Exam - I
CSCE 790 : Neural Networks and Their Applications
Fall 2024
Due Date - November 10 (Submit your solutions before 11.49 PM)

Instructions:

- Do not use any optimization package for implementing the optimization algorithm for any problem in Part B.
- Do not include colab link or .ipynb file in your submission without extracting and summarizing the results in your solution document.
- If the answers are not readable, they will not be graded
- Points will be deducted if a problem is not solved as well as presented (solutions) in its entirety. Pay attention to details.
- If you refer to any resource to get your solutions, add an acknowledgement with your solutions (details of the source, e.g., book, website, etc.).
- Include codes to the problems in Part A (share github or Colab link) but add captioned figures in the PDF. If the figures are not added as part of the solution, the problem will not be graded.
- Compile all your solutions into a single file (.docx or .pdf) and upload it to Blackboard.

Part A: (Coding) [Choose any two problems - 50 points/question]

1. Read the article in the link below (i). Use the codes in the article and re-run the code by replacing the optimizer used in the code (i.e., optimizer = optim.SGD(model.parameters(), lr=0.003, momentum=0.9)) with your own optimization algorithm to train the classifier.

   (i) Article: Classification of handwritten digits – this is the same code you have submitted for a HW 1 problem.

   (ii) Generate appropriate figures to demonstrate the success of training and validation process. (submit captioned image with good resolution).

2. From the research article (a), reproduce the results of Examples 1 and 3. Include a brief summary of the example problems, its formulation, the type of NN architecture considered, and the training process.

3. From the research article (a), reproduce the results of Example 7. Include a brief summary of the problem, its formulation, the type of NN architecture considered, and the training process.

(a) Kumpati, S.N. and Kannan, P., 1990. Identification and control of dynamical systems using neural networks. IEEE Transactions on neural networks, 1(1), pp.4-27. (Download PDF here)