CDT402-Deep Learning for Data Science

Module 3

1. List the major contributions in AlexNet model.
2. Illustrate the strengths and weaknesses of convolutional neural networks.
3. Consider an activation volume of size 13×13×64 and a filter of size 3×3×64. Is it possible to perform convolutions with strides 2, 3 and 5. Detail your answer in each case.
4. Find out the total number of parameters, when an image of 32 x 32 is convolved with seven 3 x 3 kernel with stride 1.
5. Weight sharing allows CNNs to deal with image data without using too many parameters. Does weight sharing increase the bias or the variance of a model?
6. Explain the architecture of convolutional Neural network (CNN).
7. Explain the architecture of ResNet model
8. What happens if the stride of the convolutional layer increases? What can be the maximum stride? Justify your answer.
9. Suppose that a CNN was trained to classify images into different categories. It performed well on a validation set that was taken from the same source as the training set but not on a testing set. What could be the problem with the training of such a CNN? How will you ascertain the problem? How can those problems be solved?
10. Explain the following convolution functions a)tensors b) kernel flipping c) down sampling d) strides e) zero padding. f) max pooling g) min pooling
11. What is the motivation behind convolution neural networks?
12. Give two benefits of using convolutional layers instead of fully connected ones for visual tasks.
13. Design a Convolutional Neural Network (CNN) for gender classification using face images of size 256 x 256. Determine suitable filter sizes, activation functions, and the width of each layer within the network.
14. Why are CNNs more suitable for image processing tasks than fully connected networks?
15. How does padding influence the output size in same and valid convolution operations?
16. Consider an input image with dimensions of 28 x 28 pixels. You apply a convolutional operation with a kernel (filter) size of 3x3, a padding of 0, and a stride of 2. Calculate the dimensions of the output feature map. Also, calculate the padding value if we need the output to have the same size as the input with a stride of 1.
17. Explain the different formats of data that can be used with convolutional networks.
18. Why is feature extraction an essential step in image classification, and how does a Convolution Neural Network (CNN) automate this process? Explain with suitable diagrams.
19. Explain the architecture of ZFNet