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Graded Quiz • 20 min

Due Oct 25, 2:59 AM EDT

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Grade received 100% **To pass** 80% or higher

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Neural Network Basics

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1. What does a neuron compute?

1 / 1 point

○ A neuron computes the mean of all features before applying the output to an activation function

● A neuron computes a linear function (z = Wx + b) followed by an activation function

○ A neuron computes a function g that scales the input x linearly (Wx + b)

○ A neuron computes an activation function followed by a linear function (z = Wx + b)

✓ **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, ...).

2. Which of these is the "Logistic Loss"?

1 / 1 point

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

○ $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = \mid y^{(i)} - \hat{y}^{(i)} \mid$

● $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = -(y^{(i)} \log(\hat{y}^{(i)}) + (1 - y^{(i)}) \log(1 - \hat{y}^{(i)}))$

○ $\mathcal{L}^{(i)}(\hat{y}^{(i)}, y^{(i)}) = \mid y^{(i)} - \hat{y}^{(i)} \mid^2$

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

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?

1 / 1 point

○ x = img.reshape((32*32,3))

○ x = img.reshape((3,32*32))

● x = img.reshape((32*32*3,1))

○ x = img.reshape((1,32*32,*3))

✓ **Correct**

4. Consider the two following random arrays a and b:

1 / 1 point

$a = np.random.randn(2, 3) \# a.shape = (2, 3)$

$b = np.random.randn(2, 1) \# b.shape = (2, 1)$

$c = a + b$

What will be the shape of c?

○ c.shape = (3, 2)

○ c.shape = (2, 1)

○ 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.

5. Consider the two following random arrays a and b:

1 / 1 point

$a = np.random.randn(4, 3)$ # $a.shape = (4, 3)$

$b = np.random.randn(3, 2)$ # $b.shape = (3, 2)$

$c = a * b$

What will be the shape of c?

○ c.shape = (3, 3)

○ 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).

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

1 / 1 point

○ $(m, 1)$

● (n_x, m)

○ $(1, m)$

○ (m, n_x)

✓ **Correct**

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

1 / 1 point

Consider the two following random arrays a and b:

$a = np.random.randn(12288, 150)$ # $a.shape = (12288, 150)$

$b = np.random.randn(150, 45)$ # b.shape = (150, 45)$$

$c = np.dot(a, b)$

What is the shape of c?

○ c.shape = (12288, 150)

○ c.shape = (150,150)

● c.shape = (12288, 45)

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

✓ **Correct**
Correct, 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"

8. Consider the following code snippet:

1 / 1 point

$a.shape = (3, 4)$

$b.shape = (4, 1)$

```
for i in range(3):
    for j in range(4):
        $c[i][j] = a[i][j] + b[j]$
```

How do you vectorize this?

● c = a + b.T

○ c = a + b

○ c = a.T + b

○ c = a.T + b.T

✓ **Correct**

9. Consider the following code:

1 / 1 point

$a = np.random.randn(3, 3)$

$b = np.random.randn(3, 1)$

$c = a * b$

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 multiply a 3x3 matrix a with a 3x1 vector, thus resulting in a 3x1 vector. That is, c.shape = (3,1).

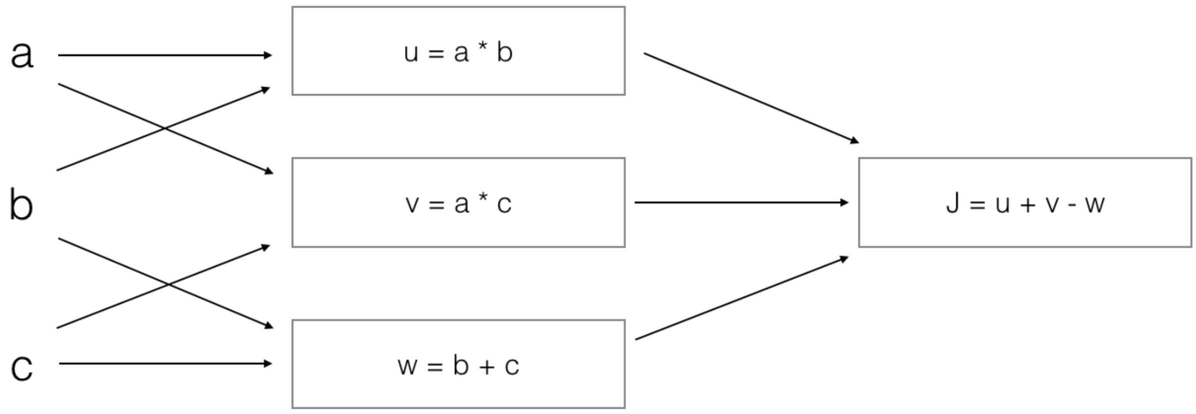
○ It will lead to an error since you cannot use "*" to operate on these two matrices. You need to instead use np.dot(a,b)

○ This will invoke broadcasting, so b is copied three times to become (3, 3), and $*$ invokes a matrix multiplication operation of two 3x3 matrices so c.shape will be (3, 3)

✓ **Correct**

10. Consider the following computation graph.

1 / 1 point



What is the output J?

○ J = a*b + b*c + a*c

○ J = (c - 1)*(b + a)

● J = (a - 1) * (b + c)

○ J = (b - 1) * (c + a)

✓ **Correct**

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