



ECEN 4493 AI in Engineering Spring 2023



Homework Assignment #4

Statement of Academic Honesty:

For this homework, I make the following truthful statements:

- I have not received, I have not given, nor will I give or receive, any assistance to another student taking this quiz.
- I will not plagiarize someone else's work and turn it in as my own.
- I understand that acts of academic dishonesty may be penalized to the full extent allowed by the University Student Conduct Code, including receiving a failing grade (F!) for the course. I recognize that I am responsible for understanding the provisions of the University Student Conduct Code as they relate to this academic exercise.

Your Signature

Problem 1: Build a neural network to predict wine class using the “Wine” dataset as used in previous homework. Use the “Adam” optimizer. Choice of neural network is yours. Plot the “Accuracy vs. Iterations” and “Loss (Both Training and Validation Loss) vs. Iterations”. Also, based on the performance on the test set, write your accuracy score.

Problem 2: Build a CNN to predict the MNIST dataset. Choice of layers is your choice. Use the Adam optimizer and plot the same charts as the first question. Also, write your accuracy score. Write a brief paragraph regarding your choice of layers.

Problem 3: Build a CNN to classify the “CIFAR10” dataset. Then load the pretrained “ResNet50” model and remove the last layer. Add additional layers based on the dataset. Compare the accuracy results of your model with the modified pre-trained model.

A basic tutorial for transfer learning can be found in the link below:

“https://www.tensorflow.org/tutorials/images/transfer_learning”

The list for available pre-trained models can be found in the link below, if you want to explore for your own projects:

“<https://keras.io/api/applications/>”

You can also use the link below to see how can you use the pre-trained models directly for image classification:

“<https://keras.io/api/applications/#usage-examples-for-image-classification-models>”

Please include the codes and graphs into a single standalone PDF file and submit your PDF file including all reference materials and citations, through **Canvas Assignments** folder, “4493-homework4-Spring23 (assign 3-20-23, due 4-3-23)” by the deadline, April 3, 2023, 11:59pm.