Neural Network Basics

Quiz, 10 questions

10/10 points (100%)

✔ **Congratulations! You passed!**

<div>Next Item</div>

✔ 1 / 1
points

1.

What does a neuron compute?

○ 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

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, ...).

○ 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)

✔ 1 / 1
points

2.

Which of these is the "Logistic Loss"?

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

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

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

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

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

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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?

○   x = img.reshape((32*32,3))

○   x = img.reshape((1,32*32,*3))

◉   x = img.reshape((32*32*3,1))
▲

Correct

○   x = img.reshape((3,32*32))

✔   1 / 1
                    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 = (3, 2)

○   c.shape = (2, 1)

◉   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.

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

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                    points

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

```
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
```

What will be the shape of "c"?

○ c.shape = (3, 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 = (4, 3)

✔ 1 / 1
points

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?

○ $(m, 1)$

○ (m, n_x)

○ $(1, m)$

◉ (n_x, m)

Correct

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points

7.

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

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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, 150)

○   c.shape = (150,150)

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

◉   c.shape = (12288, 45)

▲

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"

✔   1 / 1
     points

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.T

◉   c = a + b.T

▲

Correct

○   c = a.T + b

○   c = a + b

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points

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9.

Quiz, 10 questions   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)

Correct

○   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)

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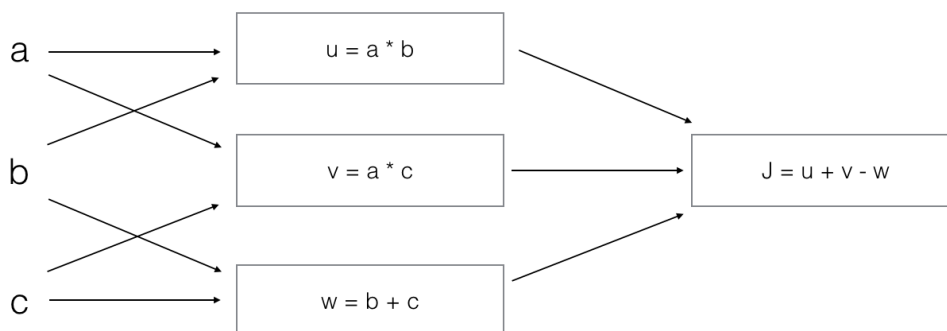   vector. That is, c.shape = (3,1).

○   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)

✔ 1 / 1
points

10.

Consider the following computation graph.

a ⟶ | u = a * b |
b ⟶ | v = a * c | ⟶ | J = u + v - w |
c ⟶ | w = b + c |

What is the output J?

○   J = (c - 1)*(b + a)

○   J = (a - 1) * (b + c)