

Take Home Exam 2

Foundations of Machine Learning, Spr 2025

Instructions

- You may work with one other student in the class. On the exam, say who you worked with.
- You may use anything on our class website (Matlab and Python code samples in particular), or anything in our class notes.
- You may not use any other sources.
- What to turn in? For each question turn in both the code that was used and the computer output (for example, as screen shots). Incorporating these into one document is a nice way to present your answers.
- **Due:** Tuesday, Apr 22 at 11:59 PM (Upload to Canvas).

The first two questions use data representing measurements taken from grains of wheat. There are 210 samples, 7 measurements each, and labeled as class 1, 2 or 3. Loading the data gives you a matrix X that is 210 x 7, and target matrix T that is 210x1. You can download the data matrix from the class website.

1. Use the seed data (.mat file on the class website) to construct a **5-nearest neighbor classifier**. Use a 70/30 split for training and testing. Use a confusion matrix to display your results.
2. Use the seed data to build a **linear neural network classifier**. Be sure you're choosing good target values for your network. Again us a 70/30 split for training and testing. Use a confusion matrix to display your results.
3. Use the "Basic Gradient Descent" examples on the Gradient Descent homework page as templates, and find a linear neural network for the Walla Walla housing data. Be sure to show your results graphically. You should check to see if you need to scale your data, and use a 70/30 split for training and testing.