

## Assignment #5: Convolutional Neural Network (CNN)

### Due: Wednesday, May 19<sup>th</sup>, 2021 at 11:59 PM (EST)

#### Description

In this assignment you will practice how to create Convolutional Neural Networks (CNNs) in PyTorch. First, you will construct a CNN by following the specific requirements and architecture described in the notebook. Then, you will construct your own CNN to achieve a certain accuracy on the testing data. Both CNNs will be trained on CIFAR-10 dataset. The goal of this homework is:

- To implement and understand Convolutional Neural Networks

#### Instructions

In this assignment, you need to fill in the blocks of code in the python notebook file. The descriptions of all the functions you need to implement are as follow:

- **Setup** (5 points): Set some of the parameters for your model. In particular, set SUID equal to your SUID number as a random seed. You can also select the batch size and number of epochs.
- **Net** (20 points): Define all the layers you will use in the embedding network. Define the network layer connectivity. The exact requirements are in the notebook.
- **Optimizer and Criterion** (5 points): Implement your optimizer and loss model.
- **Learning** (10 Points): Follow the instructions in the notebook to learn the CIFAR-10 dataset.
- **Net2** (20 points): Define all the layers you will use in the embedding network. Define the network layer connectivity. For this section you are free to design your own network with a target overall accuracy of  $> \sim 70\%$
- **Optimizer and Criterion 2** (5 points): Implement your optimizer and loss model. For this section you are free to choose the criterion of your choice.
- **Learning 2** (10 Points): As above.

The final twenty-five (25) points will be for a report. In the report please answer the following questions.

- What is the structure of your own CNN? Why did you select the parameters that you did? If you used any methods outside of those for the first CNN, what methods did you use and why did you select them?
- What was the final accuracy of your own CNN versus the original? Did it perform better or worse on different classes?

#### Notes:

- The notebook has comments that will walk you through the implementation. Furthermore, they have explanations in each block of code that you have to fill in.
- The number of points available for each block of code is in the comment with the instructions.
- Comment your code.
- Do not call the print function in your final submission.
- \*\*\* Do NOT edit any of the code outside of the TODO blocks. The only exceptions to this are to fix errors and are described in the notebook. Please contact the TA if you have any other issues.\*\*\*

#### Submission

Your submission ZIP archive will contain one (1) python notebook named: ‘**Assignment\_5.ipynb**’, and one (1) PDF report named ‘**report.pdf**’. (Do not change the names of the python files!)

- Zip file named via the following convention:
  - <SU-EMAIL>\_<FIRST-Name>\_AS5.zip
  - Ex. dprider\_Daniel\_AS5.zip
- Upload the zip file to blackboard before 11:59PM (EST Time) 05/19/2021