The Basics of ConvNets

1.
Question 1

What do you think applying this filter to a grayscale image will do?

$$[01-1013-3-113-3-101-10]\begin{bmatrix}0&1&1&0\\1&3&3&1\\-1&-3&-3&-1\\0&-1&-1&0\end{bmatrix}$$

1 / 1 point

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.
Question 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

Expand

Correct

Correct, the number of weights is $300\times300\times3\times100=27,000,000300\times300\times3\times100=27,000,000$, when you add the bias terms (one per neuron) you get $27,000,10027,000,100$.

3.
Question 3

Suppose your input is a 256 by 256 color (RGB) image, and you use a convolutional layer with 128 filters that are each $7\times77\times7$. How many parameters does this hidden layer have (including the bias parameters)?

0 / 1 point

Expand

Incorrect

No, recall that the filter must have matching channels with the input volume.

4.
Question 4

You have an input volume that is $121\times121\times16121\times121\times16$, and convolve it with 32 filters of $4\times44\times4$, using a stride of 3 and no padding. What is the output volume?

1 / 1 point

Expand

Correct

Correct, using the formula ⬚⬚[⬚]=⬚⬚[⬚−1]+2×⬚−⬚⬚+1$n_{H[l]}=sn_{H[l-1]}+2\times p-f+1$ with ⬚⬚[⬚−1]=121$n_{H[l-1]}=121$, ⬚=0$p=0$, ⬚=4$f=4$, and ⬚=3$s=3$ we get 40

5.
Question 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

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.
Question 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

Expand

Correct

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

7.
Question 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

Expand

Correct

Yes, using the formula ⬚⬚[⬚]=⬚⬚[⬚−1]+2×⬚−⬚⬚+1$n_{H[l]}=sn_{H[l-1]}+2\times p-f+1$ with ⬚=0$p=0$, ⬚=3$f=3$, ⬚=3$s=3$ and ⬚⬚[⬚−1]=66$n_{H[l-1]}=66$.

8.
Question 8

Which of the following are hyperparameters of the pooling layers? (Choose all that apply)

1 / 1 point

Expand

Correct

Great, you got all the right answers.

9.
Question 9

Which of the following are true about convolutional layers? (Check all that apply)

0 / 1 point

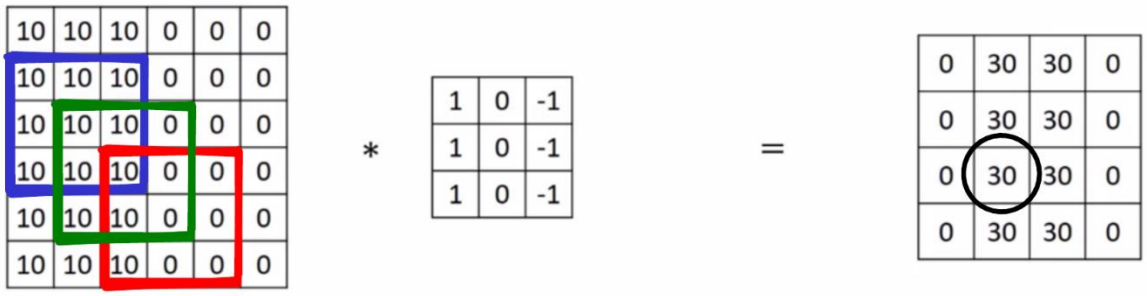
Expand

Incorrect

You didn't select all the correct answers

10.
Question 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.



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

1 / 1 point

Expand

Correct

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