

The background image is a high-angle, black and white aerial photograph of a complex highway interchange. It features multiple levels of elevated roads, ramps, and overpasses. On the roads, there are several cars and a few small aircraft flying overhead, which serves as a metaphor for the multi-sensor input of a self-driving vehicle.

# Semantic Segmentation for Self-Driving Cars

Teaching the next generation of vehicles to 'see'

# The AI Revolution

- Over the past few years we've seen how AI has changed our world in ways that we couldn't imagine.
- One of the most notable ways, is the dawn of self-driving cars, or more accurately the journey to get there.
- We've seen massive progress by companies like Waymo, Tesla, Uber and Lyft, but the best is still yet to come.



WAYMO

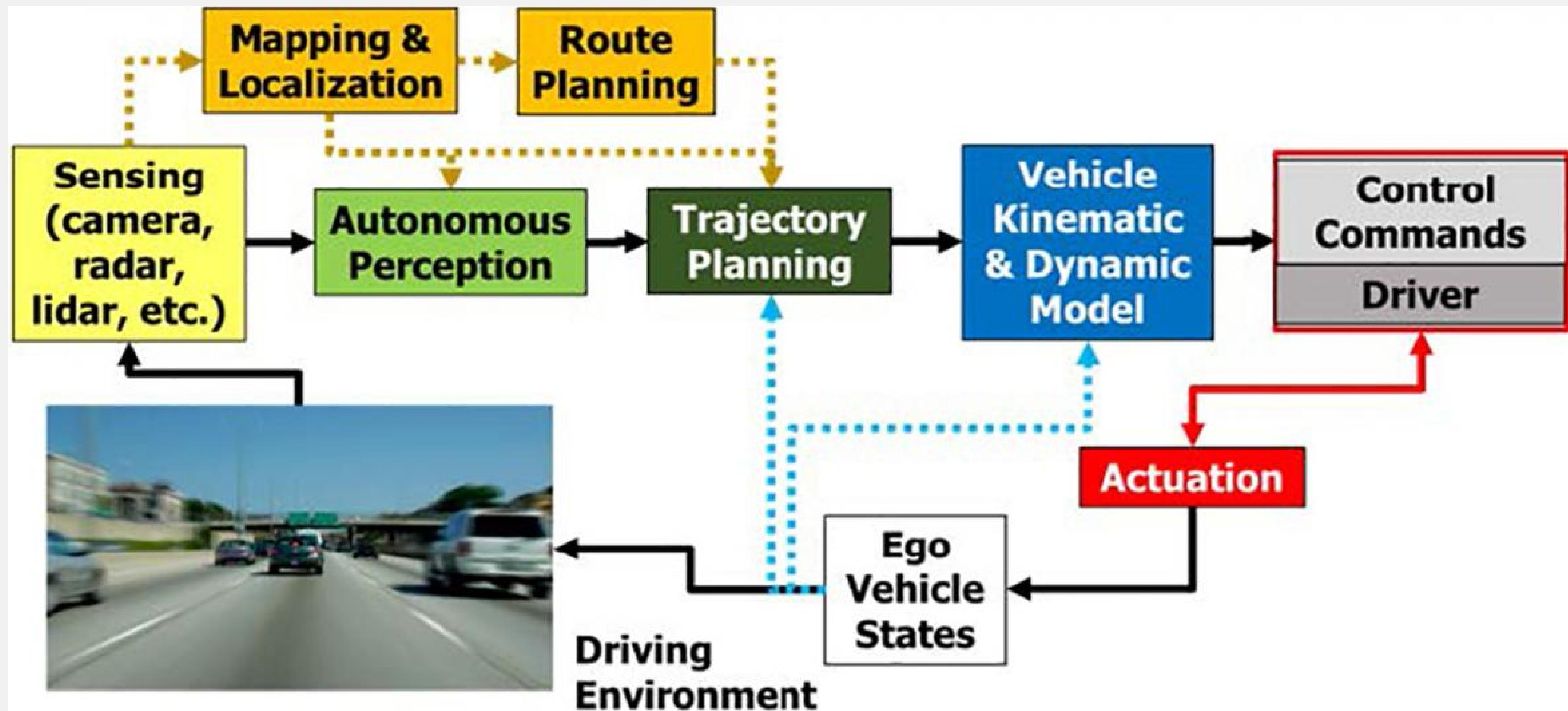


TESLA

Uber

lyft

# Self Driving Car System



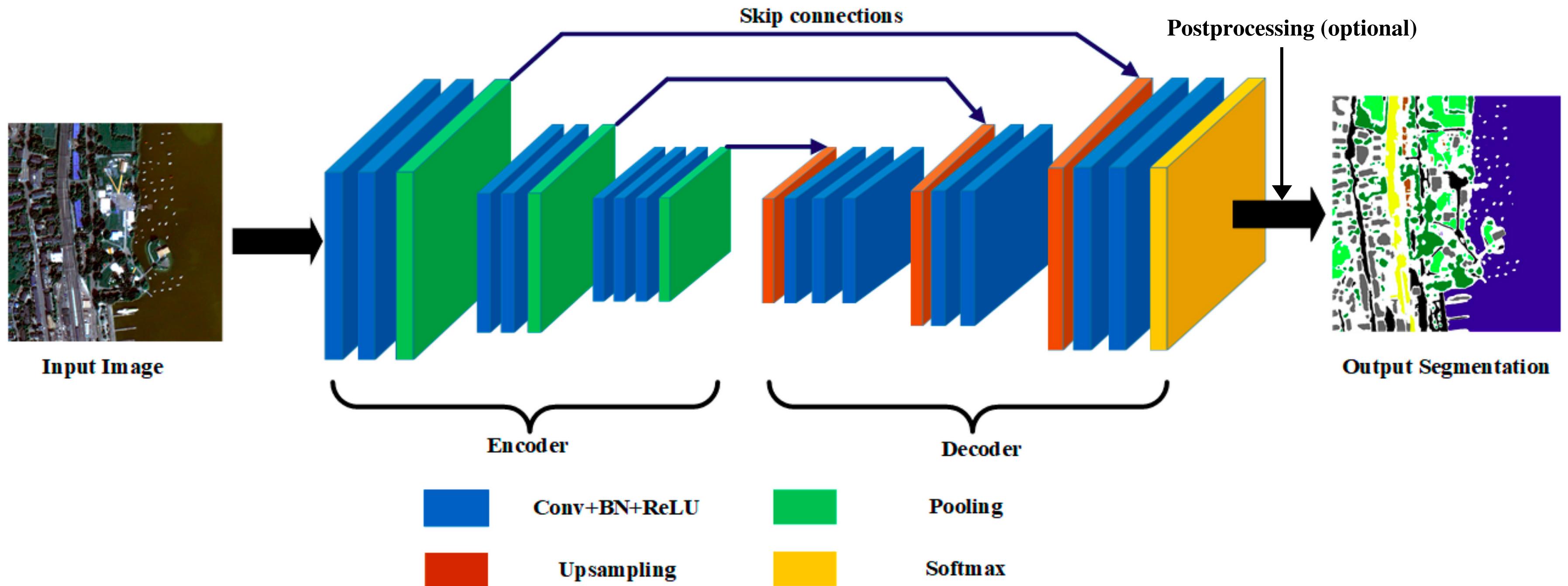
# What is Semantic Segmentation?

The process of classifying each pixel of an image or video with corresponding class labels.



# How do we do it?

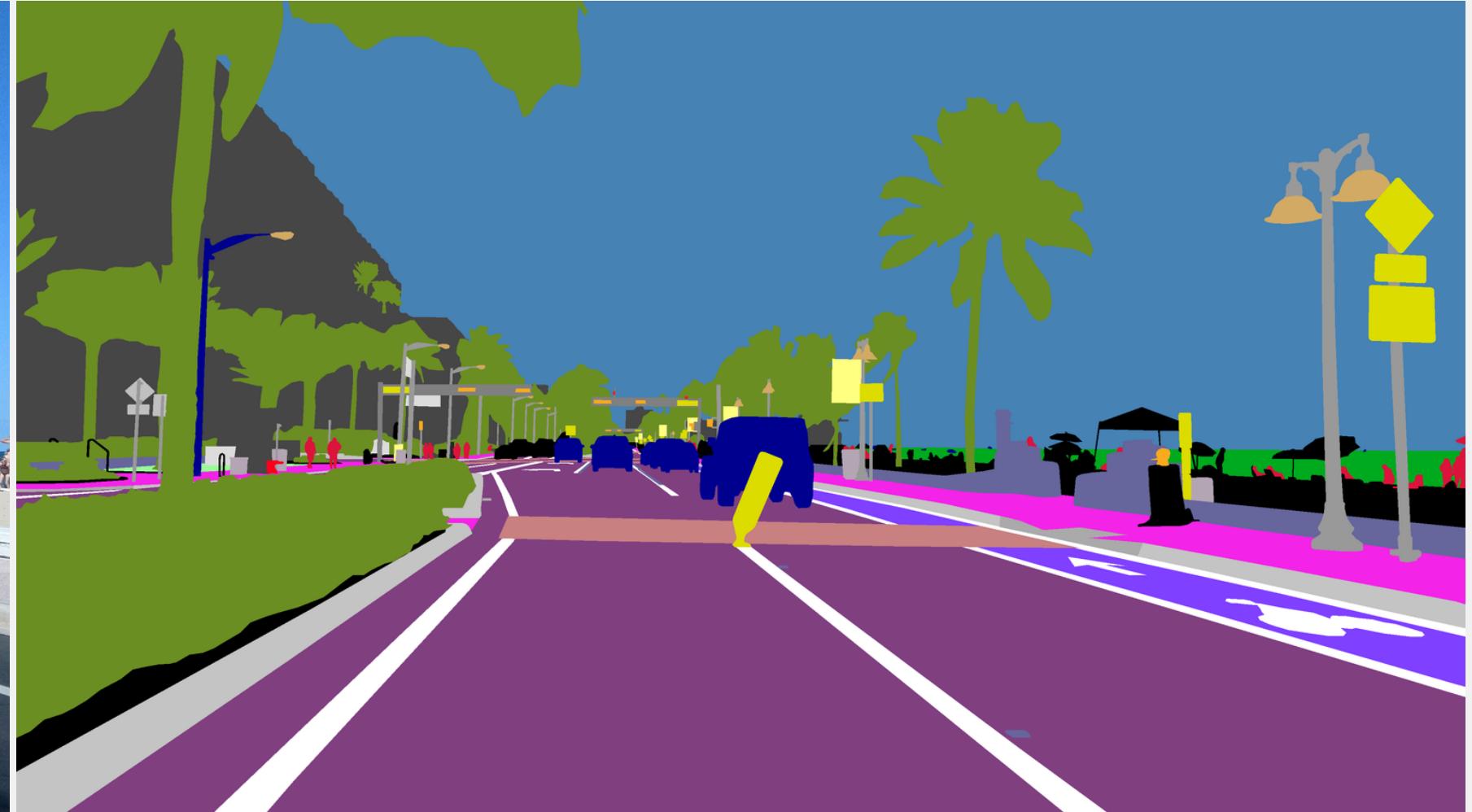
- Train a Neural network with the Unet Architecture.
- Unets were originally designed for to identify different tissues in Medical Imaging but have found a wide variety of use cases.



# Mapillary Vistas Dataset

- Contains 18000 training and 2000 validation images from street driving conditions all around the world with their corresponding labelled masks.
- Images are labelled for 66 unique classes.
- Contains an additional 5000 testing images without masks.

Can be obtained at [mapillary.com/dataset](http://mapillary.com/dataset)





# Model Performance

- 91% Accuracy on Training set of 18000 images.
- 85 % Accuracy on Validation set of 2000 images.
- Images were resized to 256x256 resolution.
- Took 18 hours of GPU time to train.

# Some Examples of Predictions

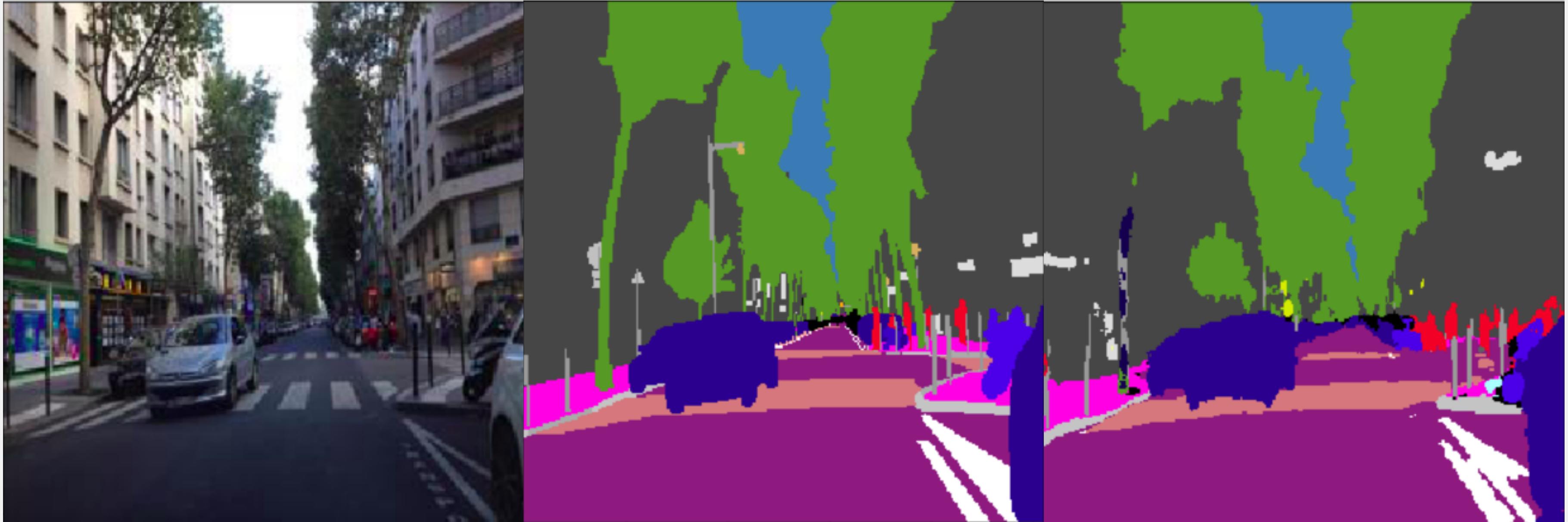


IMAGE

GROUND TRUTH

PREDICTION

# Some Examples of Predictions

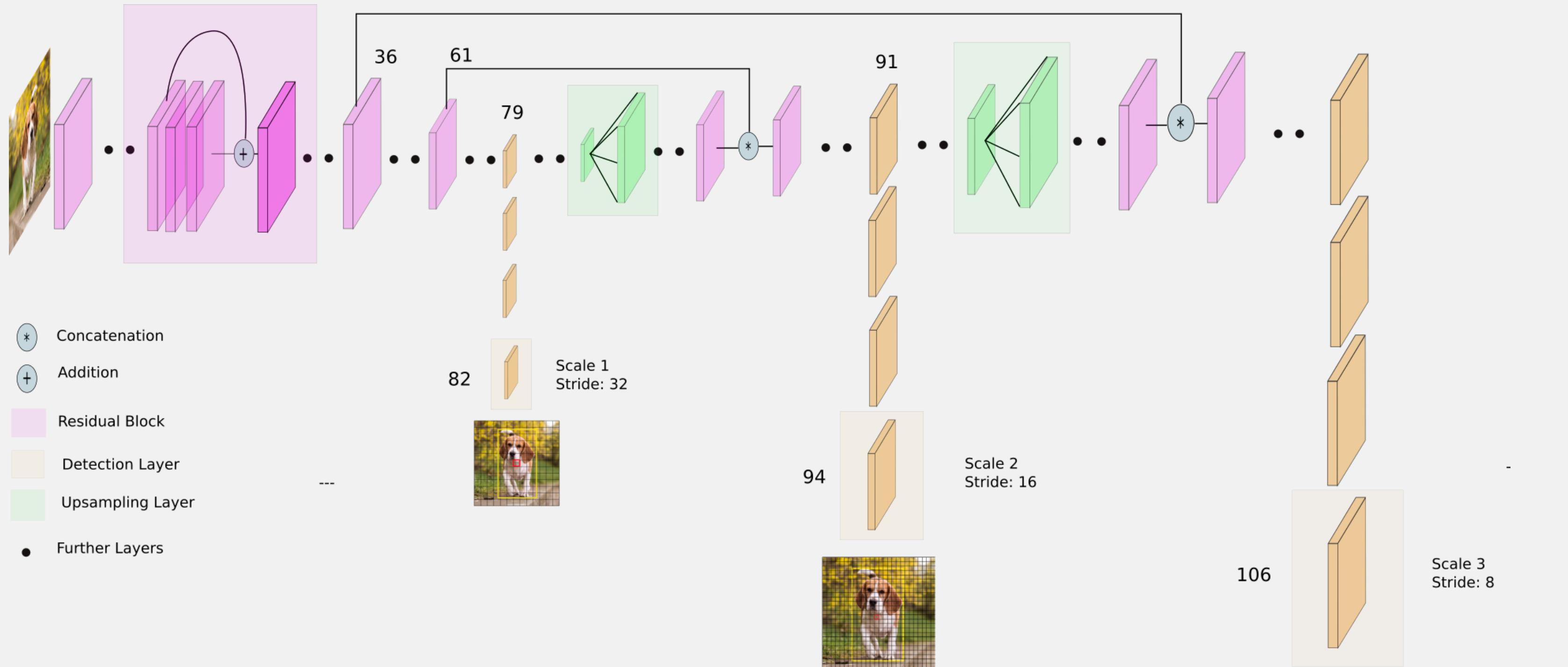


IMAGE

GROUND TRUTH

PREDICTION

# Going a little further with object detection.



YOLO v3 network Architecture

# Some Examples of Predictions



IMAGE

SEMANTIC SEGMENTATION

OBJECT DETECTION

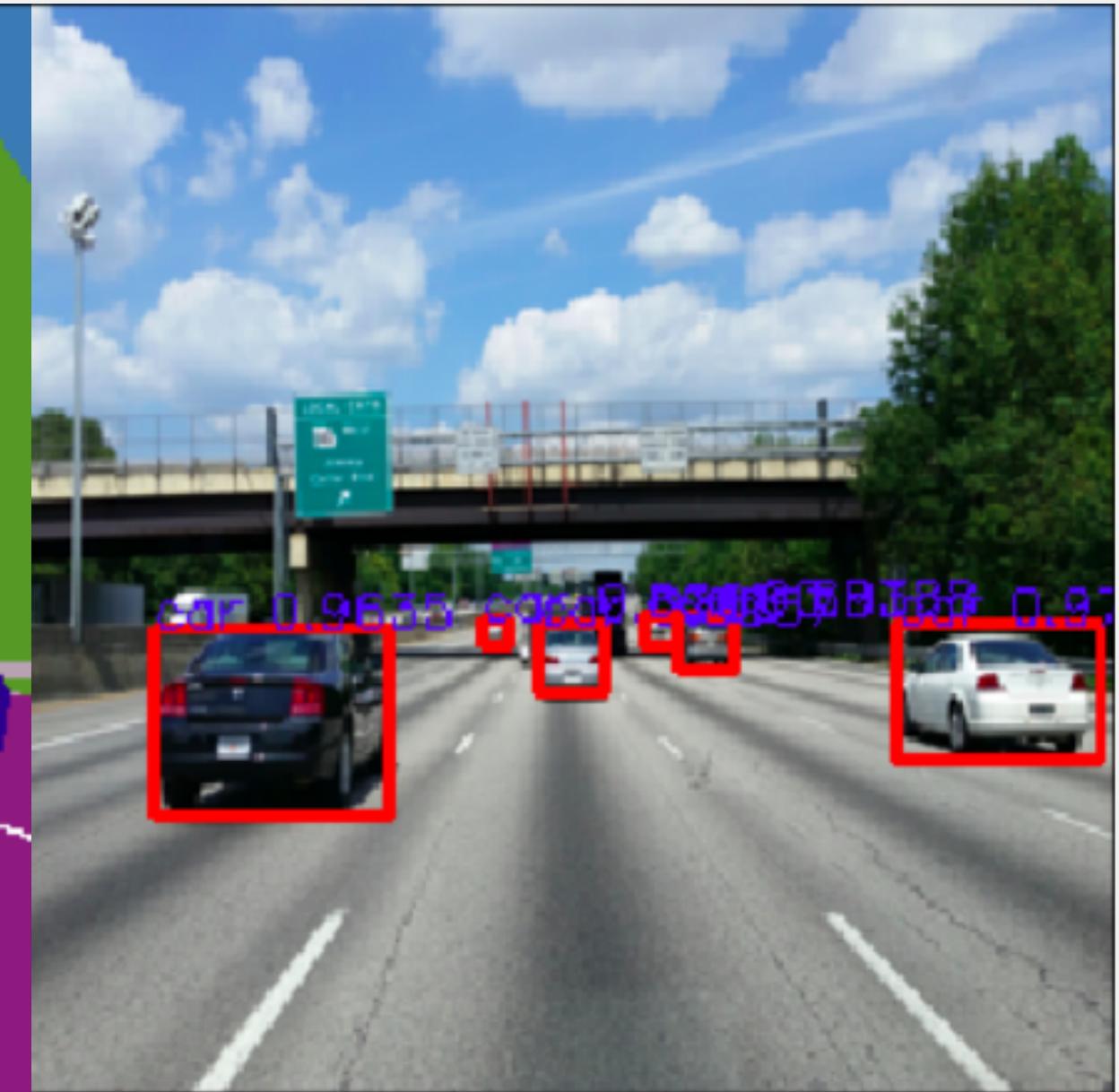
# Some Examples of Predictions



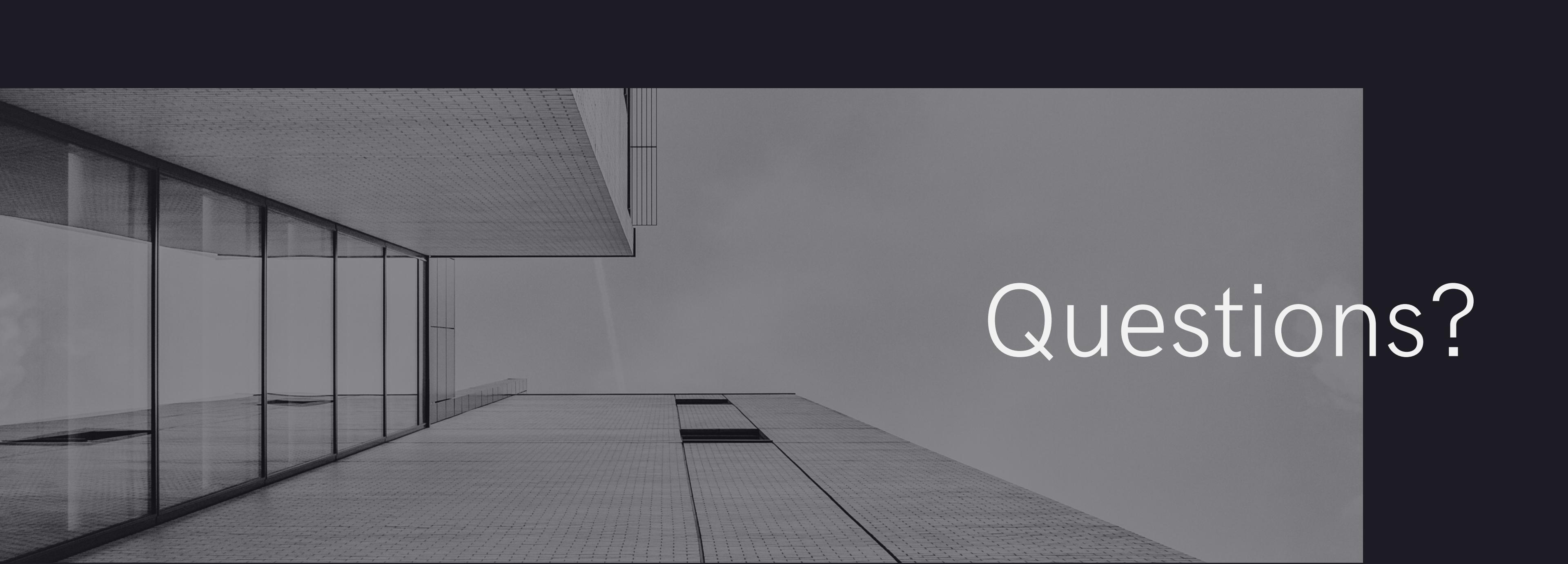
IMAGE



SEMANTIC SEGMENTATION



OBJECT DETECTION



# Questions?

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