

Understanding How AI is Trained and What That Means For Detection and Data



Pedestrian

Car
21 km/h
Motorcycle
19 km/h

Car
21 km/h

Car
23 km/h

Motorcycle
25 km/h

Motorcycle
31 km/h

Pedestrian

Car
27 km/h

Pedestrian

Basics of AI Training for Video Analytics

FLOW.
TRAFFIC



First challenges

- Collection of labeled data (images, video clips)
- Role of supervised learning
- Data annotation, model training, validation, and deployment
- Pre-trained DNNs in traffic detection



Traffic dataset

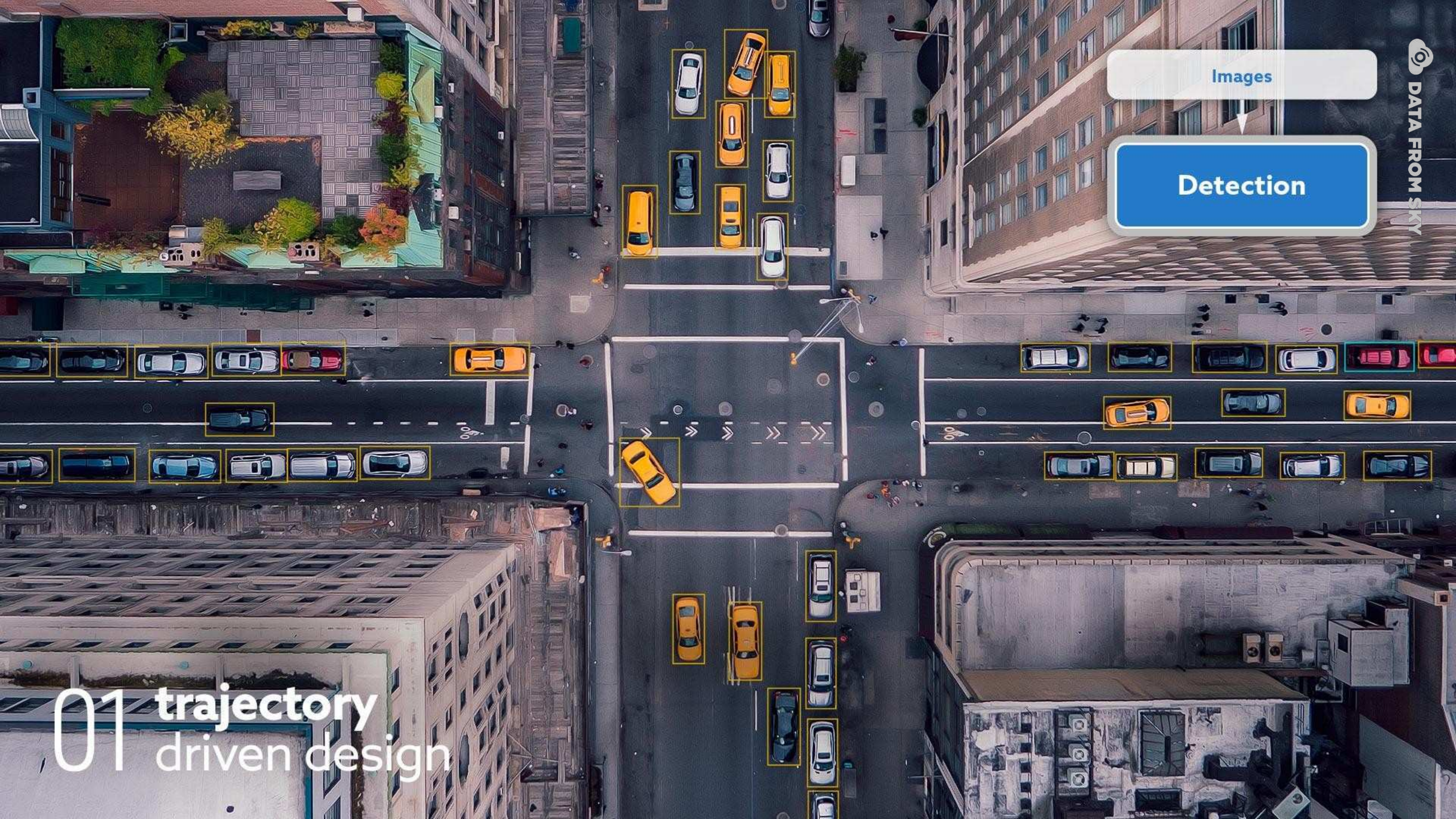
- 17 classes
- 900k images
- 9 M objects
- Balancing
- Bin packing



Images

Detection

01 trajectory
driven design



Images

Detection

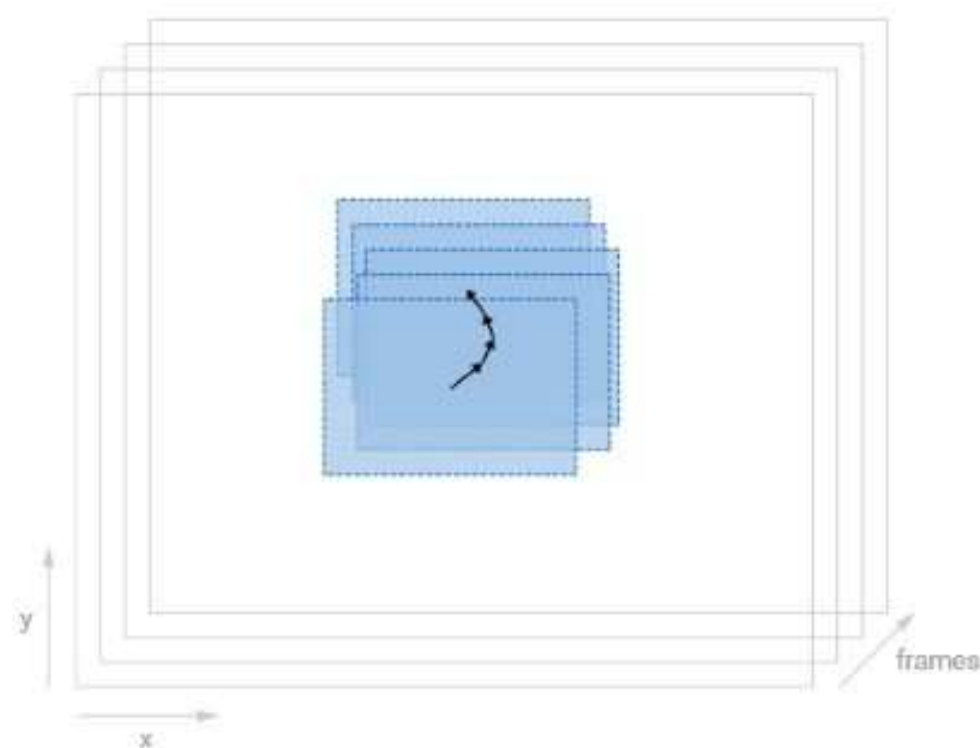
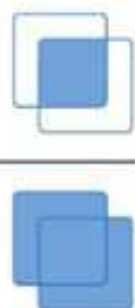
Classified detections

Tracking

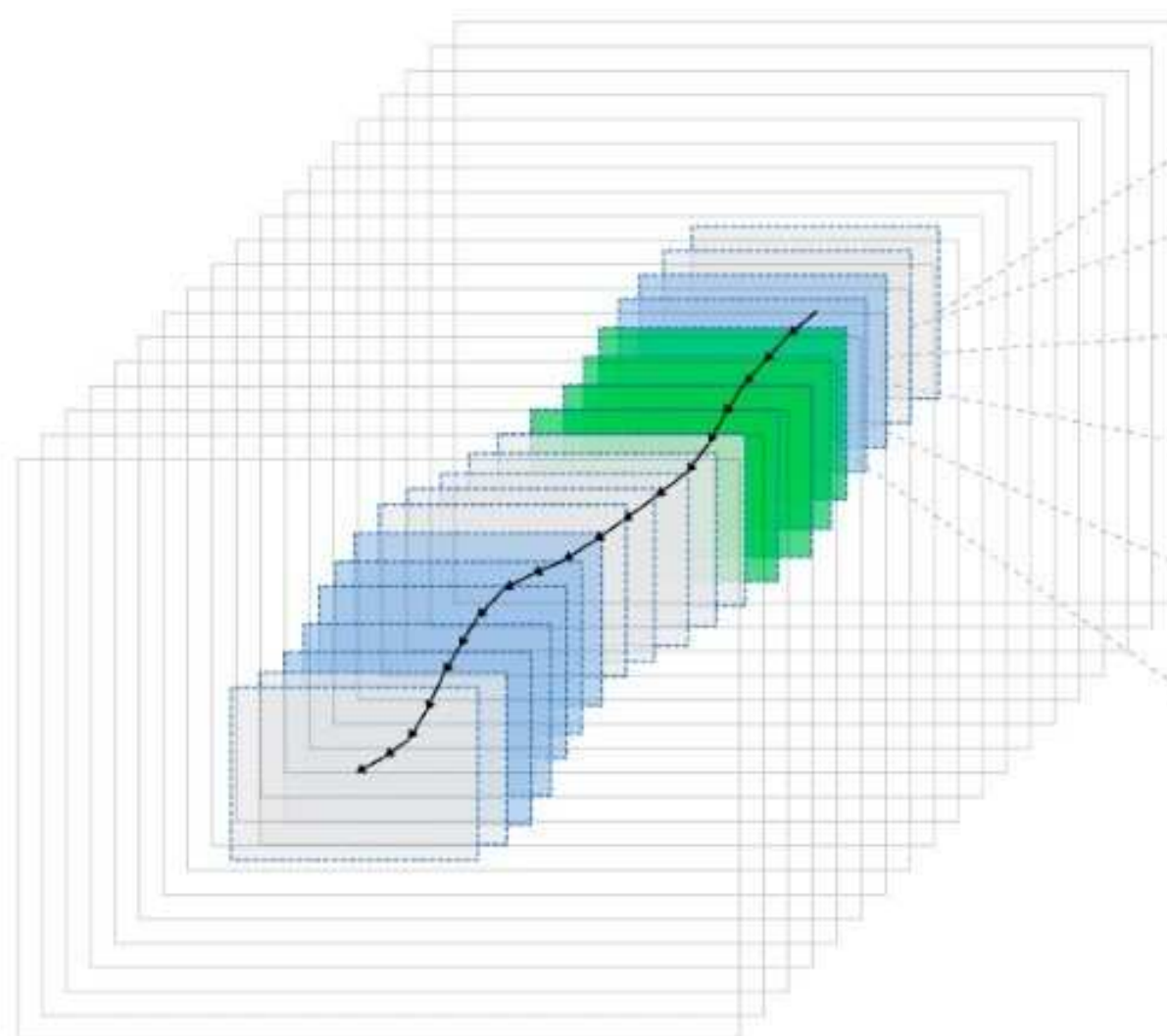
01 trajectory
driven design

Continual tracking

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



Standard IOU

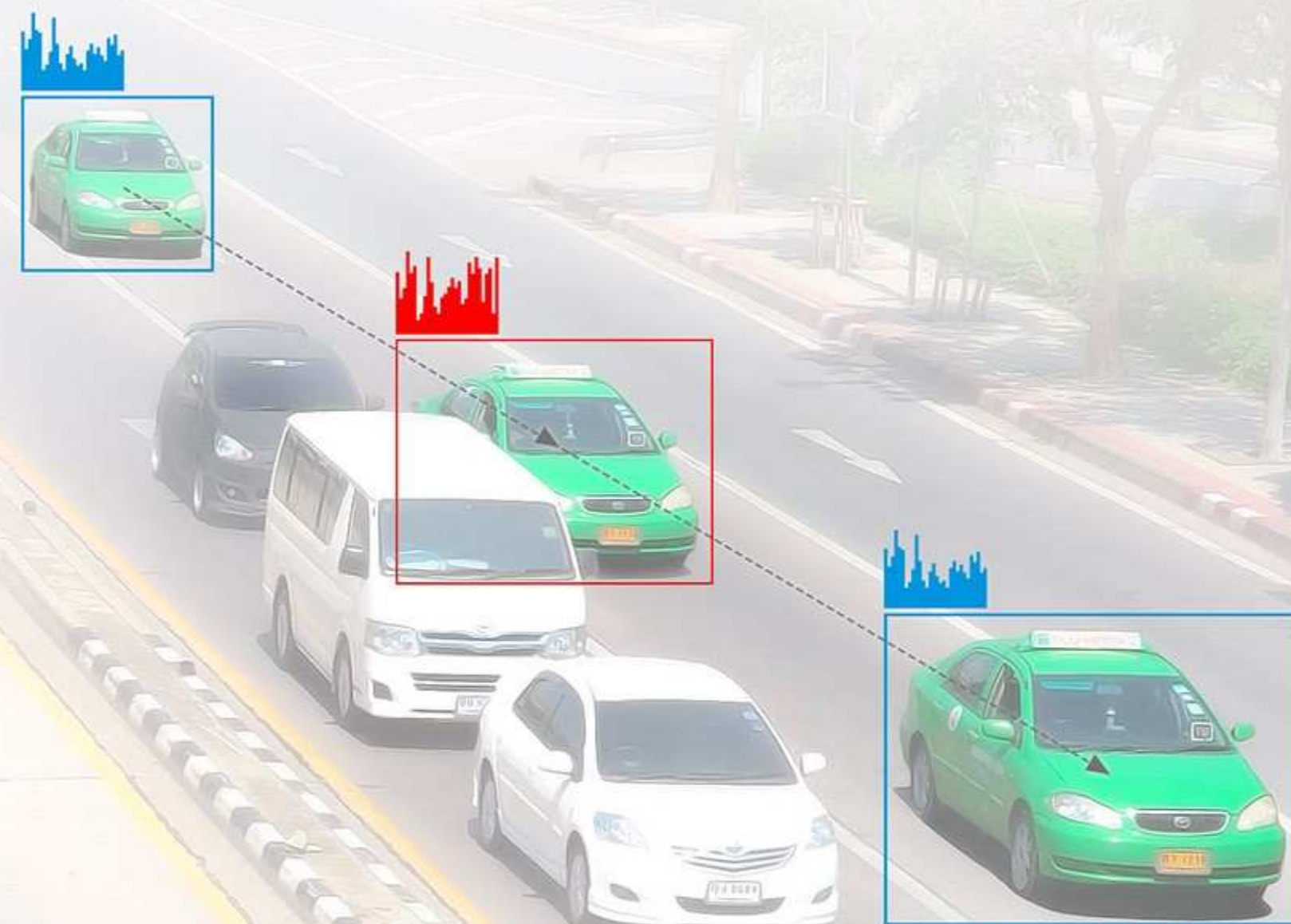


Enhanced IOU by embedding

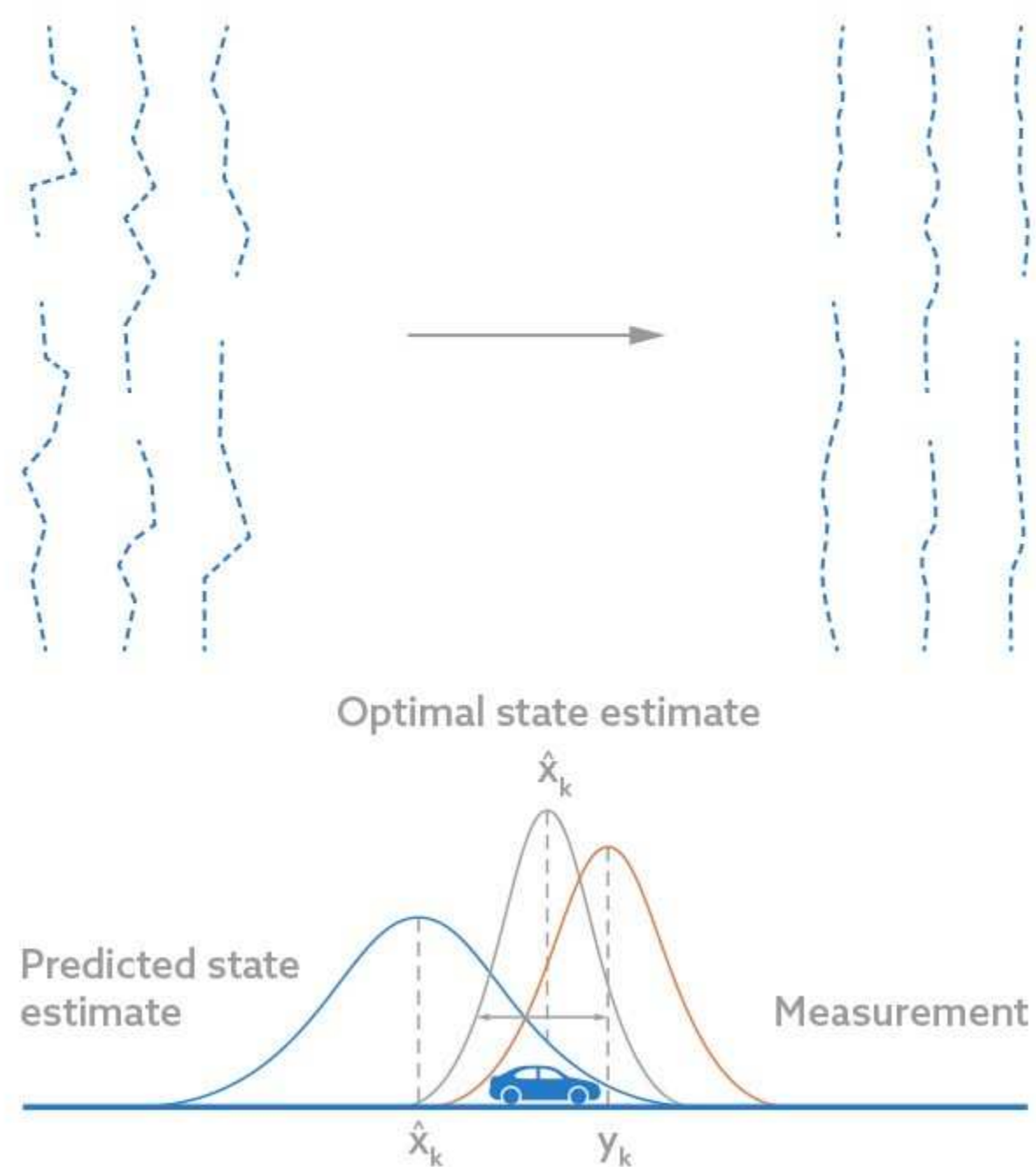


Reidentification

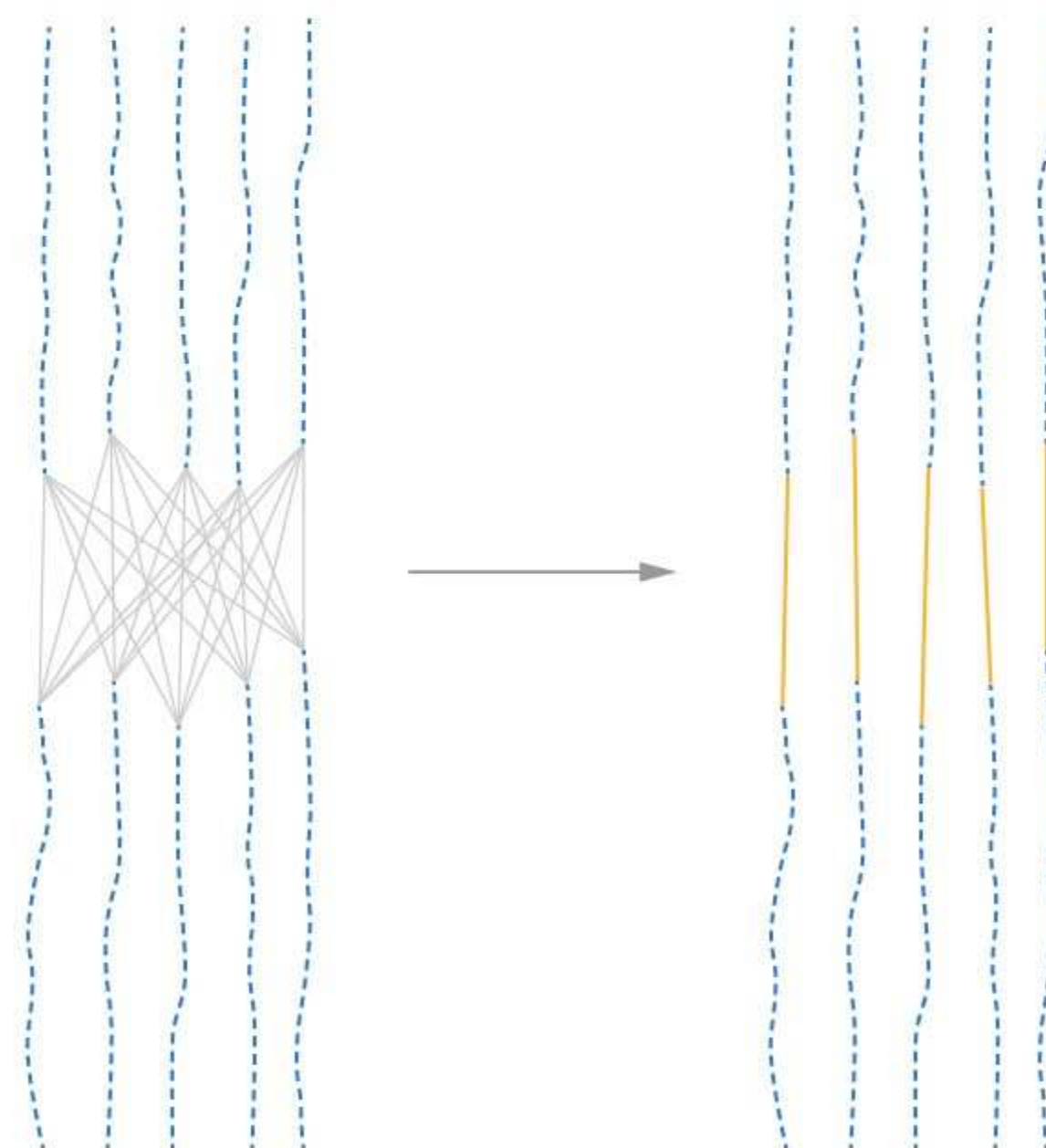
- Overcome the partial or full occlusions
- Two-second problem
- Visual descriptor from DNN
- Part of Embedder

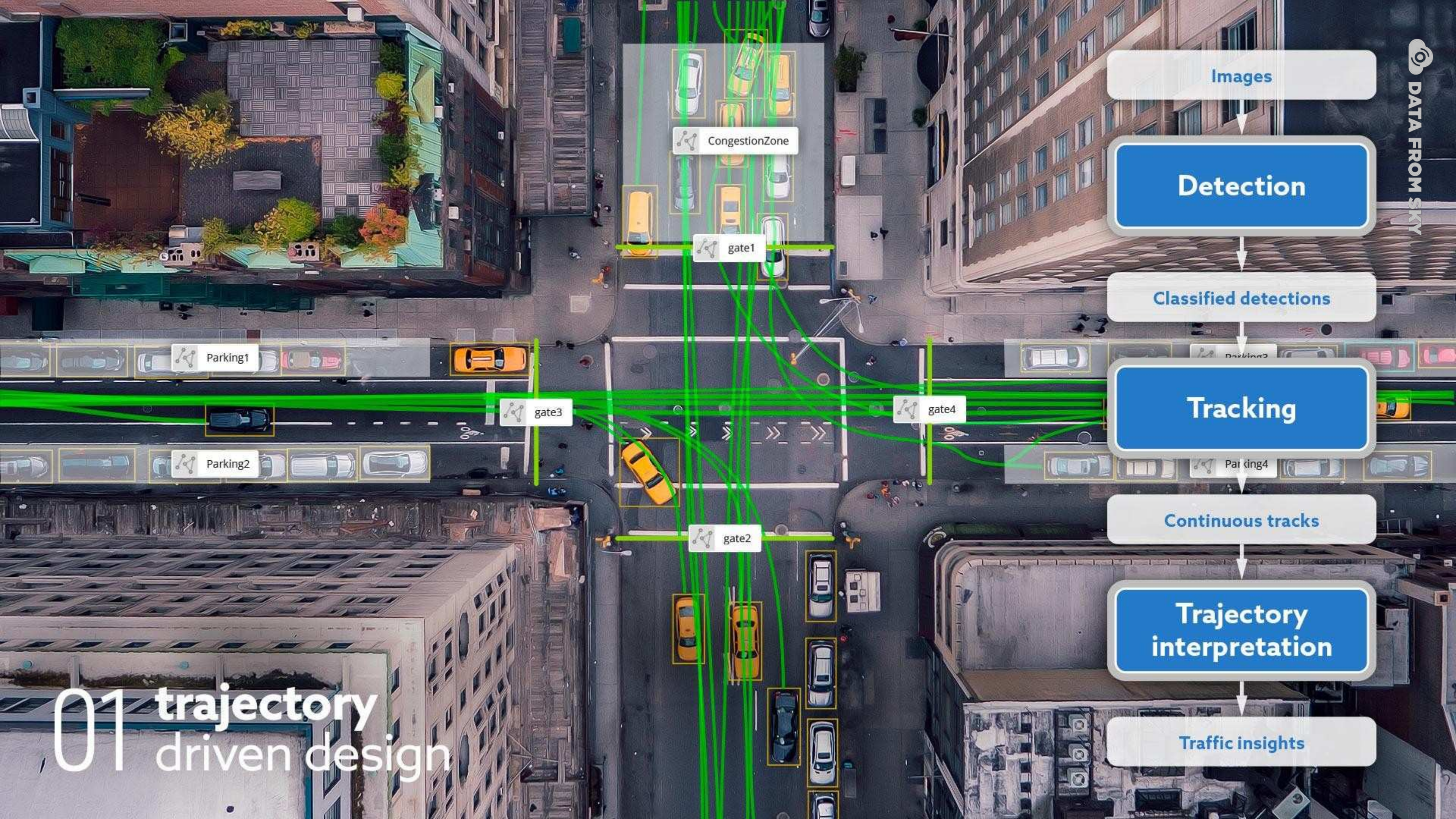


Filtration



Assignment problem solution





Images

Detection

Classified detections

Tracking

Continuous tracks

Trajectory
interpretation

Traffic insights

01 trajectory
driven design

Video Sensing Solutions Variety

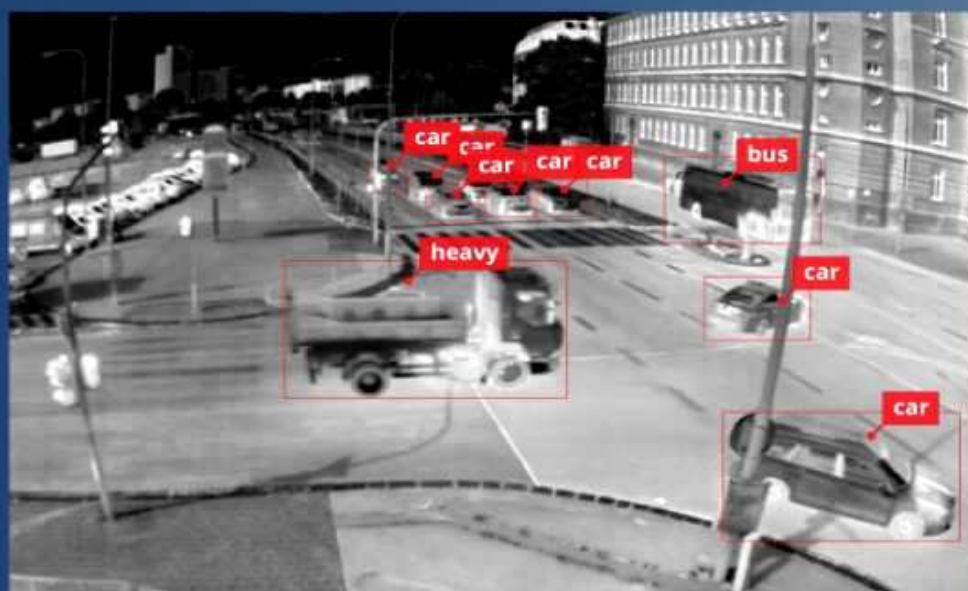
What is the best sensor?

FLOW.
TRAFFIC



CAMERA AGNOSTIC

Thermal / 360° / Drones / ...



FL FRAMEWORK **W.**



Utilizing Deep Neural Networks

How to pick the best DNN?

FL W.
TRAFFIC



AID TUNNELS & HIGHWAYS

pedestrian
score: 73.9/79.3(%)

smoke
score: 84.3/86.8(%)

fire
score: 86.2/87.2(%)

stopped vehicle
score: 92.6/91.9(%)

FL FRAMEWORK W.

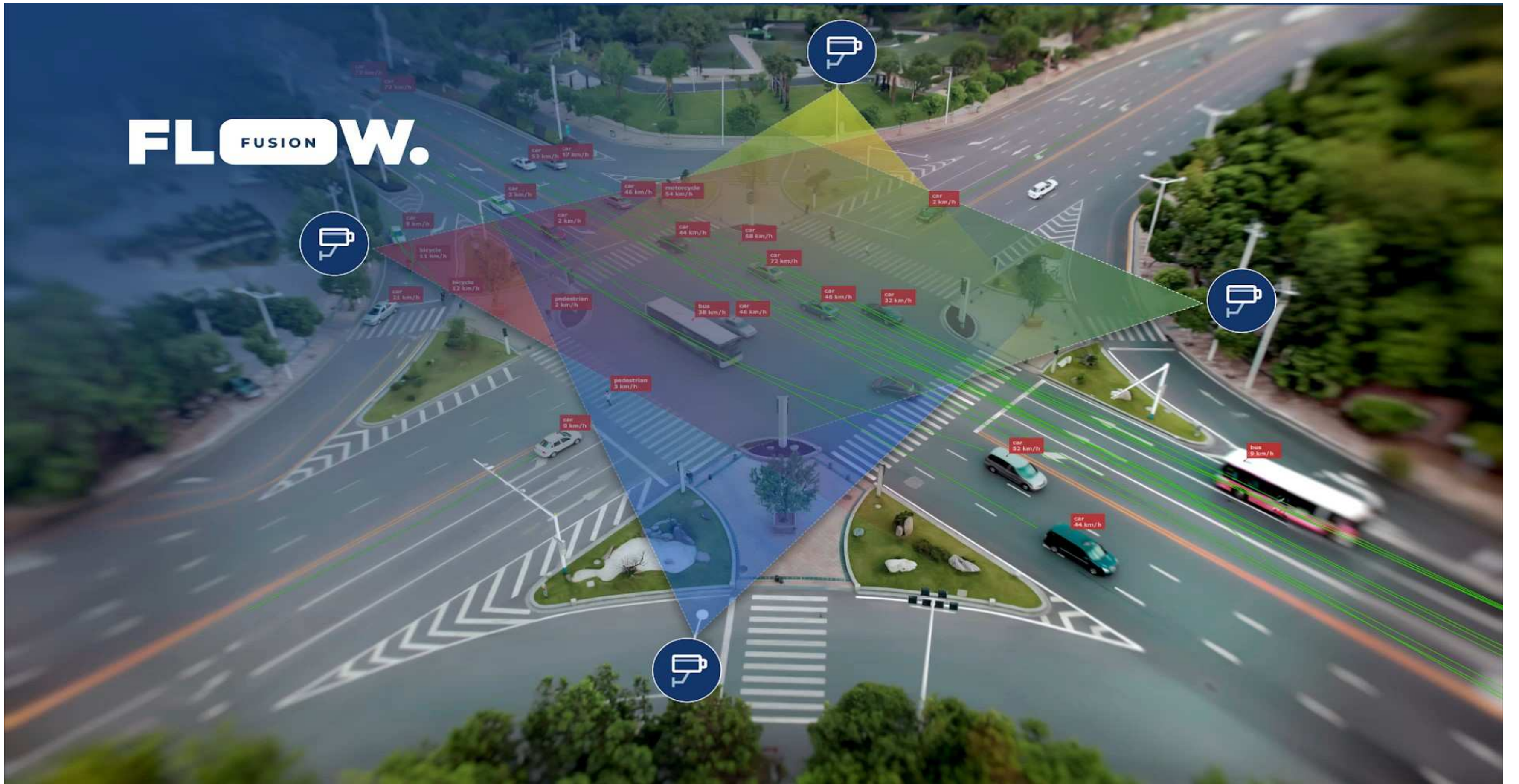
FL **TRAFFIC** **W.**

The Data



FL W.

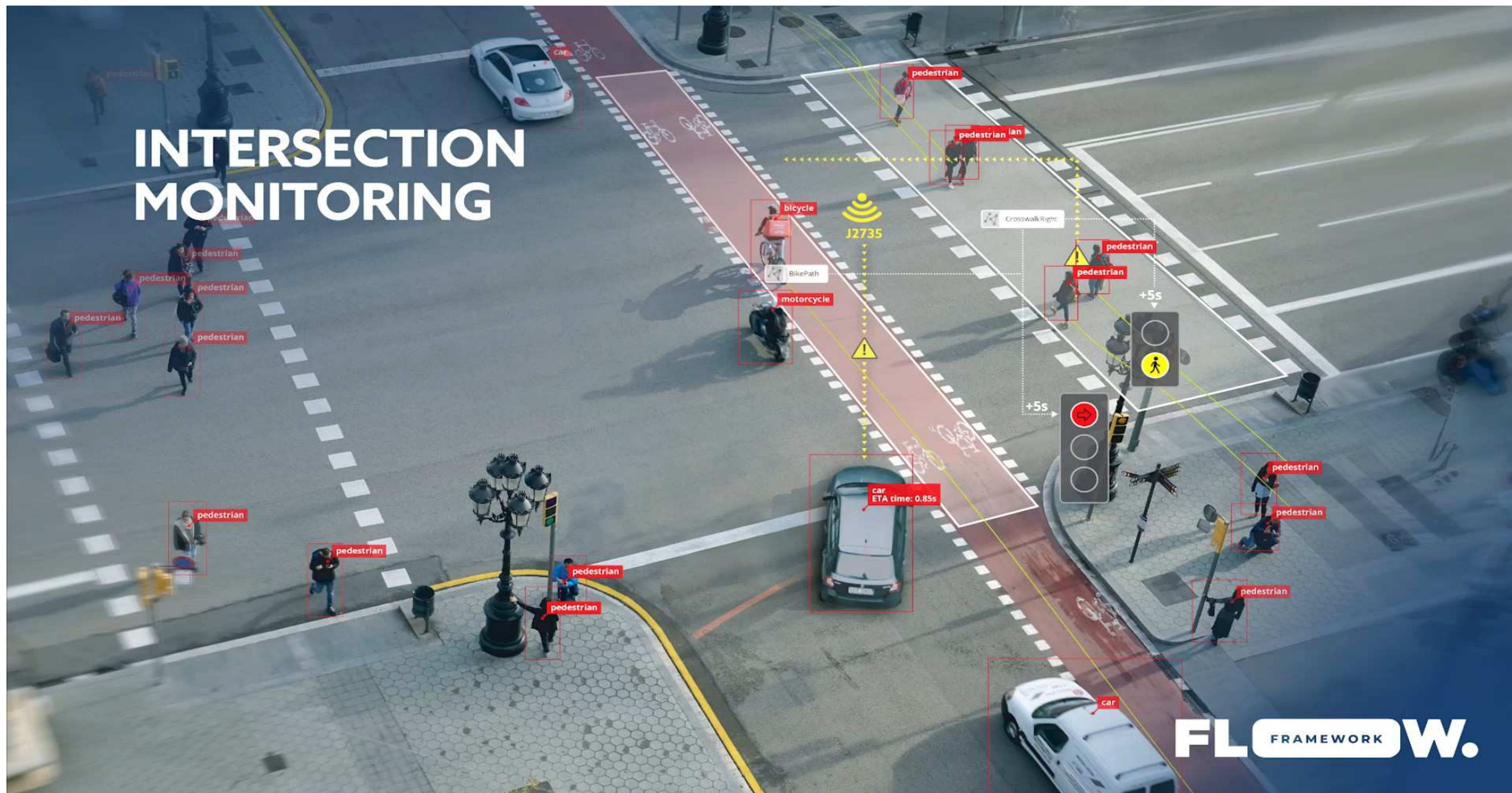
FUSION

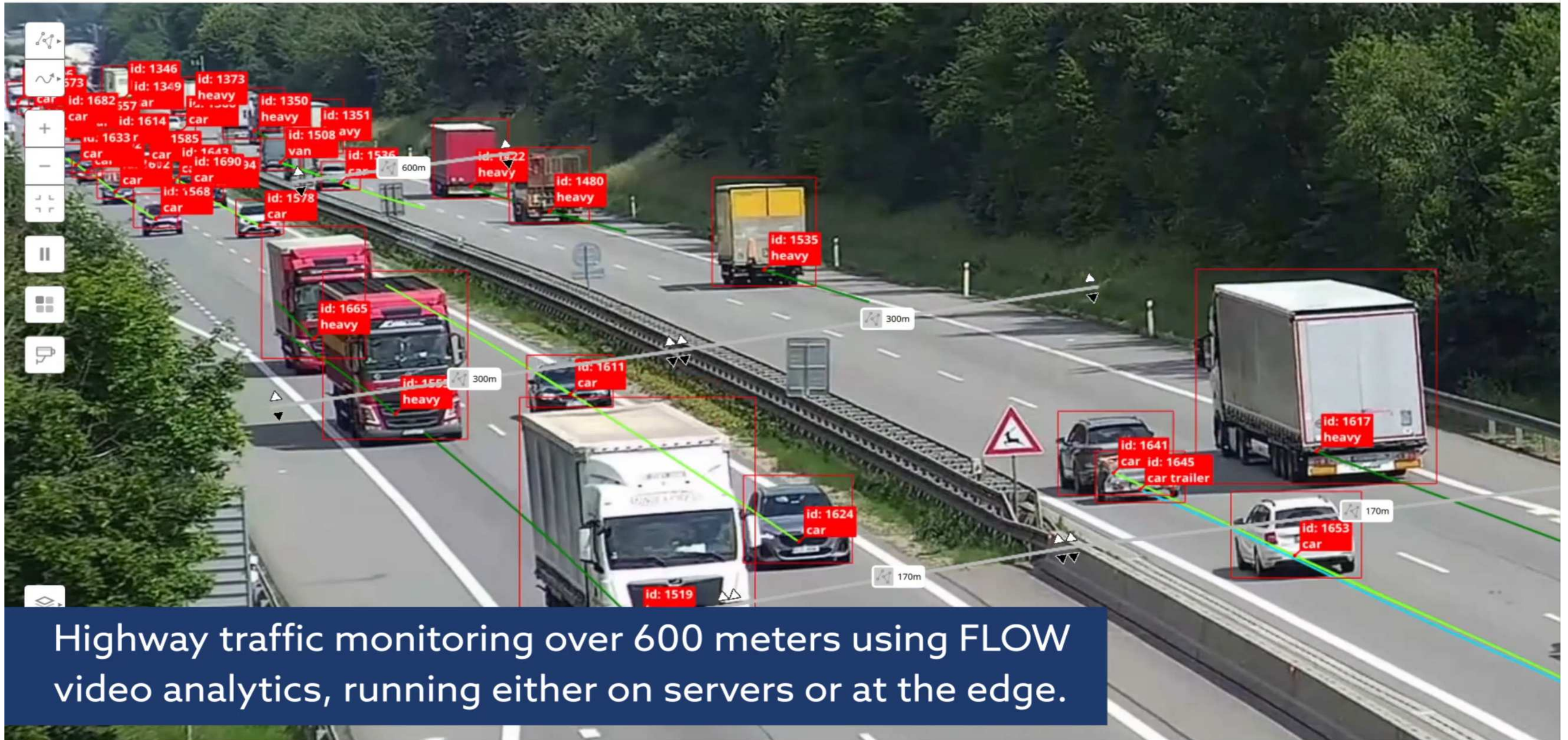


Thank you for your attention.



INTERSECTION MONITORING





Highway traffic monitoring over 600 meters using FLOW video analytics, running either on servers or at the edge.