

Industrial Day

TEC2017-88169-R MobiNetVideo (2018-2020-2021)

Visual Analysis for Practical Deployment of Cooperative Mobile Camera Networks

Multi-object tracking and applications

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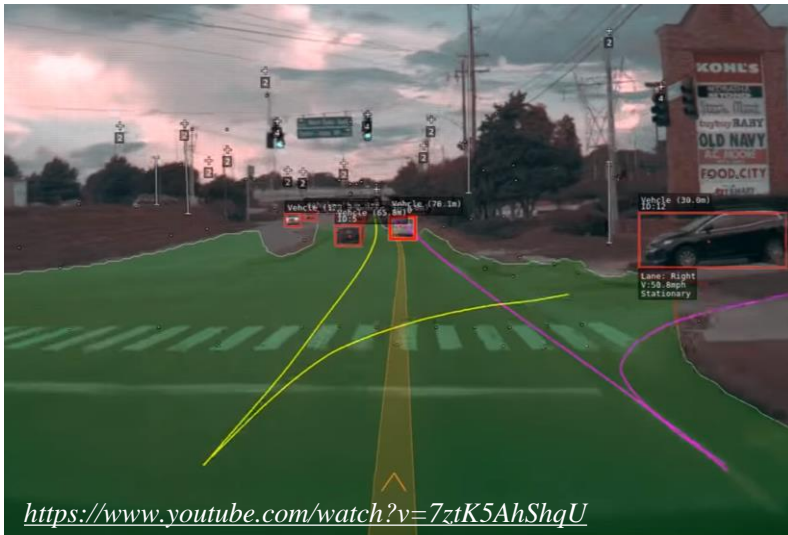
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- Introduction
- Applications
- Proposed approach
- Experiments
- Conclusions and Future Work

Detection and Tracking with moving cameras.

- Large number of detection and tracking models.
- Challenging perspectives and frame rates requirements.
- Various lighting situations.

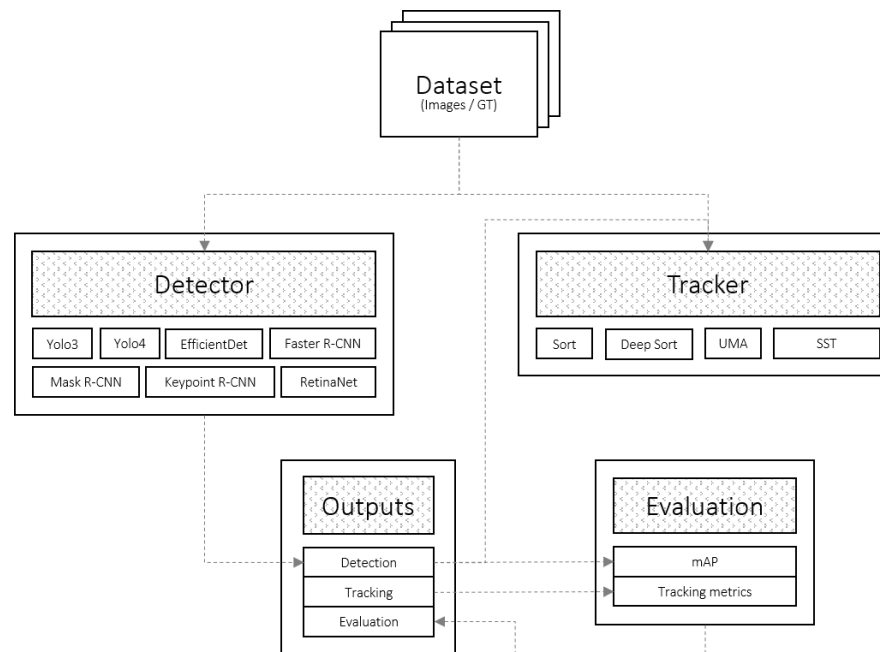


Detection and Tracking applications from moving cameras.

- Counting people. (e.g.: maximum groups of people due covid restrictions)
 - Drone perspective is challenging as camera angles are not usual.
- Avoid collisions of moving platforms.
 - Movement of a camera inside a vehicle is challenging.
 - Working in simulator could help us to replicate circumstances that would be complex in the real world.
- Multiple detection and tracking models.
 - Which combination is the best in terms of performance and accuracy for each application?

Framework to test combinations of detectors and trackers.

- Multiple detection and tracking models.
- Different datasets.
- Evaluation metrics to decide the best combination.



Detector	Publication	Publication Year
Faster-RCNN	Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks	CVPR 2017
Yolo V4	YOLOv4: Optimal Speed and Accuracy of Object Detection	Arxiv 2020
Yolo V3	YOLOv3: An Incremental Improvement	Arxiv 2018
RetinaNet	Focal Loss for Dense Object Detection	ICCV 2017
Mask R-CNN	Mask R-CNN	ICCV 2017
Keypoint R-CNN	Local keypoint-based Faster R-CNN	Arxiv 2020
EfficientDet	EfficientDet: Scalable and Efficient Object Detection	CVPR 2020

Tracker	Publication	Publication Year
Sort	Simple Online and Realtime Tracking	ICIP 2016
Deep Sort	Simple Online and Realtime Tracking with a Deep Association Metric	ICIP 2017
UMA	A Unified Object Motion and Affinity Model for Online Multi-Object Tracking	CVPR 2020
SST	Deep Affinity Network for Multiple Object Tracking	IEEE Computer 2018

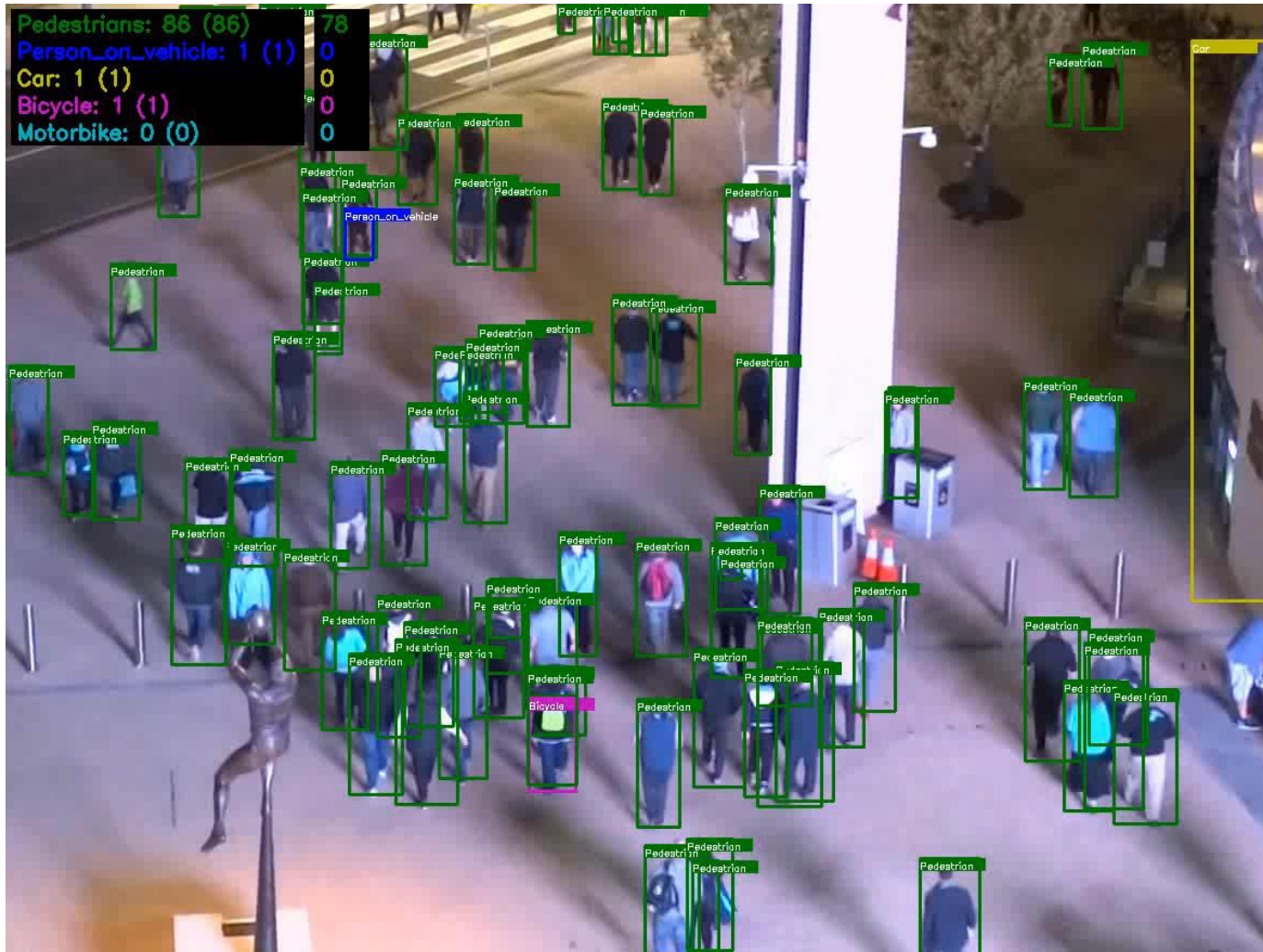
Objects counter (Faster R-CNN)

Requirements:

- Frame rate: > 1 second
- Detector: Detecting most objects as possible.



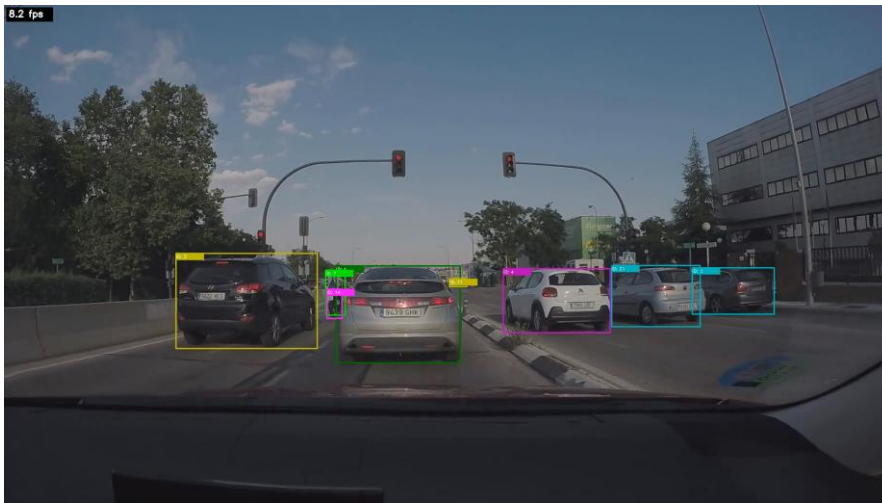




Avoiding collisions (Yolo v4 and Deep Sort)

Requirements:

- Frame rate: The higher the better.
- Detector: Detecting pedestrians and vehicles in advance.
- Tracker: Keep the track of near objects.







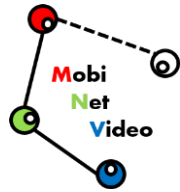


Combinations of detectors and trackers that satisfies the requirements for the applications.

- Easy to test new combinations of models.
- Execute over new data.

Future work:

- Avoiding collisions: basic system based on distance to the vehicle, without calibration.



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