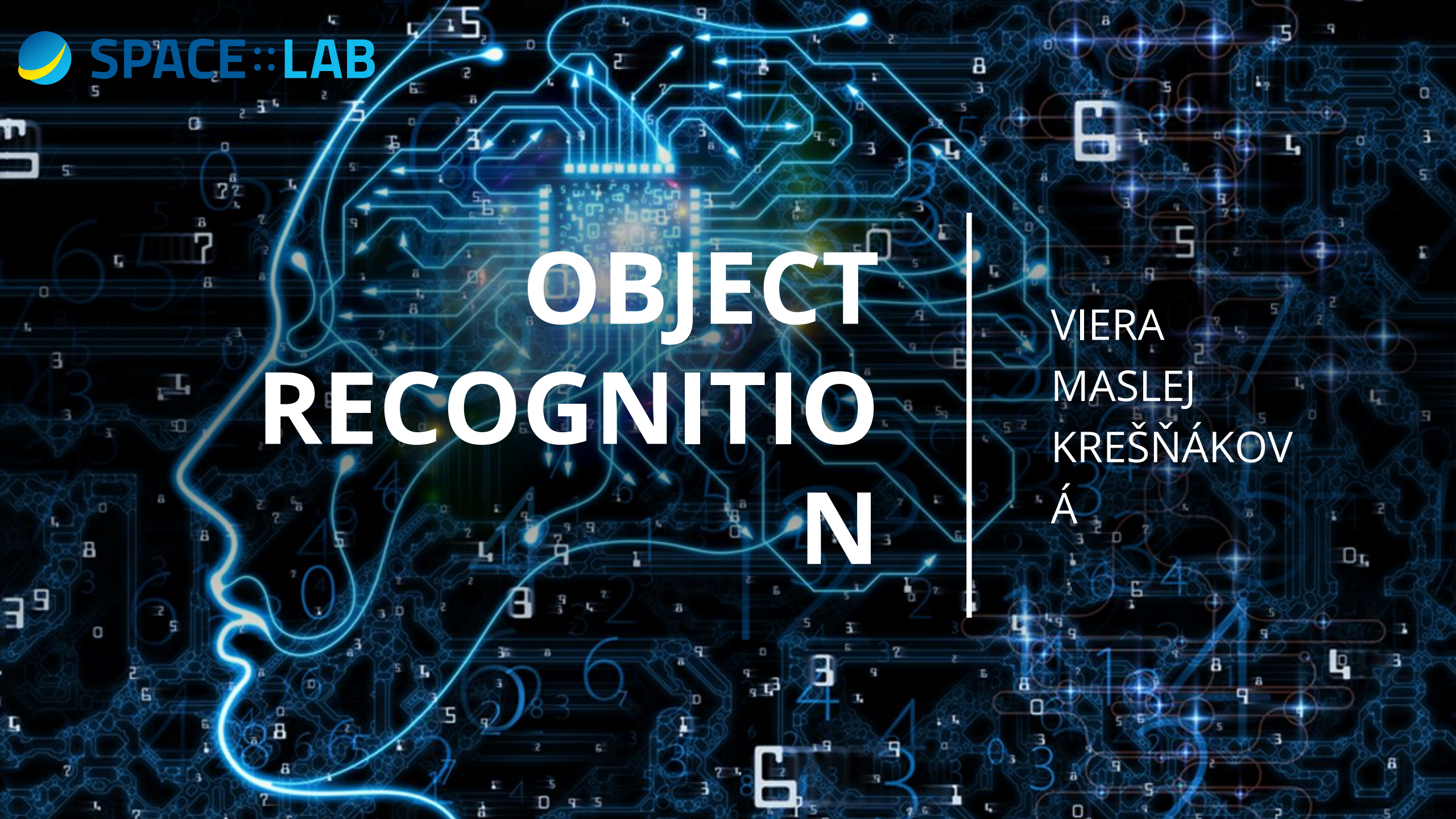
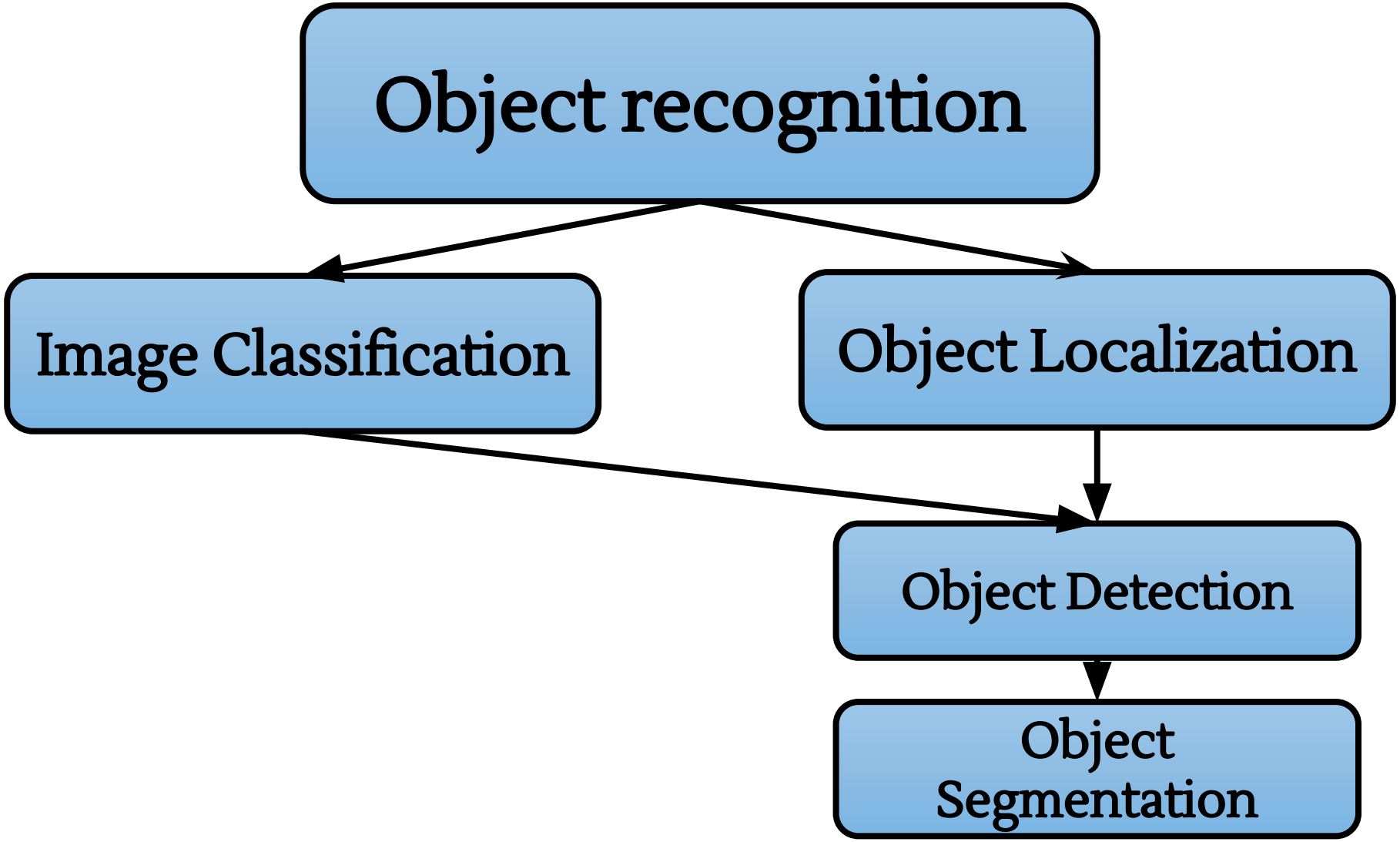

SPACE::LAB
OBJECT RECOGNITION
VIERA MASLEJ KREŠŇÁKOVÁ

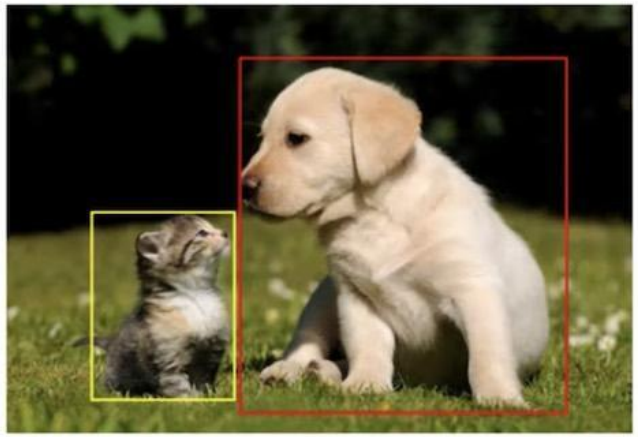
OBJECT RECOGNITION


Object recognition
Image Classification
Object Localization
Object Detection
Object
Segmentation

Is this a dog?

Image Classification

What is there in image and where?



Object Detection

Which pixels belong to which object?

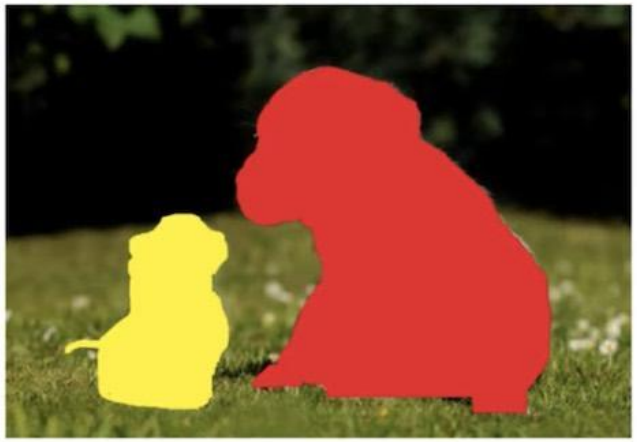
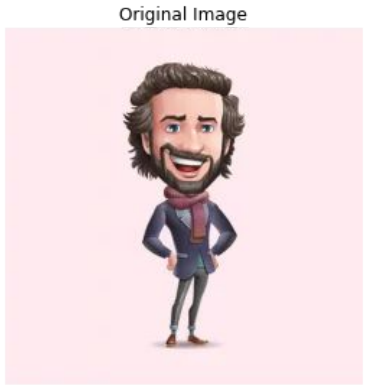
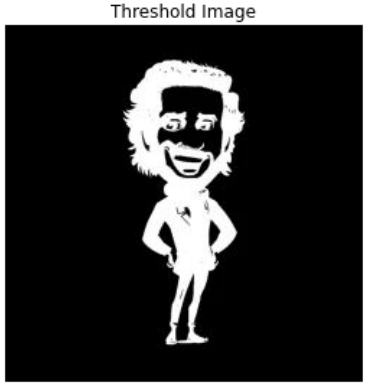
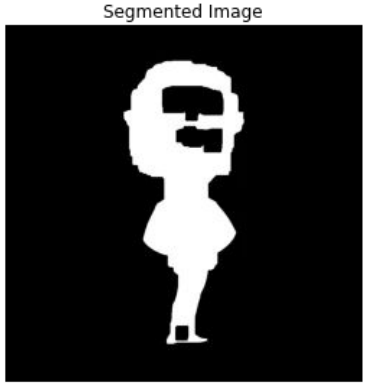


Image Segmentation

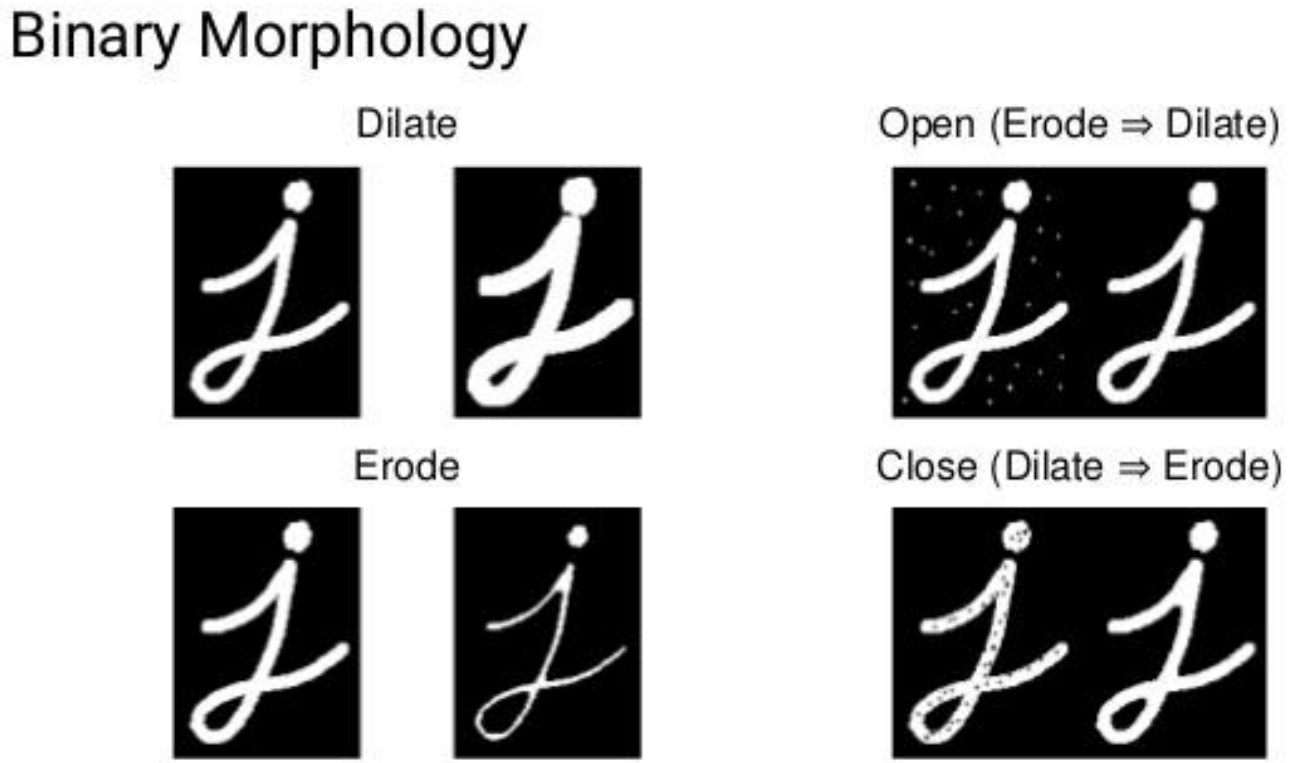
TRADITIONAL IMAGE PROCESSING TECHNIQUES



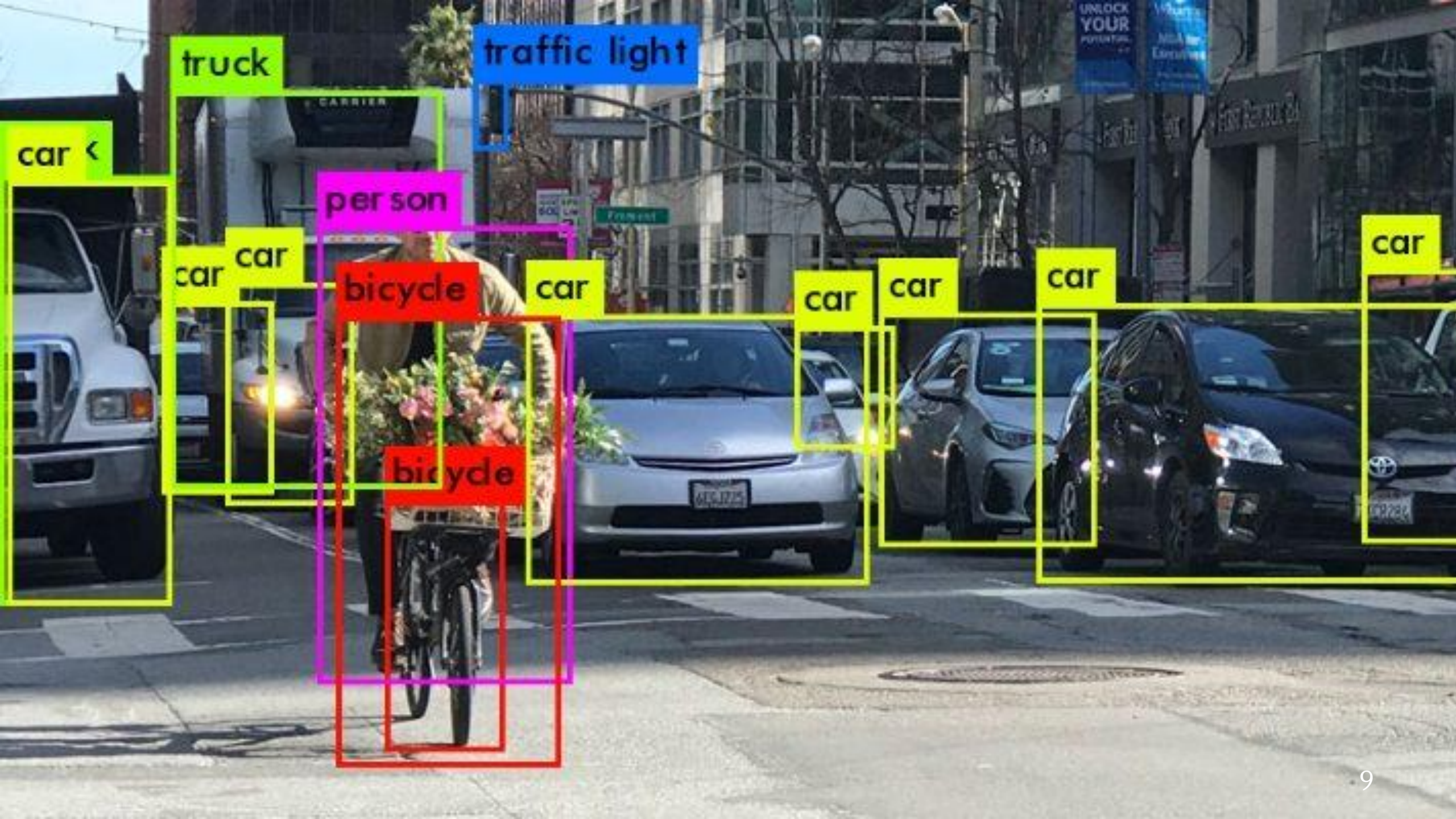




TRADITIONAL IMAGE PROCESSING TECHNIQUES




skipper
granRisparmio
risotti
granRisparmio
scotti
scotti
sale
tonnoRio
colgate
Gallo
Gran Risparmio
Gallo
Gran Risparmio
SOTTOVUOTO
RISO
Scotti
Arborio
Colgate
RIO mare
tonno


truck
traffic light
car
person
car
car
bicycle
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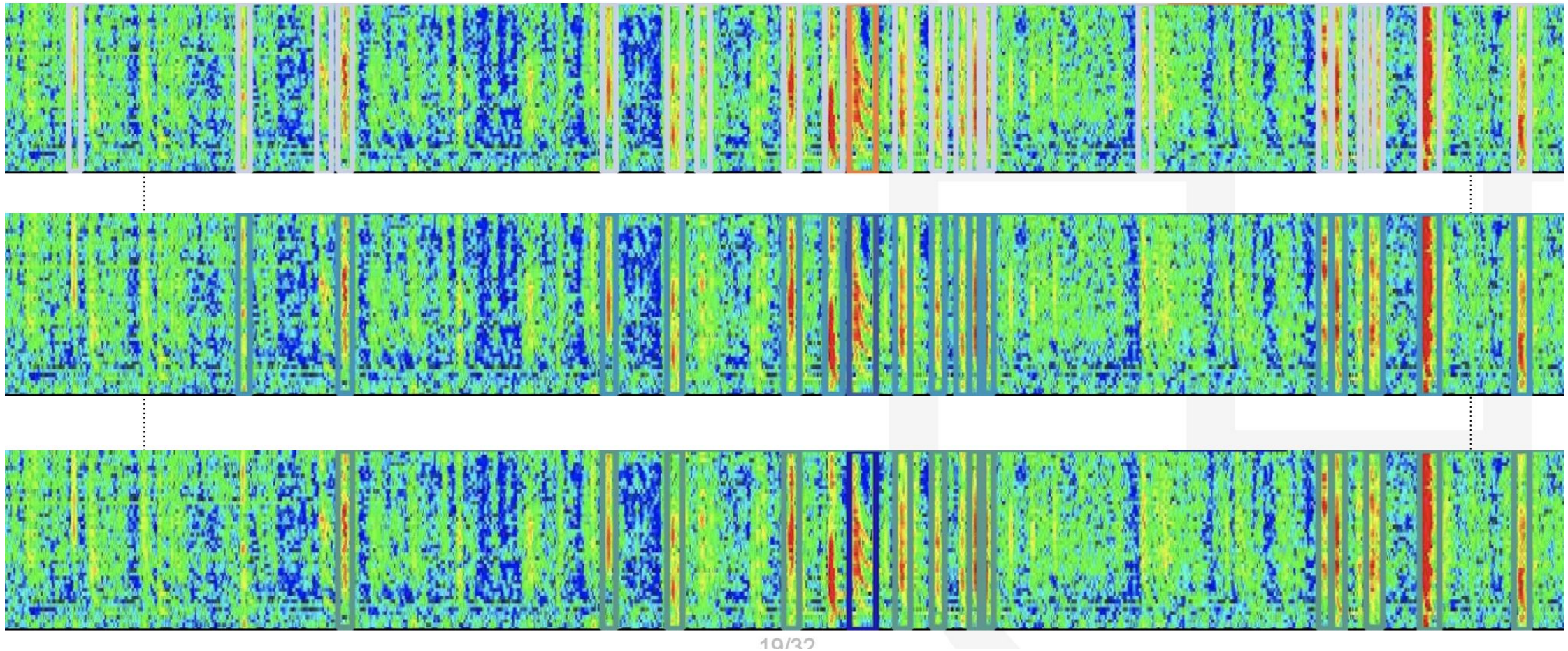
car
car
car
bicyde

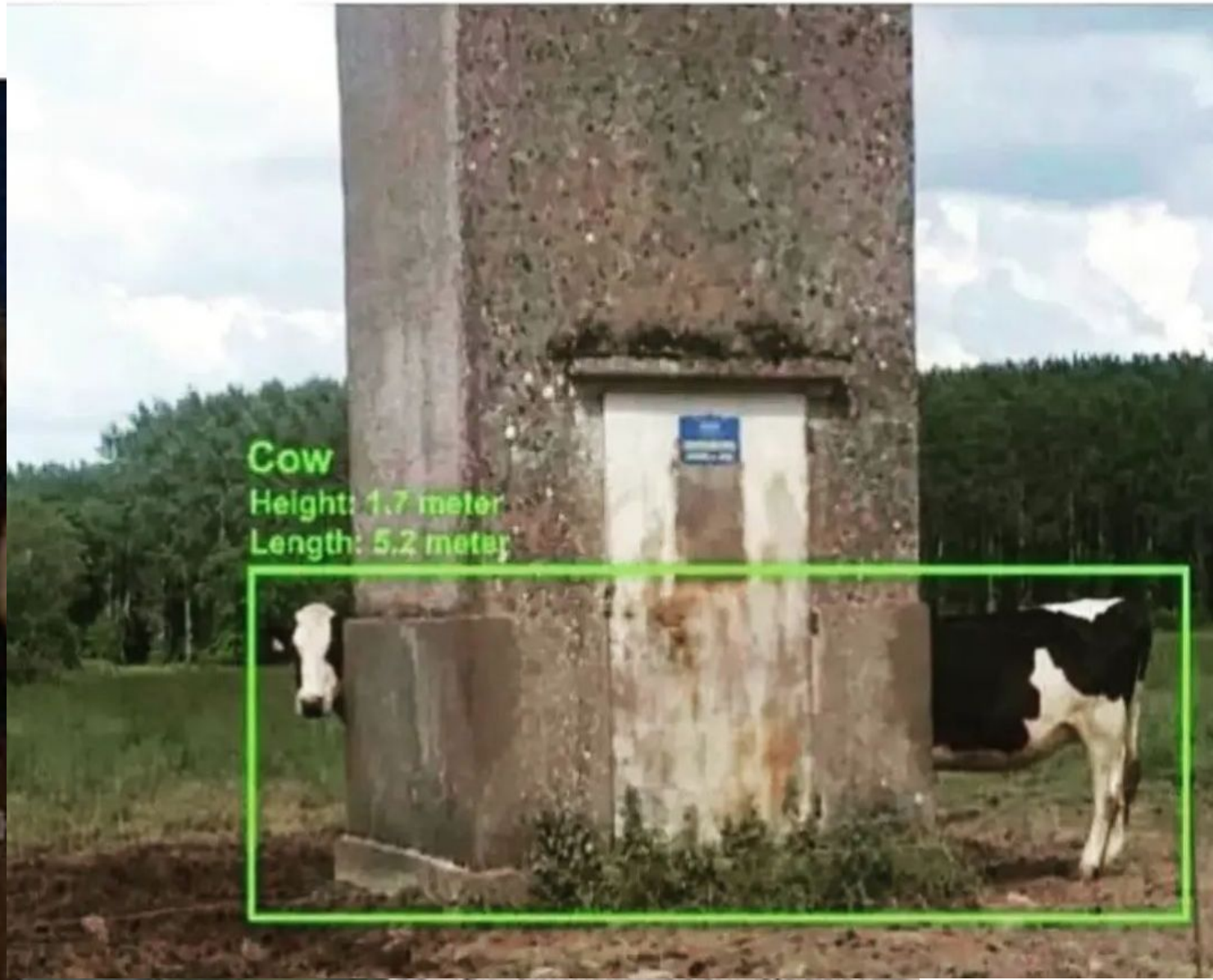

airplane 0.945
person 0.995
person 0.991
person 0.997
person 0.997
person 0.995



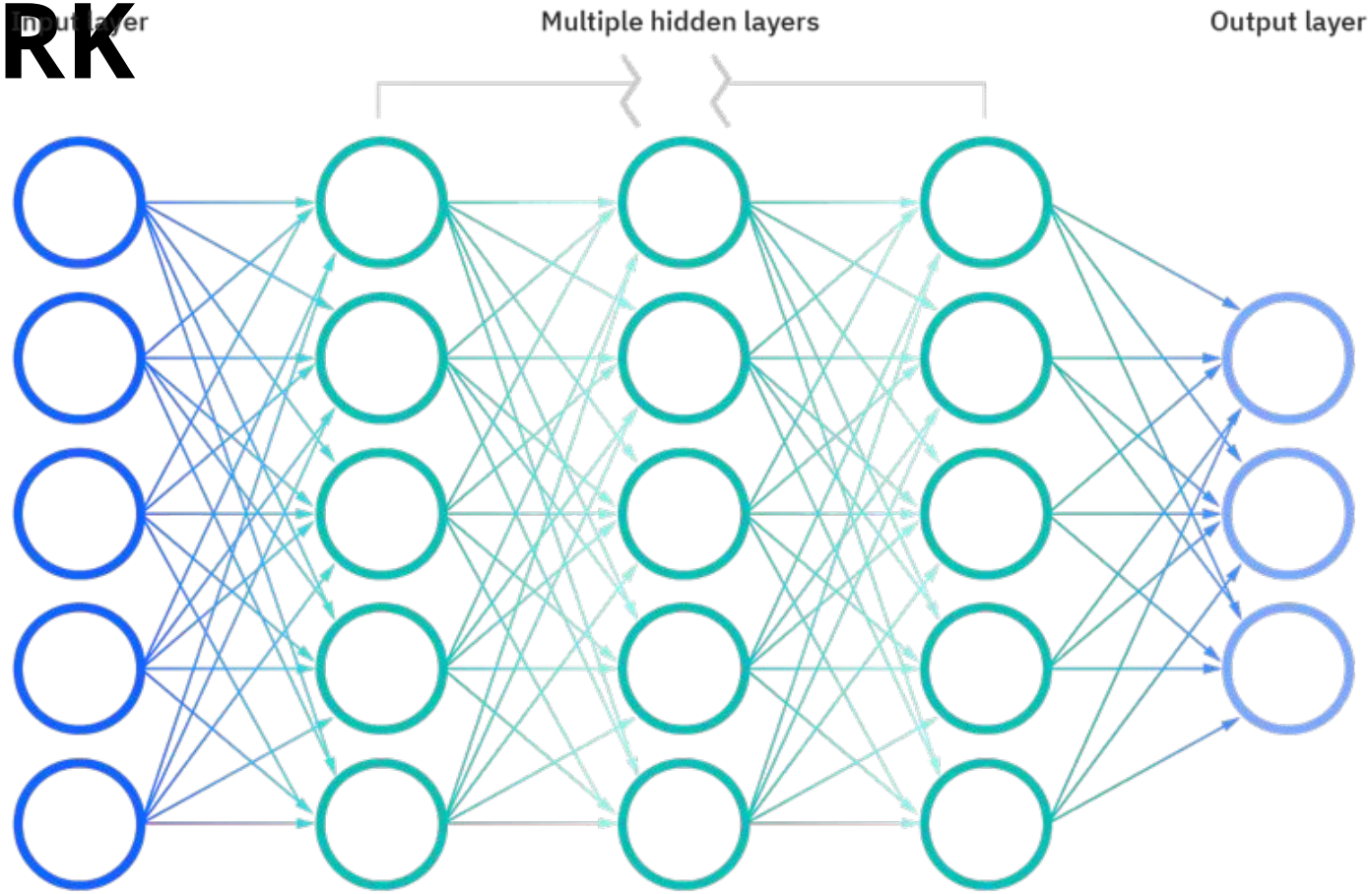
People with no idea about AI, telling me my AI will destroy the world

People: AI so smart, it will distroy us!

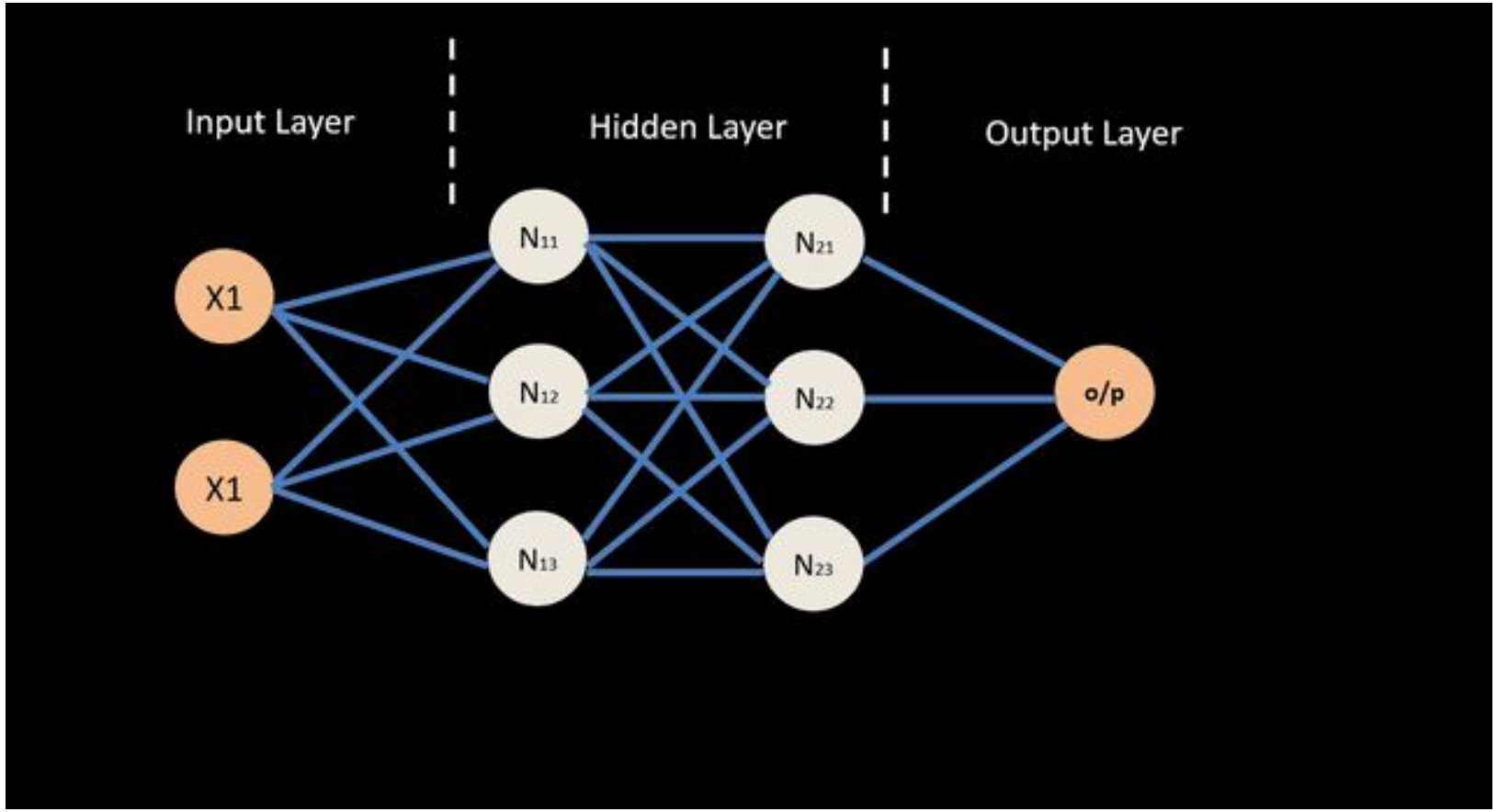
AI:

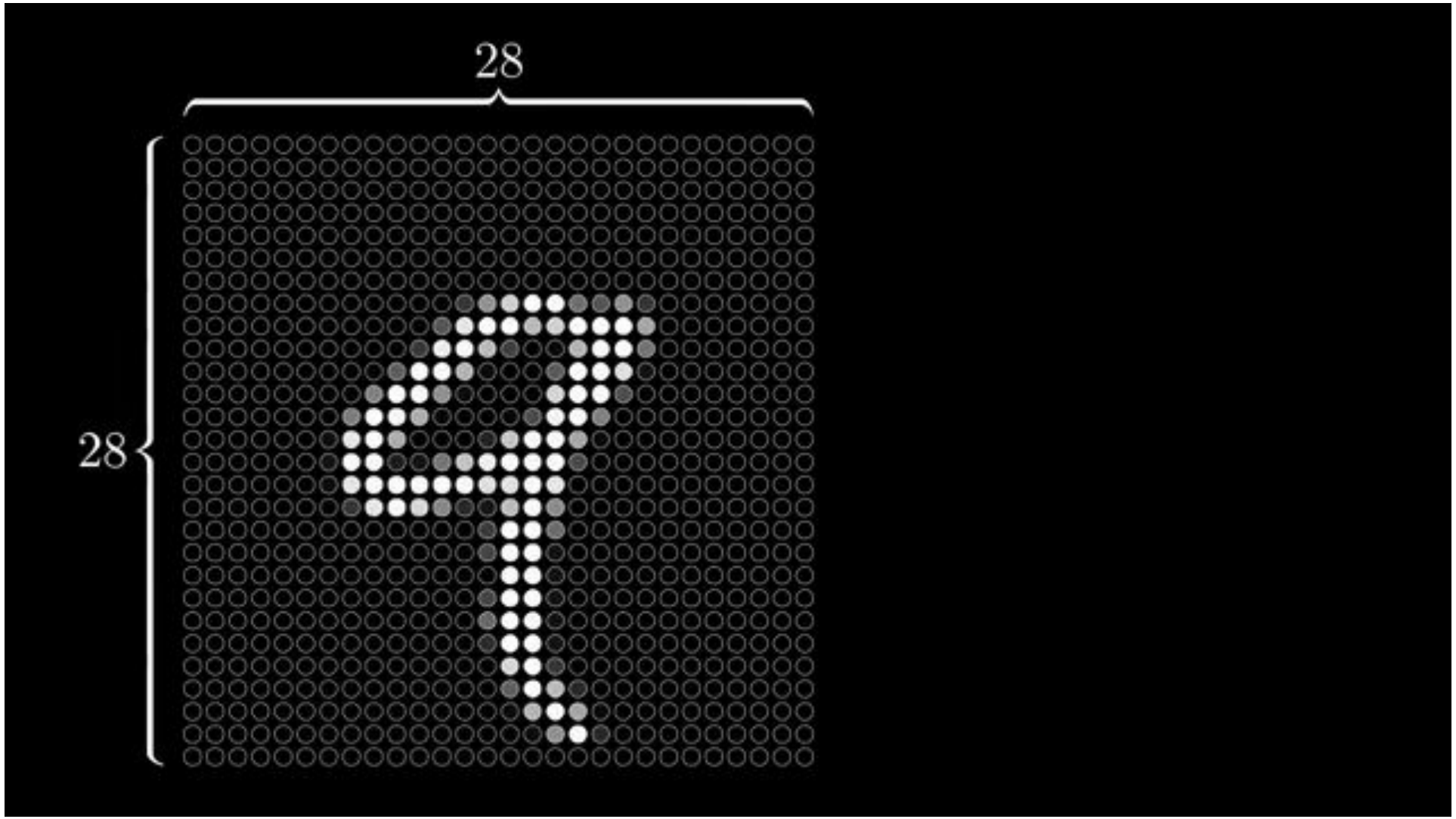


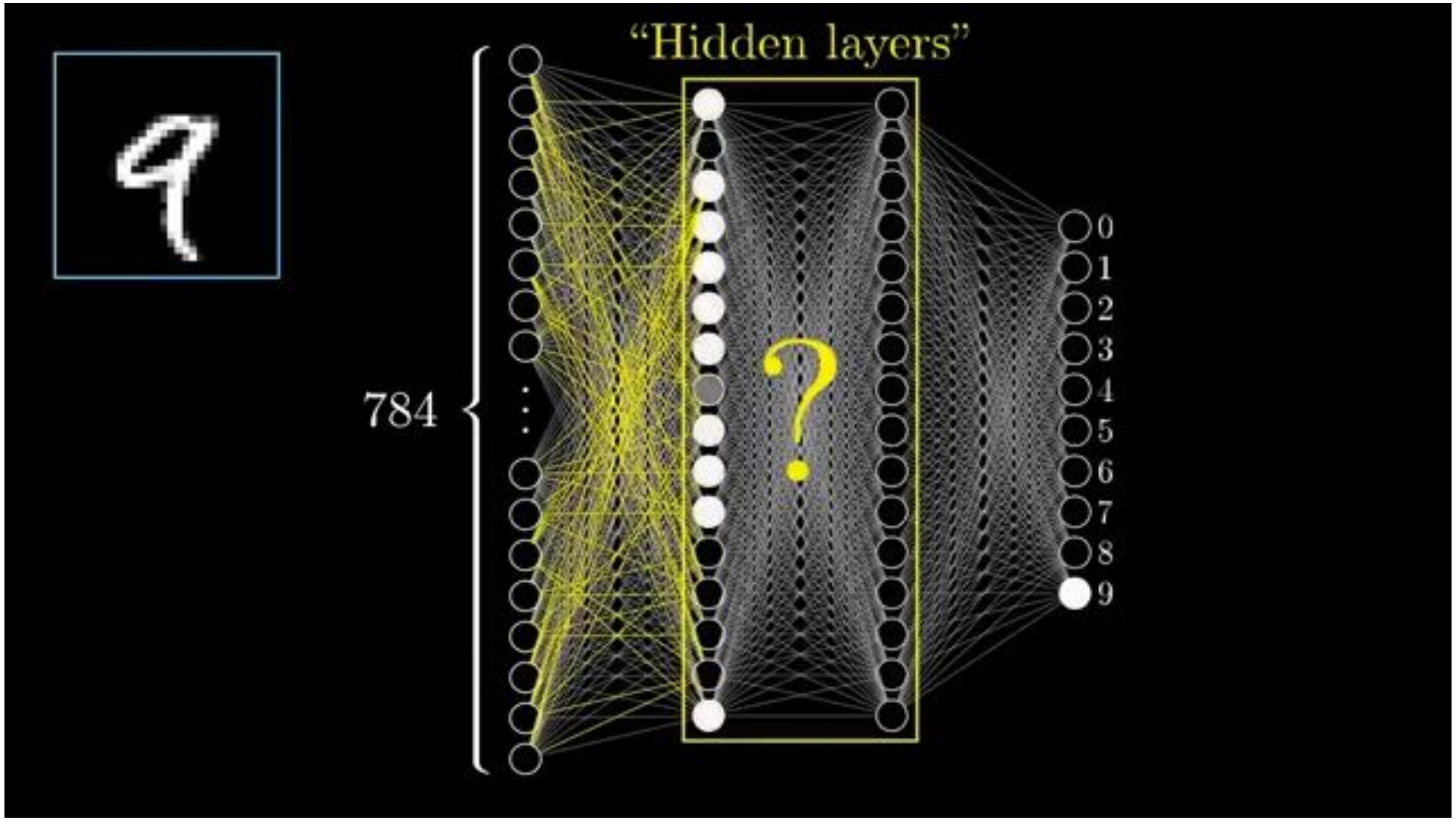
DEEP NEURAL NETWORK



BACKPROPAGATION




28
28


"Hidden layers"
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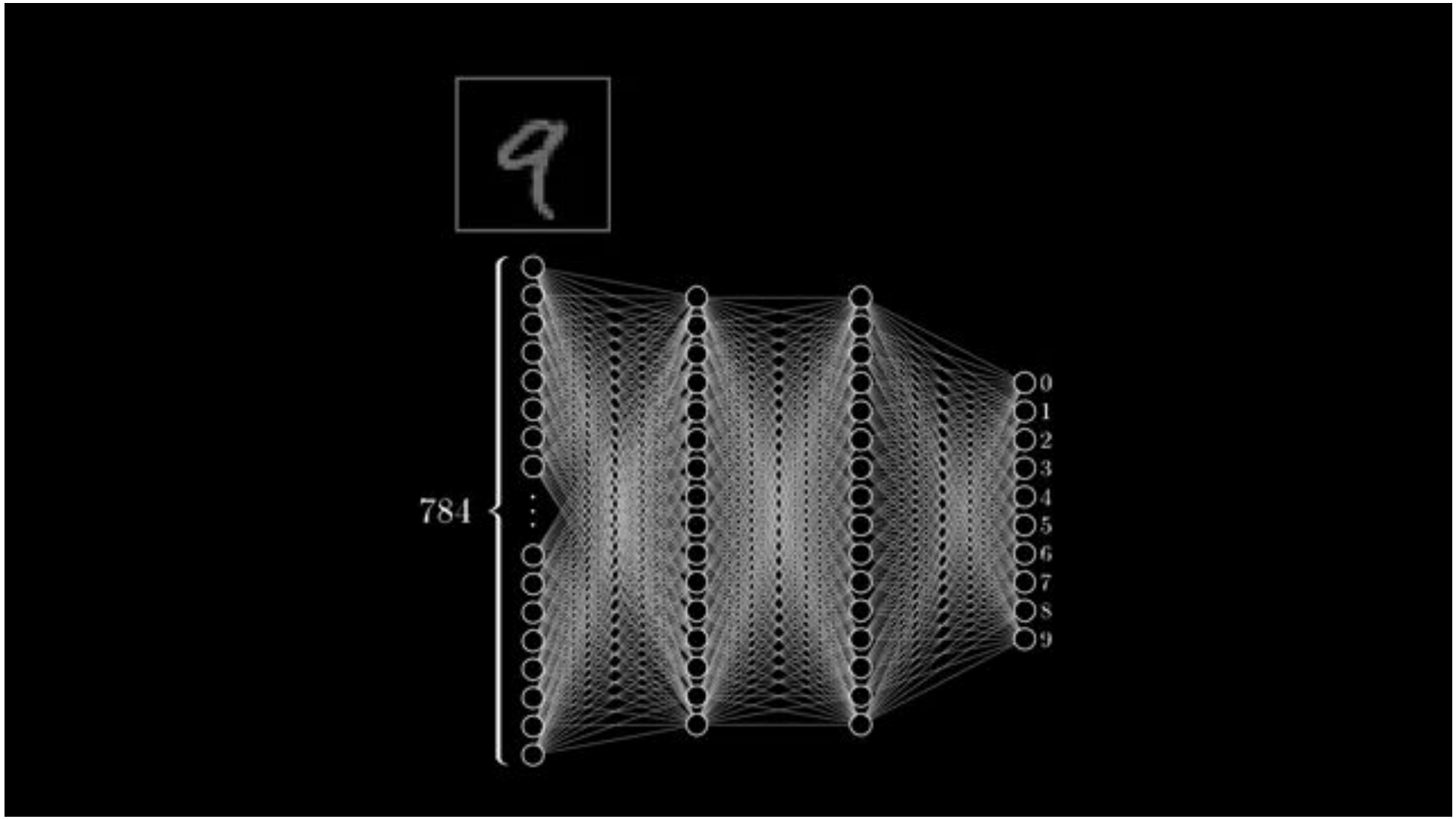
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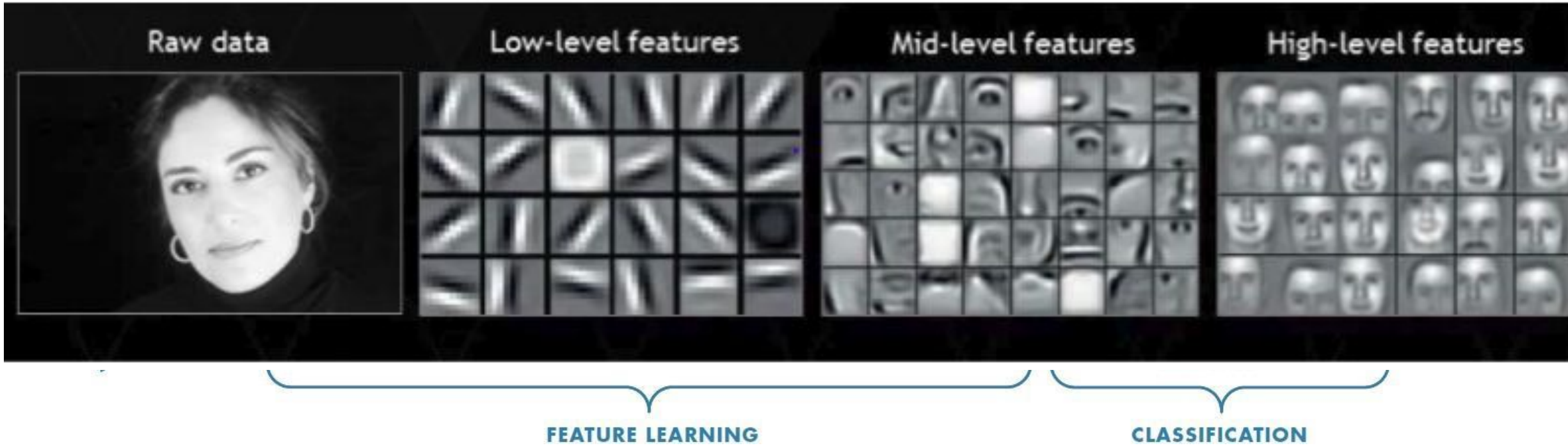
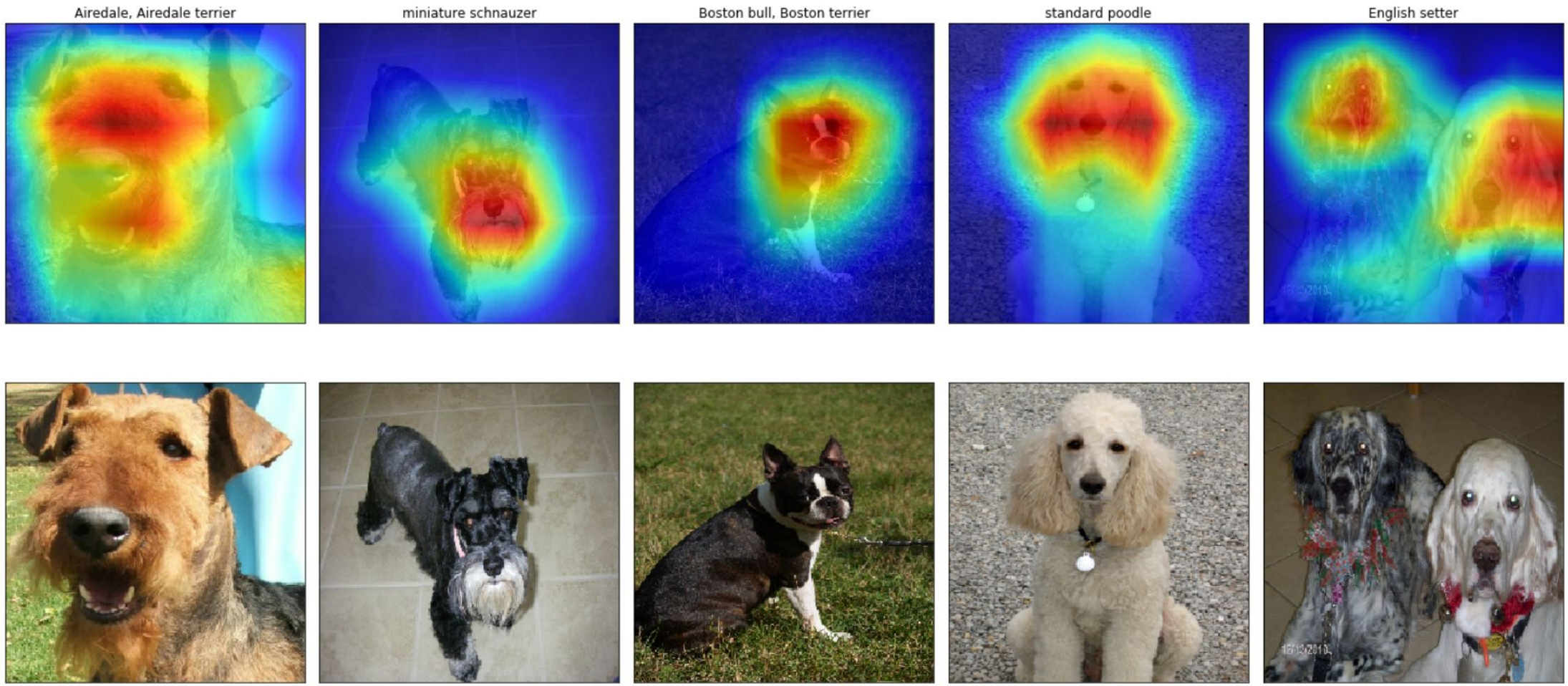
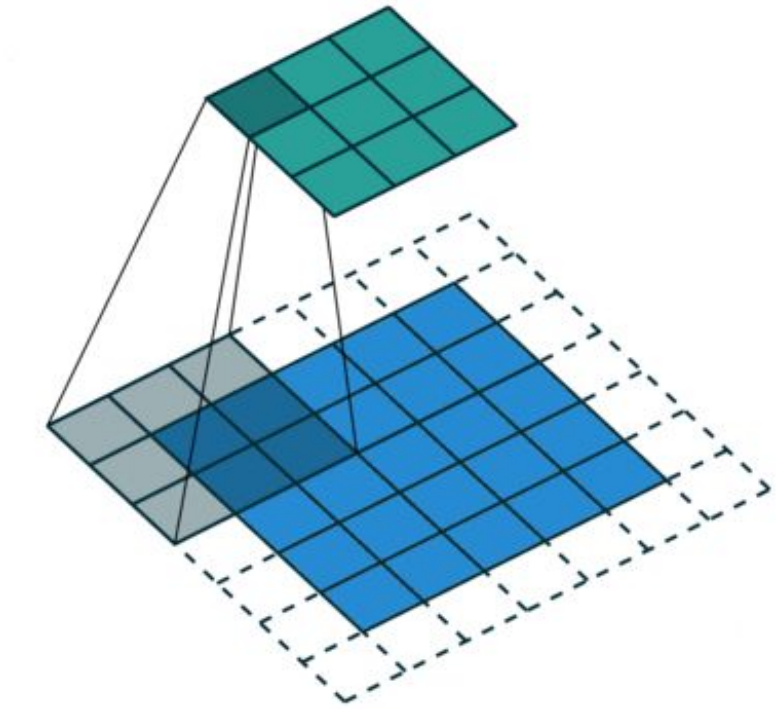
CONVOLUTIONAL NEURAL NETWORK




Airedale, Airedale terrier
miniature schnauzer
Boston bull, Boston terrier
standard poodle
English setter

CONVOLUTIONAL LAYER



DEEP LEARNING OBJECT DETECTORS

Task #1: Find an arbitrary number of objects (possibly even zero)

Task #2: Classify every single object and estimate its size with
a bounding box.

DEEP LEARNING OBJECT DETECTORS

Two-stage

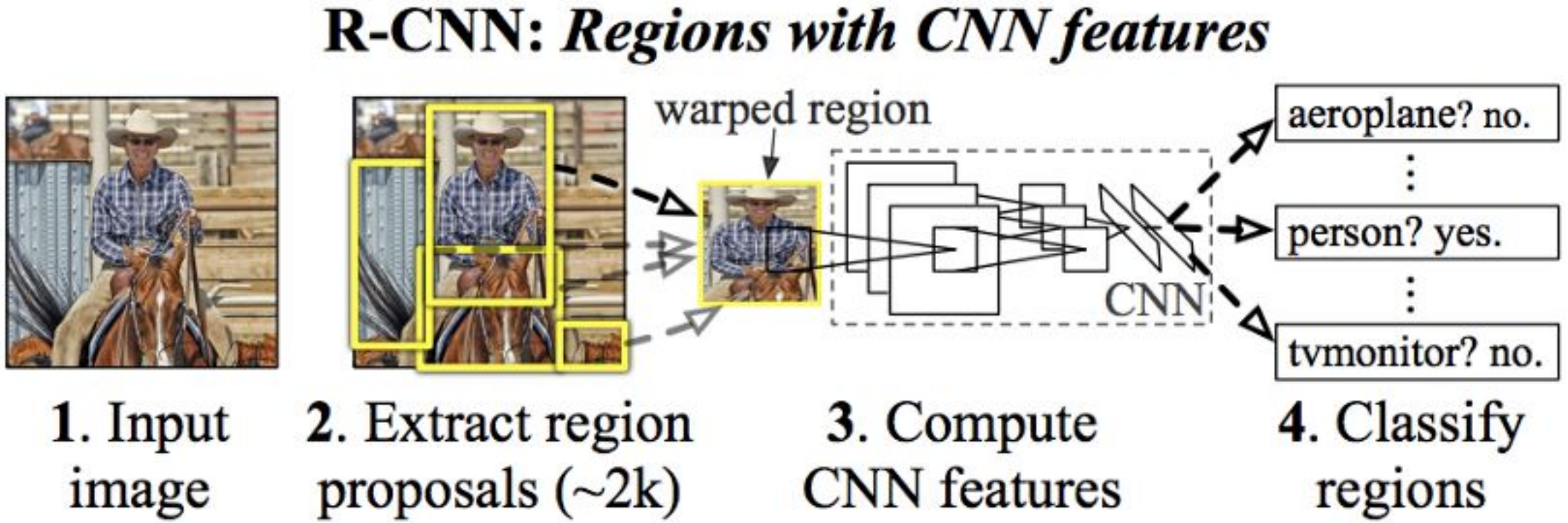
- RCNN and SPPNet (2014)
- Fast RCNN and Faster RCNN (2015)
- Mask R-CNN (2017)
- Pyramid Networks/FPN (2017)
- G-RCNN (2021)

One-stage

- YOLO (2016)
- SSD (2016)
- RetinaNet (2017)
- YOLOv3 (2018)
- YOLOv4, YOLOv5 (2020)
- YOLOR (2021)

YOLOv3 is 1000x faster than R-CNN and 100x faster than Fast R-CNN

R-CNN: REGION-BASED CONVOLUTIONAL NEURAL NETWORK



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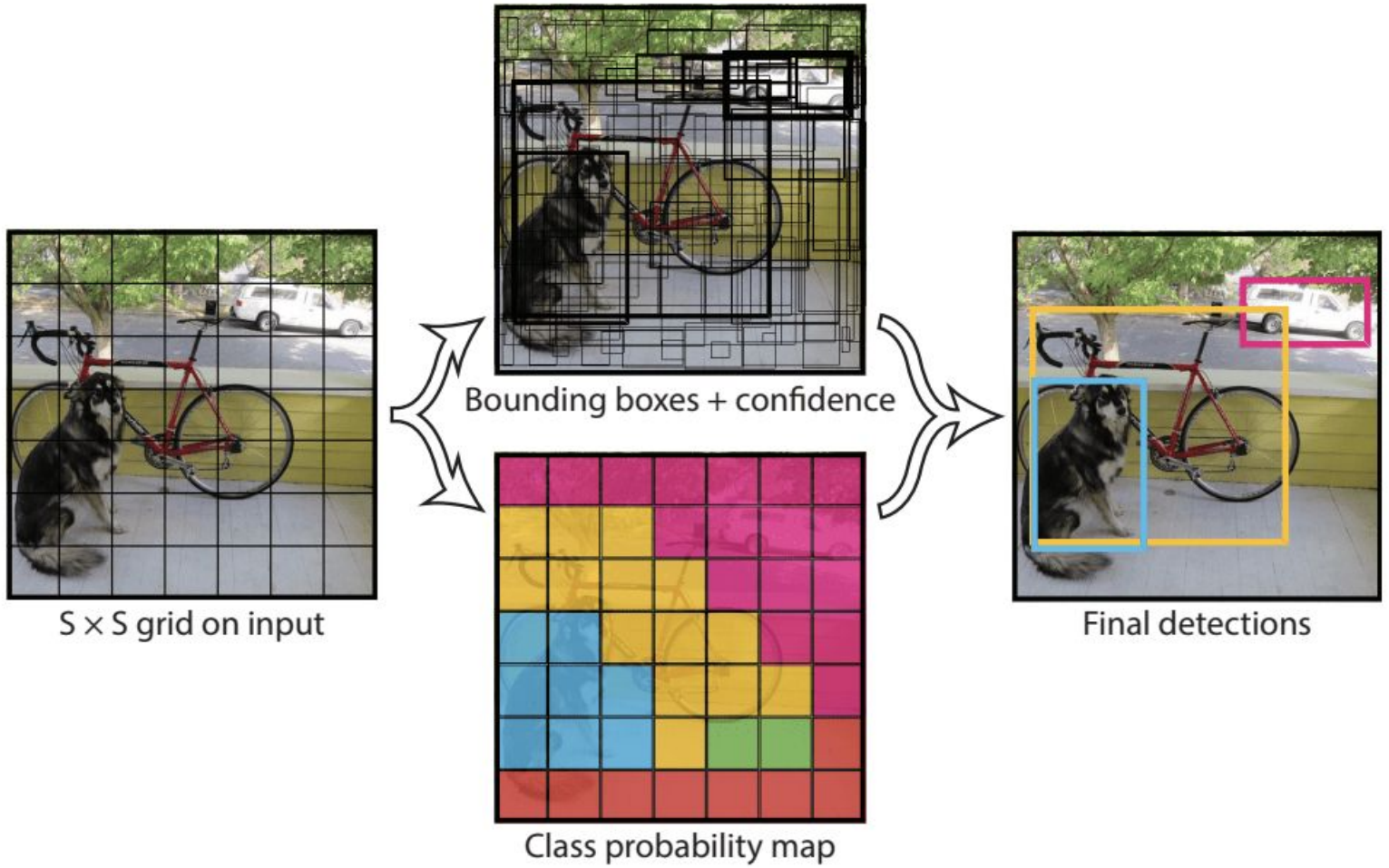
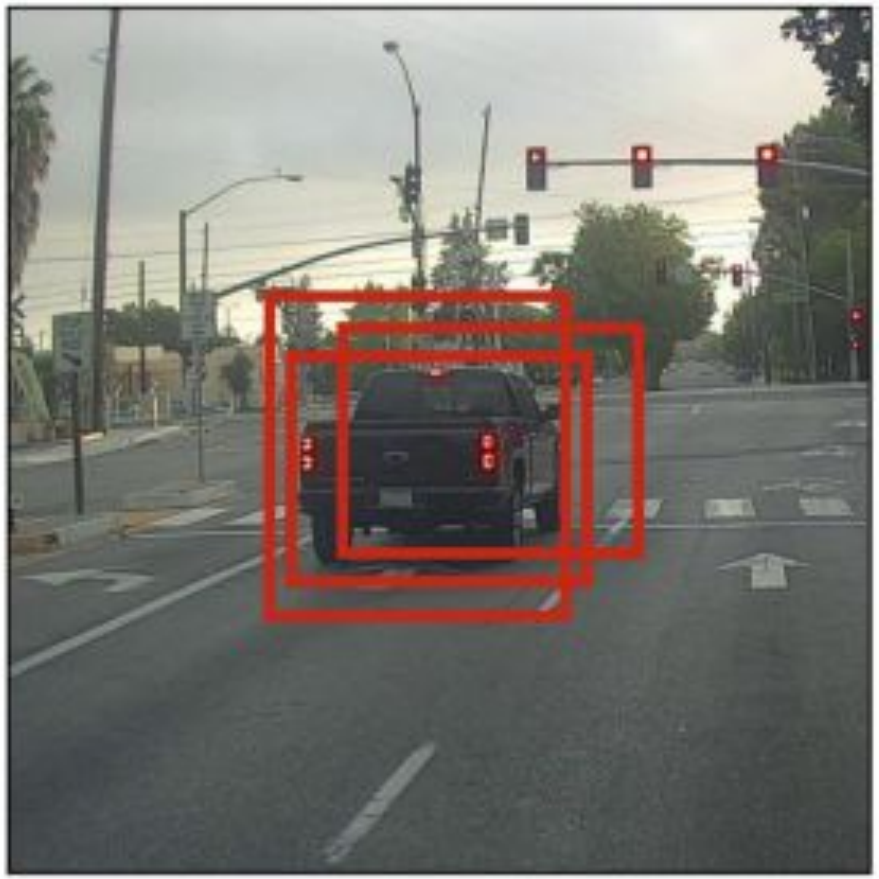
Verzia 5



Before non-max suppression

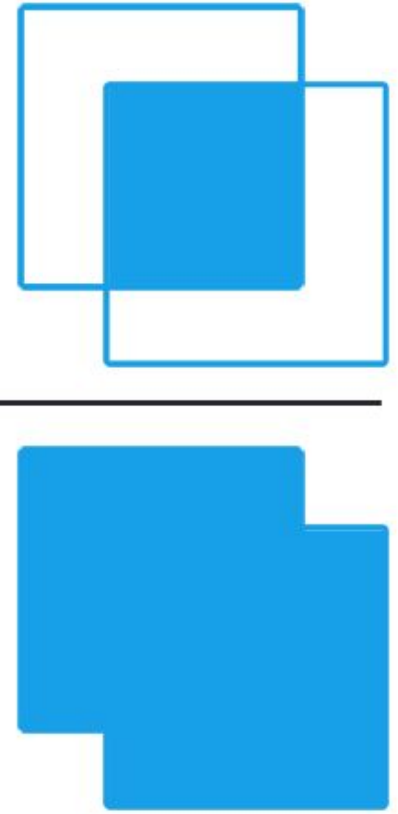


Non-Max Suppression

After non-max suppression

INTERSECTION OVER UNION (IoU metrics)

$$IoU = \frac{\text{Area of Overlap}}{\text{Area of Union}}$$



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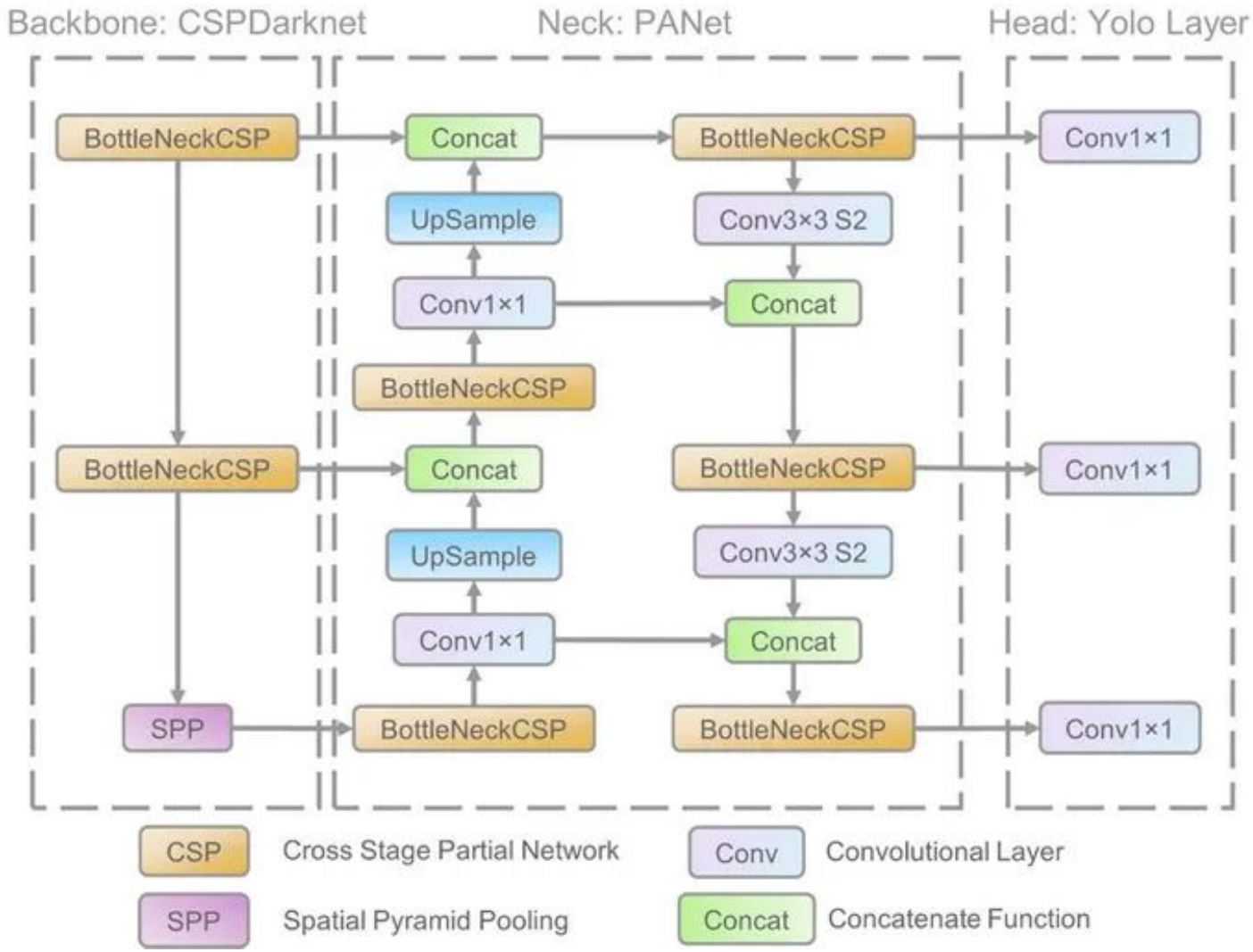
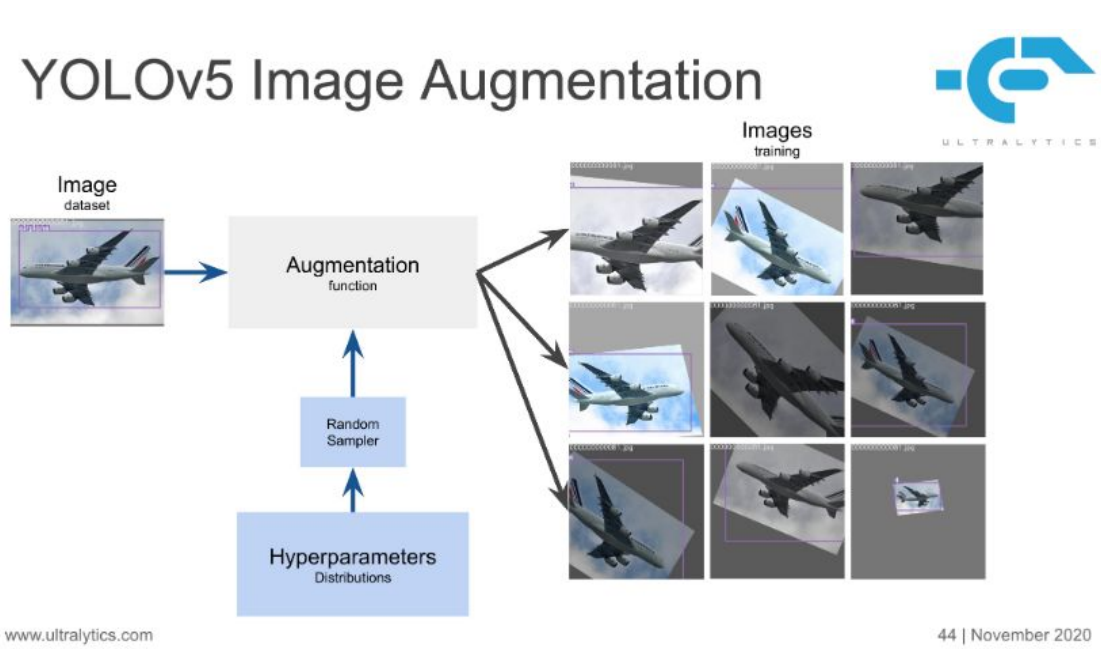


- ✔ Webcam
- ✔ Image
- ✔ Video
- ✔ Directory
- ✔ Global File Type
- ✔ RTSP stream
- ✔ RTMP stream
- ✔ HTTP stream

English | 简体中文

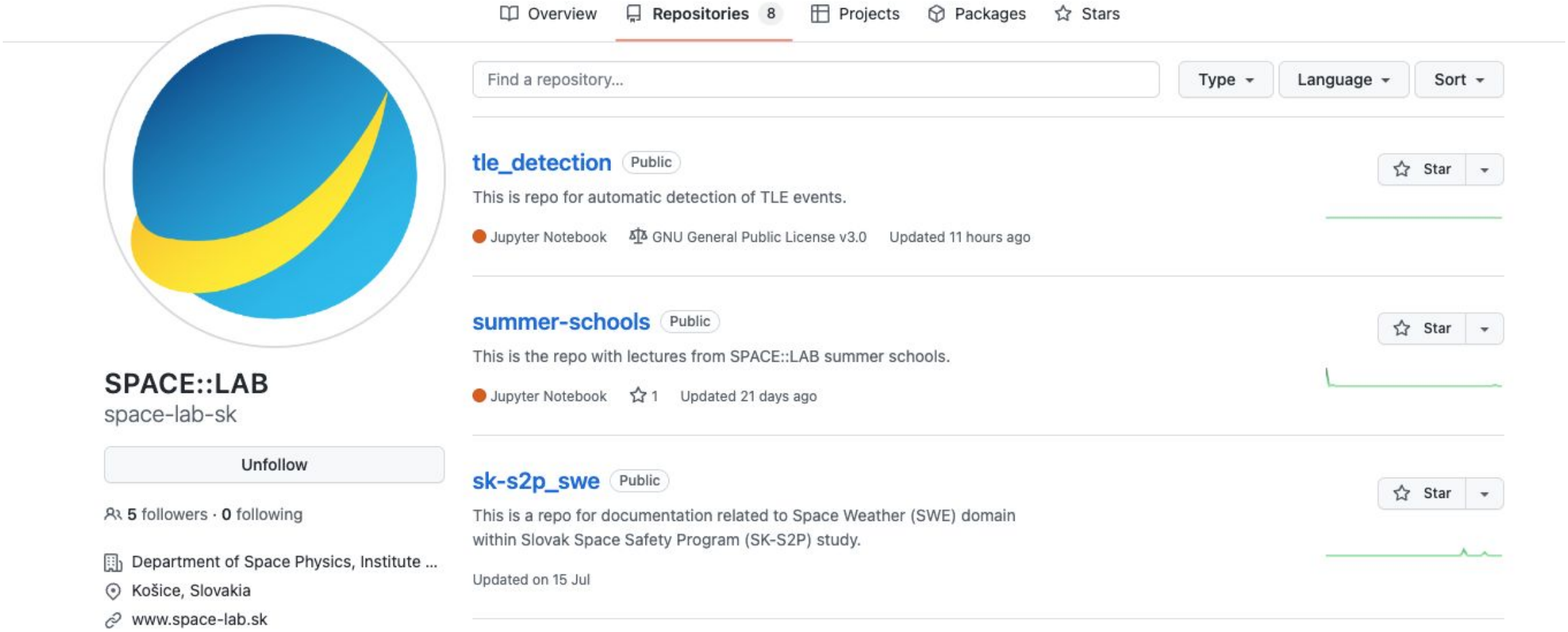
YOLOv5 🚀 is a family of object detection architectures and models pretrained on the COCO dataset, and represents Ultralytics open-source research into future vision AI methods, incorporating lessons learned and best practices evolved over thousands of hours of research and development.

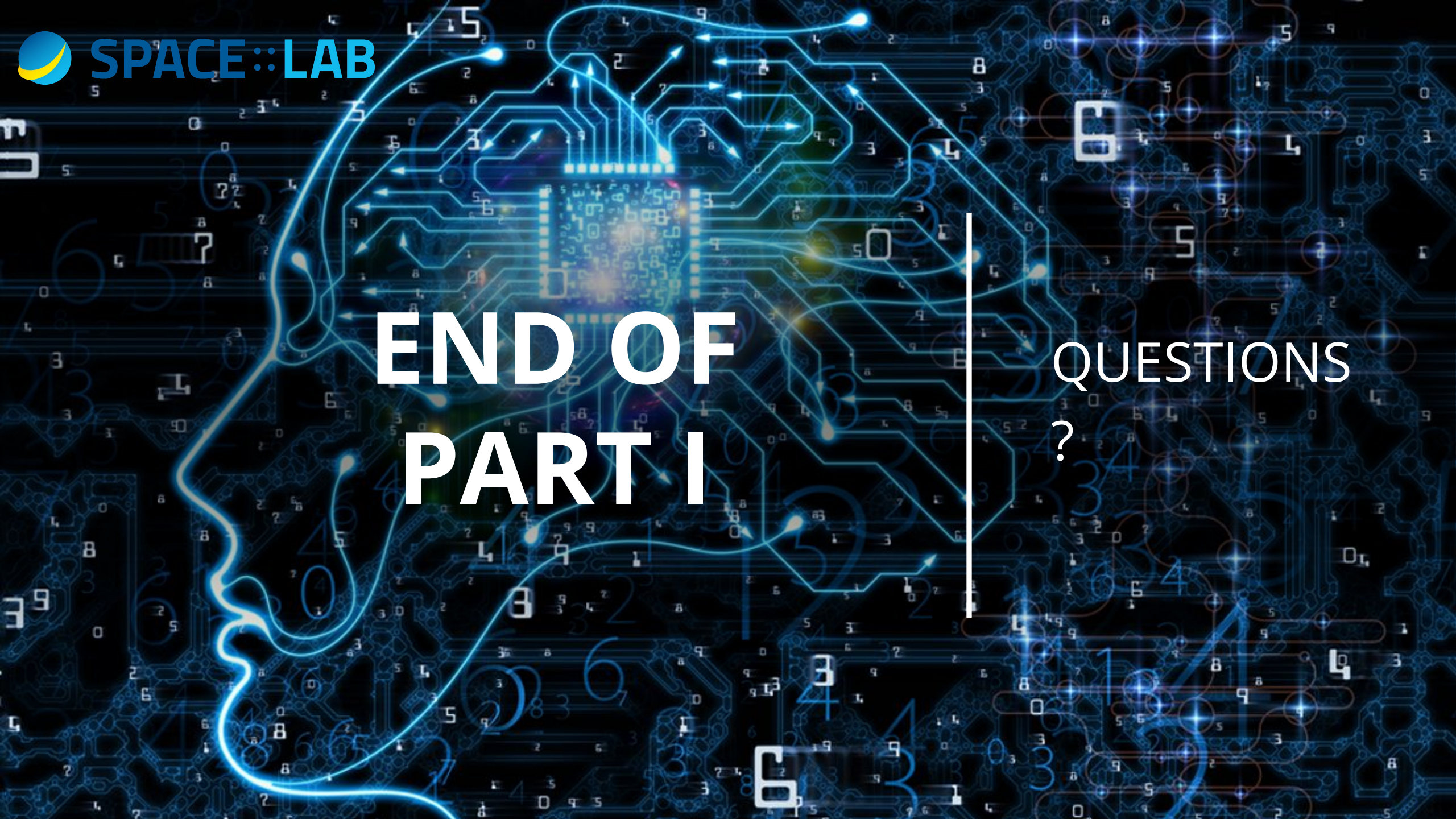


YOLOv5 🚀 applies online imagespace and colorspace augmentations in the trainloader (but not the val_loader) to present a new and unique augmented Mosaic (original image + 3 random images) each time an image is loaded for training. **Images are never presented twice in the same way**.

https://github.com/ultralytics/yolov5

```
!git clone https://github.com/space-lab-sk/tle_detection.git
```




SPACE::LAB
END OF
PART I
QUESTIONS
?