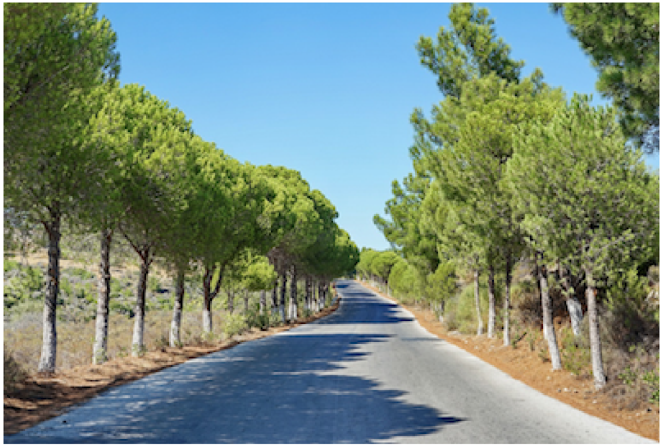
You are building a 3-class object classification and localization algorithm. The classes are: pedestrian (c=1), car (c=2), motorcycle (c=3). What should y be for the image below? Remember that "?" means "don't care", which means that the neural network loss function won't care what the neural network gives for that component of the output. Recall $y = [p_c, b_x, b_y, b_h, b_w, c_1, c_2, c_3]$.

1 point



○ $y = [1, ?, ?, ?, ?, ?, ?, ?]$

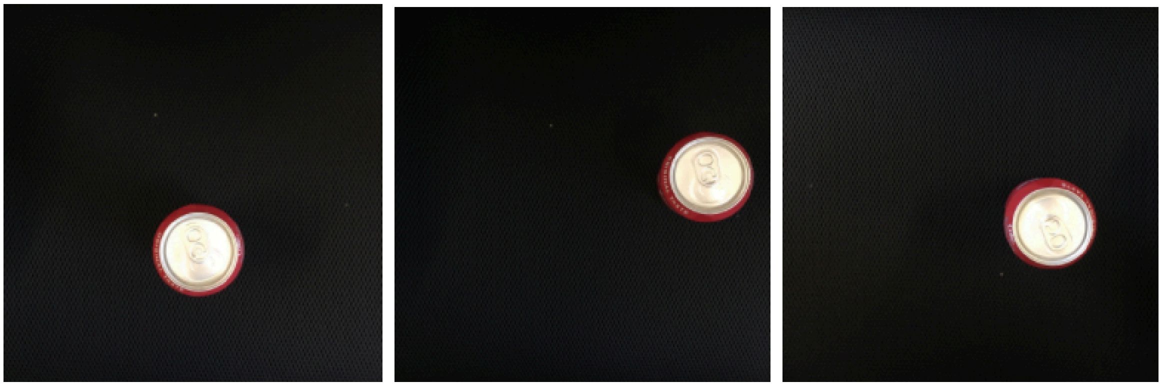
○ $y = [0, ?, ?, ?, ?, ?, ?, ?]$

○ $y = [1, ?, ?, ?, ?, 0, 0, 0]$

○ $y = [?, ?, ?, ?, ?, ?, ?, ?]$

2.You are working on a factory automation task. Your system will see a can of soft-drink coming down a conveyor belt, and you want it to take a picture and decide whether (i) there is a soft-drink can in the image, and if so (ii) its bounding box. Since the soft-drink can is round, the bounding box is always square, and the soft-drink can always appear the same size in the image. There is at most one soft-drink can in each image. Here are some typical images in your training set:

1 point



The most adequate output for a network to do the required task is $y = [p_c, b_x, b_y, b_h, b_w, c_1]$. (Which of the following do you agree with the most?)

○ False, we don't need b_h, b_w since the cans are all the same size.

○ True, p_c indicates the presence of an object of interest, b_x, b_y, b_h, b_w indicate the position of the object and its bounding box, and c_1 indicates the probability of there being a can of soft-drink.

○ False, since we only need two values c_1 for no soft-drink can and c_2 for soft-drink can.

○ True, since this is a localization problem.

3.If you build a neural network that inputs a picture of a person's face and outputs N landmarks on the face (assume the input image always contains exactly one face), how many output units will the network have?

1 point

○ N

○ 3N

○ N^2

○ 2N

4.You are working to create an object detection system, like the ones described in the lectures, to locate cats in a room. To have more data with which to train, you search on the internet and find a large number of cat photos.

1 point

Which of the following is true about the system?

○ We can't add the internet images unless they have bounding boxes.

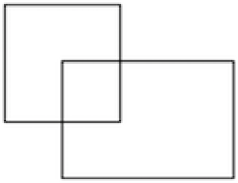
○ We should add the internet images (without the presence of bounding boxes in them) to the train set.

○ We can't use internet images because it changes the distribution of the dataset.

○ We should use the internet images in the dev and test set since we don't have bounding boxes.

5.What is the IoU between these two boxes? The upper-left box is 2x2, and the lower-right box is 2x3. The overlapping region is 1x1.

1 point



○ 1/9

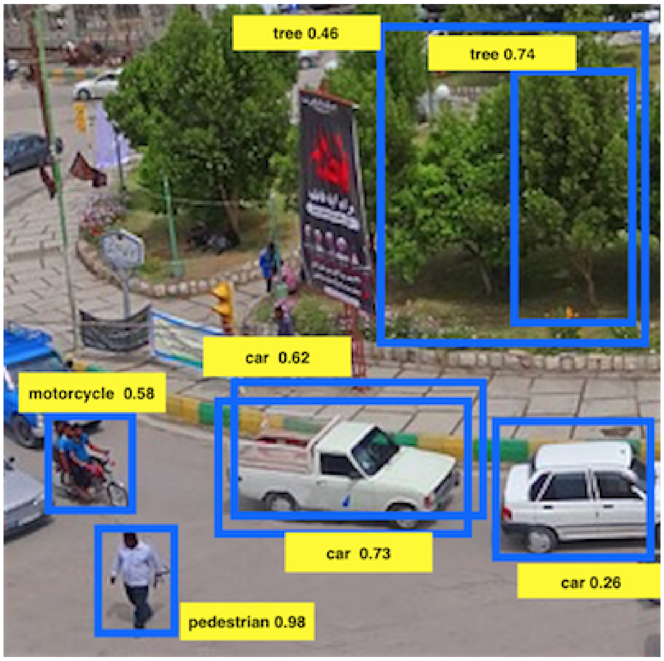
○ 1/10

○ None of the above

○ ⅙

6.Suppose you run non-max suppression on the predicted boxes below. The parameters you use for non-max suppression are that boxes with probability ≤ 0.4 are discarded, and the IoU threshold for deciding if two boxes overlap is 0.5.

1 point



Notice that there are three bounding boxes for cars. After running non-max suppression, only the bounding box of the car with 0.73 is kept from the three bounding boxes for cars. True/False? Choose the best answer.

○ False. All the cars are eliminated since there is a pedestrian with a higher score of 0.98.

○ False. Two bounding boxes corresponding to cars are left since their IoU is zero.

○ True. The non-maximum suppression eliminates the bounding boxes with scores lower than the ones of the maximum.

7.If we use anchor boxes in YOLO we no longer need the coordinates of the bounding box b_x, b_y, b_h, b_w since they are given by the cell position of the grid and the anchor box selection. True/False? 1 point

○ True

○ False

8.What is Semantic Segmentation? 1 point

○ Locating objects in an image by predicting each pixel as to which class it belongs to.

○ Locating an object in an image belonging to a certain class by drawing a bounding box around it.

○ Locating objects in an image belonging to different classes by drawing bounding boxes around them.

9.Using the concept of Transpose Convolution, fill in the values of X, Y and Z below. 1 point

(*padding* = 1, *stride* = 2)

○ X = 10, Y = 0, Z = 0

○ Input: 2x2

1	3
2	4

○ X = 10, Y = 0, Z = 6

○ Result: 6x6

0	0	0	0
0	X	0	7
0	0	0	Y
0	Z	0	4

○ Filter: 3x3

1	0	1
0	0	0
1	0	1

○ X = 3, Y = 0, Z = 4

○ X = 4, Y = 3, Z = 2

10. When using the U-Net architecture with an input $h \times w \times c$, where c denotes the number of channels, the output will always have the shape $h \times w$. True/False? 1 point

○ True

○ False