The basics of ConvNets

Quiz, 10 questions

1 point

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

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

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

1 point

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)?

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

1 point

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)?

- 2501
- 2600
- 7500
- 7600

1 point

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?

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

1 point

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)?

- 19x19x8
- 19x19x12
- 17x17x10

- ○ 17x17x8

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1 point

6. You have an input volume that is 63x63x16, and convolve it with 32 filters that are each 7x7, and stride of 1. You want to use a “same” convolution. What is the padding?

- ○ 1
- ○ 2
- ○ 3
- ○ 7

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1 point

7. You have an input volume that is 32x32x16, and apply max pooling with a stride of 2 and a filter size of 2. What is the output volume?

- ○ 32x32x8
- ○ 15x15x16
- ○ 16x16x8
- ○ 16x16x16

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1 point

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

- ○ True
- ○ False

1 point

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.)

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

1 point

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

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

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