NNTI Assignment 1

November 9, 2022

Guidelines: You are expected to work in a group of 2-3 students. While submitting the assignments, please make sure to include the following information for all our teammates in your PDF/python script:
Name:
Student ID (matriculation number):
Email:

Your submissions should be zipped as **Name1_id1_Name2_id2_Name3_id3.zip** when you have multiple files, as the case might be for the assignments. For assignments where you are submitting a single file, use the same **naming convention** without creating a zip. For any clarification, please reach out to us on **Piazza**.

Exercise 1

Assume A, B, C are matrices which fulfill the condition for matrix multiplication, show that $(AB)C = A(BC)$ **2 point**

Exercise 2

This exercise will help you get familiar with NumPy library in python. The goal of this exercise is for you to explore the documentation of different NumPy libraries and their implementation details.[1]   **2 point**

- Write a function to perform the following tasks in the order:

    - Randomly generate a 4x4 matrix

    - Transpose the matrix

    - Find the inverse of the transposed matrix

- Write a function using NumPy libraries to compute eigenvalues and eigenvectors of a randomly generated 4x4 matrix.

---

[1]While dealing with random functions, always remember to fix your seeds in the code. It helps in reproducibility of your result.

Exercise 3

This exercise will help you get familiar with PyTorch Dataset and Dataloader classes. The goal of the exercise is to implement your own Dataset and Dataloader classes with following constraints:

- Your custom dataset class should subclass the Dataset class from PyTorch

- Your dataset class should have the required function(s) to iterate over the requested dataset i.e. len(), iter, init etc.

- Your custom dataloader class should subclass the Dataloader class from PyTorch

- Your implementation of the dataloader class should work with the objects returned by your custom dataloader class

- (Bonus) You should also implement a custom collate_fn() which resizes the image to 80% of its original size

You are encouraged to lookup the source code of Dataloader and Dataset class in PyTorch. The main aim of this exercise is to help you understand the working of Dataset and Dtaloader classes as we shall be using them in future assignments.   **6 point**