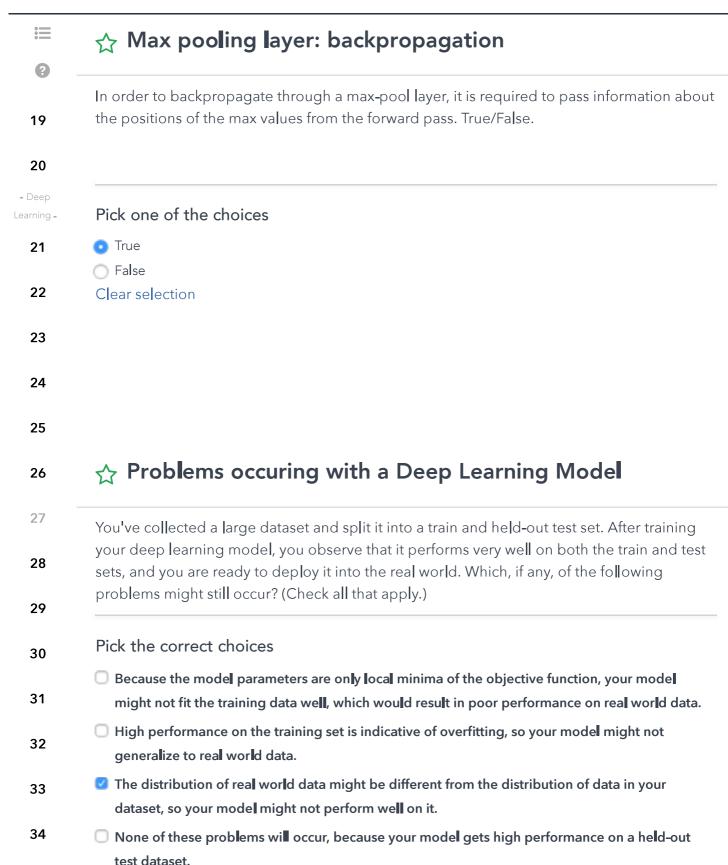


Machine Learning Engineers Test - (1h45)

© 24m to test end



#### Clear selection



Consider a neural network trained to classify images of animals (one class per image). The Loss  $\mathcal{L}$  is used during training. The dataset consists in (image, labels) pairs denoted (x,y).

What is the meaning of  $\overline{\partial x}$ ?

#### Pick one of the choices

- It quantifies the influence of the choice of the loss function on the image's pixels' values.
- It quantifies the influence of the image's pixels on the loss function's value.
- It quantifies the influence of the input layer of the model on the loss function's value.
- It quantifies the influence of the choice of the loss function on the first layer's activation.

Clear selection

### ☆ End-to-end approach

You want to count the number of fish in the aquarium based on images from a camera facing the aquarium. Assume there's nothing else than fishes and that we can neglect occlusion between fishes.

You are considering using one of the two following approaches:

- (A) Input an image (x) to a neural network and have it directly learn a mapping to make a prediction for the number of fishes in the aquarium.
- **(B)** A two-step approach, where you would first (i) detect the fishes in the image (if any), then (ii) sum the predicted bounding boxes to get the number of fishes in the aquarium.

Between these two, Approach B is more of an end-to-end approach because it has distinct steps for the input end and the output end. True/False?

### Pick one of the choices

True

False

Clear selection

## ☆ Loss functions: malicious attack

You have access to a deep neural network trained to classify animals. You are malicious and would like to find an image that is a cat, but that the model will classify as an iguana. This is an optimization problem. Which of these loss functions is a valid quantity to minimize in order to find the malicious image.

$$\begin{array}{l} \mathsf{A})L = \mid\mid x - x_{cat}\mid\mid_{2}^{2} + \mid\mid \hat{y} - y_{iguana}\mid\mid_{2}^{2} \\ \mathsf{B})L = \mid\mid x - x_{iguana}\mid\mid_{2}^{2} + \mid\mid \hat{y} - y_{cat}\mid\mid_{2}^{2} \\ \mathsf{C})L = \mid\mid x - x_{cat}\mid\mid_{2}^{2} - \mid\mid \hat{y} - y_{iguana}\mid\mid_{2}^{2} \\ \mathsf{D})L = \mid\mid x - x_{iguana}\mid\mid_{2}^{2} - \mid\mid \hat{y} - y_{cat}\mid\mid_{2}^{2} \end{array}$$

where:

 $\boldsymbol{x}$  denotes the input

 $T_{
m cat}$  denotes a cat image

Tiguana denotes an iguana image

**Year** denotes the one-hot vector for the cat label

Yiguana denotes the one-hot vector for the iguana label

 $\hat{\pmb{y}}$  denotes the network's output prediction

### Pick one of the choices

 $\bigcirc$  A

B

C

 $\bigcirc$  D

Clear selection

# ☆ What layer to use?