

EdX and its Members use cookies and other tracking technologies for performance, analytics, and marketing purposes. By using this website, you accept this use. Learn more about these technologies in the [Privacy Policy](#).



MITx: 6.86x

Machine Learning with Python-From Linear Models to Deep Learning

[Help](#)[sandipan_dey.](#)[Lecture 12. Convolutional Neural](#)[Course](#) > [Unit 3 Neural networks \(2.5 weeks\)](#) > [Networks](#)

> 2. CNN - Continued

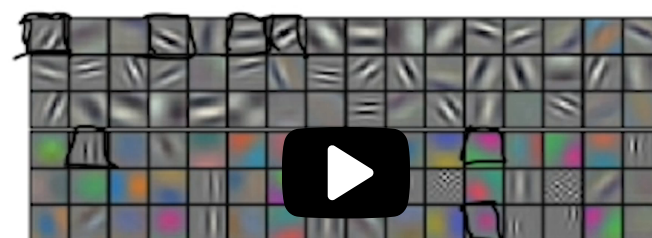
2. CNN - Continued

Convolution Neural Networks (Continued)



ConvNet features

Learned layer 1 CNN filters



96 convolutional filters on the first layer
(filters are of size 11x11x3, applied across
input images of size 224x224x3)

(Krizhevsky et al., 12')

are run through the image generating feature map.

Second thing is, the pulling that

tries to generate a slightly more compressed image

forgetting where things are, but maintaining information

about what's there, what was activated.

And CNN's are architectures that combine these type of layers

successively in a variety of different ways.



7:44 / 7:44

Speed 1.50x

[End of transcript. Skip to the start.](#)

Video

[Download video file](#)

Transcripts

[Download SubRip \(.srt\) file](#)[Download Text \(.txt\) file](#)

CNN - Numerical Example

1/1 point (graded)

In this problem, we are going to work out the outputs of a tiny toy example of CNN that is made up of just one conv layer consisting of just one filter F of shape 2×2 followed by a max-pooling layer of shape 2×2 . The input image is of shape 3×3

The output of the CNN is calculated as $\text{Pool}(\text{ReLU}(\text{Conv}(I)))$ where ReLU is the rectified linear activation function given by:

$$\text{ReLU}(x) = \max(0, x)$$

Also assume that the stride for the convolution and pool layers is 1

For the following values of the image I and filter weights F enter below the value of the output of the CNN (hint - it will be a single integer):

$$I = \begin{bmatrix} 1 & 0 & 2 \\ 3 & 1 & 0 \\ 0 & 0 & 4 \end{bmatrix}$$

$$F = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

✓ Answer: 5

Solution:

First let's calculate the output of the convolutional layer

$$I = \begin{bmatrix} 1 & 0 & 2 \\ 3 & 1 & 0 \\ 0 & 0 & 4 \end{bmatrix}$$

$$F = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\text{Conv}(I) = \begin{bmatrix} 1 & 0 & 2 \\ 3 & 1 & 0 \\ 0 & 0 & 4 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\text{Conv}(I) = \begin{bmatrix} 2 & 0 \\ 3 & 5 \end{bmatrix}$$

$$\text{ReLU}(\text{Conv}(I)) = \text{ReLU}\left(\begin{bmatrix} 2 & 0 \\ 3 & 5 \end{bmatrix}\right)$$

$$\text{ReLU}(\text{Conv}(I)) = \begin{bmatrix} 2 & 0 \\ 3 & 5 \end{bmatrix}$$

$$\text{Pool}(\text{ReLU}(\text{Conv}(I))) = \text{Pool}\left(\begin{bmatrix} 2 & 0 \\ 3 & 5 \end{bmatrix}\right)$$

$$\text{Pool}(\text{ReLU}(\text{Conv}(I))) = 5$$

Submit

You have used 1 of 3 attempts

i Answers are displayed within the problem

CNN Meaning

1/1 point (graded)

If you are trying to recognize a large number of features, you should have a small number of filters.

☐ true

☒ false ✓

Solution:

Each filter represents a distinct set of weights, which corresponds to searching for a particular feature in the image. If you have a large number of features, you want many filters.

Submit

You have used 1 of 3 attempts

ⓘ Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Unit 3 Neural networks (2.5 weeks):Lecture 12. Convolutional Neural Networks / 2. CNN - Continued

Add a Post

Show all posts ▼by recent activity ▼

There are no posts in this topic yet.

✕

Learn About Verified Certificates