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? 0 / 1 point

- ○ 80
- ◉ 1101
- ○ 1020
- ○ 8250

Expand

✗ **Incorrect**
No, recall that we are not using bias.

9. Which of the following are true about Depth wise-separable convolutions? (Choose all that apply)

- ☐ They are just a combination of a normal convolution and a bottleneck layer.
- ☑ They have a lower computational cost than normal convolutions.

✓ **Correct**
Yes, as seen in the lectures the use of the depthwise and pointwise convolution reduces the computational cost significantly.

- ☑ They combine depthwise convolutions with pointwise convolutions.

✓ **Correct**
Correct, this combination is what we call depth wise separable convolutions.

- ☐ The result has always the same number of channels n_c as the input.

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.

- ☐ 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.
- ☐ A model trained for one computer vision task can usually be used to perform data augmentation for a different computer vision task.
- ☑ Parameters trained for one computer vision task are often useful as pre-training for other computer vision tasks.

✓ **Correct**
True

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

✓ **Correct**
True

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

- [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.

- [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.

- [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

4. Which of the following equations captures the computations in a ResNet block?b

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

Expand

✓ **Correct**
Correct. This expresses the computations of a ResNet block, where the last term $a^{[l]}$ is the shortcut connection.

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

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

  ✓ **Correct**
  This is true.

- [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.

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

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

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.

- (●) False
- ( ) True

Expand

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

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.

- ( ) True
- (●) False

Expand

Correct
Correct!

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

- [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.

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

In the best scenario when adding a ResNet block it will learn to approximate the identity function after a lot of training, helping improve the overall performance of the network. True/False?
False
True

ChatGPT
True.

In the best scenario, the addition of a ResNet block allows the network to learn the identity function, which means it can learn to approximate the original mapping. This is facilitated by the skip (or shortcut) connections in ResNet, which enable the gradient to flow directly through the identity path d backpropagation. This helps in avoiding the vanishing gradient problem and allows the model to learn more

uppose 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 ayer" below always uses a stride of 1 and no padding.)

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

  ! **This should not be selected**
  No, a pooling layer only reduces the height/width dimension.

- [ ] You can use a 2D pooling layer to reduce n_H, n_W, but not n_C.
- [ ] You can use a 1x1 convolutional layer to reduce n_H, n_W, and n_C.
- [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

Which of the following are true about bottleneck layers? (Check all that apply)

- [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] 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.

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

  ✓ **Correct**

  Yes, although it reduces the computational cost significantly.

. 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? 0/

- ○ True
- ◉ False

Expand

⊗ **Incorrect**

No, 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.

. In Depthwise Separable Convolution you:

- [ ] You convolve the input image with a filter of n_f x n_f x n_c where n_c acts as the depth of the filter (n_c is the number of color channels of the input image).
- [x] You convolve the input image with n_c number of n_f x n_f filters (n_c is the number of color channels of the input image).

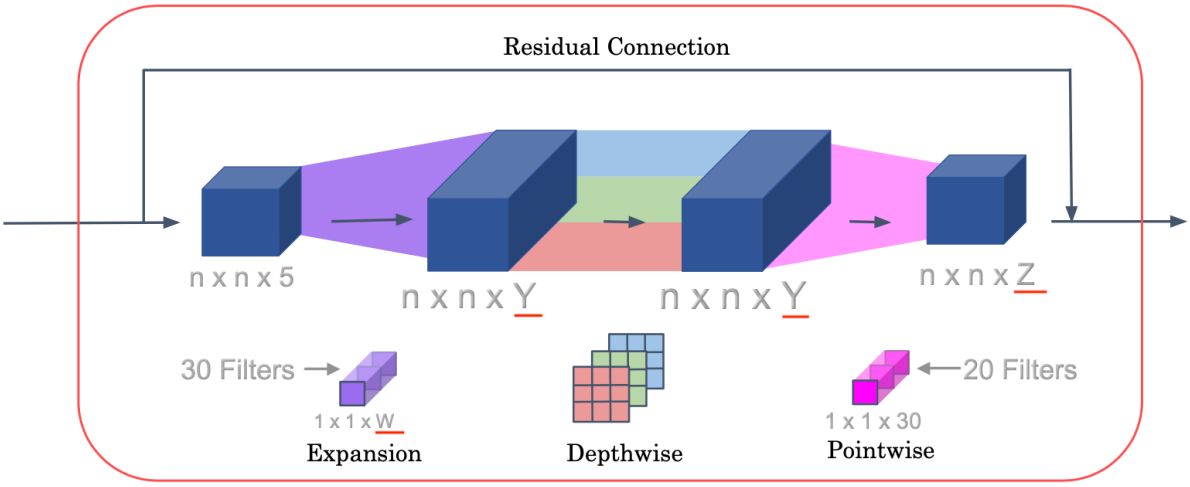
  ✓ **Correct**

- [ ] Perform two steps of convolution.
- [x] For the "Depthwise" computations each filter convolves with all of the color channels of the input image.

  ! **This should not be selected**

  Incorrect!

MobileNet v2 Bottleneck



- W = 5, Y = 20, Z = 5
- W = 30, Y = 30, Z = 5
- W = 30, Y = 20, Z =20
- W = 5, Y = 30, Z = 20

Expand

Correct