



## Neural Network Basics

9/10 points (90.00%)

Quiz, 10 questions

**Congratulations! You passed!**

Next Item

1 / 1  
points

1.

What does a neuron compute?

- ☐ A neuron computes an activation function followed by a linear function ( $z = Wx + b$ )
- ☐ A neuron computes the mean of all features before applying the output to an activation function
- ☐ A neuron computes a function  $g$  that scales the input  $x$  linearly ( $Wx + b$ )
- ☒ A neuron computes a linear function ( $z = Wx + b$ ) followed by an activation function

**Correct**Correct, we generally say that the output of a neuron is  $a = g(Wx + b)$  where  $g$  is the activation function (sigmoid, tanh, ReLU, ...).1 / 1  
points

2.

Which of these is the "Logistic Loss"?

- ☐  $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = |y^{(i)} - \hat{y}^{(i)}|^2$
- ☒  $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = -(y^{(i)} \log(\hat{y}^{(i)}) + (1 - y^{(i)}) \log(1 - \hat{y}^{(i)}))$

**Correct**

Correct, this is the logistic loss you've seen in lecture!

- ☐  $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = |y^{(i)} - \hat{y}^{(i)}|$
- ☐  $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = \max(0, y^{(i)} - \hat{y}^{(i)})$

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3.

Suppose `img` is a (32,32,3) array, representing a 32x32 image with 3 color channels red, green and blue. How do you reshape this into a column vector?



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- ☐ `x = img.reshape((3,32*32))`
- ☐ `x = img.reshape((32*32,3))`
- ☐ `x = img.reshape((1,32*32,*3))`
- ☒ `x = img.reshape((32*32*3,1))`

Correct



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points

4.

Consider the two following random arrays "a" and "b":

```
1 a = np.random.randn(2, 3) # a.shape = (2, 3)
2 b = np.random.randn(2, 1) # b.shape = (2, 1)
3 c = a + b
```

What will be the shape of "c"?

- ☐ `c.shape = (2, 1)`
- ☐ `c.shape = (3, 2)`
- ☐ The computation cannot happen because the sizes don't match. It's going to be "Error"!
- ☒ `c.shape = (2, 3)`

Correct

Yes! This is broadcasting. `b` (column vector) is copied 3 times so that it can be summed to each column of `a`.



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5.

Consider the two following random arrays "a" and "b":



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```
1 a = np.random.randn(4, 3) # a.shape = (4, 3)
2 b = np.random.randn(3, 2) # b.shape = (3, 2)
3 c = a*b
```

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What will be the shape of "c"?

- ☐ c.shape = (4, 3)
- ☐ c.shape = (4,2)
- ☒ The computation cannot happen because the sizes don't match. It's going to be "Error"!

**Correct**

Indeed! In numpy the "\*" operator indicates element-wise multiplication. It is different from "np.dot()". If you would try "c = np.dot(a,b)" you would get c.shape = (4, 2).

- ☐ c.shape = (3, 3)



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6.

Suppose you have  $n_x$  input features per example. Recall that  $X = [x^{(1)} x^{(2)} \dots x^{(m)}]$ . What is the dimension of X?

- ☐ (1,  $m$ )
- ☒ ( $n_x$ ,  $m$ )

**Correct**

- ☐ ( $m$ , 1)
- ☐ ( $m$ ,  $n_x$ )



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7.

Recall that "np.dot(a,b)" performs a matrix multiplication on a and b, whereas "a\*b" performs an element-wise multiplication.

Consider the two following random arrays "a" and "b":

```
1 a = np.random.randn(12288, 150) # a.shape = (12288, 150)
2 b = np.random.randn(150, 45) # b.shape = (150, 45)
3 c = np.dot(a,b)
```

What is the shape of c?



c.shape = (12288, 45)



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Quiz, 10 questions. Remember that a np.dot(a, b) has shape (number of rows of a, number of columns of b). The sizes match because :

"number of columns of a = 150 = number of rows of b"



c.shape = (12288, 150)



The computation cannot happen because the sizes don't match. It's going to be "Error"!



c.shape = (150,150)

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8.

Consider the following code snippet:

```
1 # a.shape = (3,4)
2 # b.shape = (4,1)
3
4 for i in range(3):
5     for j in range(4):
6         c[i][j] = a[i][j] + b[j]
```

How do you vectorize this?



c = a.T + b



c = a + b



c = a + b.T



Correct



c = a.T + b.T

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9.

Consider the following code:

```
1 a = np.random.randn(3, 3)
2 b = np.random.randn(3, 1)
3 c = a*b
```

What will be c? (If you're not sure, feel free to run this in python to find out).



This will invoke broadcasting, so b is copied three times to become (3,3), and \* is an element-wise product so c.shape will be (3, 3)



This will invoke broadcasting, so  $b$  is copied three times to become  $(3, 3)$ , and  $*$  invokes a matrix multiplication operation of two  $3 \times 3$  matrices so  $c.shape$  will be  $(3, 3)$



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Quiz, 1 This should not be selected

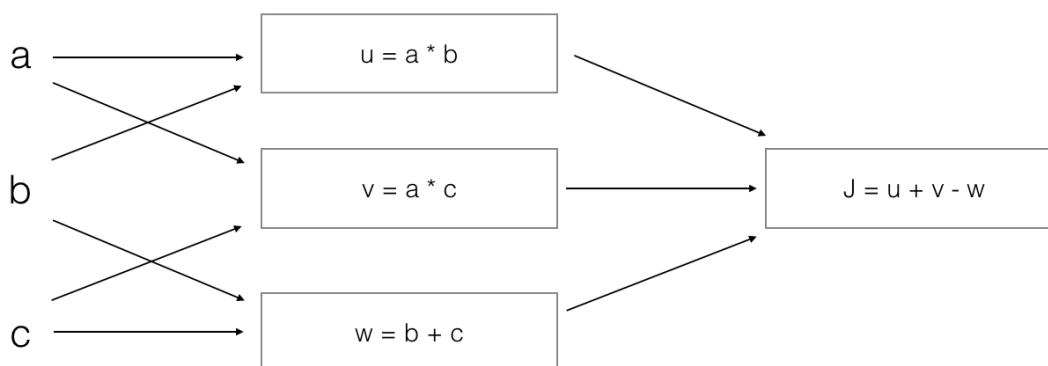
- ☐ This will multiply a  $3 \times 3$  matrix  $a$  with a  $3 \times 1$  vector, thus resulting in a  $3 \times 1$  vector. That is,  $c.shape = (3, 1)$ .
- ☐ It will lead to an error since you cannot use `"*"` to operate on these two matrices. You need to instead use `np.dot(a,b)`



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10.

Consider the following computation graph.



What is the output  $J$ ?

- ☐  $J = (c - 1) * (b + a)$
- ☒  $J = (a - 1) * (b + c)$

**Correct**

Yes.  $J = u + v - w = a*b + a*c - (b + c) = a * (b + c) - (b + c) = (a - 1) * (b + c)$ .

- ☐  $J = a*b + b*c + a*c$
- ☐  $J = (b - 1) * (c + a)$





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