CV3DST Multi-Object Tracking Challenge

The Team

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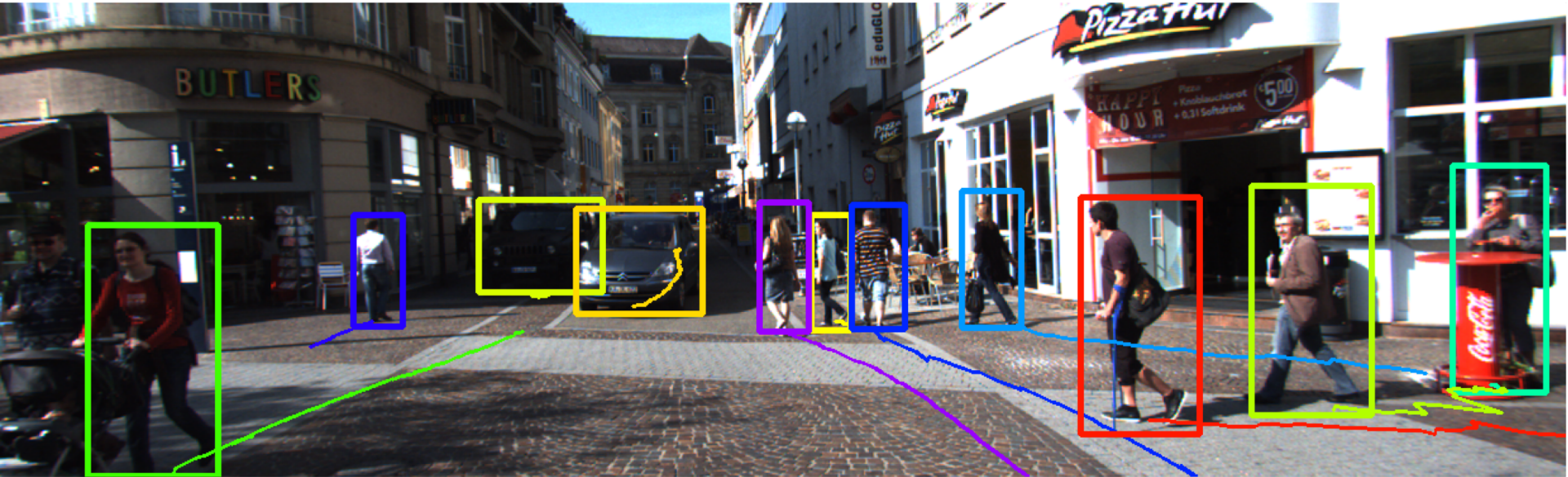Osep

Tim
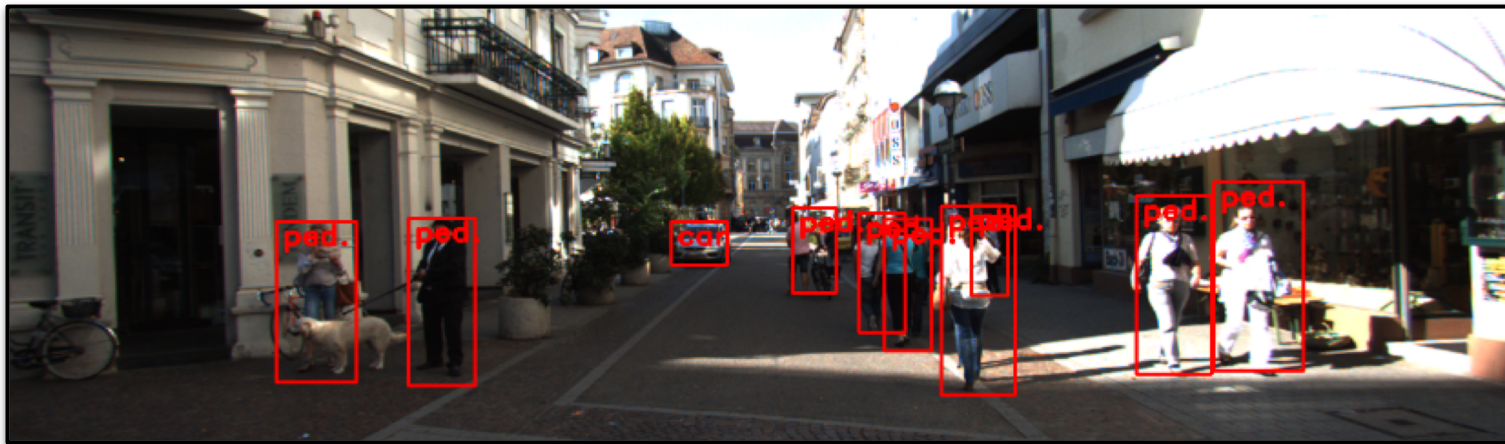Meinhardt

Patrick
Dendorfer

Vision-based Multi-Object Tracking

Vision-based Multi-Object Tracking

- Vision-based tracking
  - Sensor: camera

  - How to obtain the evidence for the presence of objects?

  - Tracking-by-detection

Challenge

Challenge

- **Given**: a baseline multi-object tracker
- **Task**: improve its tracking performance by applying different techniques from the lecture
- **Tracking-by-detection** paradigm
  - Apply object detector to each frame independently
  - Data association
- **The challenge**: connect the detections of the same object and produce identity preserving tracks

What Do We Provide?

- Google collab platform:
    - Dataset (MOT16 train split)
    - Object detector (Faster R-CNN, trained on our data)
    - Simple tracking baseline
    - Ground-truth tracks for supervision
    - Evaluation scripts
    - Instance segmentation masks for training

https://colab.research.google.com/drive/18uAKz1qMLvsr2h1w9tSk1zl Mekhi-lUU

Baseline Tracker

- Frame-by-frame detections (Faster R-CNN)
- **Association**: intersection-over-union (IoU)
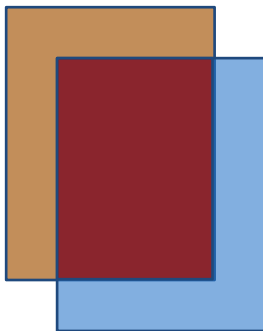
- **Initialize** new tracks from non-associated detections
- **Remove** tracks that can not be extended with detections

Possible directions

- Object detection
  - Tracking performance depends on the detection quality
- Tracking
  - Assign correct identities to detected objects
  - Cope with occlusions, missing detections and false positives
- Leverage additional cues, e.g.,
  - Segmentation masks
  - Optical flow
  - Semantic segmentation

Rules and Timeline

CV3DST competition: timeline

- Dates:
  - 22:04.20: Competition starts! Starting code and training set are released.
  - 01.06.20: Test set released, evaluation server is open.
  - 10.07.20 (midnight): Competition closes
  - 11.07.20 (midnight): Abstract and code submission deadline
  - 15.07.20: Presenters are announced
  - 22.07.20: Presentation of the selected methods

CV3DST competition: bonus

- How do I get the bonus?
  - You need a minimum MOTA value of 64
  - You need a minimum IDF1 value of 54

- Best methods will present their work on the last week of lectures

CV3DST competition: presentations

- The most original works will be presented on the last lecture day!

- It is your opportunity to present all the ideas that you tried (even if they did not work!).

- Attendance is mandatory

- GOAL: find out what has worked best/worst to solve the MOT problem

Rules

- Don't's
  - No teams!
  - Do not copy code from the internet!
  - You cannot use better off-the-shelf detectors!
  - You cannot use off-the-shelf trackers!

  Improvements on detection/tracking side you need to implement yourself.

- Do's
  - Use any additional source of information:
    - Segmentation masks
    - Semantic segmentation, optical flow
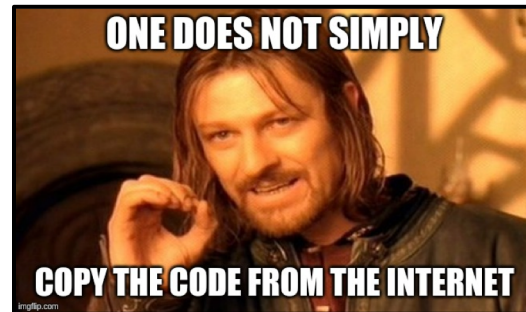
  Feel free to use external code here.

ONE DOES NOT SIMPLY

COPY THE CODE FROM THE INTERNET

YES

WE WILL CHECK YOUR CODE

Rules

- No off-the-shelf detectors or trackers can be used.

- You can use off-the-shelf methods that compute additional features that you might use, e.g., optical flow. Nonetheless, this cannot be the only contribution of your method.

- This is an individual effort, but sharing ideas between participants in the class is allowed, as long as you come up with different methods and implementations to solve the MOT problem.

- We will not provide help to solve coding issues nor to decide what methods to use to improve your tracker. This is a real competition, so you are on your own!

Dataset

- MOTChallenge MOT16 training dataset
  https://motchallenge.net/
- Define your own train/validation splits, on which you can validate your design decisions and hyper-parameters
- You will evaluate your final model on test sequences
- We will provide them 01.06.20
  - You will not be given access to the ground-truth
  - You will upload your results to our evaluation server

Dataset

- You only have access to the training set for now.

- Start working on the training set, creating your own cross-validation experiments.

- You will only be able to submit 4 times on the test set (to avoid overfitting), so all experiments are meant to be done in a cross-validation fashion on the training set.

Final comments

- Be creative!

- Be fair!

- Log all your experiments and results! (even the ones that did not work!)

- Happy tracking!

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