Assignment : Module 4 (Deep Learning)
Deadline :- 12 August 2024 11:59 pm
Marks: 100

Part A) (50 marks)

Please train a network for image classification on mini-imagenet datasets (mentioned below). You should experiment with the following network parameters:

1. number of convolutional (conv) layers
2. fully connected (fc) layers
3. number of filters in different layers
4. Max Pooling
5. training time (number of epochs)
6. Stride

to come up with a study of the effect of these parameters on the classification performance. Try to improve the performance as much as possible by modifying these parameters. Please present the results of such a study in the form of a table that shows the classification performance as a function of these parameters. Also look at some of the images that are mis-classified and see if there is an explanation for such mis-classifications.

Part B) (50 marks)

From the models you have trained for Part - A, consider the one that gave you highest accuracy on test data and perform the following experiments on the same test data.

Given a fully-trained high-performance image classifier model, the question arises whether the model has really learnt the location of the object in the image or if the model just classifies the image based on surrounding or contextual cues. In this regard, to understand the behavior of your model, for some of the selected images (~ 10 images) from test-set of your dataset, perform occlusion sensitivity experiment as follows: For each pixel position i(along x-direction), j (along y-direction):

1. consider a window (N × N, choose an appropriate value of N) around (i, j) and replace the content of the window with gray pixels. Refer [1] figure 7, 8 for more information.

2. Pass the modified image (with respect to the position (i, j)) through the model and note down the probability for the true class into an array. i.e., confidence(i, j). Plot the confidence array as an image and comment on the observations.

Progress Report and Submission Guidelines

1. You should prepare and submit a report of the results obtained from your work.
2. Do not attach screenshots of code into your report.
3. Code containing .py files or .ipynb files should be shared along with your report.
4. Submissions without code will not be considered for evaluations.
5. Plagiarism of code will be dealt with a high penalty.

Dataset

Download your dataset from here.

References

[1] M. D. Zeiler and R. Fergus, “Visualizing and understanding convolutional networks,” in European conference on computer vision, pp. 818–833, Springer, 2014.

[2] A. Krizhevsky et al., “Learning multiple layers of features from tiny images,” 2009.

[3] “Cifar10, cifar100 datasets.” https://www.cs.toronto.edu/~kriz/cifar.html. Accessed: 2020-09-25.

[4] “Miniimagenet dataset.” https://github.com/yaoyao-liu/mini-imagenet-tools. Accessed: 2020-09- 25.

GOOD LUCK !!!
Happy Coding and Learning.