Lecture 11 – Image Segmentation

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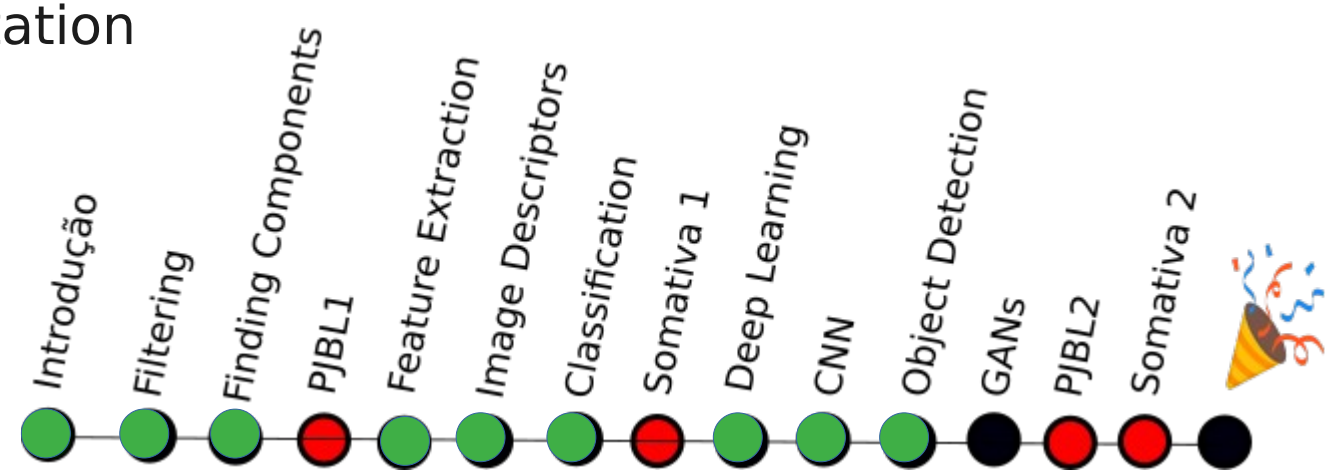
Topics

- Review of Lecture 10 – CNN Applications and Tricks

- Classification vs Segmentation
  - Classification
  - Object Detection
  - Segmentation
- Practice



Classification vs Segmentation

Is this a dog?

Image Classification

What is there in image and where?

Object Detection

Which pixels belong to which object?

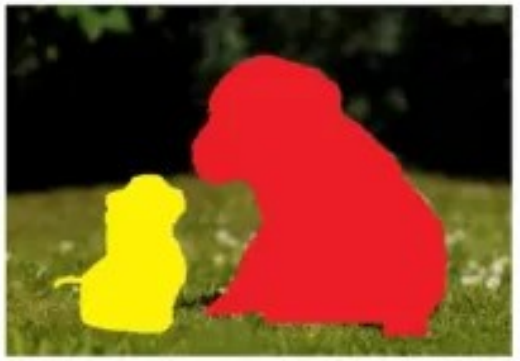
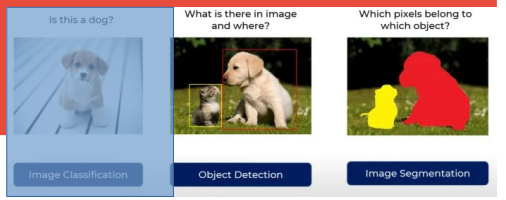
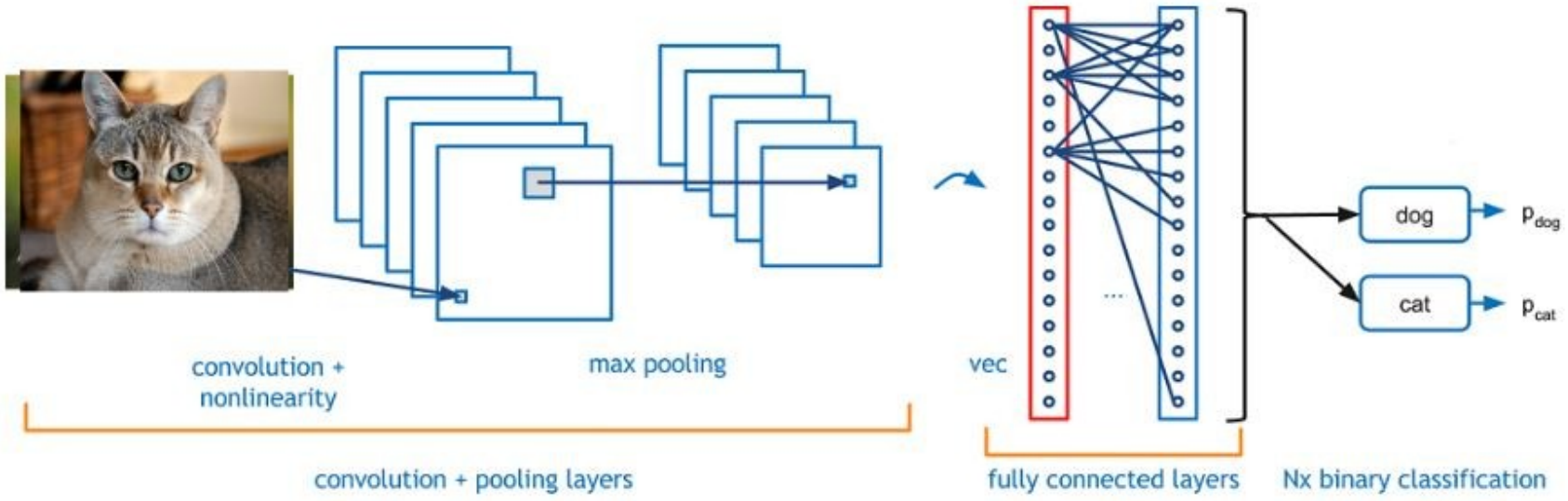


Image Segmentation

Classification





Object Detection

Is this a dog?

Image Classification

What is there in image and where?

Object Detection

Which pixels belong to which object?

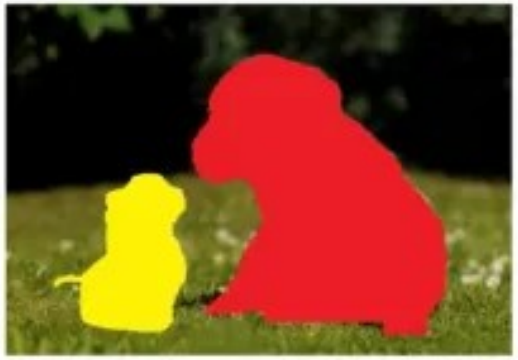
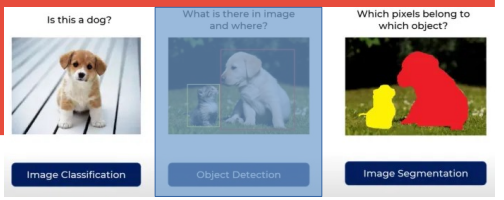
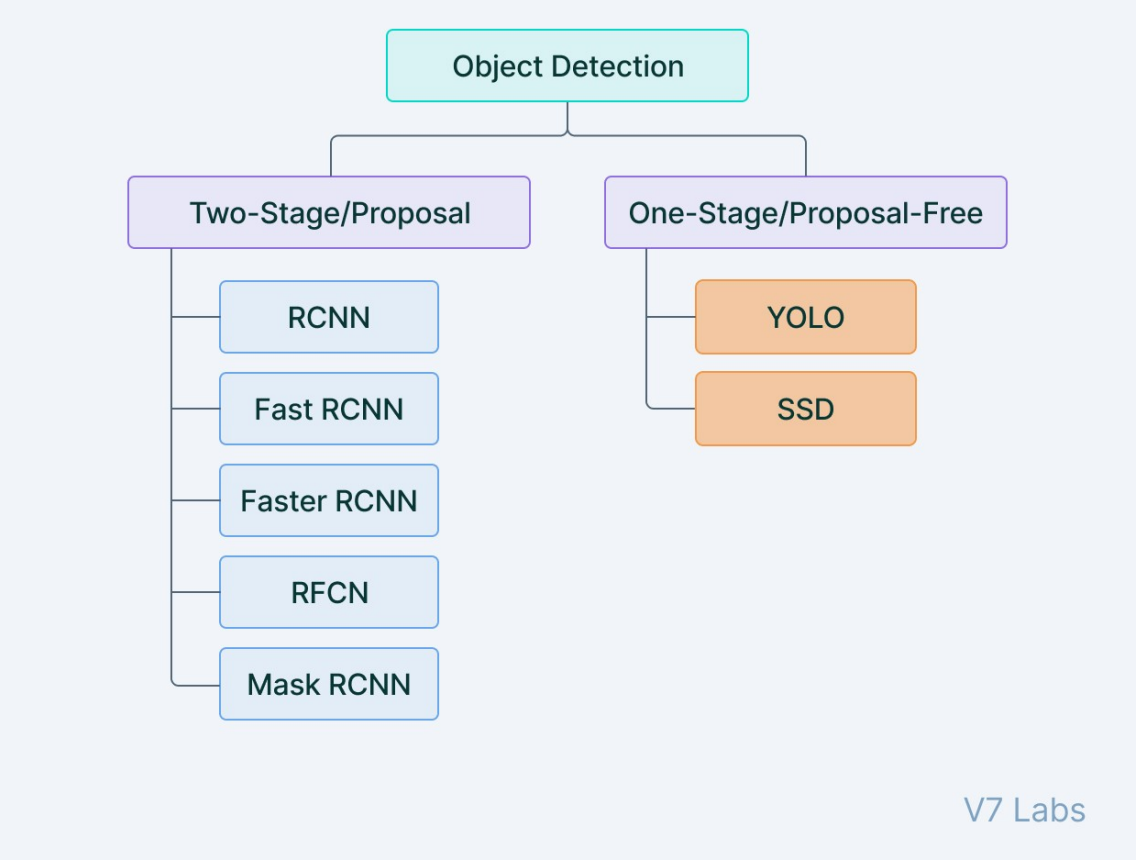


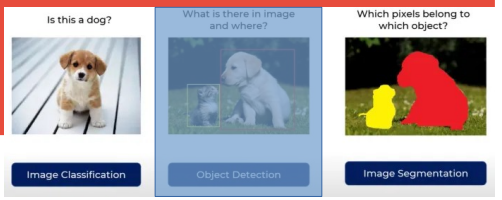
Image Segmentation

Object Detection

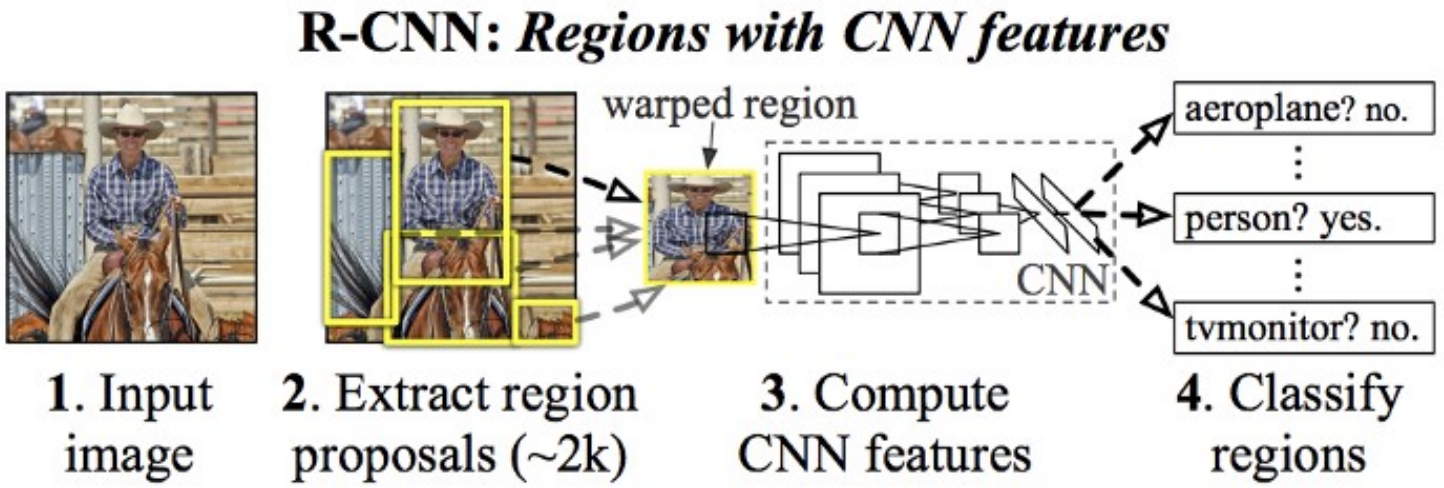




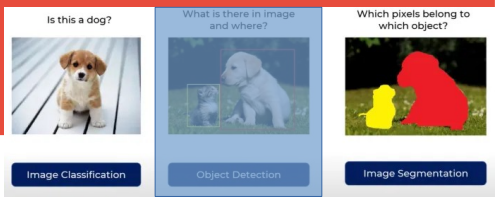
Object Detection - RCNN



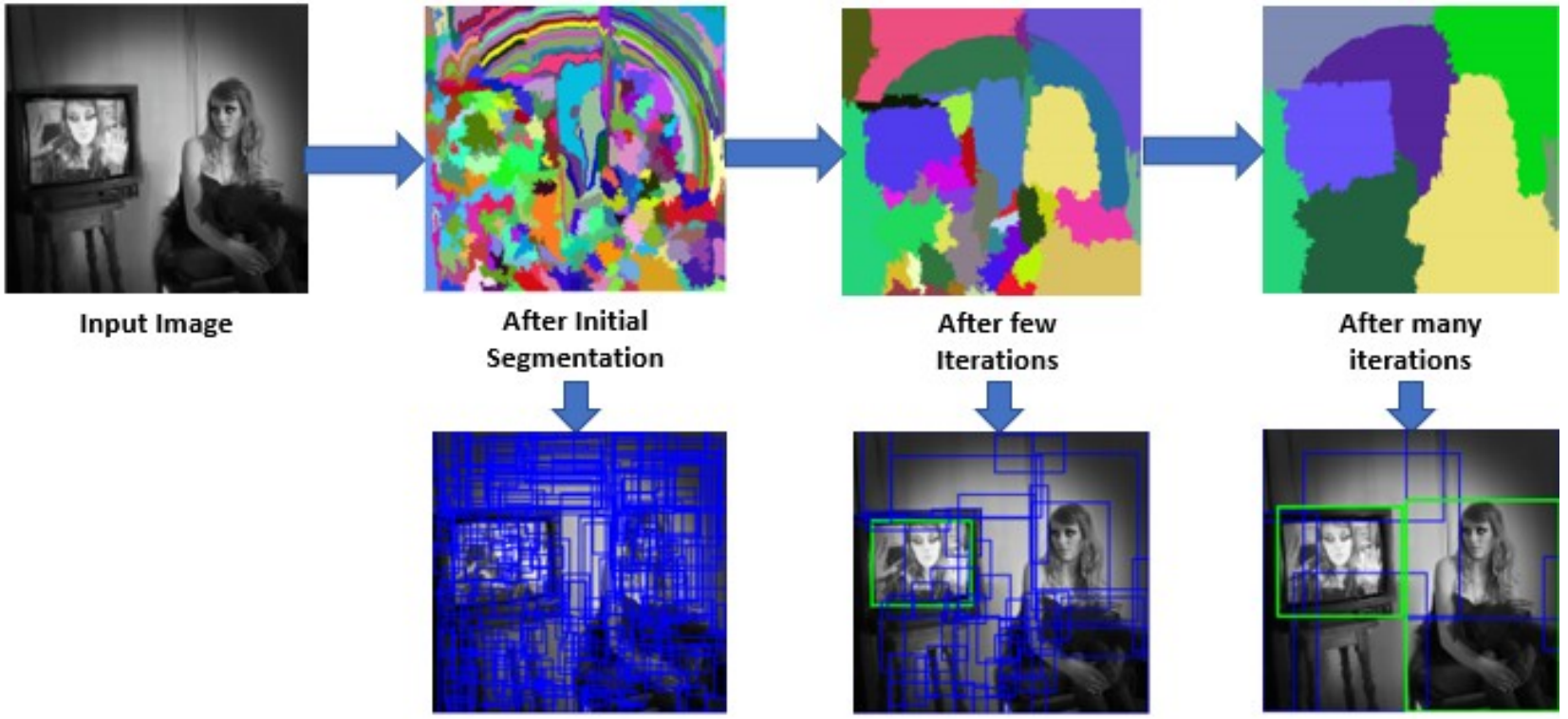
- Region Based Convolutional Neural Network (2014) - Ross Girshick
- Selective Search Algorithm (Region Proposal)
- CNN (Classification)



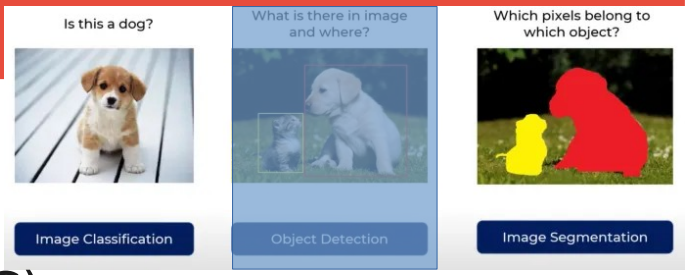
Object Detection - RCNN



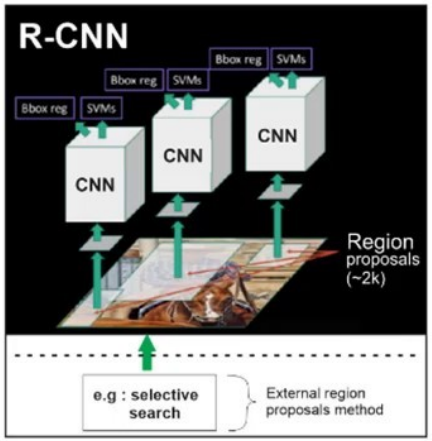
- Selective Search Algorithm (Region Proposal)

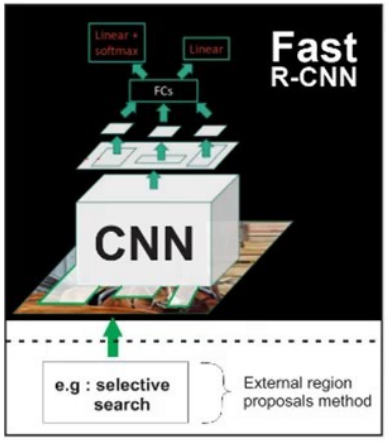


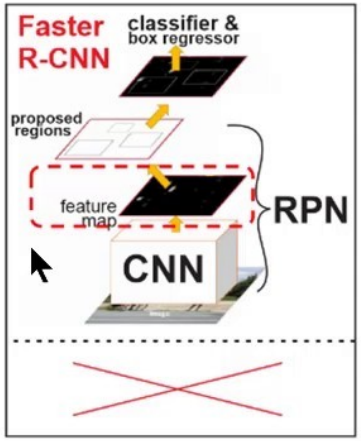
Object Detection - RCNN



- R-CNN: Selective Search->CNN
- Fast: End-to-end (Sel. Search->ROI Pooling→FC)
- Faster: Region Proposal Network (RPN)

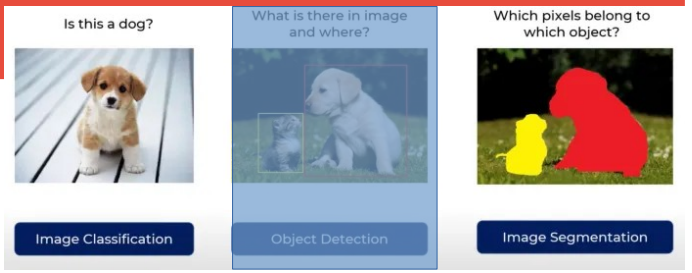




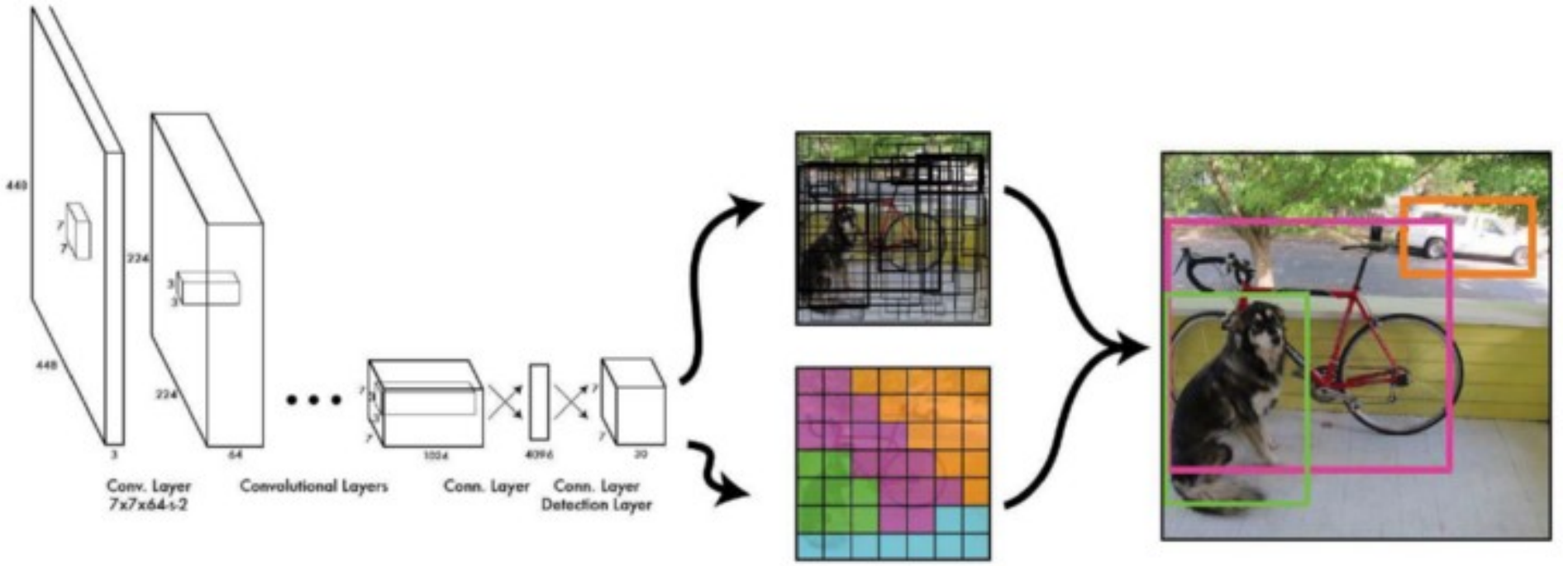


	R-CNN	Fast R-CNN	Faster R-CNN
Test time per image	50 seconds	2 seconds	0.2 seconds
Speed-up	1x	25x	250x
mAP (VOC 2007)	66.0%	66.9%	66.9%

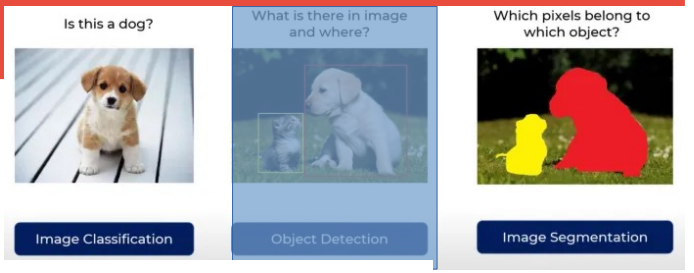
Object Detection - Yolo

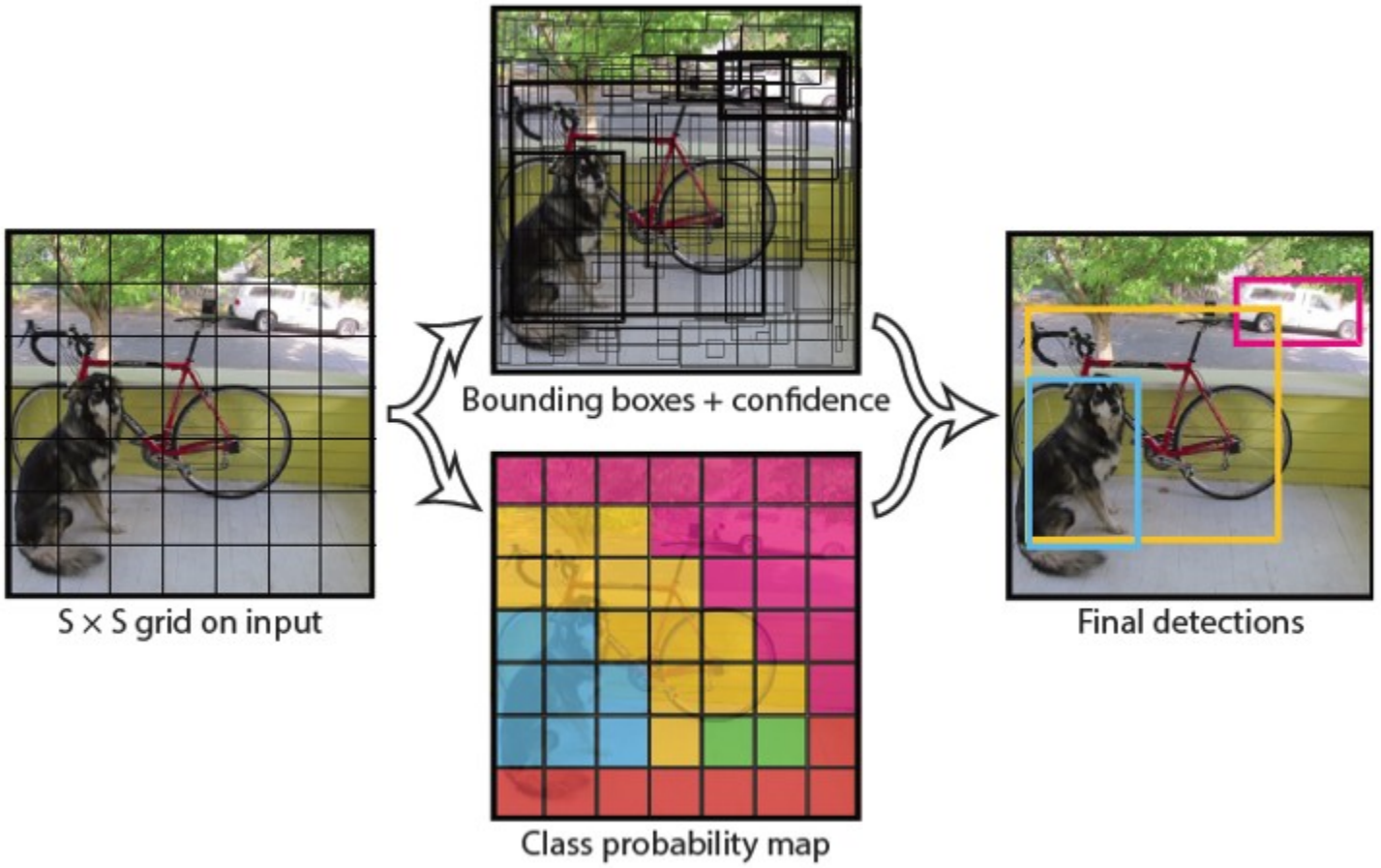


- You Look Once (2015)
  - Joseph Redmon / Ross Girshick

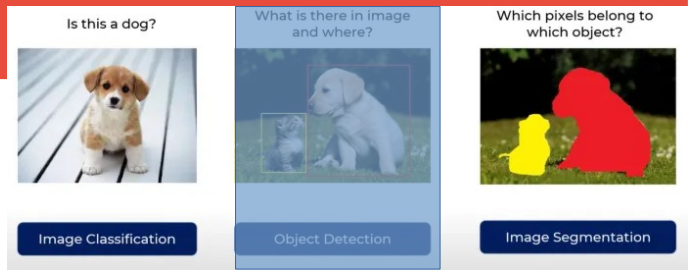


Object Detection - Yolo



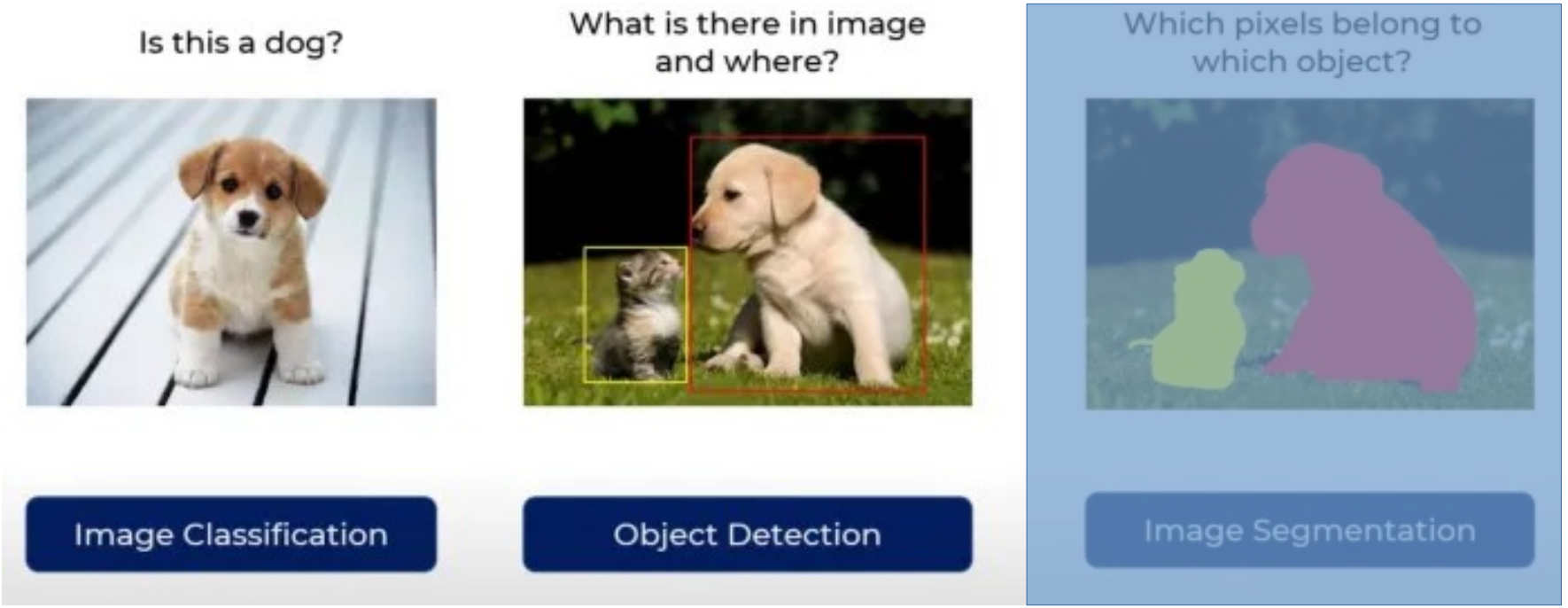


Let’s Code



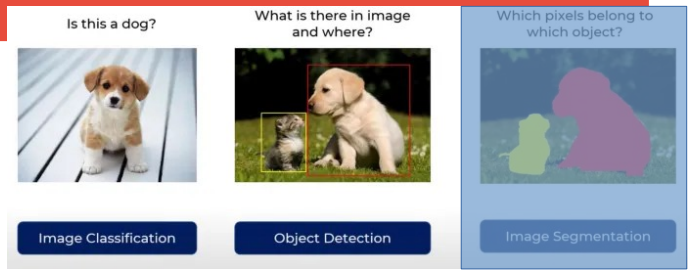
- YOLO Inference
  - [NEXT CLASS, SORRY :(]

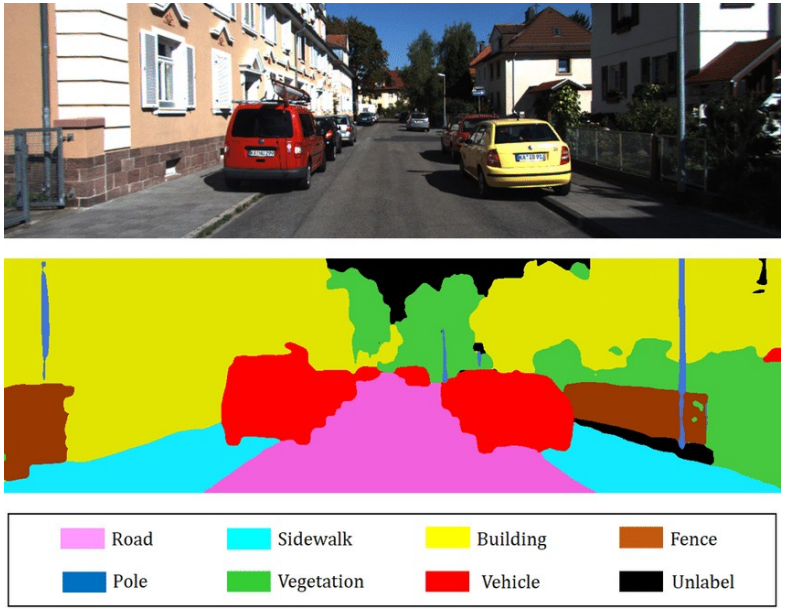
Segmentation

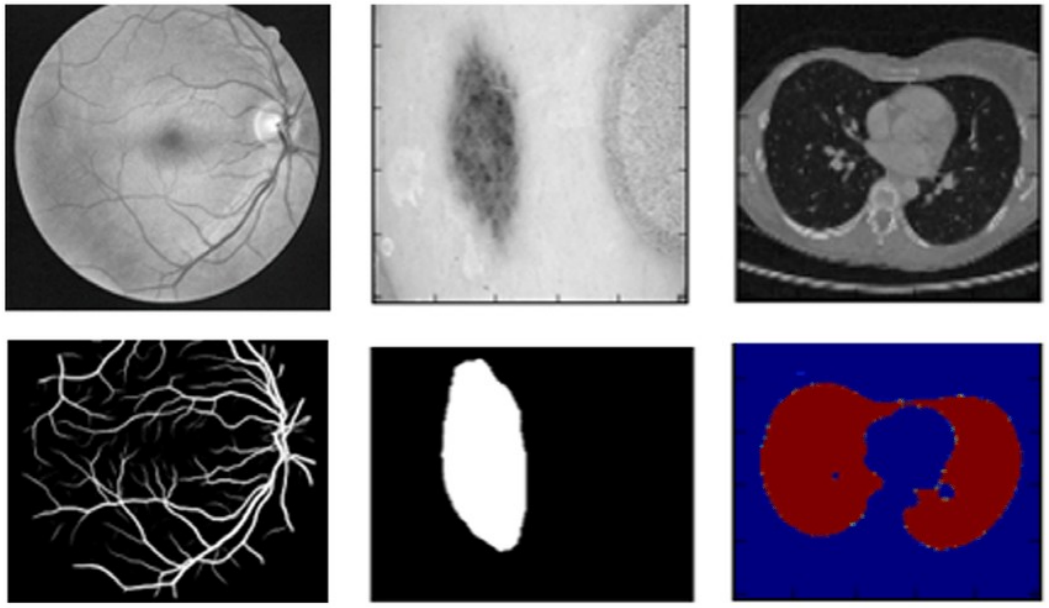


Segmentation

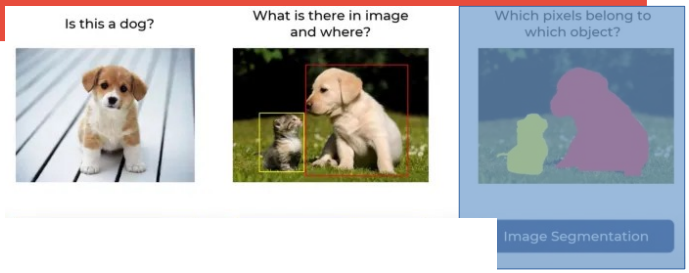
- Classification at pixel level



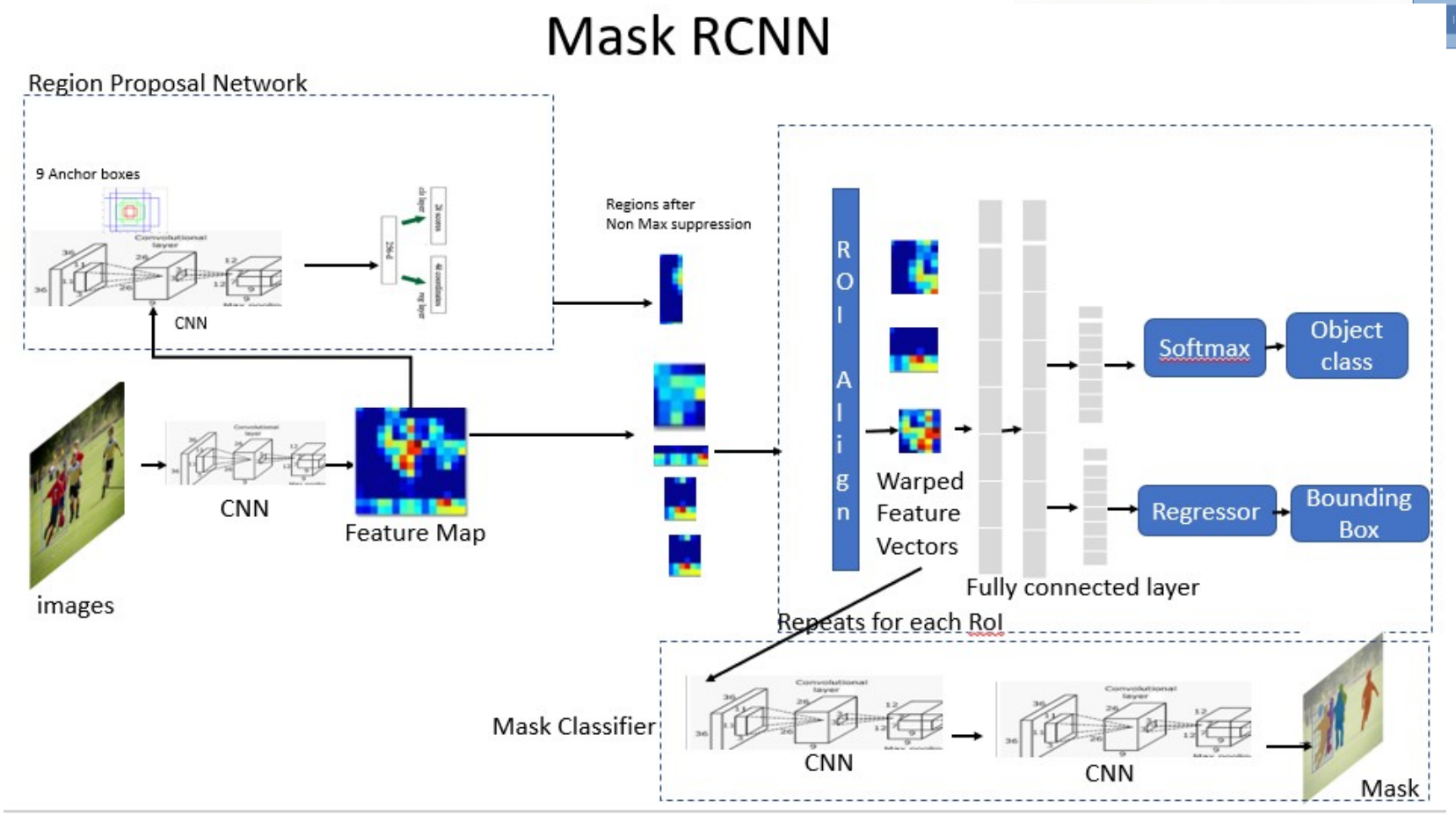




Segmentation – Mask RCNN

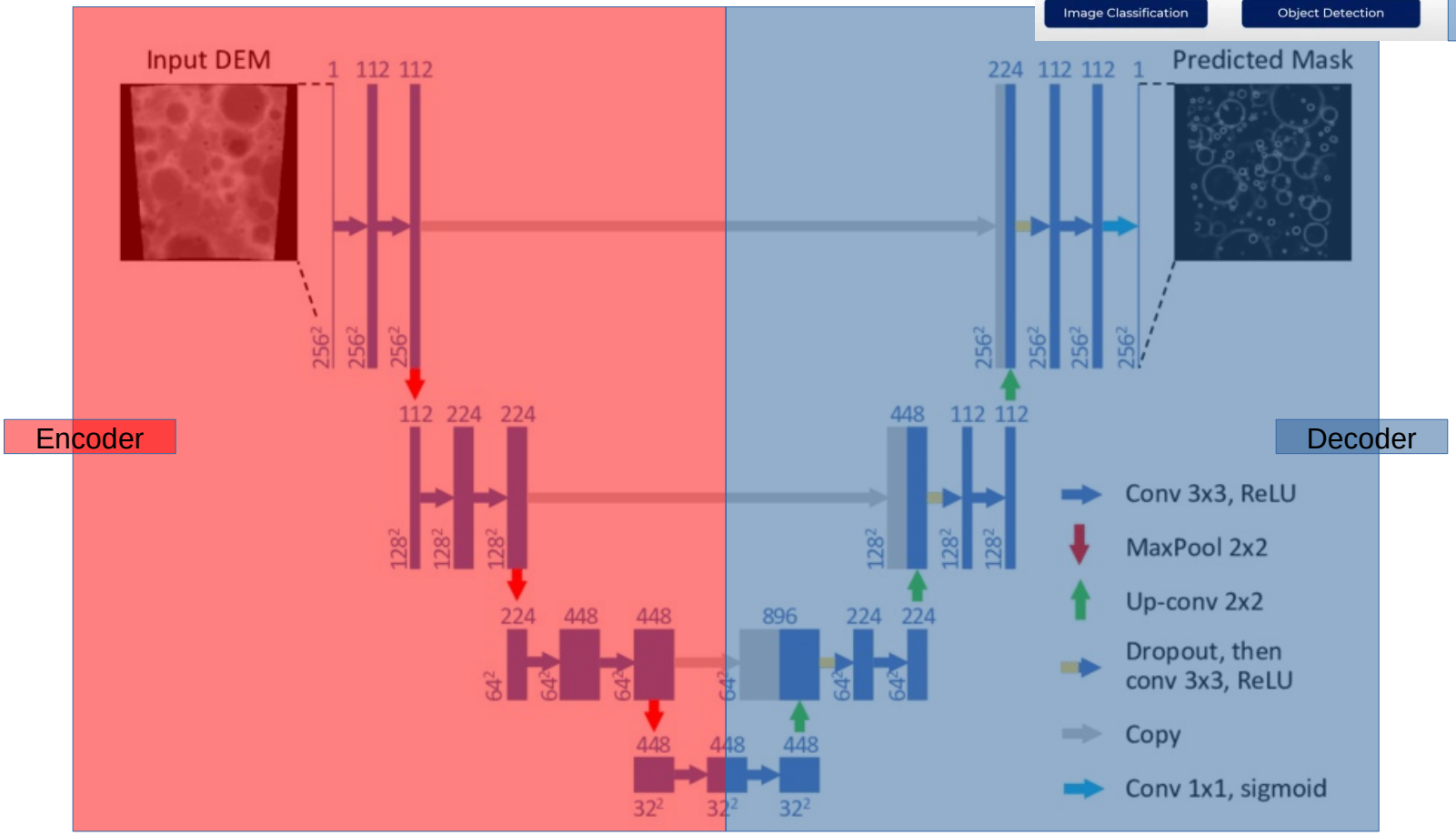


- Faster R-CNN with Binary Mask (2017)



Segmentation - UNET

- U-Net (Encoder and Decoder)



Let’s Code

- U-NET (Training and Inference)
  - *[LINK]*