Nanoquiz Week 8

The questions below are due on Thursday April 05, 2018; 09:50:00 AM.

Nanoquiz Instructions

Nanoquizzes are just like any other tutor exercise, except that they are timed, and that some questions allow a limited number of submissions. When the timer hits zero, you will be prevented from making any further submissions to the nanoquiz, and the answers will be displayed, so **please make sure you have submitted something before that occurs**.

Note that you are free to use any materials you want (electronic or otherwise, including notes, calculators, Python, and Wikipedia) during the nanoquiz, but you are **not** allowed to converse with other humans (including through text message, email, etc).
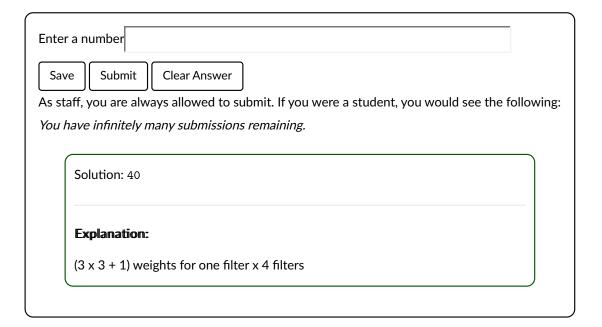
Nanoquiz

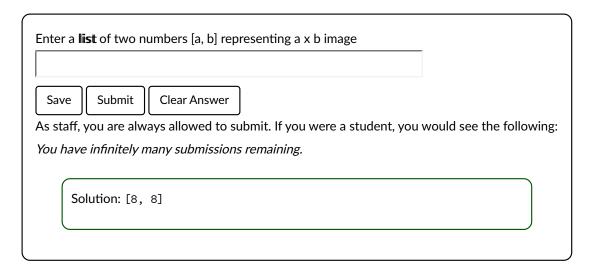Consider an 8 pixel by 8 pixel square image and the following convolutional architecture.

- Input: 64 input values representing 8 by 8 array
- Layer 1: 4 filters with 3 pixel by 3 pixel receptive field applied with a stride of 1
- Layer 2: Max-pooling with filter size 2 x 2 and stride 2
- Layer 3: 4 filters with (3 pixel by 3 pixel by 4 channels) receptive field applied with a stride of 1.
- Layer 4: Max-pooling with filter size 2 x 2 and stride 2

Assume filter inputs that fall outside of the image are treated as zero (zero-padding).
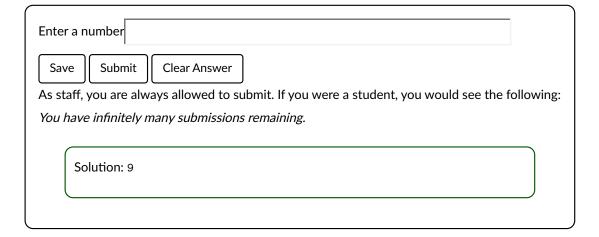**Remember that each filter output produces an output channel.**

1) How many weights (including biases) are there in Layer 1?

Enter a number

| Save | Submit | Clear Answer |

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: 40
>
> ---
>
> **Explanation:**
>
> (3 x 3 + 1) weights for one filter x 4 filters

2) We can think of the output of layer 1 as being 4 images (each one a "channel"). How big is each image?

Enter a **list** of two numbers [a, b] representing a x b image

| Save | Submit | Clear Answer |

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: [8, 8]

3) How many pixels in the original image contributed to the "typical" output pixel from layer 1 (one sufficiently away from the edges)?

Enter a number

| Save | Submit | Clear Answer |

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: 9

4) We can think of the output of layer 2 as being 4 images. How big is each one?

Enter a **list** of two numbers [a, b] representing a x b image

Save   Submit   Clear Answer

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

Solution: `[4, 4]`

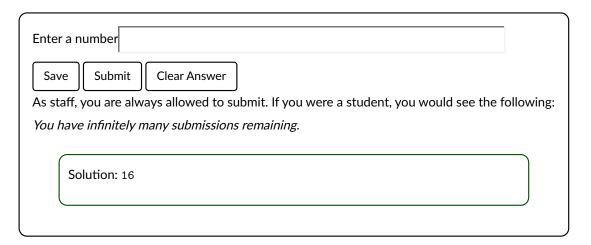5) How many pixels in the original image contributed to the "typical" output pixel from layer 2 (one sufficiently away from the edges)?

Enter a number
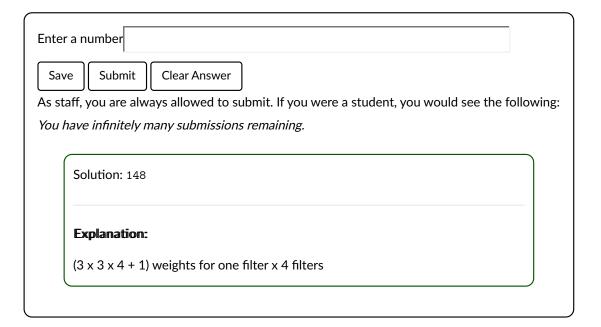
Save   Submit   Clear Answer

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

Solution: 16

6) How many weights are there in layer 3?

Enter a number

| Save | Submit | Clear Answer |

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: 148
>
> ---
>
> **Explanation:**
>
> (3 x 3 x 4 + 1) weights for one filter x 4 filters

7) How big is each image output from layer 4?

Enter a **list** of two numbers [a, b] representing a x b image

| Save | Submit | Clear Answer |

As staff, you are always allowed to submit. If you were a student, you would see the following:

You have infinitely many submissions remaining.

> Solution: [2, 2]