Congratulations! You passed!

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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 horizontal edges
- Detect vertical edges
- Detect 45 degree 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 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)? **0 / 1 point**

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

Expand

Incorrect
No, when calculating the number of weights, did you consider that you were working with a color image?

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**

- 6400
- 18944
- 1233125504
- 18816

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 $121 \times 121 \times 16$, and convolve it with 32 filters of 4×4, using a stride of 3 and no padding. What is the output volume? **1 / 1 point**

- $118 \times 118 \times 32$
- $40 \times 40 \times 16$
- $$118 \times 118 \times 16$$

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Expand

Correct
Correct, using the formula $n_H^{[l]} = \frac{n_H^{[l-1]} + 2 \times p - f}{s} + 1$ with $n_H^{[l-1]} = 121, p = 0, f = 4$, and $s = 3$ we get 40

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
- 64x64x32
- 67x67x32
- 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**

- 4
- 0
- 6
- 8

Expand

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

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**

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

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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. Because pooling layers do not have parameters, they do not affect the backpropagation (derivatives) calculation. **0 / 1 point**

- True
- False

Expand

Incorrect

Everything that influences the loss should appear in the backpropagation because we are computing derivatives. In fact, pooling layers modify the input by choosing one value out of several values in their input volume. Also, to compute derivatives for the layers that have parameters (Convolutions, Fully-Connected), we still need to backpropagate the gradient through the Pooling layers.

9. Which of the following are true about convolutional layers? (Check all that apply) **1 / 1 point**

- [ ] It speeds up the training since we don't need to compute the gradient for convolutional layers.
- [x] It allows a feature detector to be used in multiple locations throughout the whole input volume.

Correct

Yes, since convolution involves sliding the filter throughout the whole input volume the feature detector is computed over all the volume.

- [x] Convolutional layers provide sparsity of connections.

Correct

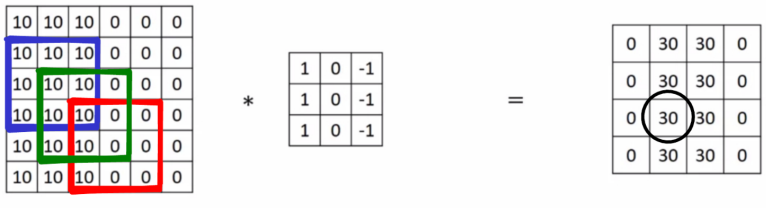
Yes, this happens since the next activation layer depends only on a small number of activations from the previous layer.

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 the pixels enclosed by the green square.
- ( ) 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 red square.

Expand

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