

Deep Learning Workshop With Python (CSE 3194)

ASSIGNMENT-4: CONVOLUTION NEURAL NETWORK

1. Write a python code to smooth the image using mean filter.
2. Write a python code to show the smoothing of an image using mean filter with different kernel size like 3X3, 5X5, 9X9, 15X15.
3. Write a python code to apply laplacian filter with and without gaussian blur filter and discuss the difference between the two.
4. Write a python code using keras to show the difference between the edge detection using different types of edge detection filter like Robert, prewitt and sobel filter.
5. Write a python code to perform the convolution without padding for given image and kernel matrix using numpy and scipy.signal use ReLU and Softmax activation function.
Image=[[1, 2, 3, 4, 5], [6, 7, 8, 9, 10], [11, 12, 13, 14, 15], [16, 17, 18, 19, 20], [21, 22, 23, 24, 25]]
Kernel=[[1, 0, -1], [1, 0, -1], [1, 0, -1]]
6. Write a python code for the given feature map perform Max Pooling for size 2X2 with stride 1 and 2.
feature_map = [[1, 3, 2, 4], [5, 6, 8, 7], [3, 2, 9, 10], [1, 4, 6, 5]]
7. Write a python code to use 1layer convolution to the given test image data with laplacian filter/sobel filter as given below and generate the original image and filtered output.
Test_image=[[10, 10, 10, 0, 0], [10, 10, 10, 0, 0], [10, 10, 10, 0, 0], [0, 0, 0, 10, 10], [0, 0, 0, 10, 10]]
sobel_kernel = [[1, 0, -1], [2, 0, -2], [1, 0, -1]]
laplacian_kernel = [[0, 1, 0], [1, -4, 1], [0, 1, 0]]
8. Write a python code to perform following operation:
 - Load MNIST dataset.
 - Normalize the pixel value and show the original image.
 - Define the sobel kernel and reshape it.
 - Build the fixed CNN layer and set the weights manually.
 - Apply the sobel filter and show the output.
9. Write a python code to build two model with two different filters one is sobel_x and the other is sobel_y and apply both the filters and also find the gradient magnitude.
10. Write a python code to train two CNN models on MNIST dataset where Model A uses 3X3 filters and Model B uses 7X7 filters and compare the compare the accuracy and feature extraction behavior and training performance.