TP - Wine Quality Estimation

1 Introduction

Physicochemical laboratory tests routinely used to characterize wine include determination of density, alcohol or pH values, while sensory tests rely mainly on human experts.

Table 1. The physicochemical data statistics

Attribute (units)	Min	Max	Mean
fixed acidity (g(tartaric acid)$/dm^3$)	3.8	14.2	6.9
volatile acidity (g(acetic acid)$/dm^3$)	0.1	1.1	0.3
citric acid (g/dm^3)	0.0	1.0	0.3
residual sugar (g/dm^3)	0.6	65.8	6.4
chlorides (g(sodium chloride)$/dm^3$)	0.01	0.35	0.05
free sulfur dioxide (mg/dm^3)	2	260	35
total sulfur dioxide (mg/dm^3)	9	260	138
density (g/cm^3)	0.987	1.039	0.994
pH	2.7	3.8	3.1
sulphates (g(potassium sulphate)$/dm^3$)	0.2	1.1	0.5
alcohol (% vol.)	8.0	14.2	10.4

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	quality
0	7.4	0.270	0.26	11.80	0.053	55.0	173.0	0.99699	3.11	0.60	9.800000	5
1	6.6	0.240	0.22	12.30	0.051	35.0	146.0	0.99676	3.10	0.67	9.400000	5
2	7.4	0.270	0.26	11.80	0.053	55.0	173.0	0.99699	3.11	0.60	9.800000	5
3	7.1	0.380	0.29	13.60	0.041	30.0	137.0	0.99461	3.02	0.96	12.100000	6
4	6.8	0.430	0.26	5.20	0.043	40.0	176.0	0.99116	3.17	0.41	12.300000	6
5	5.2	0.220	0.46	6.20	0.066	41.0	187.0	0.99362	3.19	0.42	9.733333	5
6	5.9	0.290	0.16	7.90	0.044	48.0	197.0	0.99512	3.21	0.36	9.400000	5
7	5.9	0.290	0.16	7.90	0.044	48.0	197.0	0.99512	3.21	0.36	9.400000	5
8	6.3	0.290	0.29	3.30	0.037	32.0	140.0	0.98950	3.17	0.36	12.800000	7
9	6.3	0.190	0.32	2.80	0.046	18.0	80.0	0.99043	2.92	0.47	11.050000	6
10	5.7	0.290	0.16	7.90	0.044	48.0	197.0	0.99512	3.21	0.36	9.400000	5

The wine quality is the target class to be estimated. We have 6 possible classes :

- { 3; 4; 5; 6; 7; 8 or 9 }

2 Objectif de TP

Train a neural network model in order to predict the Wine quality of the testset given the features from table 1.

- Using Pytorch toolkit
- Using the CE error function
- Using multiple hidden layer
- Report the Cost value over epoch
- Report the Accuracy on the test set
- Calculate the confusion matrix over the classes