Key concepts on Deep Neural Networks

Quiz, 10 questions

✔ **Congratulations! You passed!**

Next Item

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points

1.

What is the "cache" used for in our implementation of forward propagation and backward propagation?

◯ We use it to pass variables computed during forward propagation to the corresponding backward propagation step. It contains useful values for backward propagation to compute derivatives.

▲

Correct
Correct, the "cache" records values from the forward propagation units and sends it to the backward propagation units because it is needed to compute the chain rule derivatives.

◯ It is used to keep track of the hyperparameters that we are searching over, to speed up computation.

◯ We use it to pass variables computed during backward propagation to the corresponding forward propagation step. It contains useful values for forward propagation to compute activations.

◯ It is used to cache the intermediate values of the cost function during training.

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points

2.

Among the following, which ones are "hyperparameters"? (Check all that apply.)

☐ size of the hidden layers $n^{[l]}$

▲

Correct

☐ bias vectors $b^{[l]}$

▲

Un-selected is correct

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activation values $a^{[l]}$

Un-selected is correct

☐　weight matrices $W^{[l]}$

Un-selected is correct

☐　number of layers L in the neural network

Correct

☐　learning rate α

Correct

☐　number of iterations

Correct

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points

3.

Which of the following statements is true?

◯　The deeper layers of a neural network are typically computing more complex features of the input than the earlier layers.

Correct

◯　The earlier layers of a neural network are typically computing more complex features of the input than the deeper layers.

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4.

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Vectorization allows you to compute forward propagation in an L-layer neural network without an explicit for-loop (or any other explicit iterative loop) over the layers $l=1, 2, ...,L$. True/False?

○ True

◉ False

▲

Correct

Forward propagation propagates the input through the layers, although for shallow networks we may just write all the lines ($a^{[2]} = g^{[2]}(z^{[2]})$, $z^{[2]} = W^{[2]}a^{[1]} + b^{[2]}$, ...) in a deeper network, we cannot avoid a for loop iterating over the layers: ($a^{[l]} = g^{[l]}(z^{[l]})$, $z^{[l]} = W^{[l]}a^{[l-1]} + b^{[l]}$, ...).

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5.

Assume we store the values for $n^{[l]}$ in an array called layers, as follows: layer_dims = [n_x, 4,3,2,1]. So layer 1 has four hidden units, layer 2 has 3 hidden units and so on. Which of the following for-loops will allow you to initialize the parameters for the model?

○
```
1   for(i in range(1, len(layer_dims)/2)):
2     parameter['W' + str(i)] = np.random.randn(layers[i], layers[i-1])) * 0.01
3     parameter['b' + str(i)] = np.random.randn(layers[i], 1) * 0.01
```

○
```
1   for(i in range(1, len(layer_dims)/2)):
2     parameter['W' + str(i)] = np.random.randn(layers[i], layers[i-1])) * 0.01
3     parameter['b' + str(i)] = np.random.randn(layers[i-1], 1) * 0.01
```

○
```
1   for(i in range(1, len(layer_dims))):
2     parameter['W' + str(i)] = np.random.randn(layers[i-1], layers[i])) * 0.01
3     parameter['b' + str(i)] = np.random.randn(layers[i], 1) * 0.01
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◉
```
1   for(i in range(1, len(layer_dims))):
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3     parameter['b' + str(i)] = np.random.randn(layers[i], 1) * 0.01
```

▲

Correct

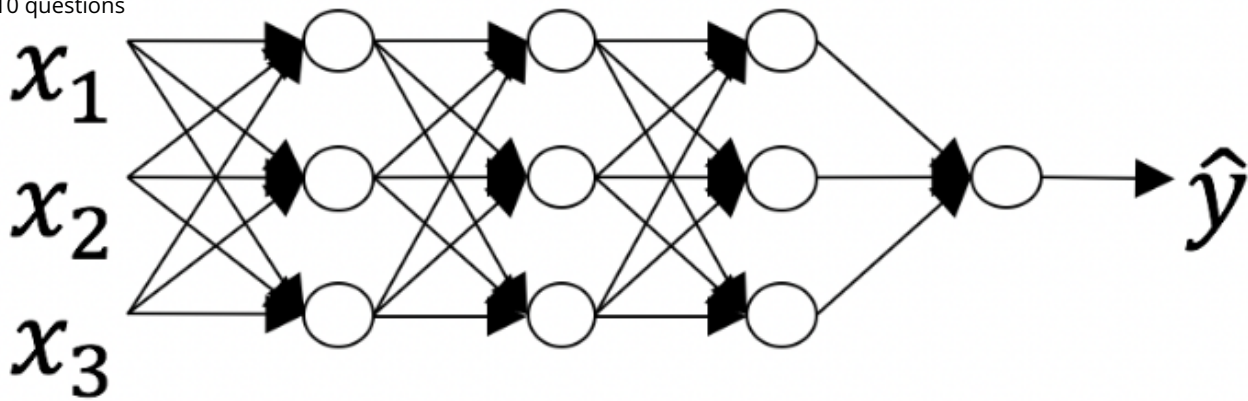✔   1 / 1
                 points

6.

Consider the following neural network.

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How many layers does this network have?

○   The number of layers L is 4. The number of hidden layers is 3.

△

Correct
Yes. As seen in lecture, the number of layers is counted as the number of hidden layers + 1. The input and output layers are not counted as hidden layers.

○   The number of layers L is 3. The number of hidden layers is 3.

○   The number of layers L is 4. The number of hidden layers is 4.

○   The number of layers L is 5. The number of hidden layers is 4.

✔   1 / 1
points

7.

During forward propagation, in the forward function for a layer l you need to know what is the activation function in a layer (Sigmoid, tanh, ReLU, etc.). During backpropagation, the corresponding backward function also needs to know what is the activation function for layer l, since the gradient depends on it. True/False?

○   True

△

Correct
Yes, as you've seen in the week 3 each activation has a different derivative. Thus, during backpropagation you need to know which activation was used in the forward propagation to be able to compute the correct derivative.

○   False

---

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8.

There are certain functions with the following properties:

(i) To compute the function using a shallow network circuit, you will need a large network (where we measure size by the number of logic gates in the network), but (ii) To compute it using a deep network circuit, you need only an exponentially smaller network. True/False?
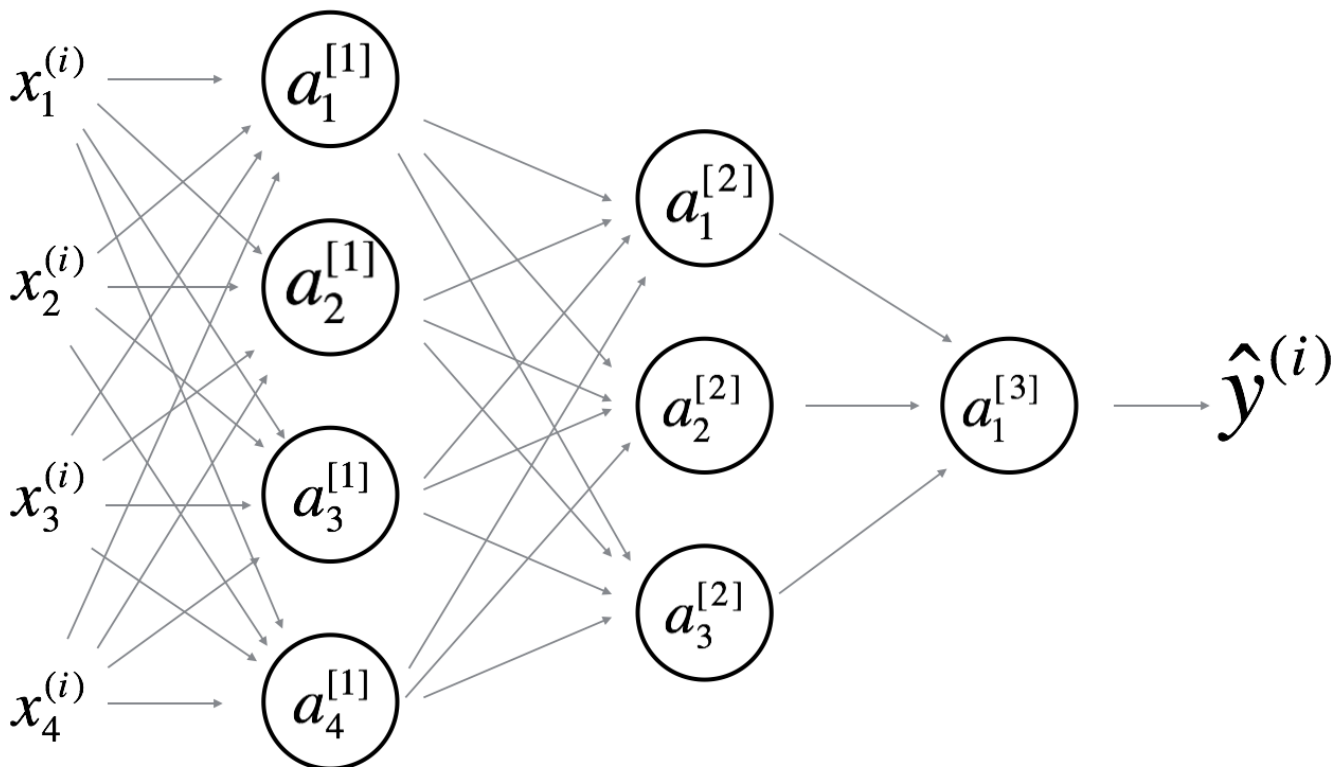
○   True

Correct

○   False

---

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points

9.

Consider the following 2 hidden layer neural network:

Which of the following statements are True? (Check all that apply).

☐ $W^{[1]}$ will have shape (4, 4)

Correct

Yes. More generally, the shape of $W^{[l]}$ is $(n^{[l]}, n^{[l-1]})$.

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☐ $b^{[1]}$ will have shape (4, 1)

▲

Correct

Yes. More generally, the shape of $b^{[l]}$ is $(n^{[l]}, 1)$.

☐ $W^{[1]}$ will have shape (3, 4)

▲

Un-selected is correct

☐ $b^{[1]}$ will have shape (3, 1)

▲

Un-selected is correct

☐ $W^{[2]}$ will have shape (3, 4)

▲

Correct

Yes. More generally, the shape of $W^{[l]}$ is $(n^{[l]}, n^{[l-1]})$.

☐ $b^{[2]}$ will have shape (1, 1)

▲

Un-selected is correct

☐ $W^{[2]}$ will have shape (3, 1)

▲

Un-selected is correct

☐ $b^{[2]}$ will have shape (3, 1)

▲

Correct

Yes. More generally, the shape of $b^{[l]}$ is $(n^{[l]}, 1)$.

☐ $W^{[3]}$ will have shape (3, 1)

▲

Un-selected is correct

☐ $b^{[3]}$ will have shape (1, 1)

▲

Correct

Yes. More generally, the shape of $b^{[l]}$ is $(n^{[l]}, 1)$.

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☑ $W^{[3]}$ will have shape (1, 3)

Correct
Yes. More generally, the shape of $W^{[l]}$ is $(n^{[l]}, n^{[l-1]})$.

☑ $b^{[3]}$ will have shape (3, 1)

Un-selected is correct

✓   1 / 1
    points

10.

Whereas the previous question used a specific network, in the general case what is the dimension of W^{[l]}, the weight matrix associated with layer l?

○ $W^{[l]}$ has shape $(n^{[l+1]}, n^{[l]})$

○ $W^{[l]}$ has shape $(n^{[l-1]}, n^{[l]})$

◉ $W^{[l]}$ has shape $(n^{[l]}, n^{[l-1]})$

Correct
True

○ $W^{[l]}$ has shape $(n^{[l]}, n^{[l+1]})$