Key Concepts on Deep Neural Networks

Quiz20 minutes • 20 min

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Graded Quiz • 20 min

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1.

Question 1

What is stored in the 'cache' during forward propagation for latter use in backward propagation?

1 / 1 point

Z^{[l]}$Z^{[l]}$

b^{[l]}$b^{[l]}$

A^{[l]}$A^{[l]}$

W^{[l]}$W^{[l]}$

Correct

Yes. This value is useful in the calculation of dW^{[l]}$dW^{[l]}$ in the backward propagation.

2.

Question 2

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

1 / 1 point

activation values a^{[l]}$a^{[l]}$

☑

number of iterations

Correct

☑

size of the hidden layers n^{[l]}$n^{[l]}$

Correct

☑

number of layers L in the neural network

Correct

☐

weight matrices W^{[l]}$W^{[l]}$

☑

learning rate \alpha$\alpha$

Correct

☐

bias vectors b^{[l]}$b^{[l]}$

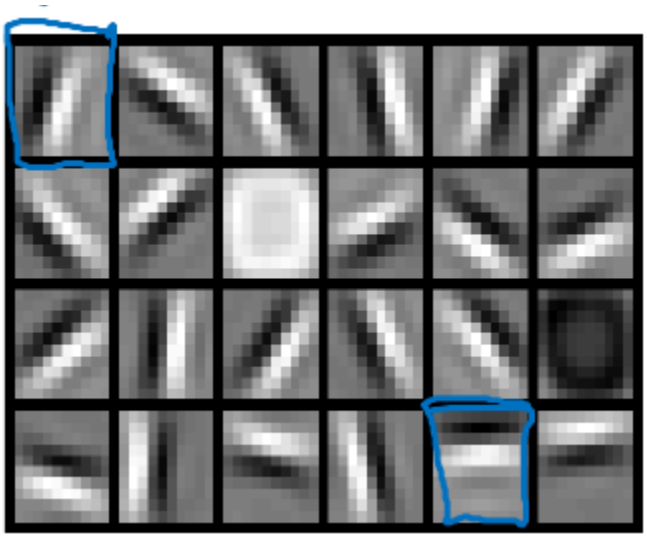
3.

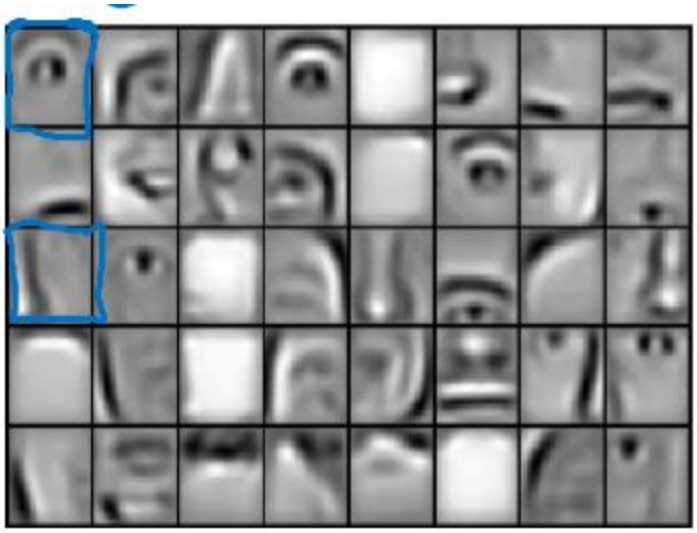
Question 3

Which of the following is more likely related to the early layers of a deep neural network?

1 / 1 point

◉





Correct

Yes. The early layer of a neural network usually computes simple features such as edges and lines.

4.

Question 4

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?

1 / 1 point

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]}) $a^{[2]}=g^{[2]}(z^{[2]})$, z^{[2]}= W^{[2]}a^{[1]}+b^{[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]})$a^{[l]}=g^{[l]}(z^{[l]})$, z^{[l]} = W^{[l]}a^{[l-1]} + b^{[l]}$z^{[l]}=W^{[l]}a^{[l-1]}+b^{[l]}$, ...).

5.

Question 5

Assume we store the values for n^{[l]}$n^{[l]}$ in an array called layer_dims, as follows: layer_dims = [n_xnn_xnn,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 / 1 point

for i in range(1, len(layer_dims)/2):

parameter['W' + str(i)] = np.random.randn(layer_dims[i], layer_dims[i-1]) * 0.01

parameter['b' + str(i)] = np.random.randn(layer_dims[i], 1) * 0.01

for i in range(len(layer_dims)-1):

parameter['W' + str(i+1)] = np.random.randn(layer_dims[i+1], layer_dims[i]) * 0.01

parameter['b' + str(i+1)] = np.random.randn(layer_dims[i+1], 1) * 0.01

for i in range(len(layer_dims)):

parameter['W' + str(i+1)] = np.random.randn(layer_dims[i+1], layer_dims[i]) * 0.01

parameter['b' + str(i+1)] = np.random.randn(layer_dims[i+1], 1) * 0.01

for i in range(len(layer_dims)-1):

parameter['W' + str(i+1)] = np.random.randn(layer_dims[i], layer_dims[i+1]) * 0.01

parameter['b' + str(i+1)] = np.random.randn(layer_dims[i+1], 1) * 0.01

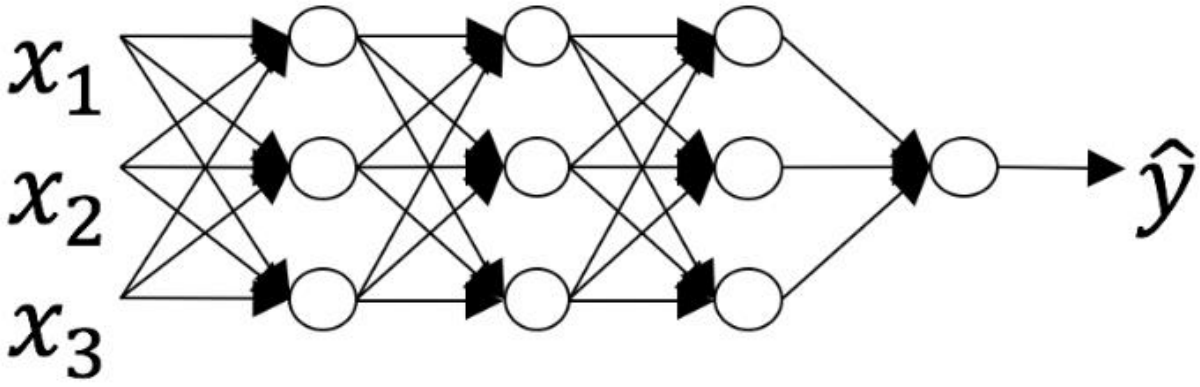
Correct

Yes. This iterates over 0, 1, 2, 3 and assigns to W^{[l]}$W^{[l]}$ the shape (n^{[l]}$n^{[l]}$, n^{[l-1]}$n^{[l-1]}$).

6.

Question 6

Consider the following neural network.



How many layers does this network have?

0 / 1 point

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

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

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.

Incorrect

No. 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.

7.

Question 7

During forward propagation, for the value of A^{[l]}$A^{[l]}$ the value is used of Z^{[l]}$Z^{[l]}$ with the activation function g^{[l]}$g^{[l]}$. During backward propagation we calculate dA^{[l]}$dA^{[l]}$ from Z^{[l]}$Z^{[l]}$.

0 / 1 point

True

False

Incorrect

Incorrect. Correct. During backward propagation we are interested in computing dW^{[l]}$dW^{[l]}$ and db^{[l]}$db^{[l]}$. For that we use g'^{L}g'^{L}, dZ^{[l]}$dZ^{[l]}$, Z^{[l]}$Z^{[l]}$, and W^{[l]}$W^{[l]}$.

8.

Question 8

A shallow neural network with a single hidden layer and 6 hidden units can compute any function that a neural network with 2 hidden layers and 6 hidden units can compute. True/False?

1 / 1 point

False

True

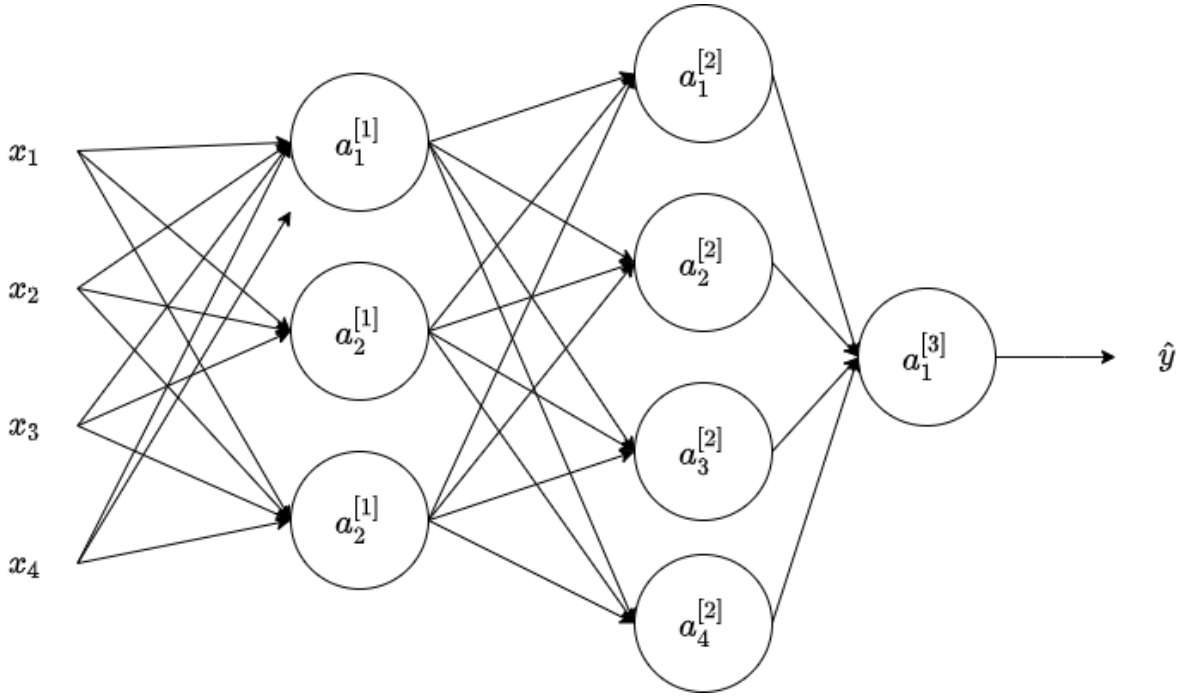
Correct

Correct. As seen during the lectures there are functions you can compute with a "small" L-layer deep neural network that shallower networks require exponentially more hidden units to compute.

9.

Question 9

Consider the following 2 hidden layers neural network:



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

1 / 1 point

- [ ] b^{[1]}$b^{[1]}$ will have shape (1, 3)
- [ ] b^{[1]}$b^{[1]}$ will have shape (4, 1)
- [x] b^{[1]}$b^{[1]}$ will have shape (3, 1)

Correct

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

- [ ] W^{[2]}$W^{[2]}$ will have shape (3, 1)
- [ ] W^{[2]}$W^{[2]}$ will have shape (1, 3)
- [x] W^{[1]}$W^{[1]}$ will have shape (3, 4)

Correct

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

- [ ] W^{[2]}$W^{[2]}$ will have shape (3, 4)
- [x] W^{[2]}$W^{[2]}$ will have shape (4, 3)

Correct

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

- [ ] W^{[1]}$W^{[1]}$ will have shape (4, 3)

10.

Question 10

In the general case if we are training with mm examples what is the shape of A^{[l]}$A^{[l]}$?

1 / 1 point

- ( ) (mm, n^{[l+1]}$n^{[l+1]}$)
- ( ) (n^{[l+1]}$n^{[l+1]}$, mm)
- (•) (n^{[l]}$n^{[l]}$, mm)
- ( ) (mm, n^{[l]}$n^{[l]}$)

Correct

Yes. The number of rows in A^{[1]}$A^{[1]}$ corresponds to the number of units in the l-th layer.