CS 637- Assignment 3

Due date – Tuesday, April 23rd, 2024, on or before 11:59 pm.
Assigned - Wednesday, April 10th
, 2024.

Problem-1: programming project [100 points]

In this homework you are given codes for two convolutional neural networks for two classic datasets, namely MNIST and CIFAR-10. Your goal is to do the following:

Part-1: [50 points]

a) You need to run both the codes to train the networks over multiple epochs. The codes are set up such that they will run for a certain number of epochs and report the accuracies and/or loss for each of the epochs.
b) For the CIFAR-10 code we also saved the model after each epoch to give you an example of how to save a model and then reload it for testing. You need to replicate this for MNIST dataset where this is not given.
c) In both cases, for the first part of the assignment, you need to modify the code so that you can visualize the feature map after the first convolutional layer generated by the model after every epoch.
d) Save these feature maps as images in a directory and display the images in your report discussing whether the feature maps evolved over epochs as the network was trained to become more accurate in learning the model. You are only required to do this for the feature maps generated by the first convolutional layer. To print these feature maps, you need to provide the trained network obtained after each epoch, with an input for which the feature map is computed. Note that for this assignment, you need to provide the same input for the model obtained after every epoch. Please use second training example of class '8' for MNIST and second training example of class 'airplane' for CIFAR-10 as the input image for computing the feature map.

Part-2: [50 points]

You need to prepare two separate reports containing:

1. Provide a diagram of the complete architecture.
2. What is the input image size?
3. Then clearly mention the input size, filter size, number of filters and output size after every convolution layer and the output size after every pooling layer (if there is any pooling layer in the code).
4. What is the size of the fatten layer?

5. Prepare a chart for the number of parameters being computed at each convolution layer and between the FC layers.

Programming project Submission Guidelines

Please e-mail your submission to Hera Siddiqui at hs0111@uah.edu by 11:59 PM on Tuesday, April 23rd , 2024 keeping me (cm0282@uah.edu) in the loop. DO NOT SUBMIT THE PROGRAMMIMG ASSIGNMENT THROUGH DROPBOX or CANVAS. They will not be accepted and will result in late penalty. Put all your materials for the PROGRAMMING project ONLY in a folder with your name and then create a zip file out of it. Email the zip file.

Point distribution:

PART-1:

Amending the code for saving the model in MNIST: 10 points

Amending the code for computing the feature map in MNINT: 20 points

Amending the code for computing the feature map in CIFAR-10: 20 points

PART-2:

For MNIST:

1) 5 points
2) 1 point
3) 8 points
4) 2 points
5) 5 points

For CIFAR-10

1) 5 points
2) 1 point
3) 16 points
4) 2 points
5) 5 points