Week 5 – Object detection

Outline

- Sliding windows
- Bounding box
- score

Object detection

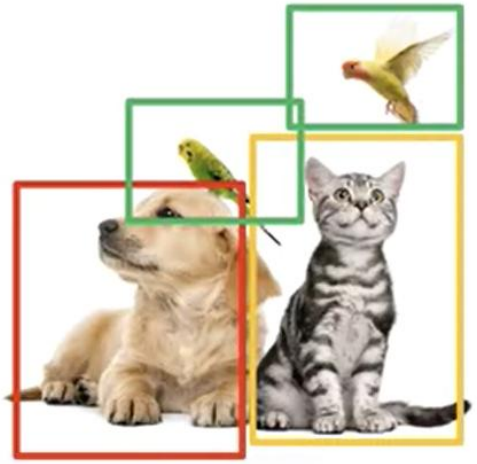
Classification

dog

Classification+
Localization

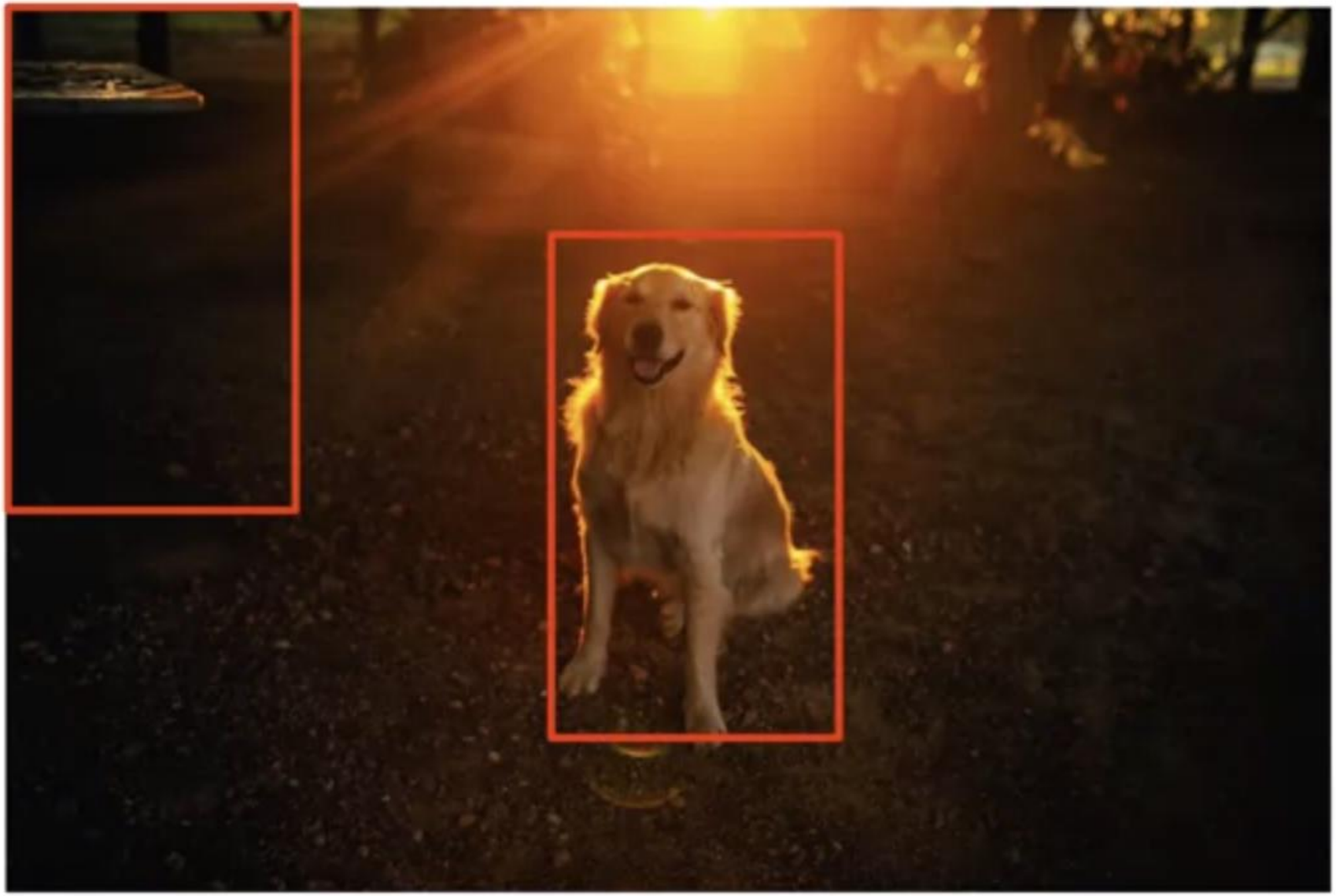
dog

Object detection



dog, cat, bird

Sliding windows



$dog\ y = 1$

$background\ y = 0$

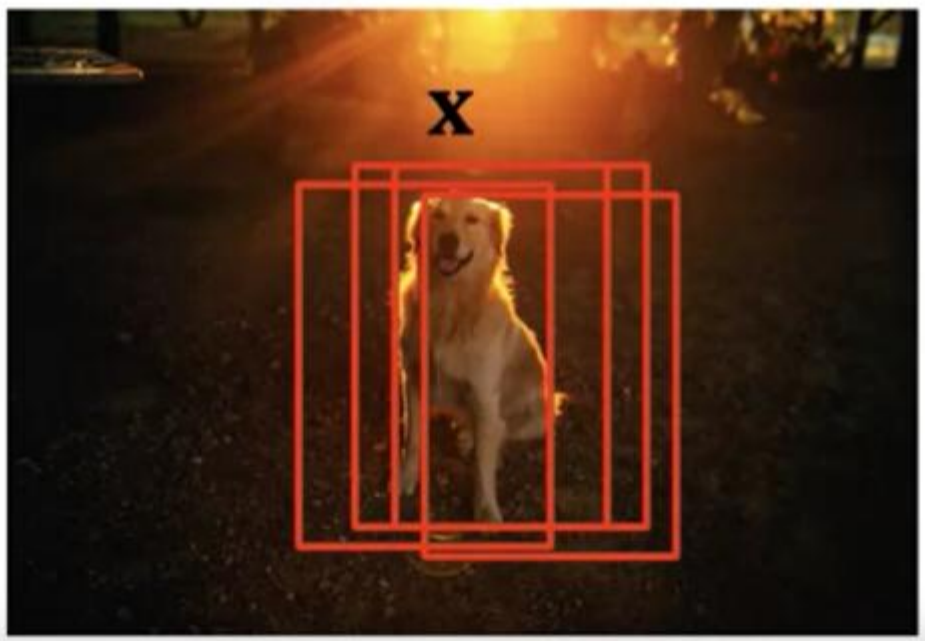
Sliding windows

Sliding windows

Sliding windows

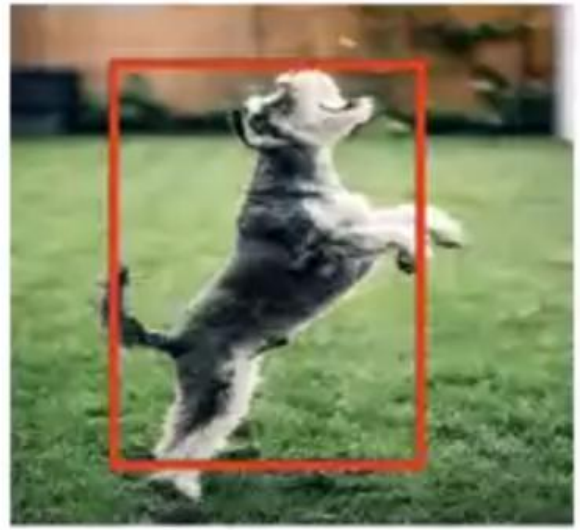
Problems of Sliding Windows

- Overlapping Boxes



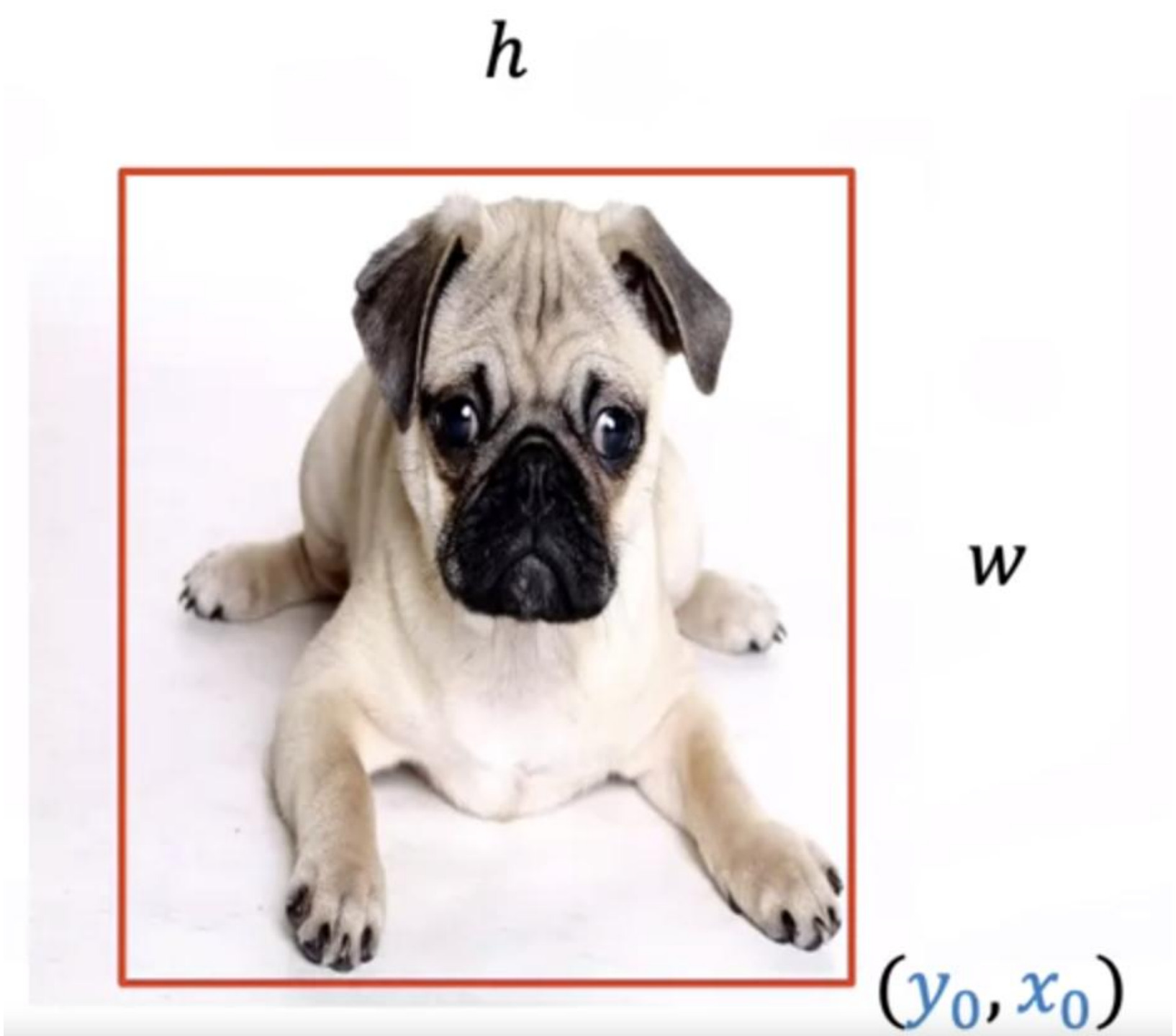
Problems of Sliding Windows

- Object shape



Iamge by: Eriklam, istockphoto.com

Bounding box


h
w
(y_0, x_0)

(y_{min}, x_{min})

(y_{max}, x_{max})

$$\widehat{box} = [(\hat{y}_{min}, \hat{x}_{min}), (\hat{y}_{max}, \hat{x}_{max})]$$

$(\hat{y}_{min}, \hat{x}_{min})$

$(\hat{y}_{max}, \hat{x}_{max})$

$y_1, \mathbf{x}_1, box_1$

$y_4, \mathbf{x}_4, box_4$

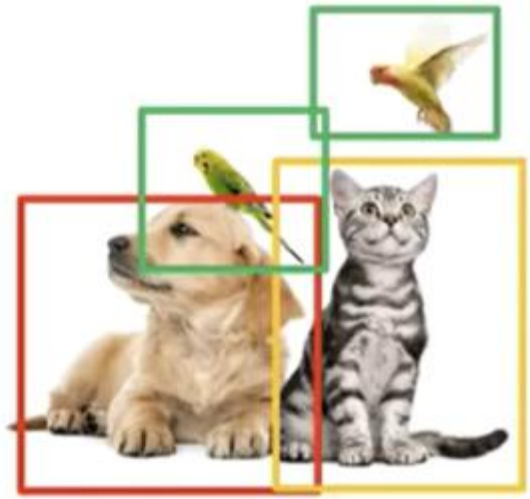
$y_2, \mathbf{x}_2, box_2$

$y_3, \mathbf{x}_3, box_3$

$y_5, \mathbf{x}_5, box_5$


$y_1, \mathbf{x}_1, box_1$
$y_2, \mathbf{x}_2, box_2$
$y_3, \mathbf{x}_3, box_3$
$y_4, \mathbf{x}_4, box_4$
Training
Object Detector

Object Detector



$dog, \widehat{box}_1$

$cat, \widehat{box}_2$

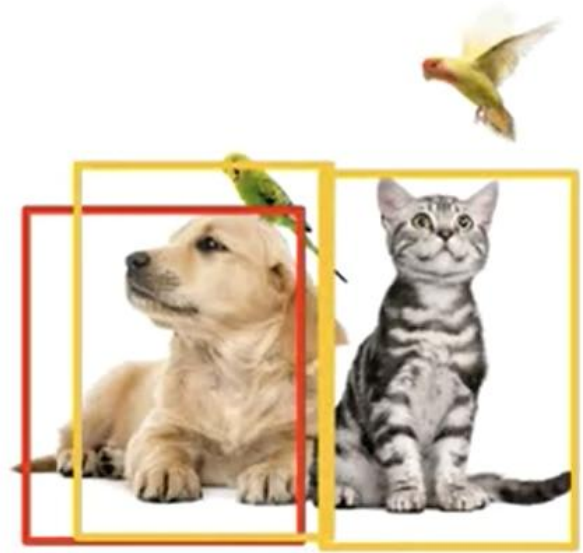
$bird, \widehat{box}_3$

$bird, \widehat{box}_3$

Score

$Score$	0.5	0.99
$\hat{y}$	dog	dog
		

Object Detector



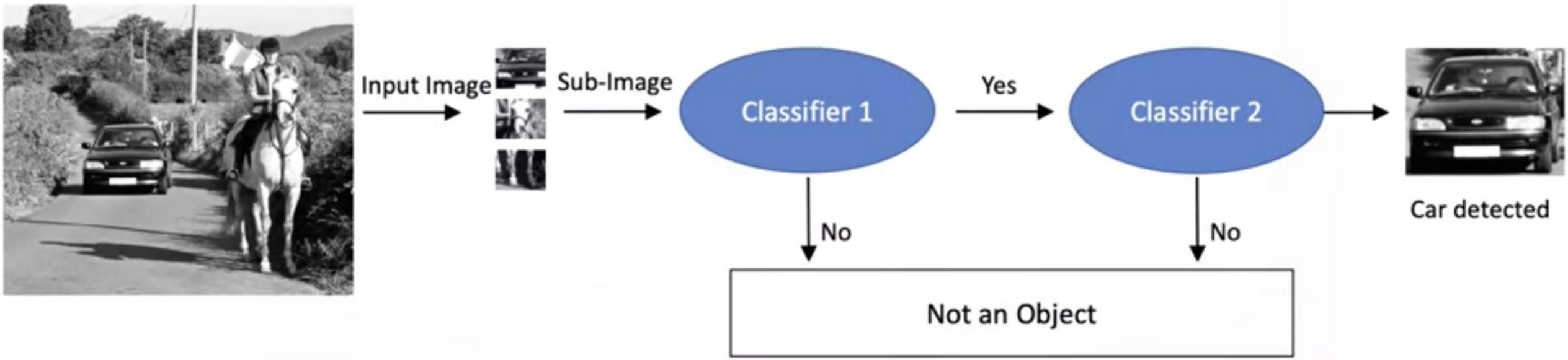
$$dog, \widehat{box}_1, score_1$$

$$cat, \widehat{box}_2, score_2$$

$$cat, \widehat{box}_3, score_3$$

Haar feature-based Cascade Classifier

A cascade of Classifiers



Lab – Object detection

- Dò tìm :
  - Khuôn mặt người trong ảnh.
  - Người đi bộ trong ảnh
  - Xe hơi trong ảnh
- Hướng dẫn:
  Download cascade train sẵn ở đây:
- https://github.com/opencv/opencv/tree/master/data/haarcascades
- áp dụng haarcascade fullbody, upper, lower, frontal face, car …