

## ✓ Congratulations! You passed!

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1. When building a ConvNet, typically you start with some POOL layers followed by some CONV layers. True/False?

1 / 1 point

☐ True

☒ False

↗ Expand

✓ Correct

Correct. It is typical for ConvNets to use a POOL layer after some Conv layers; sometimes even one POOL layer after each CONV layer; but is not common to start with POOL layers.

2. In LeNet - 5 we can see that as we get into deeper networks the number of channels increases while the height and width of the volume decreases. True/False?

1 / 1 point

☐ False

☒ True

↗ Expand

✓ Correct

Correct, since in its implementation only valid convolutions were used, without padding, the height and width of the volume were reduced at each convolution. These were also reduced by the POOL layers, whereas the number of channels was increased from 6 to 16.

3. The motivation of Residual Networks is that very deep networks are so good at fitting complex functions that when training them we almost always overfit the training data. True/False?

1 / 1 point

☒ False

☐ True

↗ Expand

✓ Correct

Correct, very deep neural networks are hard to train and a deeper network does not always imply lower training error. Residual Networks allow us to train very deep neural networks.

4. The computation of a ResNet block is expressed in the equation:

1 / 1 point

$$y = x + \text{ReLU}(\text{BN}(\text{Conv}(\text{BN}(\text{ReLU}(x)))))$$

$$a^{[l+2]} = g \left( \underbrace{W^{[l+2]}}_C g \left( \underbrace{W^{[l+1]} a^{[l]} + b^{[l+1]}}_A \right) + b^{[l+2]} + \underbrace{a^{[l]}}_B \right)$$

Which part corresponds to the skip connection?

- ☐ The term in the blue box, marked as *A*.
- ☒ The term in the orange box, marked as *B*.
- ☐ The term in the red box, marked as *C*.
- ☐ The equation of ResNet.

[Expand](#)

✓ **Correct**

Yes, this term is the result of the skip connection or shortcut.

5. Which ones of the following statements on Residual Networks are true? (Check all that apply.)

1 / 1 point

- ☐ The skip-connections compute a complex non-linear function of the input to pass to a deeper layer in the network.
- ☒ The skip-connection makes it easy for the network to learn an identity mapping between the input and the output within the ResNet block.

✓ **Correct**  
This is true.

- ☒ Using a skip-connection helps the gradient to backpropagate and thus helps you to train deeper networks

✓ **Correct**  
This is true.

- ☐ A ResNet with L layers would have on the order of  $L^2$  skip connections in total.

[Expand](#)

✓ **Correct**

Great, you got all the right answers.

6. Suppose you have an input volume of dimension  $n_H \times n_W \times n_C$ . Which of the following statements do you agree with? (Assume that the “1x1 convolutional layer” below always uses a stride of 1 and no padding.)

1 / 1 point

- ☒ You can use a 2D pooling layer to reduce  $n_H$ ,  $n_W$ , but not  $n_C$ .

✓ **Correct**  
This is correct.

- ☒ You can use a 1x1 convolutional layer to reduce  $n_C$  but not  $n_H$  and  $n_W$ .

✓ **Correct**  
Yes, a 1x1 convolutional layer with a small number of filters is going to reduce  $n_C$  but will keep the dimensions  $n_H$  and  $n_W$

- ☐ You can use a 1x1 convolutional layer to reduce  $n_H$ ,  $n_W$ , and  $n_C$ .
- ☐ You can use a 2D pooling layer to reduce  $n_H$ ,  $n_W$ , and  $n_C$ .

Expand

Correct

Great, you got all the right answers.

7. Which of the following are true about the inception Network? (Check all that apply)

1 / 1 point

- ☒ Inception blocks allow the use of a combination of 1x1, 3x3, 5x5 convolutions and pooling by stacking up all the activations resulting from each type of layer.

Correct

Correct. The use of several different types of layers and stacking up the results to get a single volume is at the heart of the inception network.

- ☐ Making an inception network deeper won't hurt the training set performance.
- ☒ One problem with simply stacking up several layers is the computational cost of it.

Correct

Correct. That is why the bottleneck layer is used to reduce the computational cost.

- ☐ Inception blocks allow the use of a combination of 1x1, 3x3, 5x5 convolutions, and pooling by applying one layer after the other.

Expand

Correct

Great, you got all the right answers.

8. Parameters trained for one computer vision task can't be used directly in another task. In most cases, we must change the softmax layer, or the last layers of the model and re-train for the new task. True/False?

1 / 1 point

- ☐ False
- ☒ True

Expand

Correct

Yes, this is a good way to take advantage of open-source models trained more or less for the task you want to do. This may also help you save a great number of computational resources and data.

9. In Depthwise Separable Convolution you:

1 / 1 point

- ☒ The final output is of the dimension  $n_{out} \times n_{out} \times n'_c$  (where  $n'_c$  is the number of filters used in the pointwise convolution step).

Correct

- ☐ For the "Depthwise" computations each filter convolves with all of the color channels of the input image.
- ☐ You convolve the input image with a filter of  $n_f \times n_f \times n_c$  where  $n_c$  acts as the depth of the filter ( $n_c$  is the number of color channels of the input image).
- ☐ The final output is of the dimension  $n_{out} \times n_{out} \times n_c$  (where  $n_c$  is the number of color channels of the input image).
- ☒ Perform two steps of convolution.

✓ Correct

✓ For the "Depthwise" computations each filter convolves with only one corresponding color channel of the input image.

✓ Correct

✓ You convolve the input image with  $n_c$  number of  $n_f \times n_f$  filters ( $n_c$  is the number of color channels of the input image).

✓ Correct

☐ Perform one step of convolution.

↗ Expand

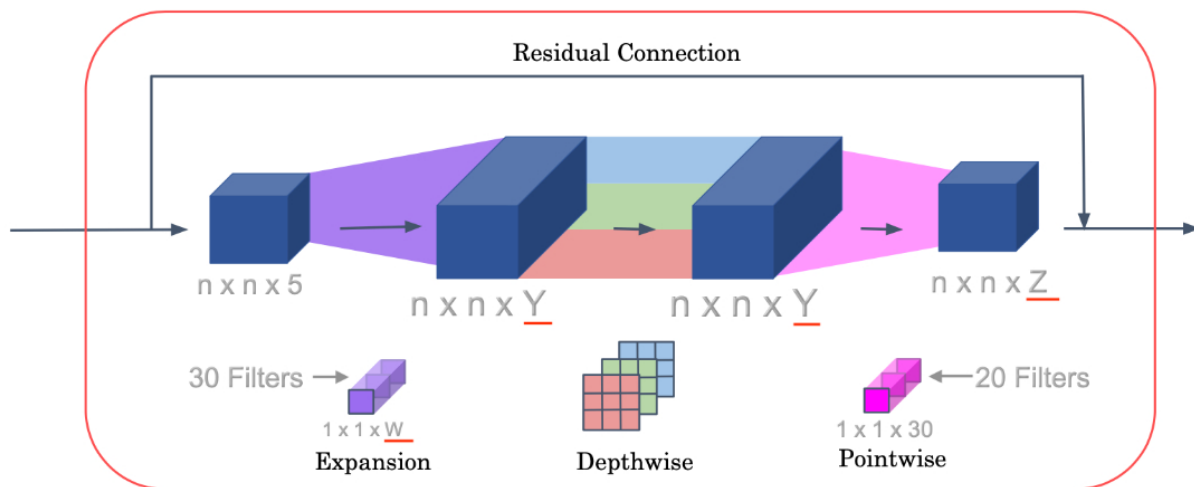
✓ Correct

Great, you got all the right answers.

10. Fill in the missing dimensions shown in the image below (marked W, Y, Z).

1 / 1 point

## MobileNet v2 Bottleneck



☐ W = 30, Y = 20, Z = 20

☒ W = 5, Y = 30, Z = 20

☐ W = 30, Y = 30, Z = 5

☐ W = 5, Y = 20, Z = 5

↗ Expand

✓ Correct