Deep Convolutional Models

Congratulations! You passed!

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1. Which of the following do you typically see in ConvNet? (Check all that apply.) **1 / 1 point**

- (●) Use of FC layers after flattening the volume to output classes.
- ( ) ConvNet makes exclusive use of CONV layers.
- ( ) Use of multiple POOL layers followed by a CONV layer.
- ( ) Multiple FC layers followed by a CONV layer.

Expand

Correct
Yes, FC layers are typically used in the last few layers after flattening the volume to generate the output in classification.

2. LeNet - 5 made extensive use of padding to create valid convolutions, to avoid increasing the number of channels after every convolutional layer. True/False? **1 / 1 point**

- ( ) True
- (●) False

Correct
Yes, back in 1998 when the corresponding paper of LeNet - 5 was written padding wasn't used.

3. Training a deeper network (for example, adding additional layers to the network) allows the network to fit more complex functions and thus almost always results in lower training error. For this question, assume we're referring to "plain" networks. **1 / 1 point**

- (•) False
- ( ) True

Expand

Correct
Correct, Resnets are here to help us train very deep neural networks.

4. The computation of a ResNet block is expressed in the equation: **1 / 1 point**

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

C A B

Which part corresponds to the skip connection?

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

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**

- [x] 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.

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

Correct
This is true.

- [ ] The skip-connections compute a complex non-linear function of the input to pass to a deeper layer in the network.
- [ ] 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 x n_W x 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**

- [x] 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

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

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**

- [x] 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.

- [ ] Making an inception network deeper won't hurt the training set performance.
- [ ] Inception blocks allow the use of a combination of 1x1, 3x3, 5x5 convolutions, and pooling by applying one layer after the other.
- [x] 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.

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**

- (●) True
- ( ) False

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. Which of the following are true about Depthwise-separable convolutions? (Choose all that apply) **1 / 1 point**

- [x] The depthwise convolution convolves each channel in the input volume with a separate filter.

  Correct
  Yes, the output of this kind of convolution is the same as the input.

- [x] Depthwise-separable convolutions are composed of two different types of convolutions.

  Correct
  Yes, it is composed of a depthwise convolution followed by a pointwise convolution.

- [ ] The depthwise convolution convolves the input volume with 1×1 filters over the depth dimension.
- [x] The pointwise convolution convolves the input volume with 1×1 filters.

Correct

Yes, the number of filters for the output of the depthwise-separable convolution is determined by the number of 1 × 1 filters used.

Expand

Correct

Great, you got all the right answers.

10. Suppose that in a MobileNet v2 Bottleneck block the input volume has shape $64 \times 64 \times 16$. If we use 32 filters for the expansion and 16 filters for the projection. What is the size of the input and output volume of the depthwise convolution, assuming a pad='same'? **1 / 1 point**

- $64 \times 64 \times 32$ $64 \times 64 \times 16$
- $64 \times 64 \times 16$ $64 \times 64 \times 32$
- $32 \times 32 \times 32$ $32 \times 32 \times 32$
- $64 \times 64 \times 32$ $64 \times 64 \times 32$

Expand

Correct

Correct, the size of the input and output volume of the depthwise convolution is determined by the number of filters in the expansion.