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Deep Convolutional Models

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Deep Convolutional Models
Graded Quiz • 30 min

Due May 31, 10:59 AM +04

Deep Convolutional Models

TOTAL POINTS 10

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

1 point

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

2.
Question 2
In order to be able to build very deep networks, we usually only use pooling layers to downsize the height/width of the activation volumes while convolutions are used with “valid” padding. Otherwise, we would downsize the input of the model too quickly.

1 point

- ( ) True
- (•) False

3.
Question 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 point

- (•) False
- ( ) True

4.
Question 4
The following equation captures the computation in a ResNet block. What goes into the two blanks above?

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

1 point

00 and z^{[l+1]}$z^{[l+1]}$, respectively

a^{[l]}$a^{[l]}$ and 0, respectively

z^{[l]}$z^{[l]}$ and a^{[l]}$a^{[l]}$, respectively

0 and a^{[l]}$a^{[l]}$, respectively

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

1 point

The skip-connection makes it easy for the network to learn an identity mapping between the input and the output within the ResNet block.

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^2L^2 skip connections in total.

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

6.
Question 6
Suppose you have an input volume of dimension n_Hn_H x n_Wn_W x n_Cn_C. Which of the following statements you agree with? (Assume that “1x1 convolutional layer” below always uses a stride of 1 and no padding.)

1 point

- [x] You can use a 1x1 convolutional layer to reduce n_C but not n_H, 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.

- [x] You can use a 2D pooling layer to reduce n_H, n_W, but not n_C.

7.
Question 7
Which ones of the following statements on Inception Networks are true? (Check all that apply.)

1 point

- [x] A single inception block allows the network to use a combination of 1x1, 3x3, 5x5 convolutions and pooling.

- [ ] Inception networks incorporate a variety of network architectures (similar to dropout, which randomly chooses a network architecture on each step) and thus has a similar regularizing effect as dropout.

- [ ] Making an inception network deeper (by stacking more inception blocks together) *might* not hurt training set performance.

- [x] Inception blocks usually use 1x1 convolutions to reduce the input data volume's size before applying 3x3 and 5x5 convolutions.

8.
Question 8
Which of the following are common reasons for using open-source implementations of ConvNets (both the model and/or weights)? Check all that apply.

1 point

- [ ] A model trained for one computer vision task can usually be used to perform data augmentation even for a different computer vision task.

The same techniques for winning computer vision competitions, such as using multiple crops at test time, are widely used in practical deployments (or production system deployments) of ConvNets.

It is a convenient way to get working with an implementation of a complex ConvNet architecture.

Parameters trained for one computer vision task are often useful as pretraining for other computer vision tasks.

9.
Question 9 (Worng Answer)
In Depthwise Separable Convolution you:

1 point

The final output is of the dimension n_{out}n_{out} x n_{out}n_{out} x n_{c}n_c (*where n_{c}n_c is the number of color channels of the input image*).

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

You convolve the input image with a filter of n_fn_f x n_fn_f x n_cn_c where n_cn_c acts as the depth of the filter (*n_cn_c is the number of color channels of the input image*).

You convolve the input image with n_cn_c number of n_fn_f x n_fn_f filters (*n_cn_c is the number of color channels of the input image*).

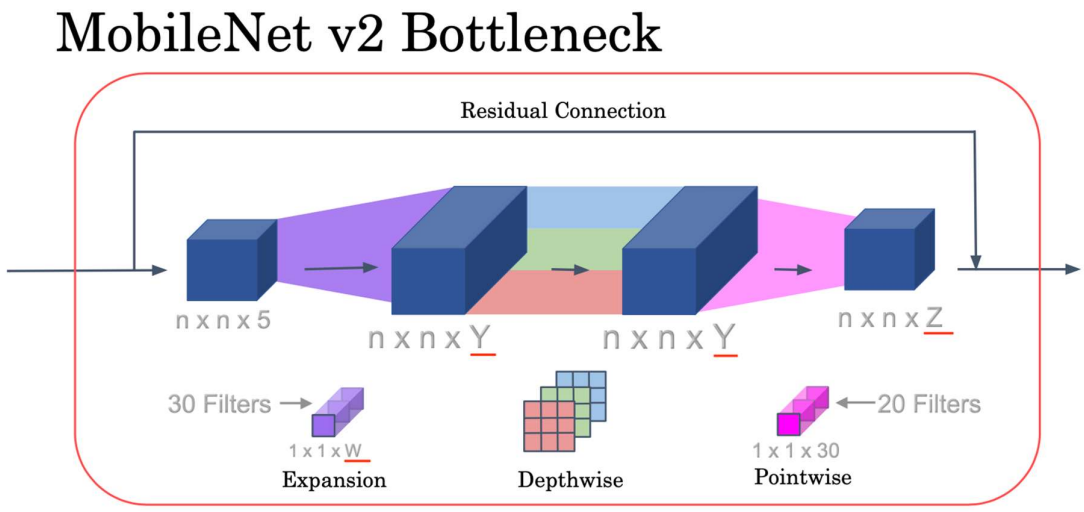
The final output is of the dimension n_{out}n_{out} x n_{out}n_{out} x n^{'}_{c}$n_{c'}$ (*where n^{'}_{c}$n_{c'}$ is the number of filters used in the previous convolution step*).

Perform one step of convolution.

For the “Depthwise” computations each filter convolves with all of the color channels of the input image.

Perform two steps of convolution.

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



1 point

W = 5, Y = 20, Z = 5

W = 30, Y = 30, Z = 5

W = 5, Y = 30, Z = 20

W = 30, Y = 20, Z =20

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