

CS50's Introduction to Artificial Intelligence with Python

OpenCourseWare

Donate  (<https://cs50.harvard.edu/donate>)

Brian Yu (<https://brianyu.me>)
brian@cs.harvard.edu

David J. Malan (<https://cs.harvard.edu/malan/>)
malan@harvard.edu

 (<https://www.facebook.com/dmalan>)  (<https://github.com/dmalan>)  (<https://www.instagram.com/davidjmalan/>)  (<https://www.linkedin.com/in/malan/>)  (<https://www.reddit.com/user/davidjmalan>)  (<https://www.threads.net/@davidjmalan>)  (<https://twitter.com/davidjmalan>)

Quiz 5

Quizzes are *optional, but encouraged*. They are a good way to test your conceptual understanding, before diving into the programming projects. Consider each question below, then reveal the answer. If you didn't get it right, consider why you may have had that misunderstanding!

Question 1

Consider the below neural network, where we set:

- $w_0 = -5$
- $w_1 = 2$
- $w_2 = -1$ and
- $w_3 = 3$.

x_1 , x_2 , and x_3 represent input neurons, and y represents the output neuron.

What value will this network compute for y given inputs $x_1 = 3$, $x_2 = 2$, and $x_3 = 4$ if we use a step activation function? What if we use a ReLU activation function?

- 0 for step activation function, 0 for ReLU activation function
- 0 for step activation function, 1 for ReLU activation function
- 1 for step activation function, 0 for ReLU activation function
- 1 for step activation function, 1 for ReLU activation function
- 1 for step activation function, 11 for ReLU activation function
- 1 for step activation function, 16 for ReLU activation function
- 11 for step activation function, 11 for ReLU activation function
- 16 for step activation function, 16 for ReLU activation function

▼ Click here for the answer to Question 1

1 for step activation function, 11 for ReLU activation function

Question 2

How many total weights (including biases) will there be for a fully connected neural network with a single input layer with 3 units, a single hidden layer with 5 units, and a single output layer with 4 units?

▼ Click here for the answer to Question 2

44

Question 3

Consider a recurrent neural network that listens to a audio speech sample, and classifies it according to whose voice it is. What network architecture is the best fit for this problem?

- One-to-one (single input, single output)
- Many-to-one (multiple inputs, single output)
- One-to-many (single input, multiple outputs)
- Many-to-many (multiple inputs, multiple outputs)

▼ Click here for the answer to Question 3

Many-to-one (multiple inputs, single output)

Question 4

Consider a 4x4 grayscale image with the following pixel values.

2	4	6	8
16	14	12	10
18	20	22	24
32	30	28	26

What would be the result of applying a 2x2 max-pool to the original image?

(Note: Answers are formatted as a matrix $\begin{bmatrix} [a, b], [c, d] \end{bmatrix}$ where $[a, b]$ is the first row and $[c, d]$ is the second row.)

- $\begin{bmatrix} [16, 12], [32, 28] \end{bmatrix}$
- $\begin{bmatrix} [16, 14], [32, 30] \end{bmatrix}$
- $\begin{bmatrix} [22, 24], [32, 30] \end{bmatrix}$
- $\begin{bmatrix} [14, 12], [30, 28] \end{bmatrix}$
- $\begin{bmatrix} [16, 14], [22, 24] \end{bmatrix}$
- $\begin{bmatrix} [16, 12], [32, 30] \end{bmatrix}$

▼ Click here for the answer to Question 4

$\begin{bmatrix} [16, 12], [32, 28] \end{bmatrix}$