Deep Learning for Perceptron

Lab # 5

Convolution Neural Network

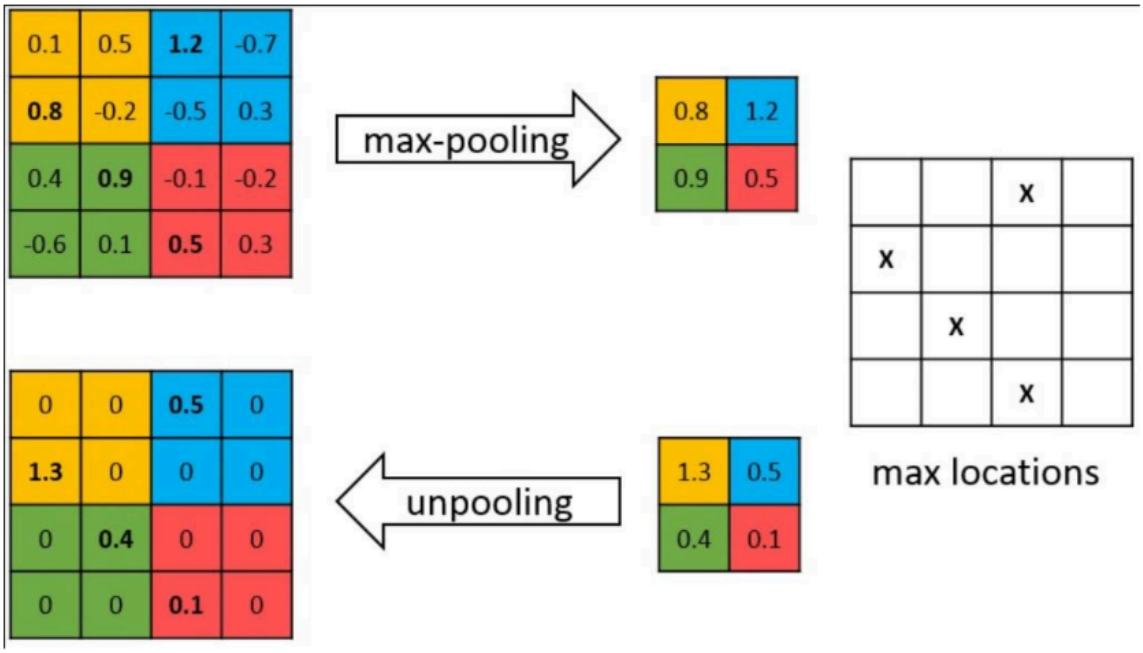
1. Run this notebook

https://www.kaggle.com/code/kanncaa1/convolutional-neural-network-cnn-tutorial

All tasks below are expected to be written from scratch.

2. Write a code for convolution operation between an image of 5*5 and filter of 2*2. Padding and stride must be passed as a parameter. And your code must work accordingly.

3. Write a code for max pooling and unpooling. You need to store max locations in another matrix.



4. Write a code for full convolution to generate a dL/dX matrix of dimension 3*3.

dO= np.array([[1, 2], [3, 4]]) # matrix for Loss Gradient

filter = np.array([[0, 1], [2, 3]]) // you need to rotate that filter by 180 degree.

Considering if originally X = np.array([np.array([200, 300,400]), np.array([100, 200,300]),np.array([150,200,300])]), what would be the updated X if learning rate is 0.05.