YOLO

01 December 2023 07:12

You only look once. — 2016 Joseph Redmon.

Classification. Localization. Detection.

Cat / dog.

Draw Box over the Region of interest.

Multiple detect objects in Images

[Class P]

Car	Cat
Bus	Dog
truck	Tree
Bike	Bicycle

Object detection.

- two stage
  - RCNN
  - Fast RCNN
  - RFCN
  - SW Tech.
- one stage.
  - YOLO. (v1)
  - SSD

Single shot object detection.

Single shot object detection uses a single pass of the input image to make prediction about the presence of location of the objects.

Two shot object detection.

uses two pass of the input image to make predictions

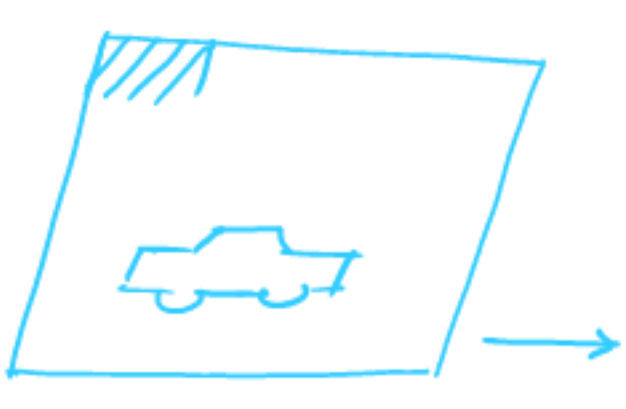
* generally single shot object detection is better suited for real time application while two shot detection used application where accuracy is important.

Comparison.	YOLO.
RCNN	1000x faster
Fast RCNN	100x faster.
Sliding window.	faster.

Pc	Object probability
bx, by, bh, bw	Bounding Box coordinates.
c1, c2, c3	probability class.

Bus, truck, car

Sliding

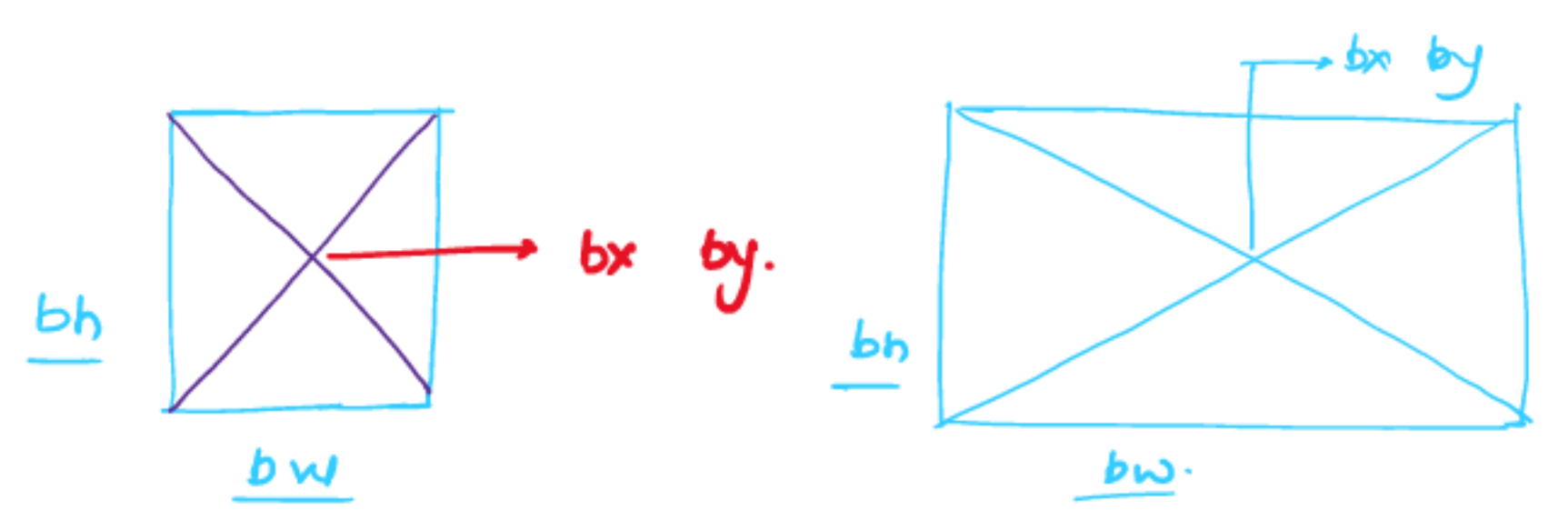


→ Result.

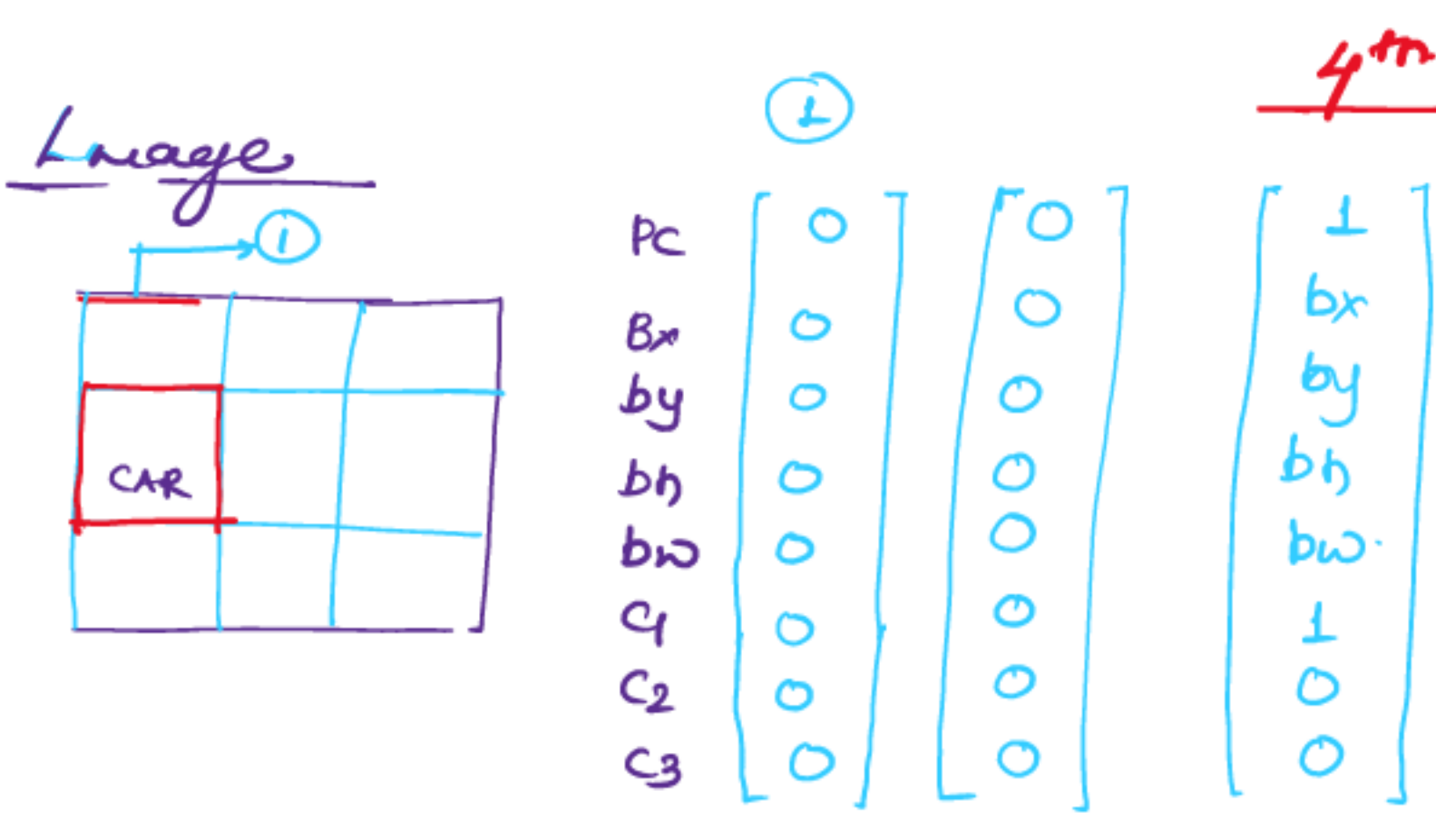
3x3, 5x5, 7x7

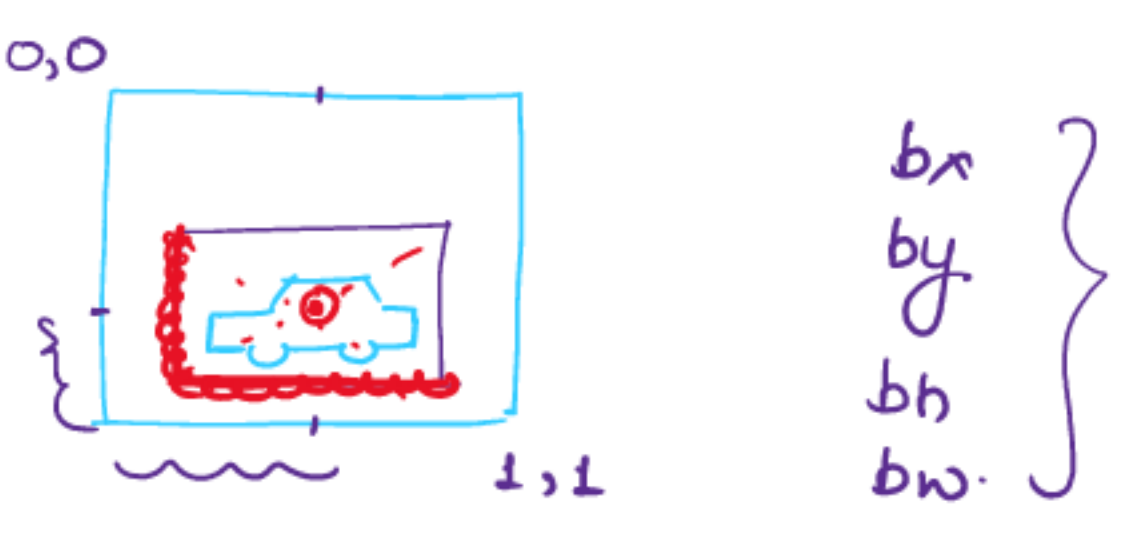
bx by bh bw. Regression

centre — height, width.



Image

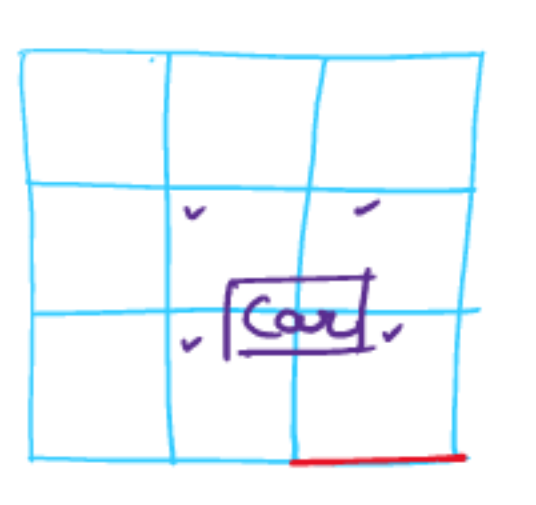


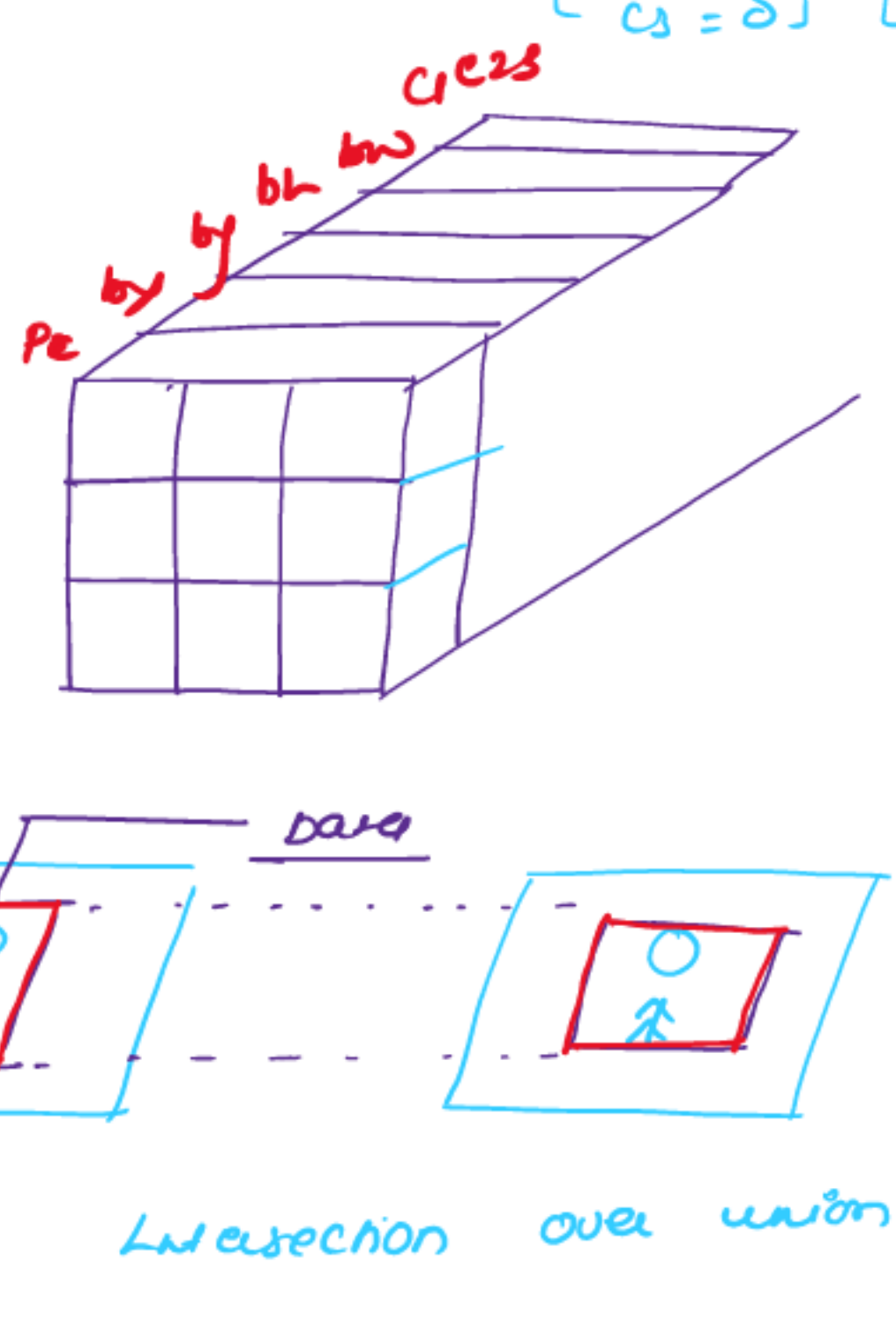


with no object — object

$$\begin{bmatrix} Pc=0 \\ bx=0 \\ by=0 \\ bh=0 \\ bw=0 \\ c1=0 \\ c2=0 \\ c3=0 \end{bmatrix} \quad \begin{bmatrix} 1 \\ bx \\ by \\ bh \\ bw \\ c1 \\ c2 \\ c3 \end{bmatrix}$$

8x1

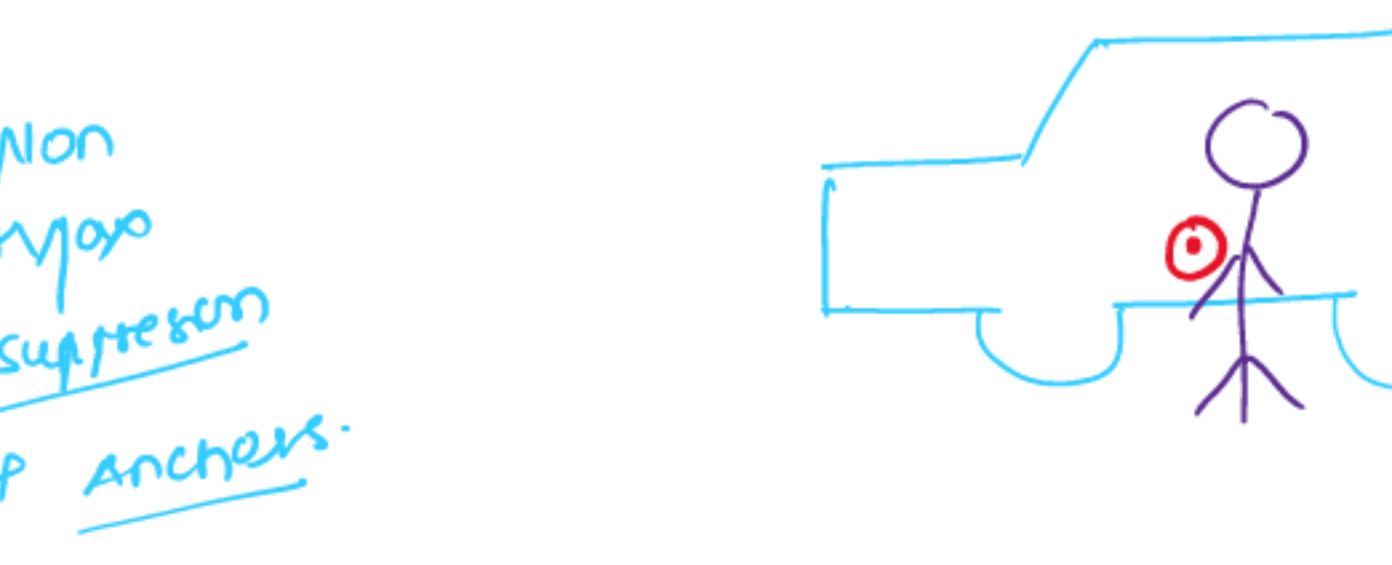




Intersection over union.

$$IOU = \frac{\text{Area of Intersection}}{\text{Area of union}}$$

[>0.5]



Non max suppression

& Anchors.

$SxS \times (B \times 5 + C)$.

Pc, bx, by, bh, bw, c1, c2, c3 — 1, 0, 0 ✓ car

Pc, bx, by, bh, bw, c1, c2, c3 — 0, 1, 0 ✓ person