CS422/622- HW 5

In HW5, we are going to implement a convolutional neural network for the handwritten digit classification problem with the MNIST data. Please use the same MNIST data with HW4 that includes 100 images on each label of 0 – 9.

Dataset: http://mkang.faculty.unlv.edu/teaching/CS489_689/HW4/MNIST_HW4.csv

You should implement a neural network (NN), compute accuracy using 5-fold CV. You can design the network by yourself. You must clearly explain the architecture of your neural network. You can implement the neural network using any deep learning frameworks (e.g., keras, pytorch, tensorflow)

[Additional Task for CS622]

Task 2: You should implement a convolutional neural network (CNN) and compare the performance with the accuracy of NN. You can design the network by yourself. You must clearly explain the architecture of your convolutional neural network. You can implement the convolutional neural network using any deep learning frameworks (e.g., keras, pytorch, tensorflow)

Submission:

You must submit the followings to WebCampus:

1. MS word file
   - Describe what you have done for the homework assignment.
   - Elucidate and justify your network design and hyper-parameters. (e.g., filter size, filter numbers, pooling, # of layers, # of nodes on each layer, choice of activation functions on each layer, cost function, learning rate, optimizer, and so on)
   - MUST include a Learning curve (from an experiment)
   - MUST include five accuracy and their average.
   - For CS622, compare the averaged accuracy of CNN with of NN.
2. Source code file(s)
   - Must be well organized (comments, indentation, …)
   - You need to upload the "original python file (*.py)" after changing to "*.py.txt". For example, "*.py" to "*.py.txt"

You must submit the files SEPERATELY. DO NOT compress into a ZIP file. If you fail to provide all required information or files, you may be given zero score without grading.

Rubric:

- The architecture and setting of the neural network should be well explained and justified.
- Learning curve should show its convergence.
- 5-fold CV should be correctly implemented. Should include five accuracies and their average.
- For CS622, accuracy comparison between neural networks and convolutional neural networks

Deadline:

You must submit HW5 by **Friday, April 19, 2024**. Late assignments will not be accepted.