Assignment 5

MINST is one of the most well-known data sets used for image classification. This dataset is formed by 42000 images of hand written numbers (dimension of the image: 28x28). The data can be found in canvas with the following name:

- Assignment5.csv

Your assignment is to apply ANN with backpropagation as a learning algorithm to classify correctly the numbers **(2 points)**. Examples of these images can be seen in the image below:

You will have to divide your train.csv in two: training set (70%), validation set (10%) and testing set (20%).

Pre-conditions in order to present your code:

- The accuracy in the test set has to be greater than 80%.
- You must have at least a hidden layer. It has to be possible to change the number of neurons in the hidden layer(s) by only changing one parameter.

Your report has to cover the key parts as follow **(3 points)**:

1. Give the structure of your ANN. **(0.5)**
2. Give the equations that you used to update the weights explaining all the parameters on them. **(1)**
3. Give the percentage of correctness of the total test data set (20% of all cases) and give the percentage of correctness of each of the classes in the test data set. **(0.5)**
4. Give a figure showing how the accuracy in the validation set is changing during the training process. **(1)**

<u>Conditions to approve the assignment 5</u>

In order to receive the points for the code, you need to submit the report and have more than half of the points. Example: If a report have 1 point, then you need to have a minimum of 0.5.

- Minimum score to pass assignment 5: 3 points.

SCORES 3-5

- Your score < 3: U
- 3 <= your score <= 3.75: 3
- 3.75 < your score < 4.75: 4
- 4.75 <= your score: 5

SCORES A-F

- Your score < 3: F
- 3 <= your score < 3.4: E
- 3.4 <= your score < 3.8: D
- 3.8 <= your score < 4.2: C
- 4.2 <= your score < 4.6: B
- 4.6 <= your score: A