Congratulations! You passed!

Grade received 90% **Latest Submission Grade** 90% **To pass** 80% or higher

Go to next item

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

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

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

Expand

Correct
Correct! As you can see the difference between values from the left part and values from the right of this filter is high. When convolving this filter on a grayscale image, the vertical edges will be detected.

2. Suppose your input is a 128 by 128 color (RGB) image, and you are not using a convolutional network. If the first hidden layer has 64 neurons, each one fully connected to the input, how many parameters does this hidden layer have (including the bias parameters)? **1 / 1 point**

- 3145792
- 1048576
- 1048640
- 3145728

Expand

Correct
Correct, the number of inputs for each unit is $128 \times 128 \times 3$ since the input image is RGB, so we need $128 \times 128 \times 3 \times 64$ parameters for the weights and 64 parameters for the bias parameters, thus $128 \times 128 \times 3 \times 64 + 64 = 3145792$.

3. Suppose your input is a 256 by 256 color (RGB) image, and you use a convolutional layer with 128 filters that are each 7×7. How many parameters does this hidden layer have (including the bias parameters)? **1 / 1 point**

- 18816
- 6400
- 1233125504
- 18944

Expand

Correct
Yes, you have $7 \times 7 \times 3 + 1$ weights per filter with the bias. Given that you have 128 filters, you get $(7 \times 7 \times 3 + 1) \times 128 = 18944$.

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 / 1 point**

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

Expand

Correct
Yes, $\frac{63-7+0\times2}{2} + 1 = 29$ and the number of channels should match the number of filters.

5. You have an input volume that is 61x61x32, and pad it using "pad=3". What is the dimension of the resulting volume (after padding)? **1 / 1 point**

- 64x64x35
- 67x67x32
- 64x64x32
- 61x61x35

Expand

Correct
Yes, if the padding is 3 you add 6 to the height dimension and 6 to the width dimension.

6. You have a volume that is $64 \times 64 \times 32$, and convolve it with 40 filters of 9×9, and stride 1. You want to use a "same" convolution. What is the padding? **1 / 1 point**

- 0
- 4
- 8
- 6

Expand

Correct
Yes, when using a padding of 4 the output volume has $n_H = \frac{64-9+2\times4}{} + 1$.

7. You have an input volume that is 128x128x12, and apply max pooling with a stride of 4 and a filter size of 4. What is the output volume? 1 / 1 point

- (•) $32 \times 32 \times 12$
- ( ) $128 \times 128 \times 3$
- ( ) $64 \times 64 \times 12$
- ( ) $32 \times 32 \times 3$

Expand

Correct
Yes, using the formula $n_H^{[l]} = \frac{n_H^{[l-1]} + 2 \times p - f}{s} + 1$ with $p = 0, f = 4, s = 4$ and $n_H^{[l-1]} = 32$.

8. Which of the following are hyperparameters of the pooling layers? (Choose all that apply) 1 / 1 point

- [x] Whether it is max or average.

Correct
Yes, these are the two types of pooling discussed in the lectures, and choosing which to use is considered a hyperparameter.

- [ ] $W^{[l]}$ weights.
- [x] Stride

Correct
Yes, although usually, we set $f = s$ this is one of the hyperparameters of a pooling layer.

- [ ] $b^{[l]}$ bias.

Expand

Correct
Great, you got all the right answers.

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 / 1 point

- [ ] It allows gradient descent to set many of the parameters to zero, thus making the connections sparse.
- [x] It allows a feature detector to be used in multiple locations throughout the whole input image/input volume.

Correct
Yes, by sliding a filter of parameters over the entire input volume, we make sure a feature detector can be used in multiple locations.

- [x] It reduces the total number of parameters, thus reducing overfitting.

Correct
Yes, a convolutional layer uses parameter sharing and usually has a lot less parameters than a fully-connected layer.

- [ ] It allows parameters learned for one task to be shared even for a different task (transfer learning).

Expand

Correct

Great, you got all the right answers.

10. The sparsity of connections and weight sharing are mechanisms that allow us to use fewer parameters in a convolutional layer making it possible to train a network with smaller training sets. True/False? **0 / 1 point**

- ○ True
- ◉ False

Expand

Incorrect
No, weight sharing reduces significantly the number of parameters in a neural network, and sparsity of connections allows us to use a smaller number of inputs thus reducing even further the number of parameters.