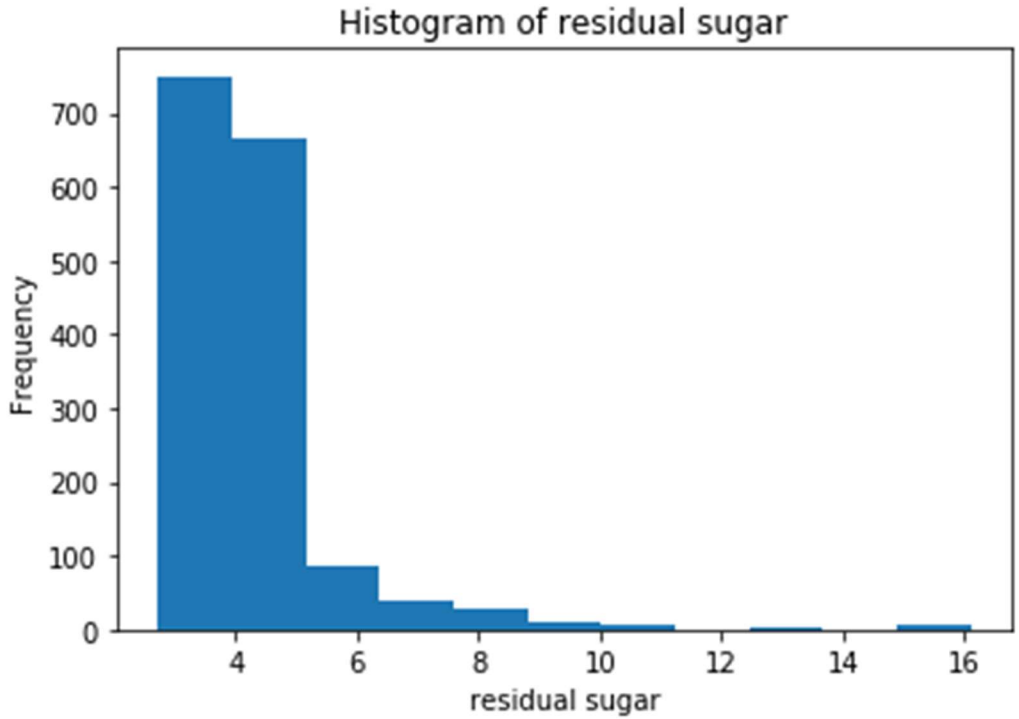
fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
7.4	0.7	0	1.9	0.076	11	34	0.9978	3.51	0.56	9.4	5
7.8	0.88	0	2.6	0.098	25	67	0.9968	3.2	0.68	9.8	5
7.8	0.76	0.04	2.3	0.092	15	54	0.997	3.26	0.65	9.8	5
11.2	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

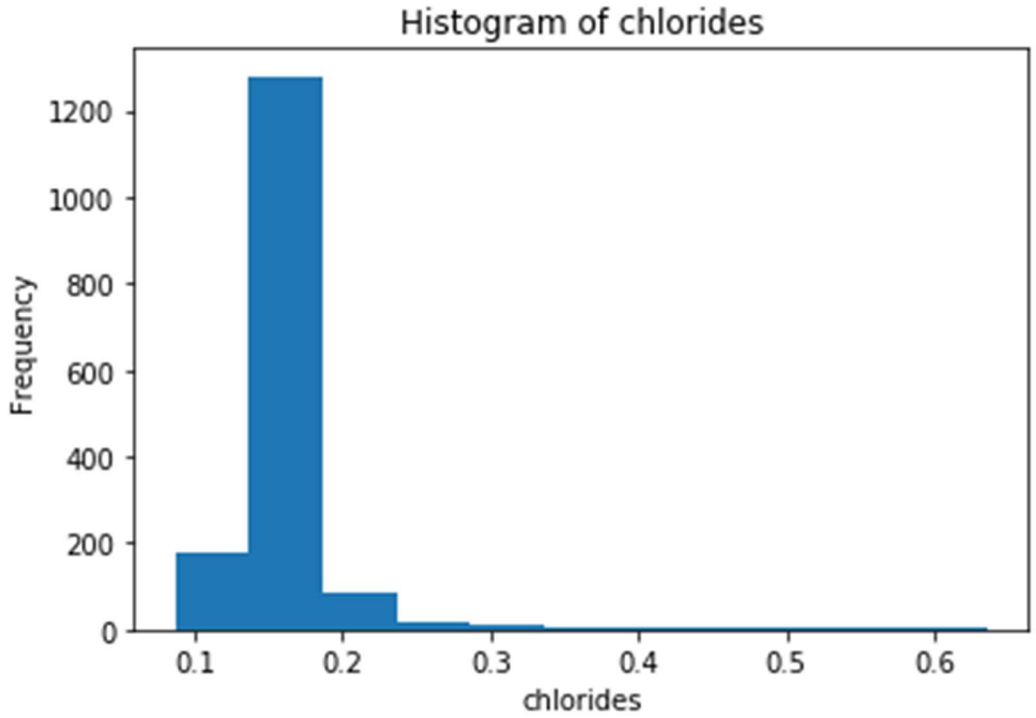
fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
7.4	0.7	0	1.9	0.076	11	34	0.9978	3.51	0.56	9.4	5
7.8	0.88	0	2.6	0.098	25	67	0.9968	3.2	0.68	9.8	5
7.8	0.76	0.04	2.3	0.092	15	54	0.997	3.26	0.65	9.8	5
11.2	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

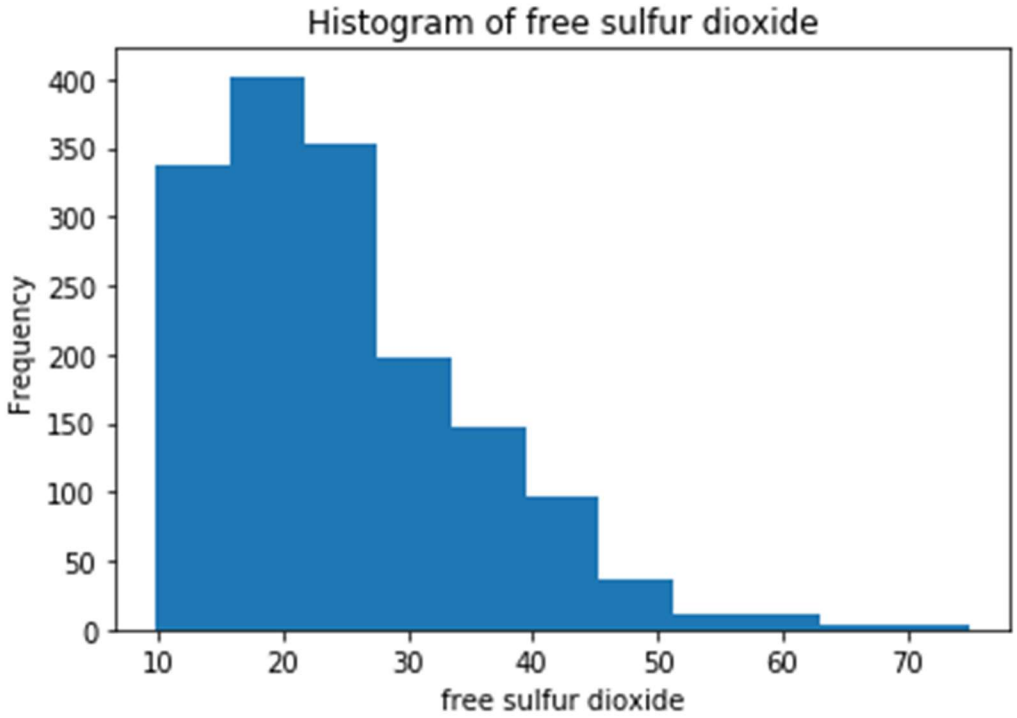

Histogram of fixed acidity
Frequency
0
50
100
150
200
250
300
350
400
6
8
10
12
14
16
fixed acidity

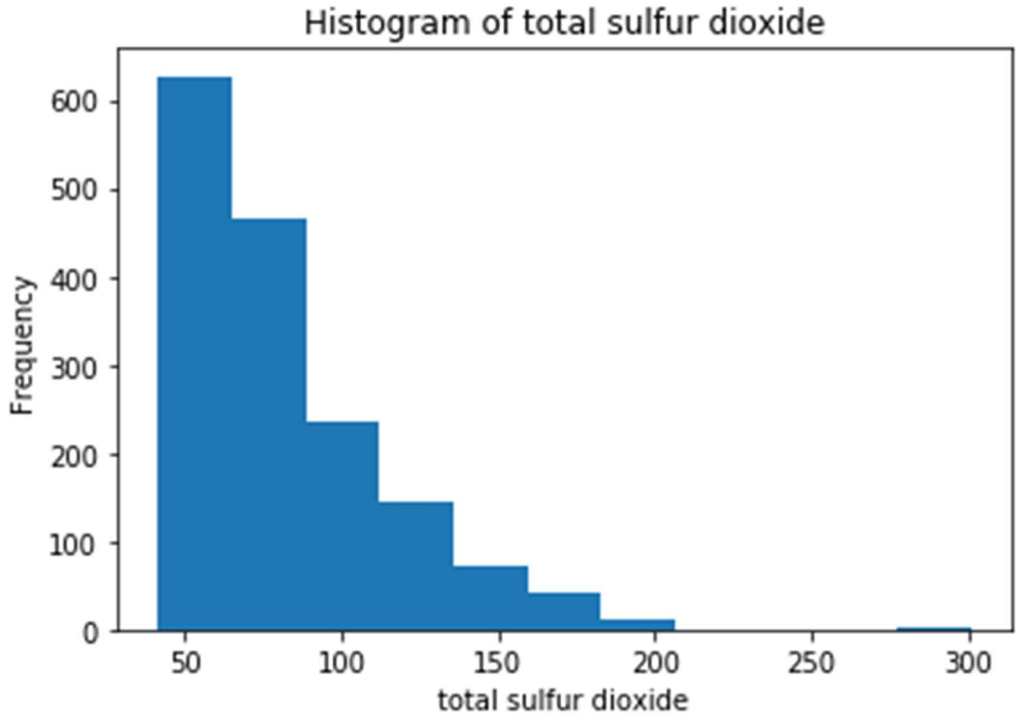

Histogram of volatile acidity
Frequency
400
350
300
250
200
150
100
50
0
0.4
0.6
0.8
1.0
1.2
1.4
1.6
volatile acidity

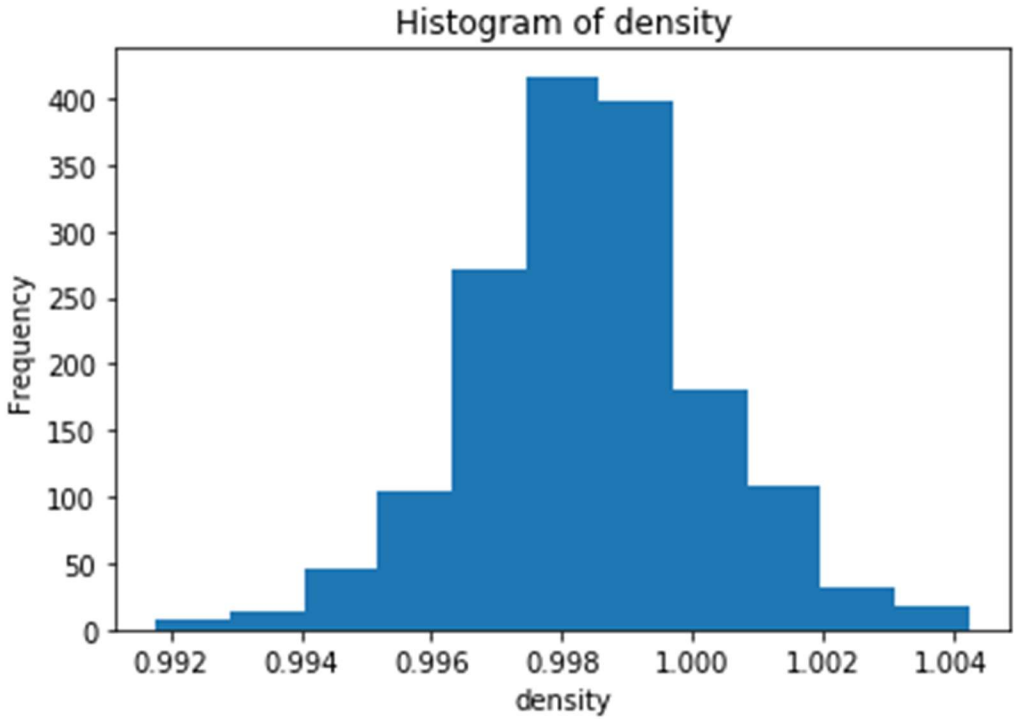

Histogram of citric acid
Frequency
350
300
250
200
150
100
50
0
0.2
0.4
0.6
0.8
1.0
citric acid

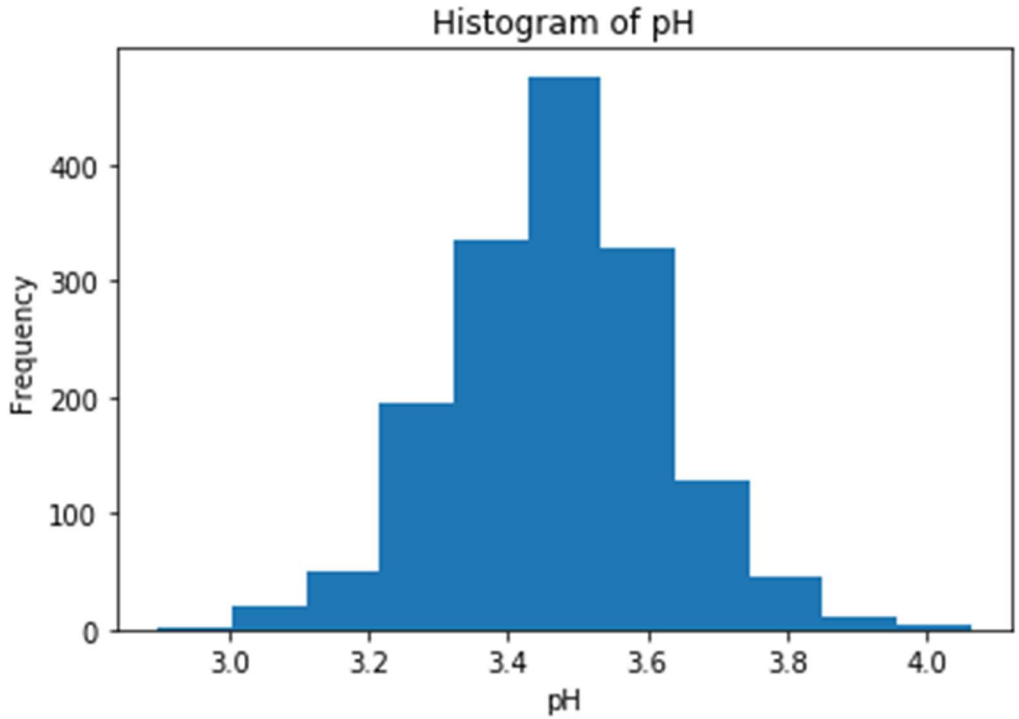

Histogram of residual sugar
Frequency
0
100
200
300
400
500
600
700
4
6
8
10
12
14
16
residual sugar

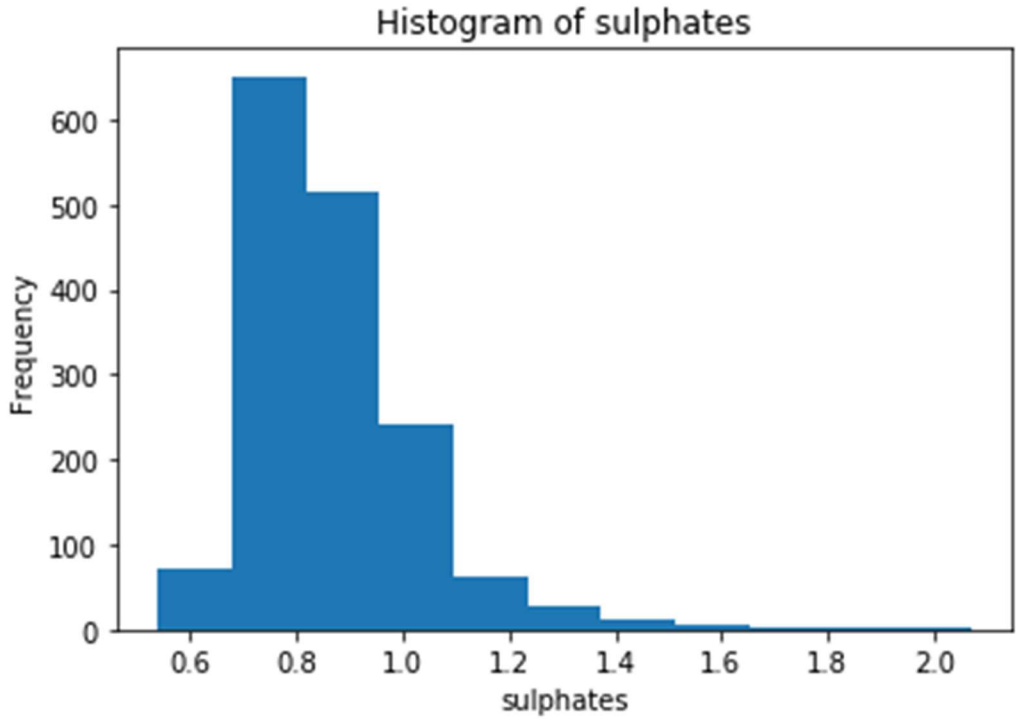

Histogram of chlorides
Frequency
1200
1000
800
600
400
200
0
0.1
0.2
0.3
0.4
0.5
0.6
chlorides

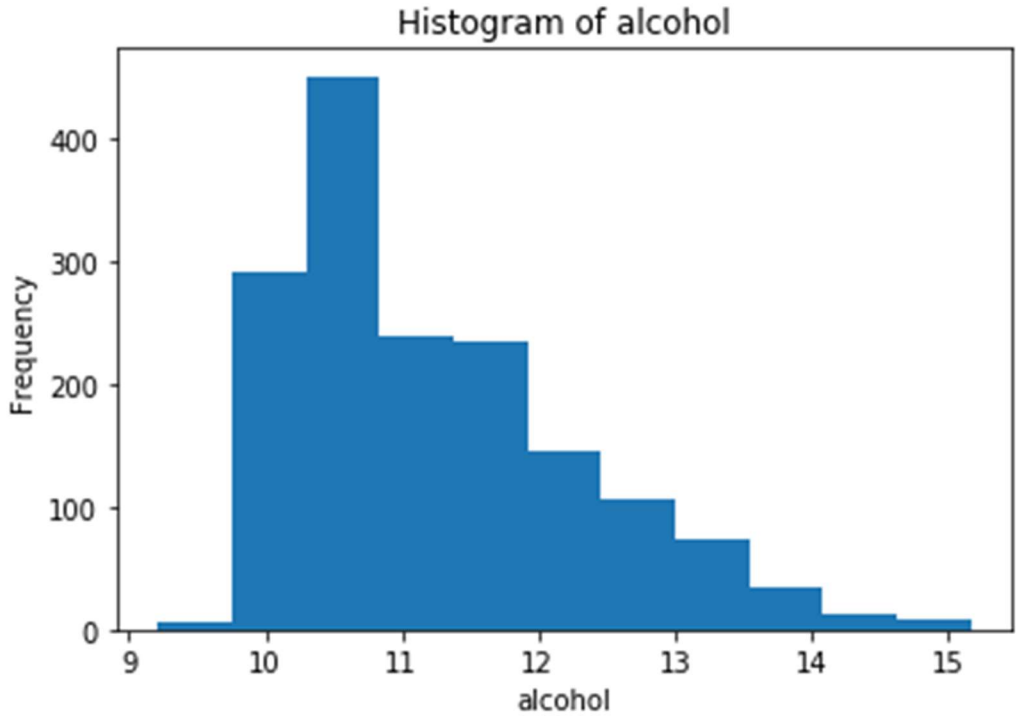

Histogram of free sulfur dioxide
Frequency
0
50
100
150
200
250
300
350
400
10
20
30
40
50
60
70
free sulfur dioxide

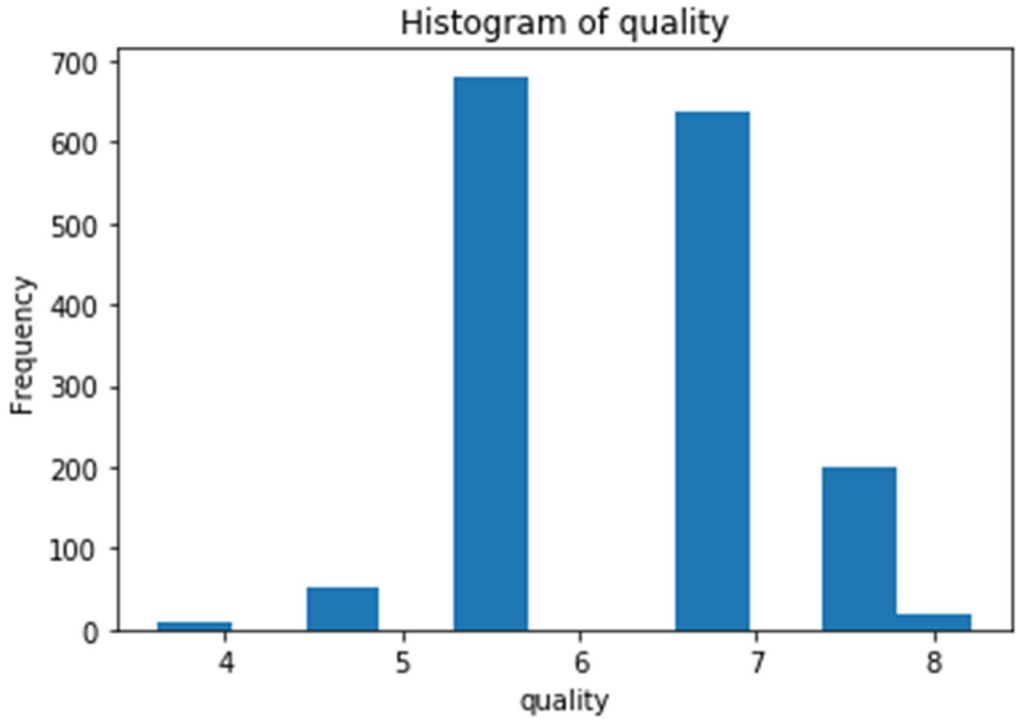

Histogram of total sulfur dioxide
Frequency
0
100
200
300
400
500
600
50
100
150
200
250
300
total sulfur dioxide

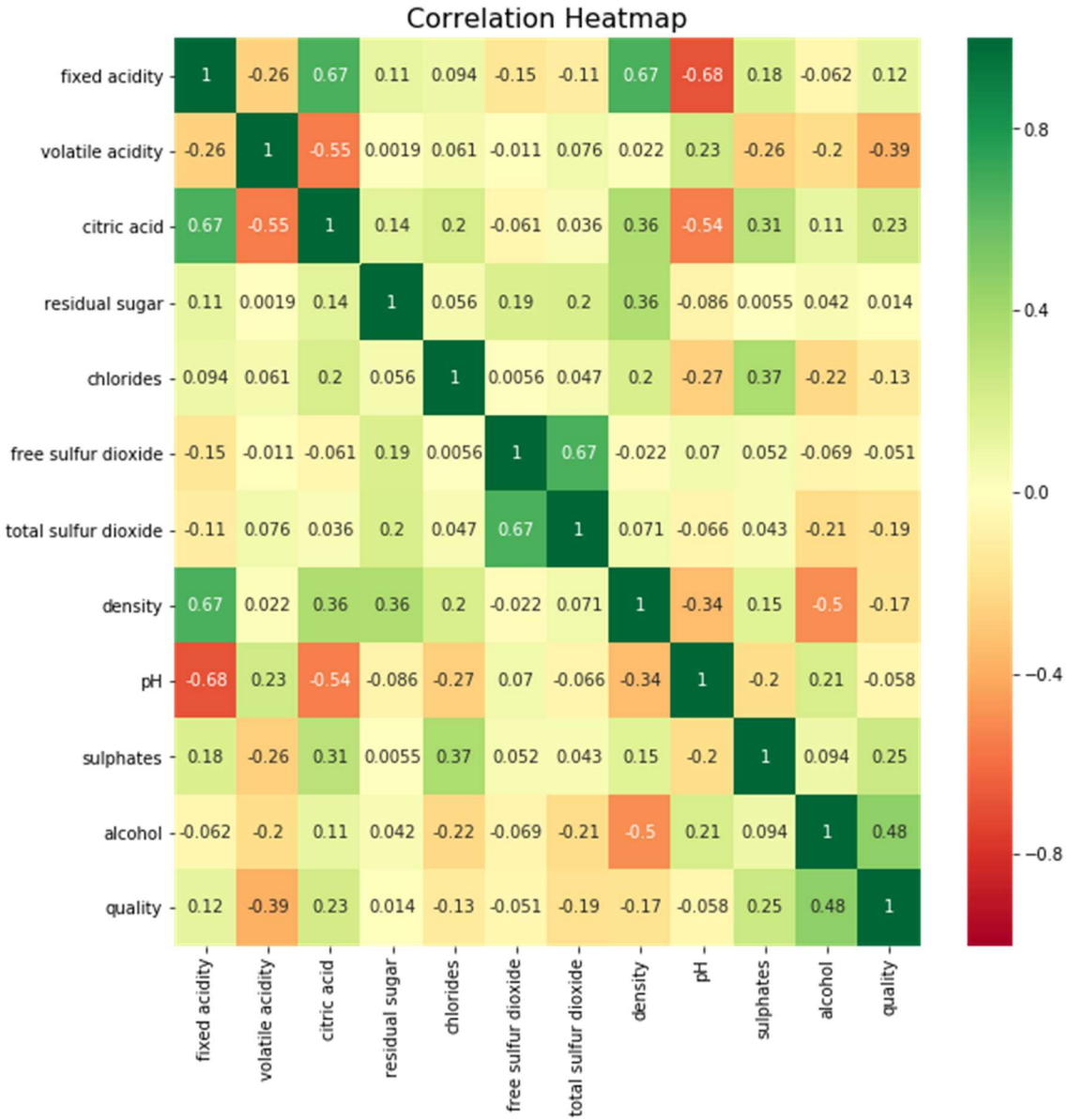

Histogram of density
Frequency
density
0
50
100
150
200
250
300
350
400
0.992
0.994
0.996
0.998
1.000
1.002
1.004


Histogram of pH
Frequency
400
300
200
100
0
3.0
3.2
3.4
3.6
3.8
4.0
pH


Histogram of sulphates
Frequency
600
500
400
300
200
100
0
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
sulphates


Histogram of alcohol
Frequency
400
300
200
100
0
9
10
11
12
13
14
15
alcohol


Histogram of quality
Frequency
quality
0
100
200
300
400
500
600
700
4
5
6
7
8


Correlation Heatmap
fixed acidity 1 -0.26 0.67 0.11 0.094 -0.15 -0.11 0.67 -0.68 0.18 -0.062 0.12
volatile acidity -0.26 1 -0.55 0.0019 0.061 -0.011 0.076 0.022 0.23 -0.26 -0.2 -0.39
citric acid 0.67 -0.55 1 0.14 0.2 -0.061 0.036 0.36 -0.54 0.31 0.11 0.23
residual sugar 0.11 0.0019 0.14 1 0.056 0.19 0.2 0.36 -0.086 0.0055 0.042 0.014
chlorides 0.094 0.061 0.2 0.056 1 0.0056 0.047 0.2 -0.27 0.37 -0.22 -0.13
free sulfur dioxide -0.15 -0.011 -0.061 0.19 0.0056 1 0.67 -0.022 0.07 0.052 -0.069 -0.051
total sulfur dioxide -0.11 0.076 0.036 0.2 0.047 0.67 1 0.071 -0.066 0.043 -0.21 -0.19
density 0.67 0.022 0.36 0.36 0.2 -0.022 0.071 1 -0.34 0.15 -0.5 -0.17
pH -0.68 0.23 -0.54 -0.086 -0.27 0.07 -0.066 -0.34 1 -0.2 0.21 -0.058
sulphates 0.18 -0.26 0.31 0.0055 0.37 0.052 0.043 0.15 -0.2 1 0.094 0.25
alcohol -0.062 -0.2 0.11 0.042 -0.22 -0.069 -0.21 -0.5 0.21 0.094 1 0.48
quality 0.12 -0.39 0.23 0.014 -0.13 -0.051 -0.19 -0.17 -0.058 0.25 0.48 1
fixed acidity
volatile acidity
citric acid
residual sugar
chlorides
free sulfur dioxide
total sulfur dioxide
density
pH
sulphates
alcohol
quality
0.8
0.4
0.0
−0.4
−0.8

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
type	real	real	real	real	real	real	real	real	real	real	real	int
mins	4.6	0.12	0.0	0.9	0.012	1.0	6.0	0.99007	2.74	0.33	8.4	3.0
mean	8.32414062499999 8	0.526085937499999	0.2731328125	2.55390625	0.08771328125	15.9906625	46.766406625	0.9967531953125001	3.308156250000006	0.6586328125	10.4136588541666666	5.63828125
maxs	15.9	1.33	1.0	15.5	0.611	72.0	289.0	1.00369	4.01	2.0	14.9	8.0
sigma	1.74067021653348 77	0.175377489760457 67	0.195791805587374 33	1.43907696416693 94	0.048235704305367326	10.5597035809974 38	33.119546246943074	0.001902985274864303	0.154551606847182 72	0.173427273214184 58	1.06991918758418 82	0.80824727536277 71
zeros	0	0	101	0	0	0	0	0	0	0	0	0
missing	0	0	0	0	0	0	0	0	0	0	0	0
0	7.4	0.7	0.0	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9.4	5.0
1	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.997	3.26	0.65	9.8	5.0
2	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.998	3.16	0.58	9.8	6.0
3	7.4	0.7	0.0	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9.4	5.0
4	7.4	0.66	0.0	1.8	0.075	13.0	40.0	0.9978	3.51	0.56	9.4	5.0

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
5	7.9	0.6	0.06	1.6	0.069	15.0	59.0	0.9964	3.3	0.46	9.4	5.0
6	7.3	0.65	0.0	1.2	0.065	15.0	21.0	0.9946	3.39	0.47	10.0	7.0
7	7.5	0.5	0.36	6.1	0.071	17.0	102.0	0.9978	3.35	0.8	10.5	5.0
8	6.7	0.58	0.08	1.8	0.097	15.0	65.0	0.9959	3.28	0.54	9.2	5.0
9	7.5	0.5	0.36	6.1	0.071	17.0	102.0	0.9978	3.35	0.8	10.5	5.0

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
type	real	real	real	real	real	int	int	real	real	real	real	int
mins	5.0	0.12	0.0	1.2	0.038	3.0	6.0	0.9902	2.9	0.4	8.7	3.0
mean	8.3015673981191 2	0.5347805642633229	0.2623197492163009 7	2.4782131661442013	0.0864764890282131 7	15.4106583072100 31	45.2695924764890 3	0.9967205329153604	3.3229780564263 32	0.6562068965517 24	10.4603970741901 76	5.6269592476489025
maxs	15.5	1.58	0.74	15.4	0.467	68.0	152.0	1.00369	4.01	1.59	14.0	8.0
sigma	1.7454245814413791	0.1932658305450942	0.1908313769275448 7	1.2866771126250562	0.0420982518672191 75	10.053505249626248	32.00269323606537	0.0018258626025552454	0.1533901061809334 3	0.1530066626660830 7	1.0492596883271392	0.8060466270636519
zeros	0	0	31	0	0	0	0	0	0	0	0	0

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
missing	0	0	0	0	0	0	0	0	0	0	0	0
0	7.8	0.88	0.0	2.6	0.098	25.0	67.0	0.9968	3.2	0.68	9.8	5.0
1	7.8	0.58	0.02	2.0	0.073	9.0	18.0	0.9968	3.36	0.57	9.5	7.0
2	8.5	0.49	0.11	2.3	0.084	9.0	67.0	0.9968	3.17	0.53	9.4	5.0
3	7.8	0.645	0.0	2.0	0.082	8.0	16.0	0.9964	3.38	0.59	9.8	6.0
4	8.3	0.655	0.12	2.3	0.083	15.0	113.0	0.9966	3.17	0.66	9.8	5.0
5	5.2	0.32	0.25	1.8	0.103	13.0	50.0	0.9957	3.38	0.55	9.2	5.0
6	8.1	0.38	0.28	2.1	0.066	13.0	30.0	0.9968	3.23	0.73	9.7	7.0
7	5.7	1.13	0.09	1.5	0.172	7.0	19.0	0.994	3.5	0.48	9.8	4.0
8	8.1	0.66	0.22	2.2	0.069	9.0	23.0	0.9968	3.3	1.2	10.3	5.0
9	7.7	0.935	0.43	2.2	0.114	22.0	114.0	0.997	3.25	0.73	9.2	5.0

```
drf Model Build progress: |████████████████████████████████████████████████| 100%
Model Details
=============
H2ORandomForestEstimator :  Distributed Random Forest
Model Key:  DRF_model_python_1571691044983_3


Model Summary:
```

	number_of_trees	number_of_internal_trees	model_size_in_bytes	min_depth	max_depth	mean_depth	min_leaves	max_leaves	mean_leaves
0	50.0	50.0	193599.0	16.0	20.0	18.82	280.0	330.0	303.14

```
ModelMetricsRegression: drf
** Reported on train data. **

MSE: 0.3233298111836051
RMSE: 0.5686209732181932
MAE: 0.41181640816504955
RMSLE: 0.08883215499280825
Mean Residual Deviance: 0.3233298111836051

Scoring History:
```

	timestamp	duration	number_of_trees	training_rmse	training_mae	training_deviance
0	2019-10-21 17:05:33	0.002 sec	0.0	NaN	NaN	NaN
1	2019-10-21 17:05:33	0.073 sec	1.0	0.859110	0.543384	0.738069
2	2019-10-21 17:05:33	0.093 sec	2.0	0.800691	0.496474	0.641106
3	2019-10-21 17:05:33	0.109 sec	3.0	0.782222	0.507039	0.611871

	timestamp	duration	number_of_trees	training_rmse	training_mae	training_deviance
4	2019-10-21 17:05:33	0.158 sec	4.0	0.771436	0.508956	0.595113
5	2019-10-21 17:05:34	0.173 sec	5.0	0.746971	0.507253	0.557966
6	2019-10-21 17:05:34	0.190 sec	6.0	0.707305	0.484062	0.500281
7	2019-10-21 17:05:34	0.204 sec	7.0	0.705847	0.486398	0.498219
8	2019-10-21 17:05:34	0.218 sec	8.0	0.682411	0.472350	0.465684
9	2019-10-21 17:05:34	0.231 sec	9.0	0.672731	0.470138	0.452566
10	2019-10-21 17:05:34	0.244 sec	10.0	0.665146	0.467504	0.442419
11	2019-10-21 17:05:34	0.257 sec	11.0	0.662418	0.469020	0.438797
12	2019-10-21 17:05:34	0.279 sec	12.0	0.648641	0.459604	0.420735
13	2019-10-21 17:05:34	0.312 sec	13.0	0.632652	0.452938	0.400248
14	2019-10-21 17:05:34	0.367 sec	14.0	0.620812	0.444634	0.385408

	timestamp	duration	number_of_trees	training_rmse	training_mae	training_deviance
15	2019-10-21 17:05:34	0.434 sec	15.0	0.614985	0.439219	0.378206
16	2019-10-21 17:05:34	0.469 sec	16.0	0.605934	0.434959	0.367156
17	2019-10-21 17:05:34	0.502 sec	17.0	0.600188	0.431080	0.360225
18	2019-10-21 17:05:34	0.532 sec	18.0	0.598876	0.430759	0.358653
19	2019-10-21 17:05:34	0.557 sec	19.0	0.597599	0.430053	0.357124

```
See the whole table with table.as_data_frame()
```

```
Variable Importances:
```

	variable	relative_importance	scaled_importance	percentage
0	alcohol	5545.688965	1.000000	0.198789
1	sulphates	3863.137939	0.696602	0.138477
2	volatile acidity	3633.098633	0.655121	0.130231

	variable	relative_importance	scaled_importance	percentage
3	density	2498.003906	0.450441	0.089543
4	citric acid	2303.624756	0.415390	0.082575
5	total sulfur dioxide	1982.966187	0.357569	0.071081
6	chlorides	1852.182983	0.333986	0.066393
7	pH	1670.367676	0.301201	0.059875
8	fixed acidity	1624.105835	0.292859	0.058217
9	free sulfur dioxide	1481.793457	0.267197	0.053116
10	residual sugar	1442.417114	0.260097	0.051704

```
gbm Model Build progress: |████████████████████████████████████████████████| 100%
Model Details
=============
H2OGradientBoostingEstimator :  Gradient Boosting Machine
Model Key:  GBM_model_python_1571691044983_4
```

Model Summary:

	number_of_trees	number_of_internal_trees	model_size_in_bytes	min_depth	max_depth	mean_depth	min_leaves	max_leaves	mean_leaves
0	50.0	50.0	16302.0	5.0	5.0	5.0	9.0	31.0	21.24

ModelMetricsRegression: gbm
** Reported on train data. **

MSE: 0.17182459867406413
RMSE: 0.41451730805126114
MAE: 0.3242619188502431
RMSLE: 0.06472317580668248
Mean Residual Deviance: 0.17182459867406413

Scoring History:

	timestamp	duration	number_of_trees	training_rmse	training_mae	training_deviance
0	2019-10-21 17:05:39	0.001 sec	0.0	0.807931	0.681733	0.652753
1	2019-10-21 17:05:39	0.017 sec	1.0	0.769768	0.649705	0.592542
2	2019-10-21 17:05:39	0.057 sec	2.0	0.737552	0.621495	0.543984

	timestamp	duration	number_of_trees	training_rmse	training_mae	training_deviance
3	2019-10-21 17:05:39	0.064 sec	3.0	0.708762	0.594358	0.502344
4	2019-10-21 17:05:39	0.071 sec	4.0	0.683845	0.570726	0.467644
5	2019-10-21 17:05:39	0.076 sec	5.0	0.662607	0.550556	0.439048
6	2019-10-21 17:05:39	0.081 sec	6.0	0.643440	0.533252	0.414015
7	2019-10-21 17:05:39	0.086 sec	7.0	0.627272	0.518119	0.393470
8	2019-10-21 17:05:39	0.091 sec	8.0	0.611728	0.503802	0.374212
9	2019-10-21 17:05:39	0.097 sec	9.0	0.598924	0.491637	0.358710
10	2019-10-21 17:05:39	0.103 sec	10.0	0.585010	0.479103	0.342236
11	2019-10-21 17:05:39	0.109 sec	11.0	0.575096	0.470550	0.330736
12	2019-10-21 17:05:39	0.115 sec	12.0	0.561788	0.458359	0.315606
13	2019-10-21 17:05:39	0.123 sec	13.0	0.550680	0.447797	0.303249

	timestamp	duration	number_of_trees	training_rmse	training_mae	training_deviance
14	2019-10-21 17:05:39	0.128 sec	14.0	0.542381	0.440745	0.294177
15	2019-10-21 17:05:39	0.133 sec	15.0	0.535079	0.433938	0.286310
16	2019-10-21 17:05:39	0.141 sec	16.0	0.527714	0.426476	0.278482
17	2019-10-21 17:05:39	0.153 sec	17.0	0.520697	0.419880	0.271126
18	2019-10-21 17:05:39	0.159 sec	18.0	0.514851	0.414657	0.265071
19	2019-10-21 17:05:39	0.166 sec	19.0	0.509889	0.410009	0.259987

```
See the whole table with table.as_data_frame()
```

```
Variable Importances:
```

	variable	relative_importance	scaled_importance	percentage
0	alcohol	1108.694824	1.000000	0.342129
1	sulphates	508.364075	0.458525	0.156875

	variable	relative_importance	scaled_importance	percentage
2	volatile acidity	395.884735	0.357073	0.122165
3	total sulfur dioxide	271.836700	0.245186	0.083885
4	chlorides	203.289703	0.183359	0.062733
5	fixed acidity	163.646622	0.147603	0.050499
6	citric acid	145.109451	0.130883	0.044779
7	pH	135.334305	0.122066	0.041762
8	density	119.817734	0.108071	0.036974
9	free sulfur dioxide	96.411209	0.086959	0.029751
10	residual sugar	92.186966	0.083149	0.028448

```
glm Model Build progress: |████████████████████████████████████████████████| 100%
Model Details
=============
H2OGeneralizedLinearEstimator :  Generalized Linear Modeling
Model Key:  glm_default
```

GLM Model: summary

	family	link	regularization	number_of_predictors_total	number_of_active_predictors	number_of_iterations	training_frame
0	gaussian	identity	Elastic Net (alpha = 0.5, lambda = 7.686E-4)	11	11	1	wine_df

ModelMetricsRegressionGLM: glm
** Reported on train data. **

MSE: 0.41677228864942434
RMSE: 0.6455790336197609
MAE: 0.5005979337476368
RMSLE: 0.09951888456527354
R^2: 0.3605438452017906
Mean Residual Deviance: 0.41677228864942434
Null degrees of freedom: 1598
Residual degrees of freedom: 1587
Null deviance: 1042.165103189493
Residual deviance: 666.4188895504295
AIC: 3164.296201714635

Scoring History:

	timestamp	duration	iterations	negative_log_likelihood	objective
0	2019-10-21 17:05:44	0.000 sec	0	1042.165103	0.651761

AutoML progress: |██| 100%

model_id	mean_residual_deviance	rmse	mse	mae	rmsle
StackedEnsemble_BestOfFamily_AutoML_20191021_170549	0.321002	0.56657	0.321002	0.404487	0.0885588
StackedEnsemble_AllModels_AutoML_20191021_170549	0.321782	0.567258	0.321782	0.4044	0.0886761
DRF_1_AutoML_20191021_170549	0.324747	0.569866	0.324747	0.41389	0.0891986
XRT_1_AutoML_20191021_170549	0.328842	0.573448	0.328842	0.416069	0.089867
GBM_4_AutoML_20191021_170549	0.343089	0.585738	0.343089	0.435054	0.09127
GBM_2_AutoML_20191021_170549	0.350806	0.592288	0.350806	0.443934	0.0925409
GBM_3_AutoML_20191021_170549	0.354253	0.595192	0.354253	0.443773	0.0928208
GBM_1_AutoML_20191021_170549	0.35614	0.596775	0.35614	0.438581	0.0932569
GBM_5_AutoML_20191021_170549	0.392899	0.626816	0.392899	0.483982	0.097219
GBM_grid_1_AutoML_20191021_170549_model_1	0.418261	0.646731	0.418261	0.522376	0.100002

model_id	mean_residual_deviance	rmse	mse	mae	rmsle
StackedEnsemble_BestOfFamily_AutoML_20191021_170549	0.321002	0.56657	0.321002	0.404487	0.0885588
StackedEnsemble_AllModels_AutoML_20191021_170549	0.321782	0.567258	0.321782	0.4044	0.0886761

model_id	mean_residual_deviance	rmse	mse	mae	rmsle
DRF_1_AutoML_20191021_170549	0.324747	0.569866	0.324747	0.41389	0.0891986
XRT_1_AutoML_20191021_170549	0.328842	0.573448	0.328842	0.416069	0.089867
GBM_4_AutoML_20191021_170549	0.343089	0.585738	0.343089	0.435054	0.09127
GBM_2_AutoML_20191021_170549	0.350806	0.592288	0.350806	0.443934	0.0925409
GBM_3_AutoML_20191021_170549	0.354253	0.595192	0.354253	0.443773	0.0928208
GBM_1_AutoML_20191021_170549	0.35614	0.596775	0.35614	0.438581	0.0932569
GBM_5_AutoML_20191021_170549	0.392899	0.626816	0.392899	0.483982	0.097219
GBM_grid_1_AutoML_20191021_170549_model_1	0.418261	0.646731	0.418261	0.522376	0.100002