Week 8 Exercises: Convolutional Neural Networks

(1.0 points possible)

For these exercises, you should review the notes on Convolutional Neural Networks.

1) Weights

1.A) In a fully-connected feedforward network, the number of weights (including biases) between two adjacent layers each having 100 units is:

Enter a number: 10100
Submit View Answer 100.00%
You have infinitely many submissions remaining.

Consider a 1D CNN consisting of an input layer with 100 units, 10 filters each with 5 inputs (i.e., each filter is size 5) having a stride of 1, that produces an output layer (or feature map). Assume zero padding on the borders when applying the filters.

1.B) How many units are there in the output layer (feature map)?

Enter a number: 1000
Submit View Answer 100.00%
You have infinitely many submissions remaining.

1.C) How many weights (including bias) are needed to specify the output layer (feature map)?

Enter a number: 60
Submit View Answer 100.00%
You have infinitely many submissions remaining.

Now consider a 1D CNN with an input layer having 100 units, followed by a max pooling layer with a pooling filter of size 3 and a stride of 2, producing the output layer.

1.D) How many units are there in the output layer?

Enter a number: 50
Submit View Answer 100.00%
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1.E) How many weights (including bias) are needed to specify the max pooling output layer?

Enter a number: 0
Submit View Answer 100.00%
You have infinitely many submissions remaining.

2) Pooling

When processing an image we ultimately want to convert the input image into a smaller set of activations that we can feed into a fully-connected net that will produce the desired outputs, such as detecting the presence of a cat in the image irrespective of where the cat might be in that image. If one of the detectors in a previous layer had a strong output, we want to preserve that information, no matter where it happened in the input. This is the role of a *max pooling* layer; it is usually chosen to reduce the size of the output layer by some factor.

With a 1D input, given a "max filter" of size 3 and a stride of 2, what is the ratio (input layer size)/(output layer size)? Assume that the input layer size is much larger than the filter size and stride.

Enter a number: 2
Submit View Answer 100.00%
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3) CNN concepts

Here are the the building blocks we will use to build a CNN:

A. Convolutional layers
B. Max pooling layers
C. Fully connected layers

Assume that the task of our CNN is to detect a cat in an image.

3.A) Which of these blocks allows the network to be less sensitive to the exact locations of different cat parts?

Choose one: B
Submit View Answer 100.00%
You have infinitely many submissions remaining.

3.B) Which of these blocks allows the network to combine all cat features for high-level reasoning?

Choose one: C
Submit View Answer 100.00%
You have infinitely many submissions remaining.

3.C) Which of these blocks are responsible for detecting low and mid-level features of a cat in an image?

Choose one: A
Submit View Answer 100.00%
You have infinitely many submissions remaining.