

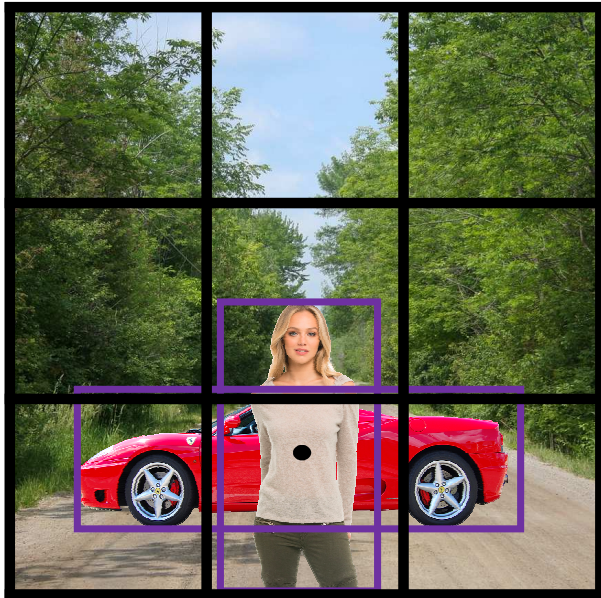


deeplearning.ai

Object Detection

Anchor boxes

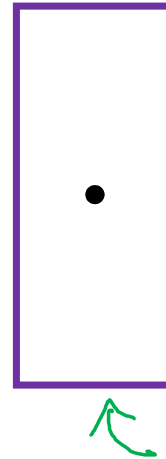
Overlapping objects:



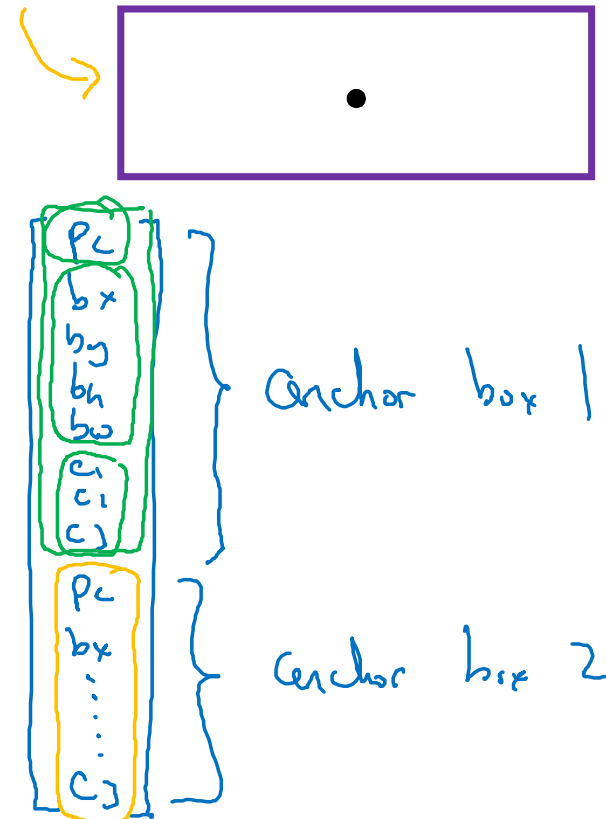
$$y = \begin{bmatrix} p_c \\ b_x \\ b_y \\ b_h \\ b_w \\ c_1 \\ c_2 \\ c_3 \end{bmatrix}$$

Handwritten annotations: A green arrow points from p_c to the center of the woman's bounding box. A blue arrow points from b_x to the left edge of the woman's bounding box. A blue bracket groups c_1, c_2, c_3 .

Anchor box 1:



Anchor box 2:



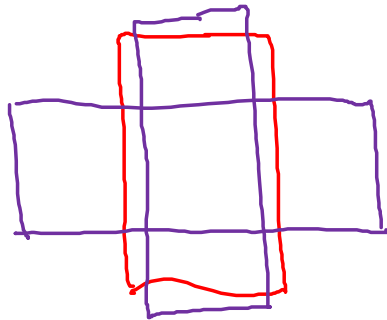
$y =$

Anchor box algorithm

Previously:

Each object in training image is assigned to grid cell that contains that object's midpoint.

Output y :
 $3 \times 3 \times 8$



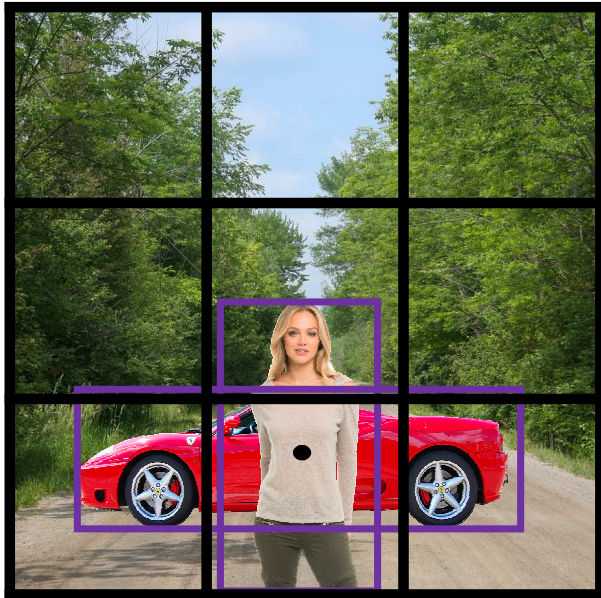
With two anchor boxes:

Each object in training image is assigned to grid cell that contains object's midpoint and anchor box for the grid cell with highest IoU.

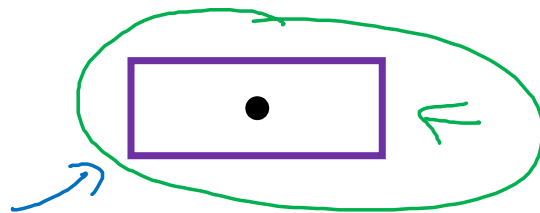
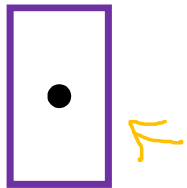
(grid cell, anchor box)

Output y :
 $3 \times 3 \times 16$
 $3 \times 3 \times 2 \times 8$

Anchor box example



Anchor box 1: Anchor box 2:



$y =$

$$\begin{bmatrix} p_c \\ b_x \\ b_y \\ b_h \\ b_w \\ c_1 \\ c_2 \\ c_3 \\ p_c \\ b_x \\ b_y \\ b_h \\ b_w \\ c_1 \\ c_2 \\ c_3 \end{bmatrix}$$

Handwritten annotations for the first vector y :

- 1, 0, 0, 1, 0, 0, 1, 0, 0 (written in orange)
- 1, b_x , b_y , b_h , b_w , 0, 1, 0, 0 (written in green)

Handwritten annotations for the second vector y :

- car only? (written in blue)
- 1, 0, 0, 1, 0, 0, 1, 0, 0 (written in green)
- anchor box 1 (written in blue, pointing to the first vector)
- anchor box 2 (written in blue, pointing to the second vector)