EEL 6814

Project 1 –TEAM of 2 students
Due October 26, 2023

This project deals with the development of a neural network to classify a Japonese character dataset comprising of 28x28 grayscale images of 70,000 Japonese letters from 10 categories, with 7,000 images per category. The training set has 60,000 images and the test set has 10,000 images.

You will compare the performance of two classifiers: a CNN (one student) and a MLP (another student) with at least one hidden layer, trained with backpropagation. You will have to decide the network architecture (#PEs, # of layers, etc.), learning rates, and how to stop training. You should use two thirds of the data for training and the rest for testing. I suggest that you randomly create the training and test sets, but use the same number of exemplars for each class across the training sets. You can also compare different training algorithms such as conjugate gradient or Levenberg-Marquadt instead of back-propagation, and/or a RBF network instead of the MLP. Comparison between the two classifiers is necessary and it should address the weak points and strong points of each implementation. You can use available packages except the automatic search for the best parameters. The results should be presented in a confusion matrix. I want also to see numerical evidence (plots/tables) that corroborate hyperparameters choices based on performance. Please provide evidence that learning is stopped at the best point to optimize generalization. It is much more important for the grade to explain what you did and why than the numerical quality of the performance.

Remember:
This is a project, so I expect a report, explaining the *rational of the method* and the *details of the implementation and the reason for the choices*. Good results will give you just ½ of the grade. In the project, clarity in writing and solid methodology are as important as results and I will grade each of the 3 components separately.

The report format follows a technical paper, which includes, abstract, introduction, methods, results, discussion and conclusions and references of no more than 7 pages double column (IEEE format) or 15 single column paper.
Kuzushiji-MNIST is available at: https://github.com/rois-codh/kmnist
[1] Deep Learning for Classical Japanese Literature, "Tarin Clanuwat, Mikel Bober-Irizar, Asanobu Kitamoto, Alex Lamb, Kazuaki Yamamoto, David Ha", arXiv:1812.01718.

NOTES:

I- The first page of the report should be a page with the project title and the names of the team, specifying their roles in the project (one or two sentences).

II- The project should be exclusive work of the team. All material in the report that is not referenced should be of your authorship, just like figures and tables. The Honor code will be enforced.