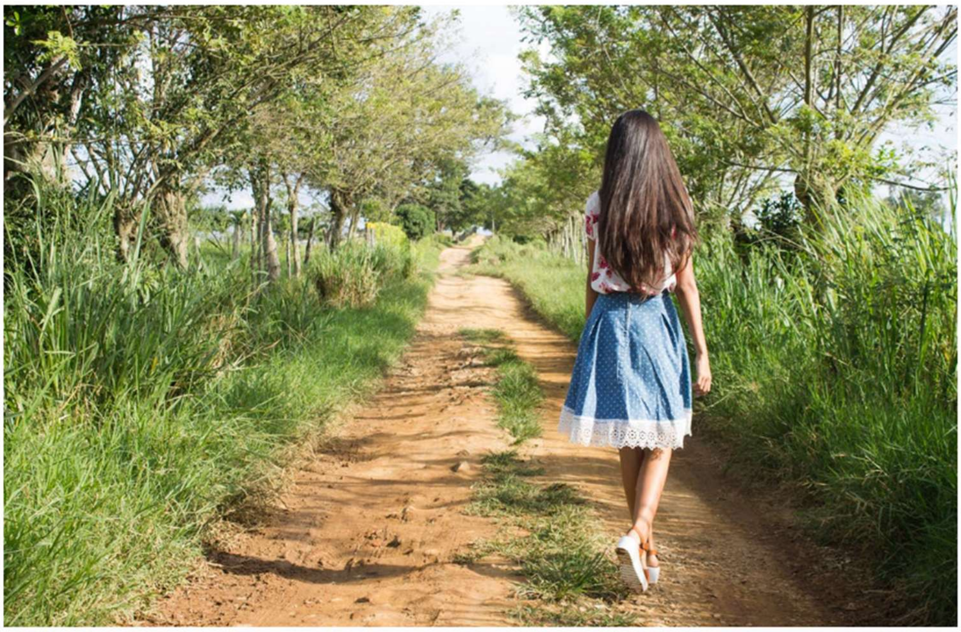
Your grade: 100%

Your latest: **100%** • Your highest: **100%** • To pass you need at least 80%. We keep your highest score.

Next item →

1. 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 $y = [p_c, b_x, b_y, b_h, b_w, c_1, c_2, c_3]$.



● $y = [1, 0.66, 0.5, 0.75, 0.16, 1, 0, 0]$

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○ $y = [1, 0.66, 0.5, 0.75, 0.16, 0, 0, 0]$

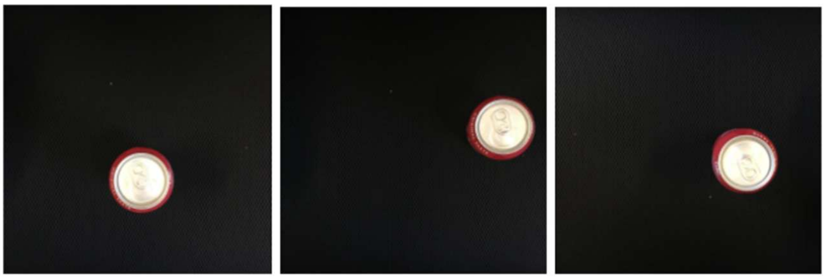
○ $y = [1, ?, ?, ?, ?, 1, ?, ?]$

○ //www.pexels.com/es-es/foto/mujer-vestida-con-falda-azul-y-blanca-caminando-cerca-de-la-hierba-verde-durante-el-dia-144474/

Correct

Correct. $p_c = 1$ since there is a pedestrian in the picture. We can see that b_x, b_y as percentages of the image are approximately correct as well b_h, b_w, and the value of $c_1 = 1$ for a pedestrian.

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're some typical images in your training set:



To solve this task it is necessary to divide the task into two: 1. Construct a system to detect if a can is present or not. 2. Construct a system that calculates the bounding box of the can when present. Which one of the following do you agree with the most?

● We can approach the task as an image classification with a localization problem.

○ We can't solve the task as an image classification with a localization problem since all the bounding boxes have the same dimensions.

○ The two-step system is always a better option compared to an end-to-end solution.

○ An end-to-end solution is always superior to a two-step system.

✓ **Correct**
Correct. We can use a network to combine the two tasks similar to that described in the lectures.

3. When building a neural network that inputs a picture of a person's face and outputs N landmarks on the face (assume that the input image contains exactly one face), we need two coordinates for each landmark, thus we need 2N output units. True/False?

● True

○ False

✓ **Correct**
Correct. Recall that each landmark is a specific position in the face's image, thus we need to specify two coordinates for each landmark.

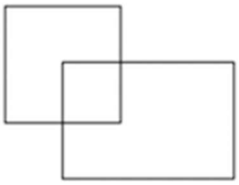
4. When training one of the object detection systems described in the lectures, you need a training set that contains many pictures of the object(s) you wish to detect. However, bounding boxes do not need to be provided in the training set, since the algorithm can learn to detect the objects by itself.

○ True

● False

✓ **Correct**
Correct, you need bounding boxes in the training set. Your loss function should try to match the predictions for the bounding boxes to the true bounding boxes from the training set.

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.



○ None of the above

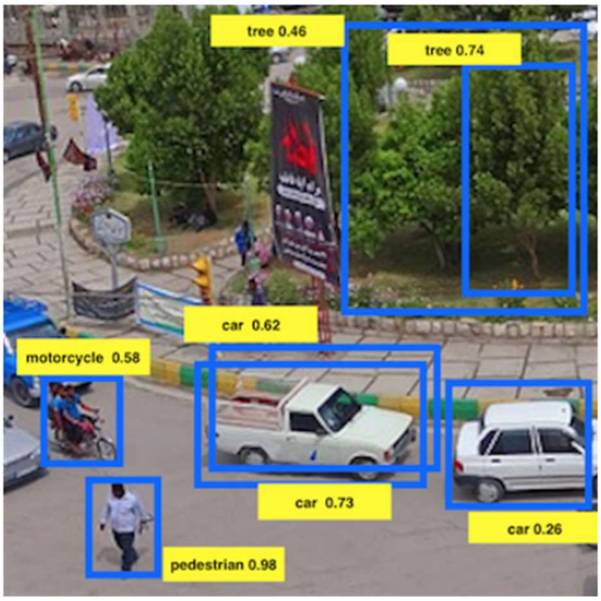
● 1/9

○ ⅙

○ 1/10

✓ **Correct**
Correct. The left box's area is 4 while the right box 's is 6. Their intersection's area is 1. So their union's area is 4 + 6 - 1 = 9 which leads to an intersection over union of 1/9.

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.



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.

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

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

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

Correct
Correct. The bounding box for the car on the right is eliminated because its probability is less than 0.4. Of the two bounding boxes in the middle, one is eliminated because their IoU is higher than 0.5. So, only one (with score 0.73) bounding box remains.

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?

● False

○ True

Correct
Correct. We use the grid and anchor boxes to improve the capabilities of the algorithm to localize and detect objects, for example, two different objects that intersect, but we still use the bounding box coordinates.

8. Semantic segmentation can only be applied to classify pixels of images in a binary way as 1 or 0, according to whether they belong to a certain class or not. True/False?

○ True

● False

Correct
Correct. The same ideas used for multi-class classification can be applied to semantic segmentation.

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

(padding = 1, stride = 2)

Input: 2x2

1	2
3	4

Filter: 3x3

1	1	1
0	0	0
-1	-1	-1

Result: 6x6

	0	0	0	**X**	
	Y	4	2	2	
	0	0	0	0	
	-3	**Z**	-4	-4	

○ X = 0, Y = 2, Z = -1

● X = 0, Y = 2, Z = -7

○ X = 0, Y =-1 , Z = -7

○ X = 0, Y = -1, Z = -4

✓ **Correct**
Correct.

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 $h \times w \times c$. True/False?

○ True

● False

✓ **Correct**
Correct. The output of the U-Net architecture can be $h \times w \times k$ where k is the number of classes. The number of channels doesn't have to match between input and output.