

CMPSC 497 - Deep Learning for Computer Vision

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Homework 1

Due: February 3, 2023 @ 11:59 EST

1 Assignment Details

Homework 1 consists of two sections, a Python and Numpy introduction/tutorial and the implementation of a simple neural network with vanilla Python and numpy. Additionally, the homework will come with instructions on how to setup 3rd party software we will be using to complete the assignment and which we will use in future assignments. We allow for the homework to be completed locally (with Jupyter), or through Google Colab. Although this assignment will not need a GPU to complete, we do recommend completing the assignment in Google Colab so you can familiarize yourself with the platform for future assignments. Both assignments will be graded on completion and achieving expected output. This assignment is worth 10 points.

2 Python and Numpy Practice (20%)

This tutorial offers exercises for beginning with the Python programming language and numpy, a Python library for working with arrays. For those familiar with Python and/or numpy, this section should largely be review. For those new to either tool, the exercises will offer a quick crash course that will enable you to get started in this current and future assignments. This is not intended to be difficult and is mostly for providing practice in Python and numpy for people unfamiliar with the tool(s). This section is mostly just exercises and should be accompanied by additional resources for those new to Python or numpy (see section 5).

3 Implementing a Neural Network from Scratch (80%)

In this section, we will be implementing a simple neural network from scratch for an image classification task. This will not only grant us more experience to numpy and its various properties, but allow us to gain more intuition on the workings of learning algorithms as well as forward and backward propagation.

4 Getting Started + Submission

Firstly, we suggest looking at the included software setup document as a general guide for working with Colab and Jupyter. For students who choose to work in Google Colab, you can start by going to Google Colab's website and upload the .ipynb files (each one individually). Go to Google Colab's website → "Upload" → upload one of the .ipynb files → complete the coding exercises in the cells. Note: for the file 'Building a simple neural network.ipynb' you will also need to upload the files in the "images" folder. This can be done by clicking the file icon on the left side of colab then clicking the upload icon below "Files". You only need to upload the three files inside of "images".



For submitting the assignment, simply upload the completed ipynb files. You do not need to include any other files (checkpoints, images, or h5py).

5 Additional Resources

Along with class lectures, some resources that may prove useful to students have been provided below. We also encourage students to attend office hours. General non-specific questions can be posted on Slack. For direct questions, such as coding questions, please attend office hours.

- Python and Numpy Tutorial: <https://cs231n.github.io/python-numpy-tutorial/>
- Introduction to PyTorch: <https://pytorch.org/tutorials/beginner/basics/intro.html>