

The basics of ConvNets



The basics of ConvNets
Graded Quiz • 30 min



1. What do you think applying this filter to a grayscale image will do?

1 point

$$\begin{bmatrix} 0 & 1 & -1 & 0 \\ 1 & 3 & -3 & -1 \\ 1 & 3 & -3 & -1 \\ 0 & 1 & -1 & 0 \end{bmatrix}$$

- ☐ Detect vertical edges
- ☐ Detect 45 degree edges
- ☐ Detect horizontal edges
- ☐ Detect image contrast

2. Suppose your input is a 300 by 300 color (RGB) image, and you are not using a convolutional network. If the first hidden layer has 100 neurons, each one fully connected to the input, how many parameters does this hidden layer have (including the bias parameters)?

1 point

- ☐ 9,000,001
- ☐ 9,000,100
- ☐ 27,000,001
- ☐ 27,000,100

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3. Suppose your input is a 300 by 300 color (RGB) image, and you use a convolutional layer with 100 filters that are each 5x5. How many parameters does this hidden layer have (including the bias parameters)?

1 point

- ☐ 2501
- ☐ 2600
- ☐ 7500
- ☐ 7600

4. You have an input volume that is 63x63x16, and convolve it with 32 filters that are each 7x7, using a stride of 2 and no padding. What is the output volume?

1 point

- ☐ 29x29x16
- ☐ 16x16x32
- ☐ 16x16x16
- ☐ 29x29x32

5. You have an input volume that is 15x15x8, and pad it using "pad=2." What is the dimension of the resulting volume (after padding)?

1 point

- ☐ 17x17x10
- ☐ 17x17x8
- ☐ 19x19x8
- ☐ 19x19x12

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6. You have an input volume that is $63 \times 63 \times 16$, and convolve it with 32 filters that are each 7×7 , and stride of 1. You want to use a "same" convolution. What is the padding?

1 point

- ☐ 1
☐ 2
☐ 3
☐ 7

7. You have an input volume that is $32 \times 32 \times 16$, and apply max pooling with a stride of 2 and a filter size of 2. What is the output volume?

1 point

- ☐ $15 \times 15 \times 16$
☐ $16 \times 16 \times 16$
☐ $16 \times 16 \times 8$
☐ $32 \times 32 \times 8$

8. Because pooling layers do not have parameters, they do not affect the backpropagation (derivatives) calculation.

1 point

- ☐ True
☐ False

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9. In lecture we talked about "parameter sharing" as a benefit of using convolutional networks. Which of the following statements about parameter sharing in ConvNets are true? (Check all that apply.)

1 point

- ☐ It allows gradient descent to set many of the parameters to zero, thus making the connections sparse.
☐ It allows a feature detector to be used in multiple locations throughout the whole input image/input volume.
☐ It reduces the total number of parameters, thus reducing overfitting.
☐ It allows parameters learned for one task to be shared even for a different task (transfer learning).

10. In lecture we talked about "sparsity of connections" as a benefit of using convolutional layers. What does this mean?

1 point

- ☐ Regularization causes gradient descent to set many of the parameters to zero.
☐ Each filter is connected to every channel in the previous layer.
☐ Each activation in the next layer depends on only a small number of activations from the previous layer.
☐ Each layer in a convolutional network is connected only to two other layers

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1. Detect vertical edges
2. 27000100
3. 7600
4. $29 \times 29 \times 32$
5. $19 \times 19 \times 8$
6. 3

7. $16 \times 16 \times 16$
8. False
9.
 - a. It allows a feature detector to be used in multiple locations throughout the whole input image/ input volume.
 - b. It reduces the total number of parameters, thus reducing overfitting.
10. Each activation in the next layer depends on only a small number of activations from the previous layer.