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Deep Convolutional Models

Quiz • 30 min

Deep Convolutional Models

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Due Apr 18, 2:59 PM CST **Attempts** 3 every 8 hours

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

Try again

- [x] FC layers in the last few layers

Receive grade

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

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- [x] Multiple CONV layers followed by a POOL layer

Correct
True, as seen in the case studies.

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

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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. 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

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 following equation captures the computation in a ResNet block. What goes into the two blanks above? **1 / 1 point**

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

- ( ) $z^{[l]}$ and $a^{[l]}$, respectively
- (•) $a^{[l]}$ and 0, respectively
- ( ) 0 and $z^{[l+1]}$, respectively
- ( ) 0 and $a^{[l]}$, respectively

Correct
Correct

5. Which ones of the following statements on Residual Networks are true? (Check all that apply.) **1 / 1 point**

- [x] 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.
- [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.

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

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 2D pooling layer to reduce n_H, n_W, but not n_C.

Correct
This is correct.

- [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

- [ ] 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.

7. Which of the following are true about the inception Network? (Check all that apply) **0.5 / 1 point**

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

This should not be selected
Incorrect. An inception block stacks up the result of applying the different size convolutions and the pooling in a single volume.

- [ ] One problem with simply stacking up several layers is the computational cost of it.
- [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.

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

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. **0 / 1 point**

Which of the following are true about Depthwise-separable convolutions? (Choose all that apply)

- [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 each channel in the input volume with a separate filter.
- [ ] The pointwise convolution convolves the input volume with 1×1 filters.
- [x] The depthwise convolution convolves the input volume with 1×1 filters over the depth dimension.

This should not be selected
No, this is what the pointwise convolution does.

10. Suppose that in a MobileNet v2 Bottleneck block we have an $n \times n \times 5$ input volume, we use 30 filters for the expansion, in the depthwise convolutions we use 3×3 filters, and 20 filters for the projection. How many parameters are used in the complete block, suppose we don't use bias? **1 / 1 point**

- ( ) 8250
- ( ) 1101
- ( ) 80
- (•) 1020

Correct
Yes, the expansion filters use $5 \times 30 = 150$ parameters, the depthwise convolutions need $3 \times 3 \times 30 = 270$ parameters, and the projection part $30 \times 20 = 600$ parameters.