

# Real-Time Multiple Object Tracking (MOT) for Autonomous Navigation

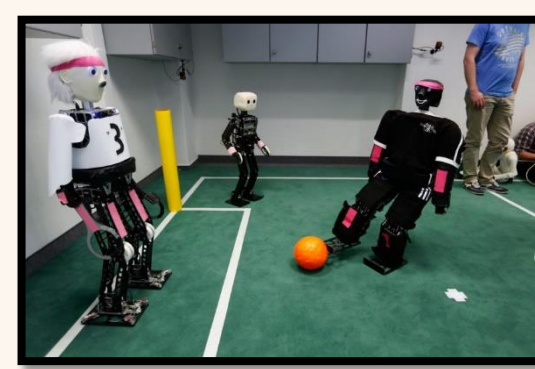
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## Introduction & Motivation

- Autonomous vehicles and robots require three dimensional (3D) awareness
- Rich spatial knowledge is necessary for virtual and artificial reality applications
- We expect these new applications to actively interact with their surroundings



(Self-driving car, Google)



(Robots playing soccer, RoboCup)



(HoloLens, Microsoft)

## Dataset

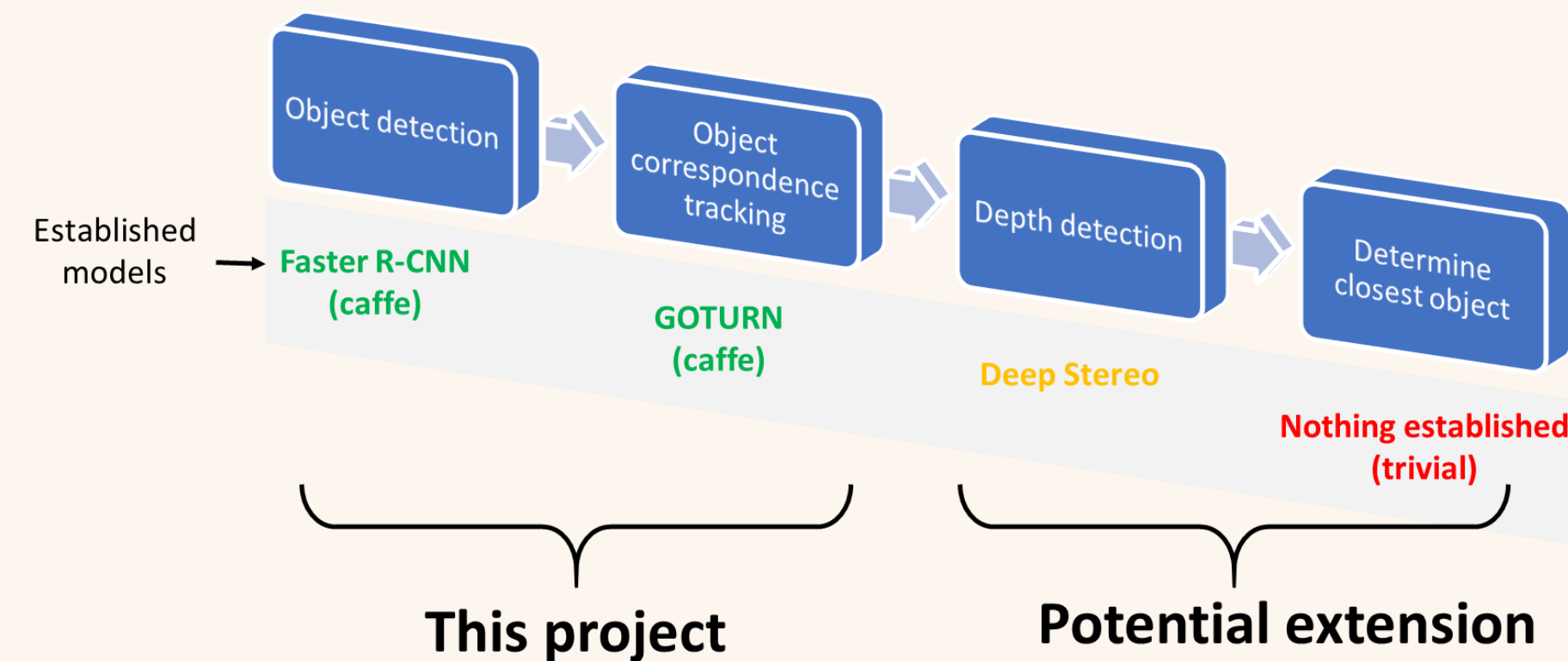
- MOT dataset: People tracking
- ✓ We train our models for multiple people tracking instead of generic object tracking
- ✓ Our network is, in principle, independent of the type of the tracked object
- ✓ Various specific task provided: sports, surveillance, 3D tracking
- ✓ Provides detection for all sequences (useful for debugging purposes)

## Multiple Object Tracking Benchmark

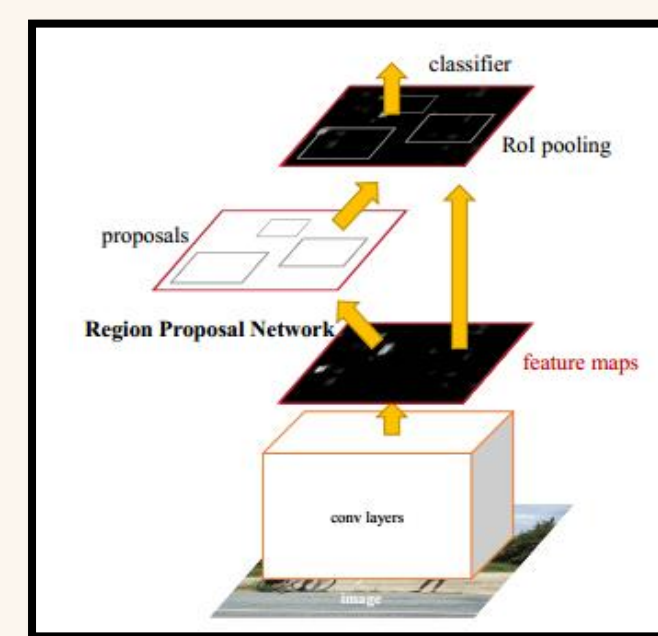
home data results vis QVA submit FAQ people

<https://motchallenge.net/>

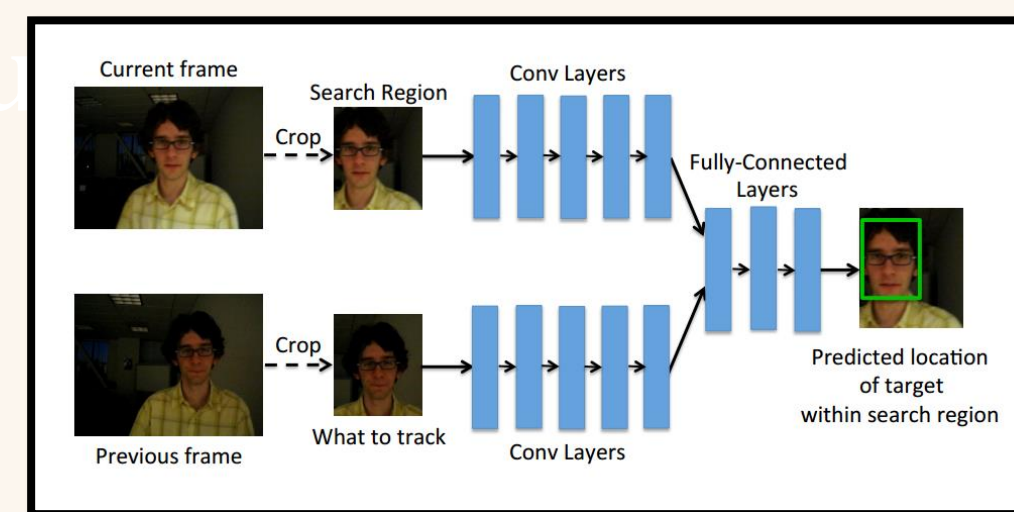
## Approach



### Faster RCNN Architecture



### GOTURN Architecture



- The multiple object detection is provided by the Faster RCNN.
- GOTURN tracks single object over time. The object detection has to be provided manually.
- We expand the GOTURN architecture to perform MOT on detection provided by Faster RCNN

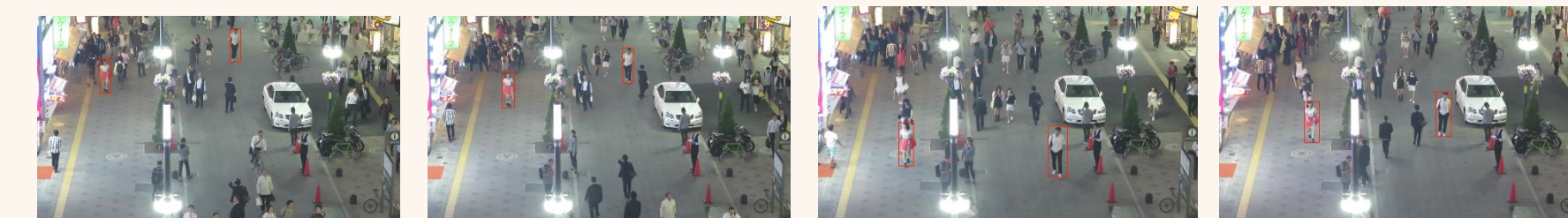
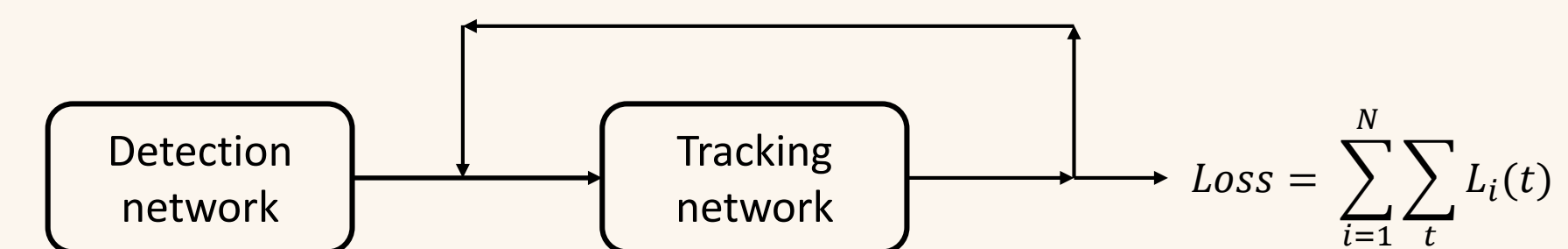
## Results

### Combining both architecture in series and running on MOT dataset (trivial case)



White box is the detection frame provided by detection network for the first frame. Red box shows tracked object by the tracking network.

### Sequential MOT



N is total objects detected by the detection network, here N is artificially limited to 2.

## Future Work

- Extend the work to real-time MOT
- We need to implement baseline for the project. For example, tracking can be benchmarked against TLD algorithm
- Need better handling of object births and deaths
- Rich information e.g. interaction between object
- Track fast objects

