# Exercise 1

Deep Learning Lab

September 23, 2021

## 1 Computational Resources and Basic Setups

In this section, your task is to briefly check that you have access to all computational resources you will potentially need for this course:

1. If not already done, install Python on your **personal computer**. Make sure that you are using Python 3. Using pip, install the packages `numpy`, `matplotlib`, and `torch`. Optionally, install these packages in a virtual environment, for example using conda by installing it from here.

2. Verify that you can access and use Google Colab. Make sure that you know how to enable GPUs (Edit/Notebook settings/Hardware accelerator).

3. (Optional) Verify that you can use SSH to connect to USI's ICS cluster (using the credentials provided during the lecture). The general instruction can be found here. You will have to learn how to check the status of the cluster, submit, monitor, and kill jobs.

## 2 Python and NumPy

1. If you are not familiar with Python, quickly read the Python tutorial. This question must be prioritized over the next question!

2. Follow the NumPy quickstart tutorial. You should be able to:

   - Create multidimensional arrays and inspect their shapes.
   - Convert a Python list to a numpy array.
   - Perform element-wise arithmetic operations between arrays.
   - Perform arithmetic operations between arrays and scalars.
   - Perform matrix multiplications using `np.dot`, `@`, or `matmul`.
   - Perform unary operations on arrays (e.g., `max`, `sum`).
   - Apply functions element-wise to an array (e.g., `np.sqrt`).
   - Index elements, slice arrays, index using lists of elements, and index using Boolean arrays.
   - Use `np.arange`.
   - Reshape arrays.

3. If you have time left, read about NumPy broadcasting.