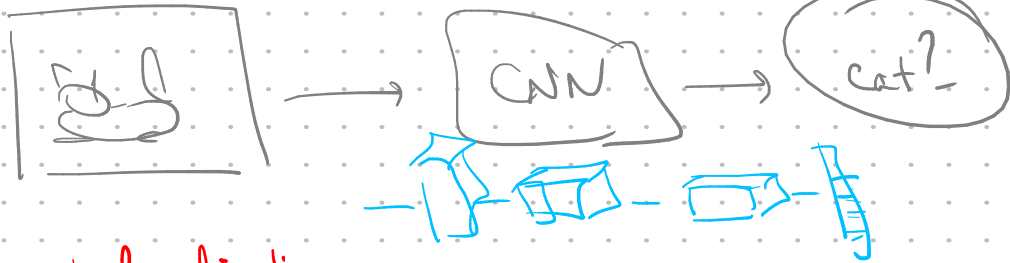
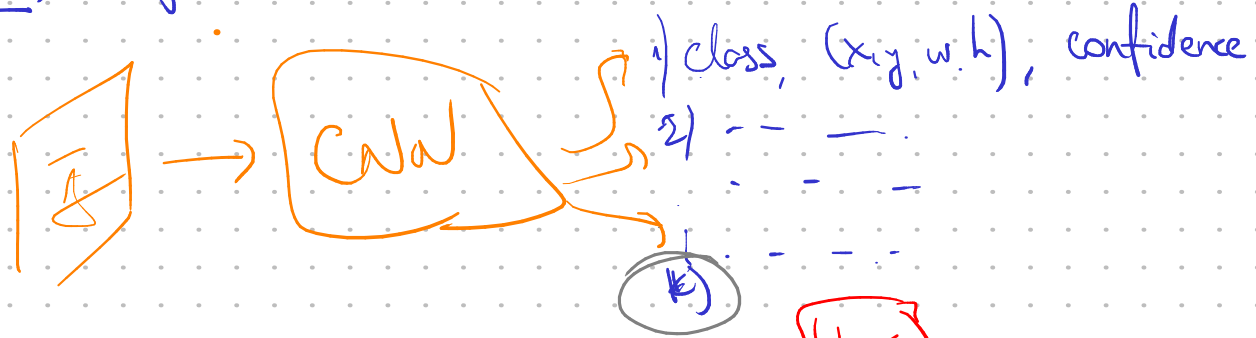
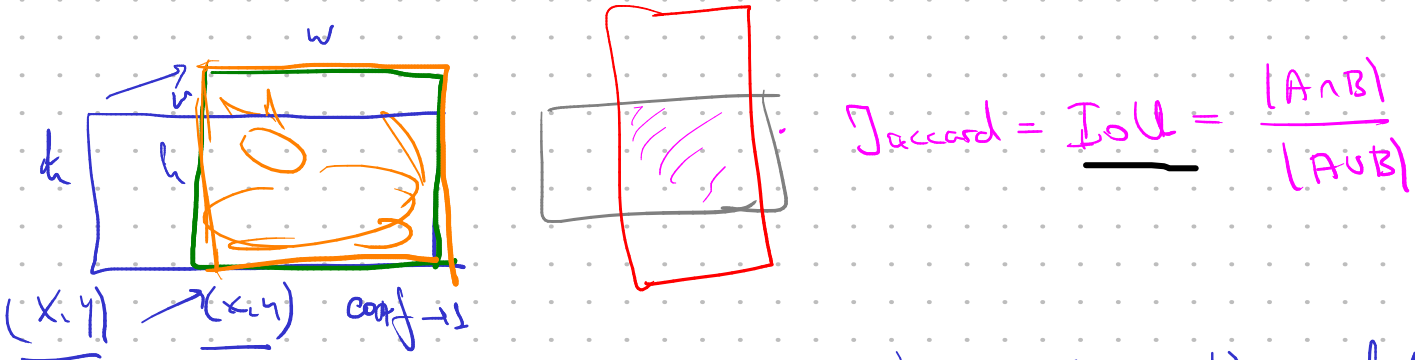
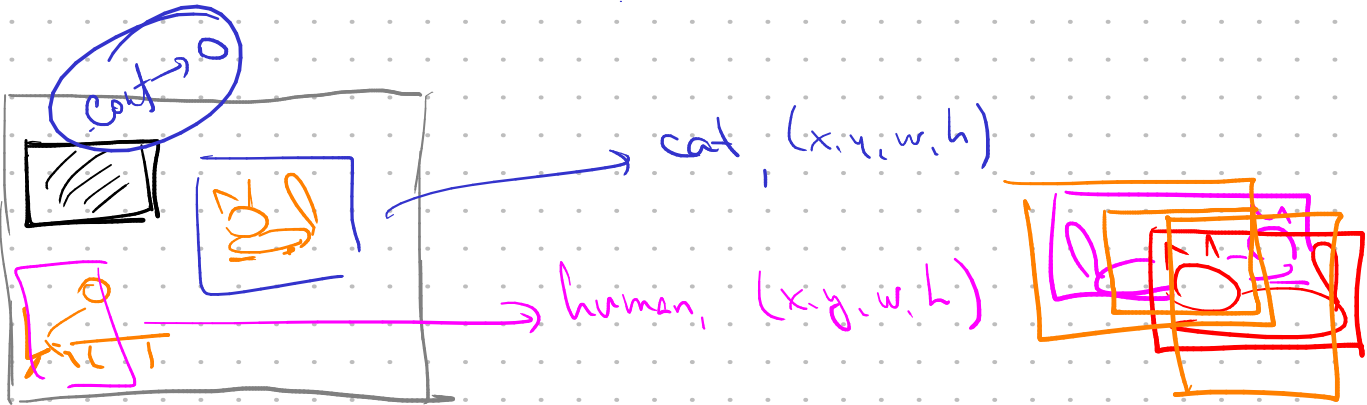
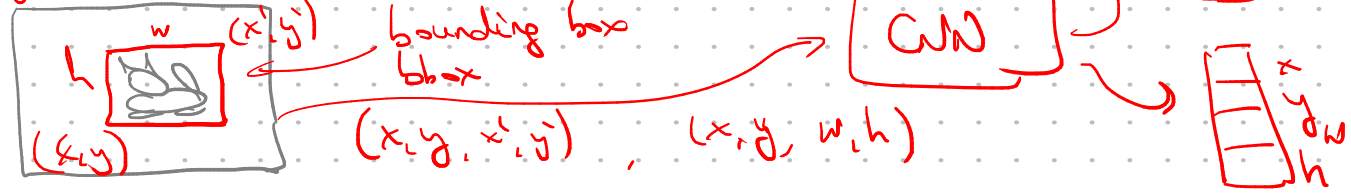


classification



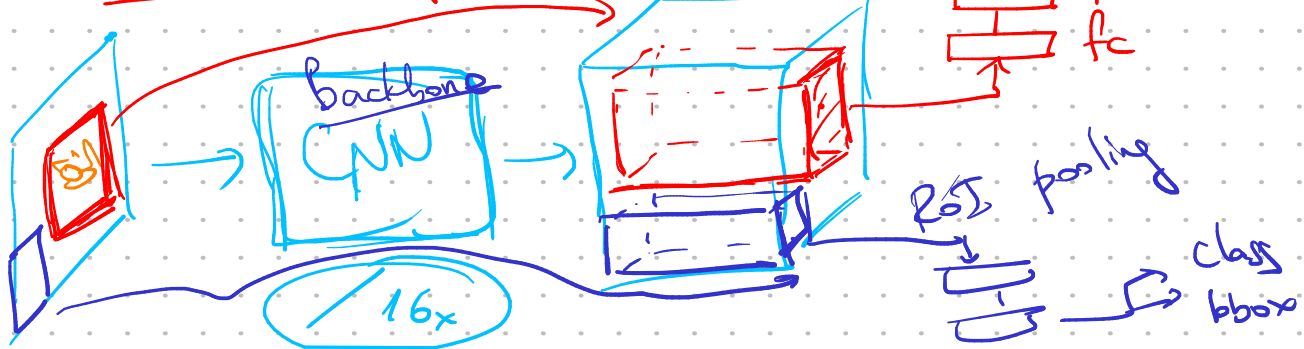
object localization

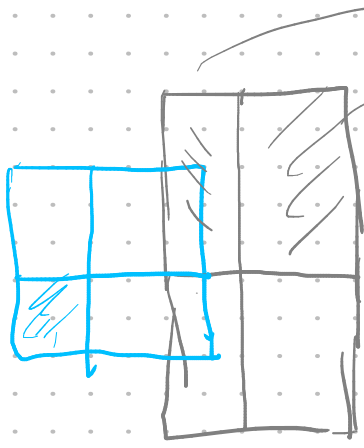


Two-stage object detection

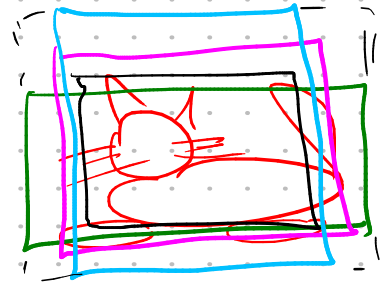
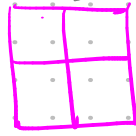
Fast R-CNN

RoI projection





max-pooling



non-maximal suppression

One-stage OD

YOLO
Loss function

$$L = \lambda_2 \sum_{i=0}^{s^2} [\text{obj}_{ij}] - \left[\sum_c (p_c(c) - \hat{p}_c(c))^2 \right]$$

$$+ \lambda_2 \sum_i \sum_{j \in \text{boxes}} [\text{obj}_{ij}] \left((x_i - \hat{x}_i)^2 + (y_i - \hat{y}_i)^2 + (\sqrt{w_i} - \sqrt{\hat{w}_i})^2 + (\sqrt{h_i} - \sqrt{\hat{h}_i})^2 \right)$$

$$+ \lambda_3 \sum_{i=0}^{s^2} \sum_{j \in \text{boxes}} [\text{obj}_{ij}] (\text{conf}_i - 1)^2$$

$$+ \lambda_4 \sum_i \sum_j [\neg \text{obj}_{ij}] (\text{conf}_i - 0)^2$$