Neural Network Basics

9/10 points (90%)

Quiz, 10 questions

✔ # Congratulations! You passed!

✖ 0 / 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

▲

This should not be selected
No. There is no mean applied in a neuron.

○ 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

---

✔ 1 / 1
   points

2.

Which of these is the "Logistic Loss"?

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

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

○

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

Neural Network Basics

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

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Quiz, 10 questions

Correct

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

✔ 1 / 1 points

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((1,32*32,*3))

○ x = img.reshape((3,32*32))

○ x = img.reshape((32*32,3))

◉ x = img.reshape((32*32*3,1))

Correct

✔ 1 / 1 points

4.

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

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```
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
```

Quiz, 10 questions

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What will be the shape of "c"?

○ 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.

○ c.shape = (3, 2)

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

✔ 1 / 1
points

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, 3)

○   c.shape = (4,2)

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

Quiz, 10 questions

▲

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).

✔   1 / 1
      points

6.

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

○ (n_x, m)

▲

Correct

○ (m, n_x)

○ $(1, m)$

○ $(m, 1)$

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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.

Neural Network Basics

Quiz, 10 questions

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)

◉   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"

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

✔   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

○

c = a + b.T

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Quiz, 10 questions

○ c = a.T + b

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points

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)

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
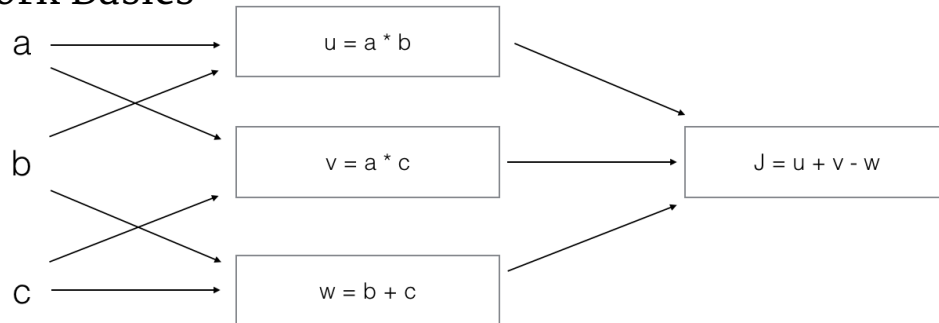two matrices. You need to instead use np.dot(a,b)

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points

10.

Consider the following computation graph.

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Quiz, 10 questions

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)