Congratulations! You passed!

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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
- ( ) Detect image contrast
- ( ) Detect horizontal edges
- ( ) Detect vertical edges

Expand

Incorrect
Incorrect, over which axis of this filter matrix do you see a high delta of values?

2. Suppose your input is a 128 by 128 grayscale image, and you are not using a convolutional network. If the first hidden layer has 256 neurons, each one fully connected to the input, how many parameters does this hidden layer have (including the bias parameters)? **1 / 1 point**

- ( ) 12582912
- ( ) 12583168
- ( ) 4194304
- (•) 4194560

Expand

Correct
Correct, the number of inputs for each unit is 128×128 since the input image is grayscale, so we need $128 \times 128 \times 256$ parameters for the weights and 256 parameters for the bias thus $128 \times 128 \times 256 + 256 = 4194560$.

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 / 1 point**

- ( ) 2501
- ( ) 7500
- (•) 7600
- ( ) 2600

Expand

Correct
Correct, you have $25 \times 3 = 75$ weights and 1 bias per filter. Given that you have 100 filters, you get 7,600 parameters for this layer.

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**

- ( ) $40 \times 40 \times 16$
- (•) $40 \times 40 \times 32$
- ( ) $118 \times 118 \times 16$
- ( ) $118 \times 118 \times 32$

Expand

Correct

Correct, using the formula $n_H^{[l]} = \frac{n_H^{[l-1]} - f + 2 \times p}{s} + 1$ 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**

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

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

- 2
- 5
- 0
- 3

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 32x32x16, and apply max pooling with a stride of 2 and a filter size of 2. What is the output volume? **1 / 1 point**

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

Expand

Correct
Correct, using the following formula: $n_H^{[l]} = \frac{n_H^{[l-1]} - f + 2 \times p - f}{s} + 1$

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 the benefits of using convolutional layers? (Check all that apply) **1 / 1 point**

- [ ] It reduces the computations in backpropagation since we omit the convolutional layers in the process.
- [x] It reduces the total number of parameters, thus reducing overfitting through parameter sharing.

Correct

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

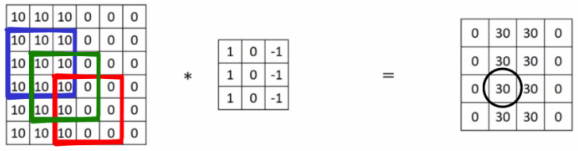
- [x] Convolutional layers are good at capturing translation invariance.

Correct
Yes, this is due in part to applying the same filter all over the image.

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 red square.
- (•) It depends on the pixels enclosed by the green square.

Expand

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