Object Detection

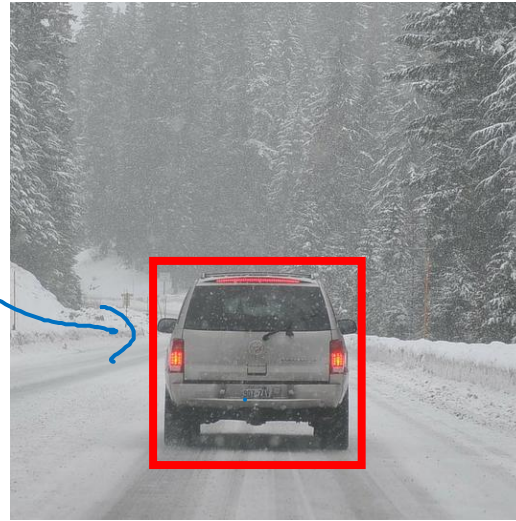# Object localization

deeplearning.ai

What are localization and detection?

Image classification

Classification with localization
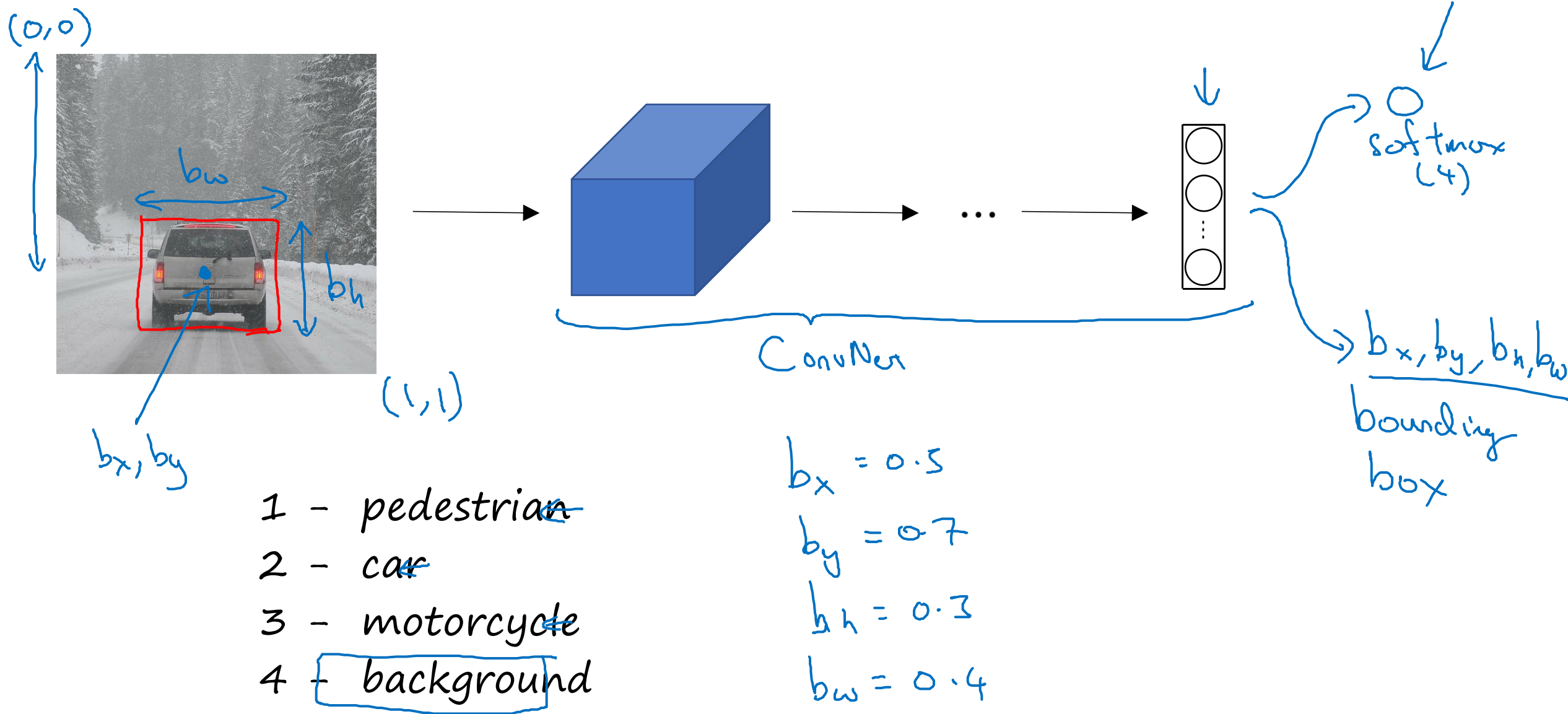
Detection

"Car"

"Car"

1 object

multiple objects
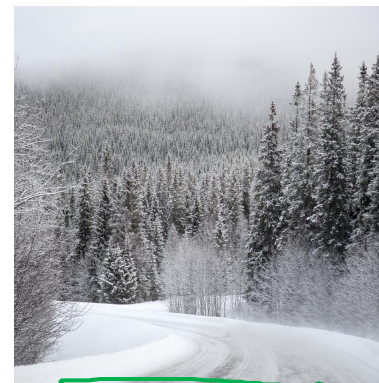
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Classification with localization

(0,0)

b_w

b_h

b_x, b_y

(1,1)

1 - pedestrian
2 - car
3 - motorcycle
4 - background

ConvNet

softmax (4)

b_x, b_y, b_h, b_w
bounding box

$b_x = 0.5$
$b_y = 0.7$
$b_h = 0.3$
$b_w = 0.4$

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Defining the target label y

1 – pedestrian
2 – car
3 – motorcycle
4 – background

Need to output b_x, b_y, b_h, b_w, class label (1-4)
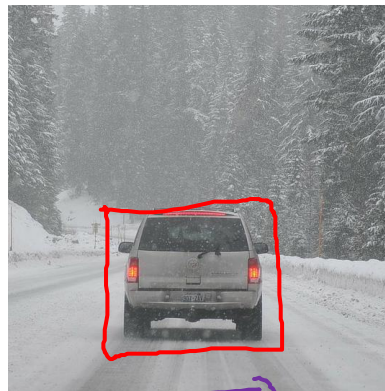
$x =$

$\mathcal{L}(\hat{y}, y) =$

$\begin{cases} (\hat{y}_1 - y_1)^2 + (\hat{y}_2 - y_2)^2 \\ + \cdots + (\hat{y}_8 - y_8)^2 & \text{if } y_1 = 1 \\ \\ (\hat{y}_1 - y_1)^2 & \text{if } y_1 = 0 \end{cases}$

$y = \begin{bmatrix} P_c \\ b_x \\ b_y \\ b_h \\ b_w \\ C_1 \\ C_2 \\ C_3 \end{bmatrix}$ } is there any object?

(x, y) $\begin{bmatrix} 1 \\ b_x \\ b_y \\ b_h \\ b_w \\ 0 \\ 1 \\ 0 \end{bmatrix}$

$\begin{bmatrix} 0 \\ ? \\ ? \\ ? \\ ? \\ ? \\ ? \\ ? \end{bmatrix}$ P_c ← "don't care"

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