1Η MANDATORY WORK
IN THE COURSE "NEURAL NETWORKS - DEEP LEARNING"

Write a program in any programming language that implements a **MULTILAYER perceptron NEURAL network** (the network can be fully connected or convolutional or a combination) trained with the back-propagation algorithm. This NN will be trained to solve any multi-class classification problem **EXCEPT MNIST**.

Database

One of the following bases can be used for training and categorisation

A. the Cifar-10 or CIFAR-100 or SVHN database available at the following addresses:
https://www.cs.toronto.edu/~kriz/cifar.html
http://ufldl.stanford.edu/housenumbers/

B. Alternatively, any of the databases available on the websites can be used:
https://www.kaggle.com/datasets
and involve multi-class categorisation problems. Where there is no control set, the database is randomly divided into a training (60%) and control (40%) set or a cross-validation technique is used.

Exporting Features

The entire input is used or appropriate features are selected to separate the samples (e.g. brightnesses at appropriate positions, average row-column brightness, etc.) or the data dimension is reduced using PCA.

Results report

A report should be written describing: the algorithm, giving typical examples of correct and incorrect categorisation and success rates at the training and testing stages, training time and success rates for different numbers of neurons in the hidden layer, different values of the training parameters. To compare the performance of the neural against the Nearest Neighbor and Nearest Class Centroid categorization of the intermediate task. Comment on the results and the code.

DELIVERY DATE : 26η November 2023, 24:00

For each day of late submission of the assignment and for 5 days the mark will be reduced by 10%. All assignments will be followed by a presentation and oral examination on the assignments, which will include **AN ORAL examination of the code.**

Interim Work

Write a program in any language that compares the performance of the nearest neighbor categorizer with 1 and 3 nearest neighbors with the nearest center categorizer in the database you choose for your project. That is, this program should read the training data (training) and the test data (test) and measure the performance of the above categorizers.

DELIVERY DATE : 12η November 2023, 24:00

Alternatively, anyone can use deep learning architecture https://www.tensorflow.org/ https://pytorch.org/ https://keras.io/ with any type of network they want.