## Congratulations! You passed!

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

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**1.** What do you think applying this filter to a grayscale image will do? **0 / 1 point**

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

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

Expand

**Incorrect**
Incorrect. Notice that there is a direction in which we can notice a high delta in the values, thus when convolving on a grayscale image the edges in that direction will be detected.

**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 / 1 point**

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

Expand

**Correct**
Correct, the number of weights is $300 \times 300 \times 3 \times 100 = 27,000,000$, when you add the bias terms (one per neuron) you get $27,000,100$.

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

- 1233125504
- 18816
- 18944

- 6400

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 $127 \times 127 \times 16$, and convolve it with 32 filters of $5 \times 5$, using a stride of 2 and no padding. What is the output volume? **1 / 1 point**

- $123 \times 123 \times 32$
- $123 \times 123 \times 16$
- $62 \times 62 \times 32$
- $62 \times 62 \times 16$

Expand

**Correct**
Correct, using the formula $n_H^{[l]} = \frac{n_H^{[l-1]} + 2 \times p - f}{s} + 1$ with $n_H^{[l-1]} = 127, p = 0, f = 5$, and $s = 2$ we get 62.

**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 / 1 point**

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

Expand

**Correct**
Correct, padding is applied over the height and the width of the input image. If the padding is two, you add 4 to the height dimension and 4 to the width dimension.

**6.** You have a volume that is $121 \times 121 \times 32$, and convolve it with 32 filters of $5 \times 5$, and a stride of 1. You want to use a "same" convolution. What is the padding? **1 / 1 point**

- 3
- 5
- 0
- 2

Expand

**Correct**
Yes, when using a padding of 2 the output volume has $n_H = \frac{121-5+4}{1} + 1$.

**7.** You have an input volume that is 66x66x21, and apply max pooling with a stride of 3 and a filter size of 3. What is the output volume? **1 / 1 point**

- $22 \times 22 \times 7$
- $66 \times 66 \times 7$
- $21 \times 21 \times 21$
- $22 \times 22 \times 21$

Expand

**Correct**
Yes, using the formula $n_H^{[l]} = \frac{n_H^{[l-1]}+2\times p-f}{s} + 1$ with $p = 0, f = 3, s = 3$ and $n_H^{[l-1]} = 66$.

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

- [x] Filter size.

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

- [ ] Average weights.
- [ ] Number of filters.
- [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.

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**

- [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.

- [ ] It allows gradient descent to set many of the parameters to zero, thus making the connections sparse.
- [x] It reduces the total number of parameters, thus reducing overfitting.

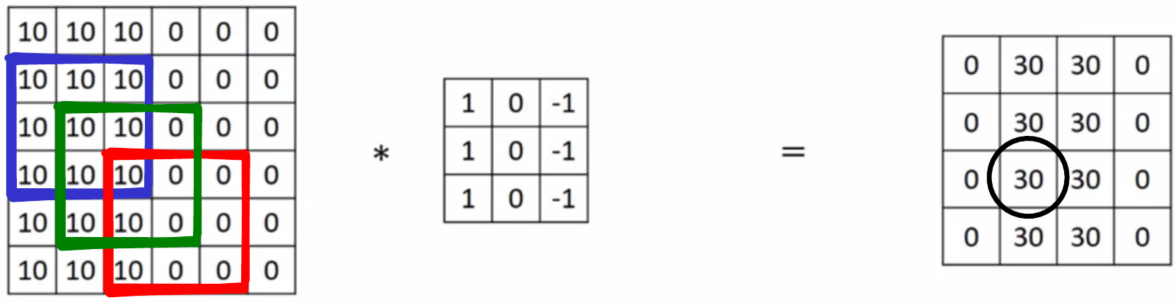
**Correct**
Yes, a convolutional layer uses parameter sharing and usually has a lot less parameters than a fully-connected layer.

- [ ] 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 following image depicts the result of a convolution at the right when using a stride of 1 and the filter is shown right next. **1 / 1 point**




On which pixels does the circled pixel of the activation at the right depend?

- It depends on all the pixels of the image on the left.
- It depends on the pixels enclosed by the blue square.
- It depends on the pixels enclosed by the green square.
- It depends on the pixels enclosed by the red square.

Expand

Correct
Yes, this is the position of the filter when we move it two pixels down and one to the right.