Congratulations! You passed!

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

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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 45-degree edges.
- (selected) Detect horizontal edges.
- Detect vertical edges.
- Detecting image contrast.

Expand

Correct
Correct. There is a high difference between the values in the top part from those in the bottom part of the matrix. When convolving this filter on a grayscale image, the horizontal 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)? **1 / 1 point**

- (selected) 27,000,100
- 9,000,100
- 9,000,001
- 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 grayscale image, and you use a convolutional layer with 128 filters that are each 3×3. How many parameters does this hidden layer have (including the bias parameters)? **1 / 1 point**

- 3584
- 1152
- 75497600
- (selected) 1280

Expand

Correct
Yes, since the input volume has only one channel each filter has $$3 \times 3 + 1$$ weights including the bias, thus the total is $$(3 \times 3 + 1) \times 128$$.

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**

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

Expand

Correct
Yes, $$\frac{63 - 7 + 0 \times 2}{2} + 1 = 29$$ 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
- 64x64x32
- 61x61x35
- 67x67x32

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
- 6
- 8
- 4

Expand

Correct
Yes, when using a padding of 4 the output volume has $$n_H = \frac{121 - 9 + 2\times4}{1} + 1$$.

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? **0 / 1 point**

- ○ $128 \times 128 \times 3$
- ○ $32 \times 32 \times 3$
- ○ $32 \times 32 \times 12$
- ◉ $64 \times 64 \times 12$

Expand

✗ **Incorrect**
No, check that you apply the formula $$n_H^{[l]} = \frac{n_H^{[l-1]} + 2 \times p - f }{s} + 1$$ correctly.

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

- ☐ $W^{[l]}$ weights.
- ☐ $b^{[l]}$ bias.
- ☑ Stride

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

- ☑ 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. Which of the following are the benefits of using convolutional layers? (Check all that apply) **0 / 1 point**

- ☑ Convolutional layers are good at capturing translation invariance.

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

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

! **This should not be selected**
No, transfer learning is not bound to ConvNets and can be used with other types of models as you've seen in Course 1-3.

- ☑ It reduces the computations in backpropagation since we omit the convolutional layers in the process.

! **This should not be selected**
No, we compute the derivatives with respect to the parameters of the filters of convolutional layers in backpropagation.

- ☑ It reduces the total number of parameters, thus reducing overfitting through parameter sharing.

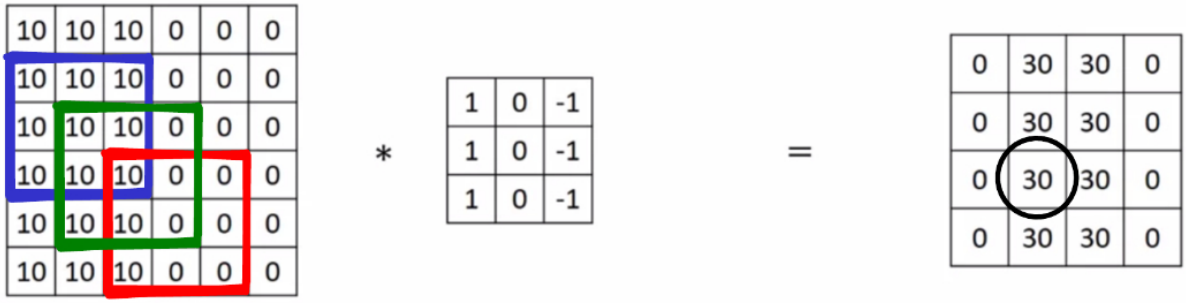
✓ **Correct**
Yes, a convolutional layer uses parameters sharing and has usually a lot fewer parameters than a fully-connected layer.

Expand

✗ **Incorrect**
You chose the extra incorrect 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 the pixels enclosed by the red square.
- ( ) It depends on all the pixels of the image on the left.
- ( ) It depends on the pixels enclosed by the blue square.

Expand

Correct

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