Exercise 1
About the exercises

- 3 weeks for each exercise + QA between then

→ Deadline always 23:59 CET on due date
Exercises

- Exercise 0 (doesn't count):
  - Get to know data and environment
- Exercise 1:
  - Build a tracker based on position and appearance (02.05.)
- Exercise 2:
  - Build a tracker using a graph neural network (23.06.)
- Exercise 3:
  - Competition! (14.07.)
Exercise 1

• Basic IuO-tracker introduced in exercise 0

→ tracker has several issues in assignment step
Recap: IoU Tracker

Tracks in past frame

Current Frame detections
Recap: IoU Tracker

Pairwise IoU cost matrix

Tracks in past frame

Current Frame detections
Recap: IoU Tracker

Pairwise IoU cost matrix

Assign detection with lowest IoU cost to track!

Tracks in past frame

Tracks Frame detections
Recap: IoU Tracker

Pairwise IoU cost matrix

Same bounding box assigned to two tracks!

Tracks in past frame

Tracks Frame detections
Recap: IoU Tracker

Missed Detection
Recap: IoU Tracker

Pairwise IoU cost matrix

Missed Detection
Recap: IoU Tracker

Pairwise IoU cost matrix

Missed Detection

New Track
Exercise 1

• Basic IuO-tracker introduced in exercise 0

→ tracker has several issues in assignment step

Tasks in this exercise:
1. Remove those issues in exercise 1!
What we want...

Assign detection with lowest IoU cost to track BUT allow each bounding box to be assigned to one track only!

Bipartite matching using Hungarian algorithm!

Pairwise IoU cost matrix

Tracks in past frame

Tracks Frame detections
What we want...

Pairwise IoU cost matrix

Add previously unmatched tracks to assignment step!

Difficult with IoU

Missed Detection
Exercise 1

• Basic IuO-tracker introduced in exercise 0

→ tracker has several issues in assignment step

Tasks in this exercise:
1. Remove those issues in exercise 1!
2. Include person ReID in the tracker
What we want...

Pairwise cost matrix

Compute distance using ReID and IoU!

Missed Detection
What we want...

appearance features from backbone CNN

bounding box position

Cosine/Euclidean distance (appearance)

IoU distance

Pairwise cost matrix
What we want...

- train backbone CNN using different loss functions
- try different distance measures

appearance features from backbone CNN

Cosine/Euclidean distance
What we want...

Missed Detection

Pairwise cost matrix

Bipartite matching using Hungarian algorithm!

Missed Detection
Exercise 1

- Basic IuO-tracker introduced in exercise 0

→ tracker has several issues in assignment step

Tasks in this exercise:
1. Remove those issues in exercise 1!
2. Include ReID in the tracker
Links

• Test server: 
  https://adm9.in.tum.de/embed.php/prakt/cv3dst/

• Exercise 1: 
  https://colab.research.google.com/drive/1Agbm-uG-_0eSQfmrIxCWTZQaxgFrQBrss?usp=sharing