INC491 Homework 2 - Where did this glass come from?

Due: Oct 22, 2023 (in LEB2)

What to submit: (Report in pdf format 1 file, which contains)

1. A diagram of your network and the parameters used (such as size, no. of neurons, learning rate, etc.)
2. Explanation how you normalize the data and perform class balancing (by code or by hand)
3. Printed the source code and a short explanation of each part
4. Graph Results (2 graphs)
5. Answer which type of glass is the sample and show the probability value

Please see https://archive.ics.uci.edu/ml/datasets/Glass+Identification

There is a crime scene that need your help. Police found a broken glass piece in the crime scene. It is an important evidence, but do not know where did it come from. They need to know its type in order to identify the murderer. In this homework, you have to implement a fully-connected neural network to classify the type of glass. The dataset has 6 types of glass, which contain different ingredient. There are 9 types of ingredients. There are 214 samples in the dataset, in which the number of classes does not balance. Note that the type of glass was labeled 1,2,3,5,6,7 (Samples type 4 are missing).

-- 1 building_windows_float_processed
-- 2 building_windows_non_float_processed
-- 3 vehicle_windows_float_processed
-- 4 vehicle_windows_non_float_processed (none in this database)
-- 5 containers

-- 6 tableware
-- 7 headlamps

File name glass.data is in the CSV format.

Train your fully-connected neural network to classify these glass according to this guideline.

1. This is a multiclass problem. The target output should be converted to one-hot of six types.

2. Classes are not balance. You should perform class balancing.

3. Perform data normalization

Print and show the graphs of

1. loss of the training set

2. Accuracy of the training set

during the progress of training in each epoch.

Please note that your network and parameters should achieve a reasonable loss and accuracy. You have to try and find your own parameters. Use techniques that were mentioned in class to achieve a good result. You should try to normalize your data and perform class balancing (you can choose to do these by hand in excel or by programming in python).

The glass piece left in the crime scene has these features

(1.52, 12.8, 1.6, 2.17, 72.2, 0.76, 9.7, 0.24, 0.5)

After training, put this data into your model and see what type that your model classify to. Show the code + print out result of this part and give the answer in the report. Also show the probability value from the softmax of this class, which indicate the confidence of your answer.