Deep Convolutional Models
Graded Assignment • 50 min

English

Your grade: 97.50%

Your latest: **97.50%** • Your highest: **97.50%** • To pass you need at least 80%. We keep your highest score.

Next item →

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

- [ ] FC layers in the first few layers
- [x] Multiple CONV layers followed by a POOL layer

Correct
True, as seen in the case studies.

- [ ] Multiple POOL layers followed by a CONV layer
- [x] FC layers in the last few layers

Correct
True, fully-connected layers are often used after flattening a volume to output a set of classes 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

- ○ True
- ◉ False

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

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

5. Adding a ResNet block to the end of a network makes it deeper. Which of the following is true? 1 / 1 point

- (●) The performance of the networks doesn't get hurt since the ResNet block can easily approximate the identity function.
- ( ) The performance of the networks is hurt since we make the network harder to train.
- ( ) The number of parameters will decrease due to the shortcut connections.
- ( ) It shifts the behavior of the network to be more like the identity function.

Correct
Yes, as noted in the lectures in a ResNet block the computations are given by $a^{[l+2]} = g(W^{[l+2]}a^{[l+1]} + b^{[l+2]} + a^{[l]})$ thus if $W^{[l+2]}$ and $b^{[l+2]}$ are zero then we get the identity function.

6. 1×1 convolutions are the same as multiplying by a single number. True/False? 1 / 1 point

- (●) False
- ( ) True

Correct
Yes, a 1×1 layer doesn't act as a single number because it makes a sum over the depth of the volume.

7. Which of the following are true about bottleneck layers? (Check all that apply) **0.75 / 1 point**

- [x] By adding these layers we can reduce the computational cost in the inception modules.

  Correct
  Yes, by using the 1×1 convolutional layers we can reduce the depth of the volume and help reduce the computational cost of applying other convolutional layers with different filter sizes.

- [ ] The bottleneck layer has a more powerful regularization effect than Dropout layers.

- [x] The use of bottlenecks doesn't seem to hurt the performance of the network.

  Correct
  Yes, although it reduces the computational cost significantly.

- [x] Bottleneck layers help to compress the 1x1, 3x3, 5x5 convolutional layers in the inception network.

  This should not be selected
  No, the bottleneck layer doesn't combine any of these different layers.

8. Models 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

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

- ☑ 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.

- ☑ 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 pointwise convolution convolves the output volume with 1×1 filters.

Correct

- [x] The pointwise convolution convolves the output 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.

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

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**

- ○ $64 \times 64 \times 16, 64 \times 64 \times 32$
- ○ $32 \times 32 \times 32, 32 \times 32 \times 32$
- ○ $64 \times 64 \times 32, 64 \times 64 \times 16$
- ◉ $64 \times 64 \times 32, 64 \times 64 \times 32$

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