

# Assignment 3

**Note:** This assignment is originally from the EECS 498-007/598-005 course at the University of Michigan.

In this assignment, you will implement Fully-Connected Neural Networks and Convolutional Neural Networks for image classification models. The goals of this assignment are as follows:

- Understand Neural Networks and how they are arranged in layered architectures
- Understand and be able to implement modular backpropagation
- Implement various update rules used to optimize Neural Networks
- Implement Batch Normalization for training deep networks
- Implement Dropout to regularize networks
- Understand the architecture of Convolutional Neural Networks and get practice with training these models on data

**Due Date:** Wednesday, Dec 11, at 11:59 PM **(No extensions will be granted)**

## Q1: Fully-Connected Neural Network (40 points)

The notebook `fully_connected_networks.ipynb` will walk you through implementing Fully-Connected Neural Networks.

## Q2: Convolutional Neural Network (60 points)

The notebook `convolutional_networks.ipynb` will walk you through implementing Convolutional Neural Networks.

## Steps

### 1. Download the zipped assignment file

Click [here](#) to download the starter code. You can also access the starter code through Cybercampus.

## 2. Unzip all and open the Colab file from the Drive

Unzip the downloaded folder, and upload the contents to your Google Drive. To open the `.ipynb` notebook files in Google Colab, right-click on the files in Drive and select "Open with Google Colab". No installation is required. For more information on using Colab, please see our [Colab tutorial](#).

## 3. Open your corresponding \*.py from Google Colab and work on the assignment

Work through the notebook, executing cells and writing code in `*.py`, as indicated. You can save your work, both `*.ipynb` and `*.py`, in Google Drive (click "File" -> "Save") and resume later if you don't want to complete it all at once. While working on the assignment, keep the following in mind:

- The notebook and the python file have clearly marked blocks where you are expected to write code. **Do not write or modify any code outside of these blocks.**
- **Do not add or delete cells from the notebook.** You may add new cells to perform scratch computations, but you should delete them before submitting your work.
- **Run all cells, and do not clear out the outputs, before submitting.** You will only get credit for code that has been run.

## 4. Download and Compress Your Work

Once you complete the notebooks, download the relevant files and compress them into a single `.zip` file. Name the file using the format: `{student_id}_A3.zip`.

Make sure your `.zip` file contains your most up-to-date edits. The `.zip` file should include `fully_connected_networks.py`, `convolutional_networks.py`, `best_overfit_five_layer_net.pth`, `best_two_layer_net.pth`, `one_minute_deepconvnet.pth`, `overfit_deepconvnet.pth` for this assignment.

## 5. Submit your zip file to Cybercampus

Submit your compressed `.zip` file on Cybercampus.