OBJECT DETECTION

1) YOLO (You only look once)

→ Object Detection
→ Object classification { If image has more than one object, object classification will not work }

Localization – drawing boundary box around object detected

$$Y = \begin{bmatrix} 1 \\ b_x \\ b_y \\ b_h \\ b_w \\ 0 \\ 1 \\ 0 \end{bmatrix}$$

- 1 → is object detected (0 → not detected, 1 → if detected)
- b_x, b_y → centre of boundary box (b_x, b_y)
- b_h → height (b_h)
- b_w → width (b_w)
- 0, 1, 0 → class of an object (car, truck, phone) ⇔ object detected is truck

★ Intersection over Union method (IoU)
↳ computes intersection over union on 2 bounding blocks

$$IoU = \frac{\text{Size of intersection}}{\text{Size of Union}}$$

correct if $IoU \geq 0.5$

★ Non-Max Supression
↳ used for cleaning up when multiple boxes are predicted for same object
↳ pick the box with max IOU

★ Anchor Boxes
↳ Used to detect multiple objects in image
↳ set of predefined boundary boxes of certain height and width

2) FASTER R-CNN

Region Proposal Network (RPN) → find area where object can be found
foreground class → area where object is found
background class → area where object is not present

Input Image → Region Proposal Network → Region of Interest (ROI) Pooling → Regressor (refined Bounding Box)

Region of Interest (ROI) Pooling → Classifier (object or background)

(gives feature map of anchor boxes which are labelled as foreground class)

(Input → different size of feature maps
Task → To reduce all feature maps to same