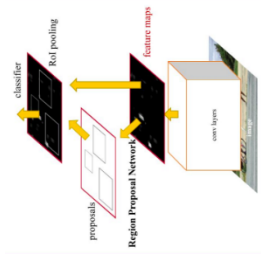


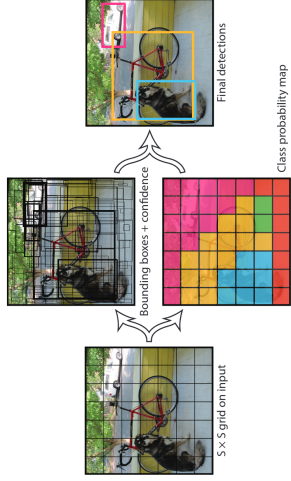
Faster R-CNN 4

- Region Proposal Network (RPN)
- Four loss: RPN classification loss, RPN regress loss, Final classification loss, Final box coordinate loss
- 250 time faster than R-CNN. (Fast R-CNN is 25 times fast)



⁴ cite 14669 Ren, Saeed and He, Kaiming and Girshick, Ross and Sun, Jan *Faster R-CNN: Towards real-time object detection with region proposal networks*, *Advances in neural information processing systems*, pages 91–99, IEEE, 2015

Yolo 5



- Conditional probability map
- See <https://pjreddie.com/darknet/yolo/>

⁵ cite 6375 Redmon, Joseph and Divvala, Santosh and Girshick, Ross and Farhadi, Ali. *You only look once: Unified, real-time object detection*; IEEE conference on computer vision and pattern recognition (CVPR); pages 779–786; 2016

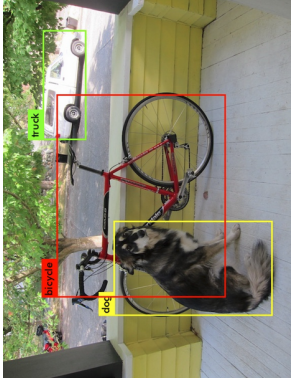
Yolo

	Pascal 2007 mAP	Speed
DPM v5	33.7	.07 FPS 14 s/img
R-CNN	66.0	.05 FPS 20 s/img
Fast R-CNN	70.0	.5 FPS 2 s/img
Faster R-CNN	73.2	7 FPS 140 ms/img
YOLO	63.4	45 FPS 22 ms/img

- It is fast
- Speed comes at the price of accuracy. Improved to 69%
- Generalizes well
- Latest version YOLOv3 2018

Object Detection with Yolo

What is there and where?

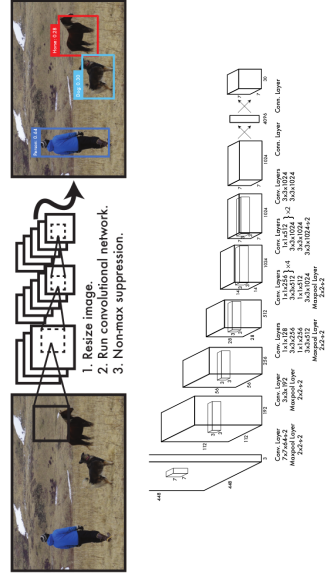


Deformative Part Model, and F-RCNN

- Apply the model to an image at multiple locations and scales. High scoring regions are considered detections.

Yolo: apply a single neural network to the full image that divides it into regions and predicts bounding boxes and probabilities for each region

Yolo



- $S \times S$ segments, gives B bounding boxes with confidence, and C class probabilities. So $S \times S \times (B \times 5 + C)$ values. S:7, B:2, C:20

Thank You!

Thank you very much for your attention!