Congratulations! You passed!

Grade received 100% **Latest Submission Grade** 100% **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 vertical edges
- ( ) Detect horizontal edges
- ( ) Detect 45 degree edges

Detect image contrast

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)?

1 / 1 point

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

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

- 1152
- 1280
- 3584
- 75497600

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 $121 \times 121 \times 16$, 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

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

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 31x31x32, and pad it using “pad=1”. What is the dimension of the resulting volume (after padding)? **1 / 1 point**

- 31x31x34
- 33x33x33
- 33x33x32 (selected)
- 32x32x32

Expand

Correct

Yes, if the padding is 1 you add 2 to the height dimension and 2 to the width dimension.

6. You have an input volume that is 63x63x16, and convolve it with 32 filters that are each 7x7, and stride of 1. You want to use a "same" convolution. What is the padding?

1 / 1 point

- ○ 1
- ◉ 3
- ○ 7
- ○ 2

Expand

Correct

Correct, you need to satisfy the following equation: $n_H - f + 2 \times p + 1 = n_H$ as you want to keep the dimensions between the input volume and the output volume.

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

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

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

- ○ True
- ◉ False

Expand

Correct

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

- [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.

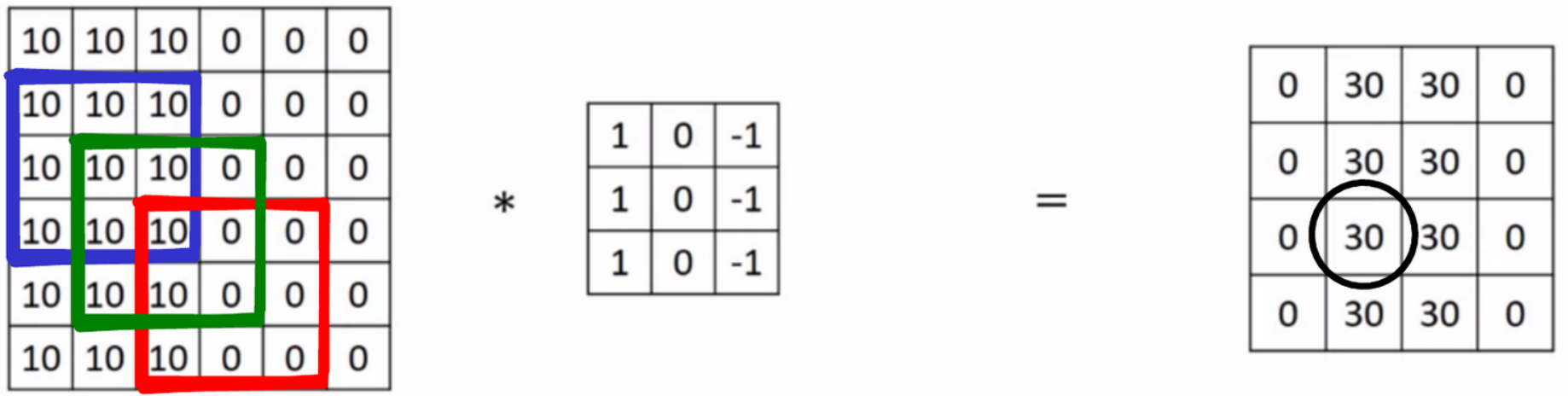
- [ ] It speeds up the training since we don't need to compute the gradient for convolutional layers.

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 red square.
- ( ) 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.