Exercise 1

About the exercises

- 3 weeks for each exercise + QA between then

| Exercise 1 02.06. | QA 09.06. | QA 16.06. | Exercise 2 23.06. | QA 30.06. | QA 07.07. | Exercise 3 14.07 | QA 21.07. | QA 28.07. |

Due date 22.06.

Due date 13.07.

Due date 05.08.
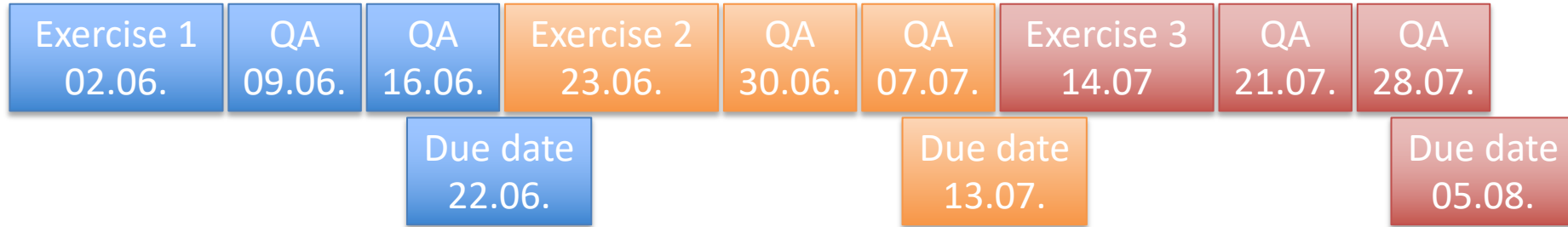
→ Deadline always 23:59 CET on due date

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

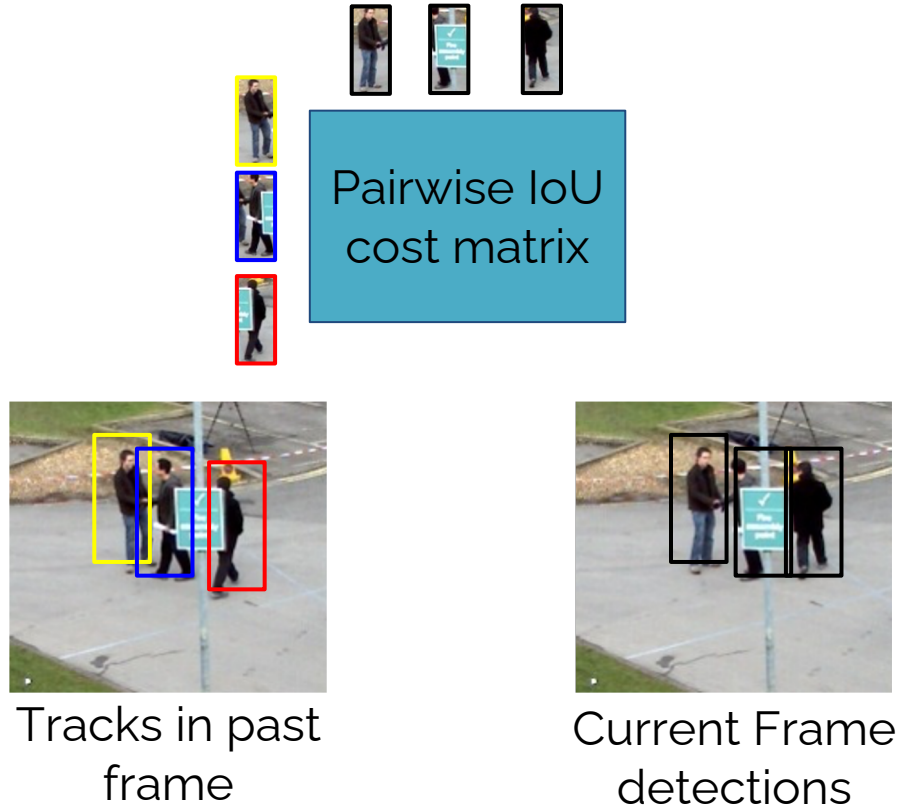→ tracker has several issues in assignment step

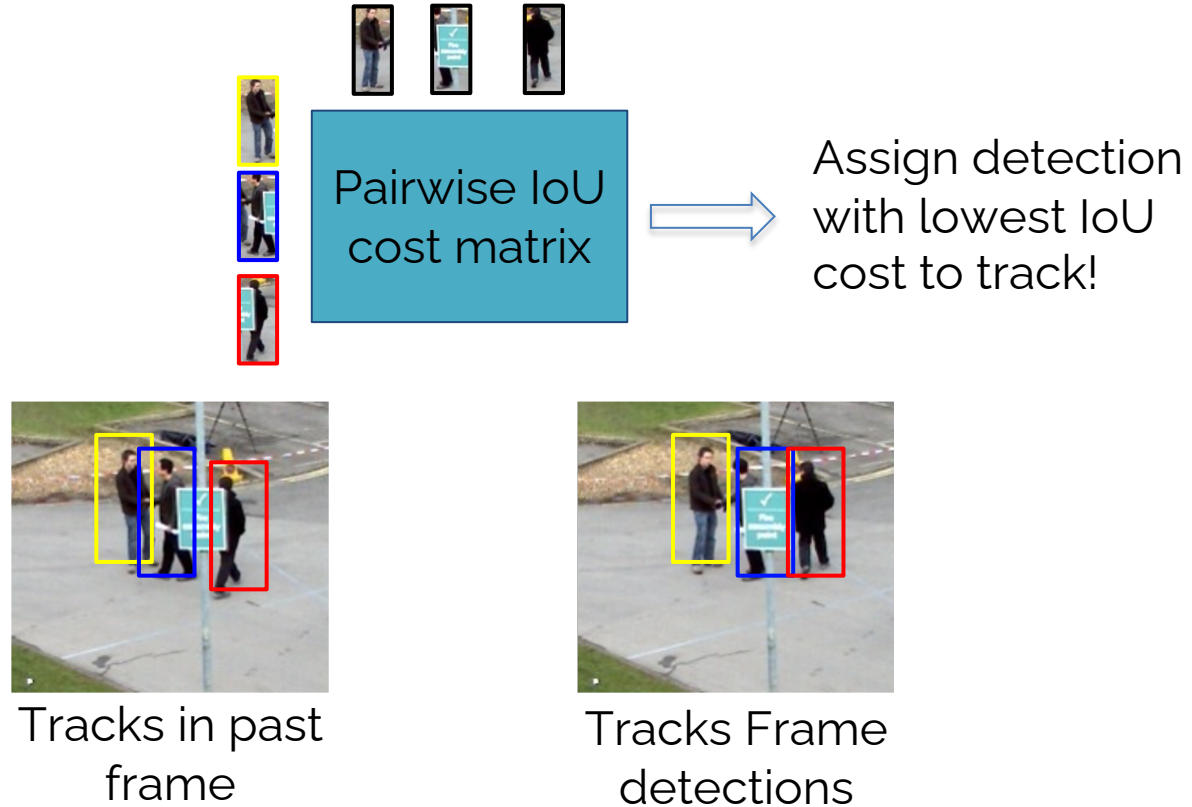# Recap: IoU Tracker
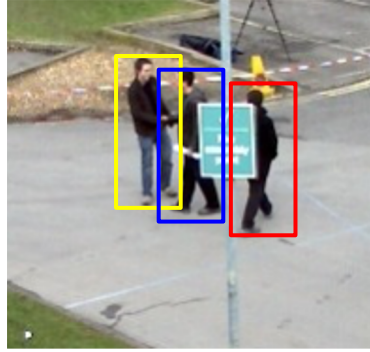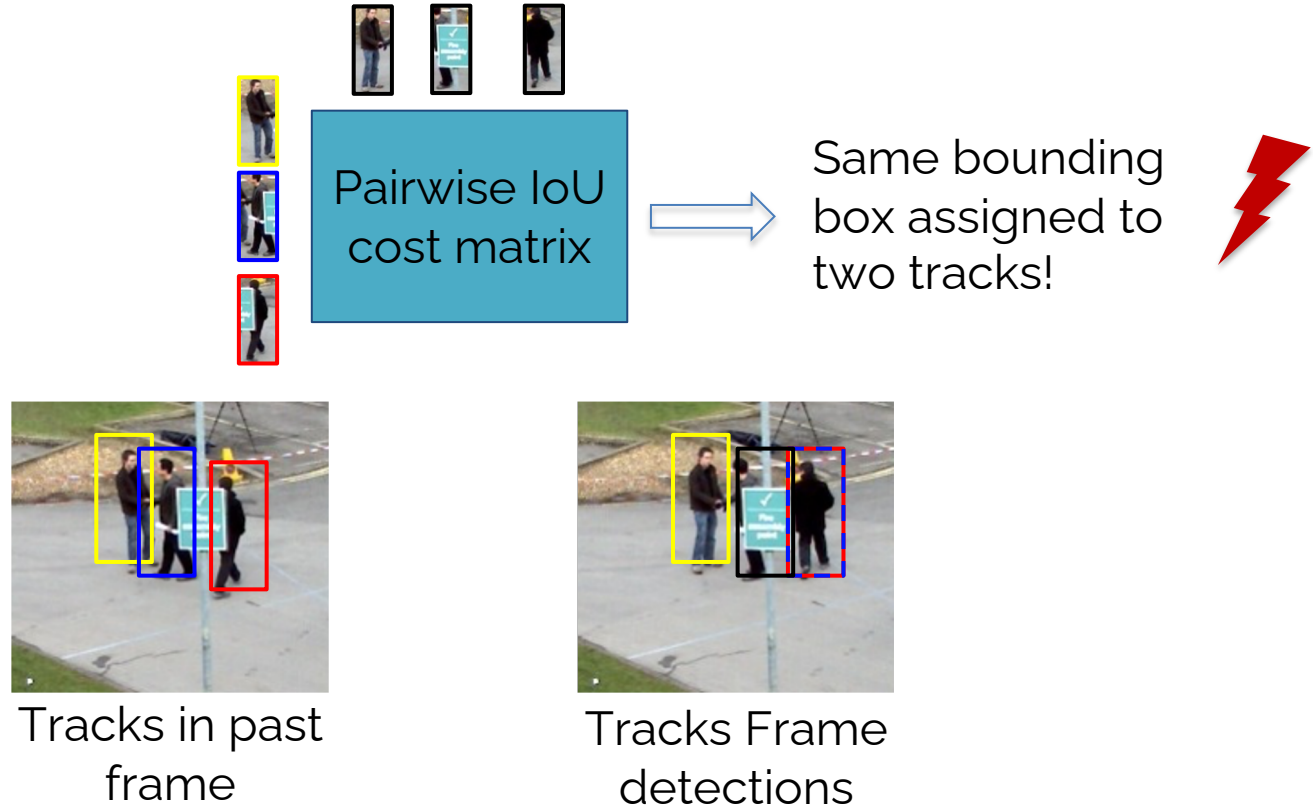

Tracks in past frame

Current Frame detections

Recap: IoU Tracker

Pairwise IoU cost matrix

Tracks in past frame

Current Frame detections

Recap: IoU Tracker

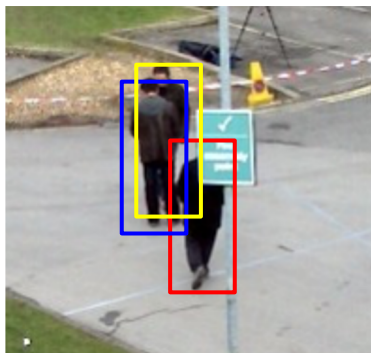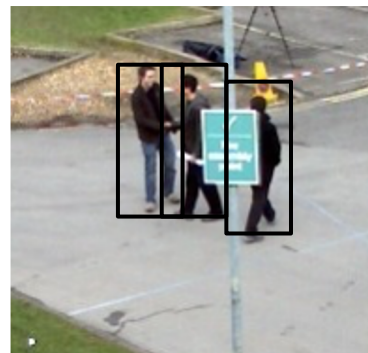
Pairwise IoU cost matrix

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!
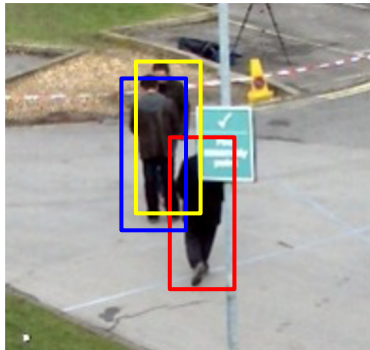
Tracks in past frame

Tracks Frame detections

Recap: IoU Tracker

Missed Detection
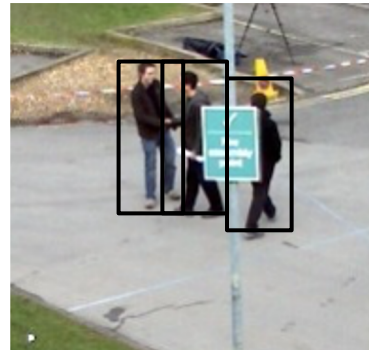
Recap: IoU Tracker

Pairwise IoU cost matrix
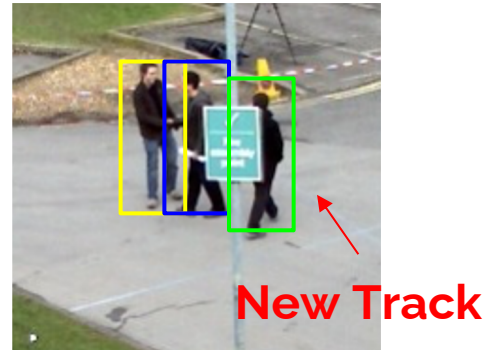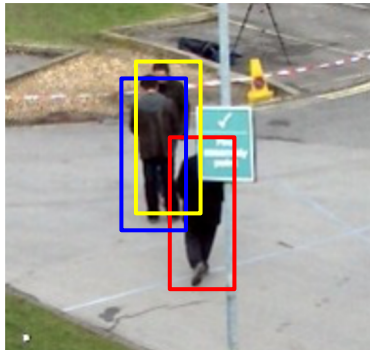
Missed Detection

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...

Bipartite matching using Hungarian algorithm!

Pairwise IoU cost matrix

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

Tracks in past frame

Tracks Frame detections

What we want...

Pairwise IoU cost matrix

Difficult with IoU

Add previously unmachted tracks to assigment step!

Missed Detection

Exercise 1

- Basic IuO-tracker introduced in exercise 0

➔ tracker has several issues in assignment step

Tasks in this exercise:

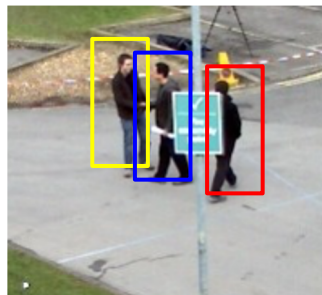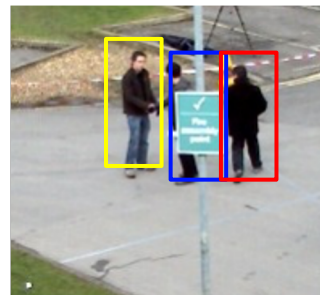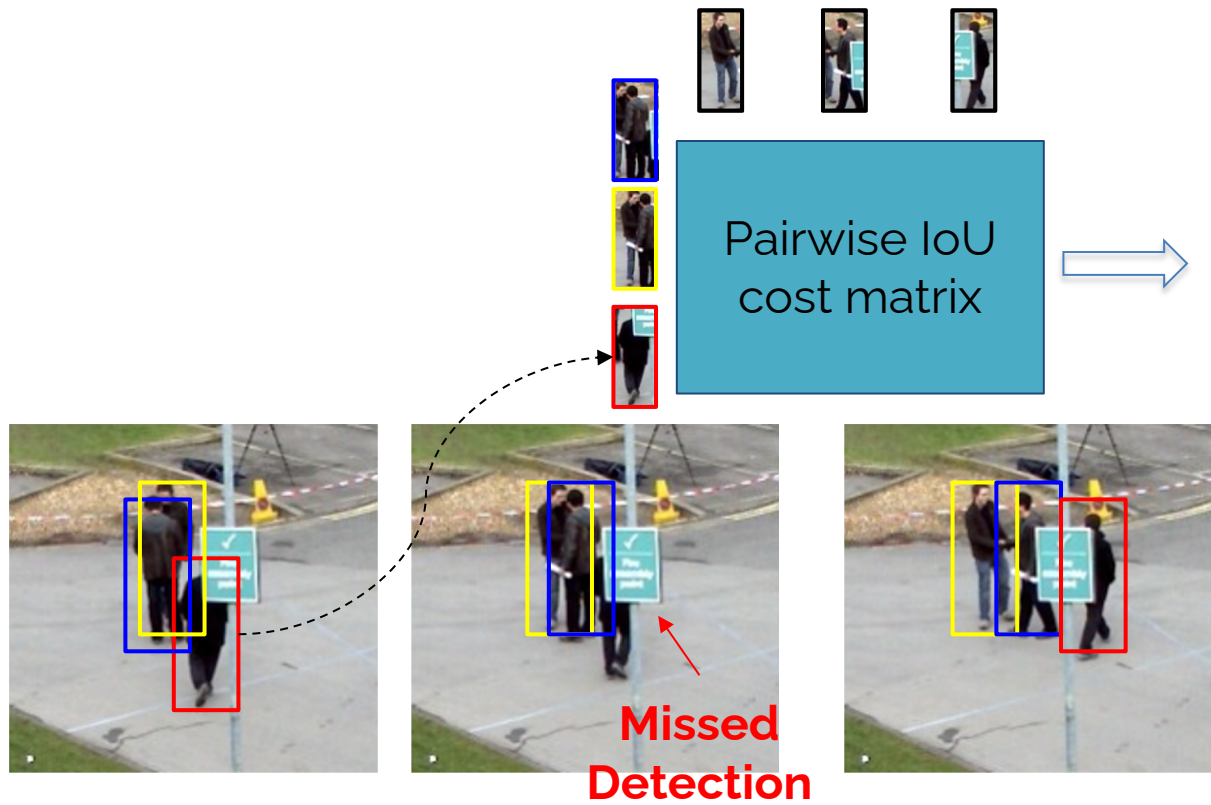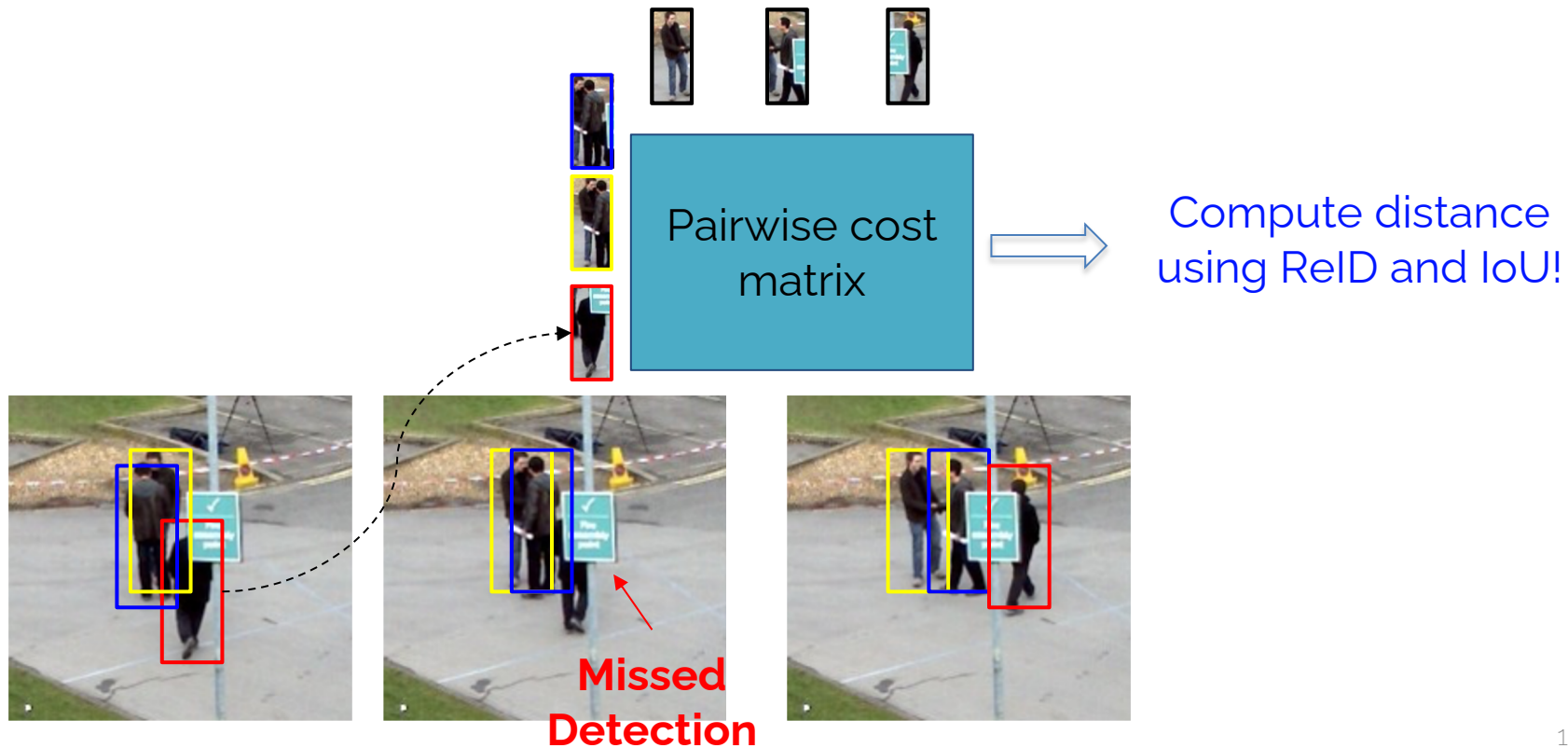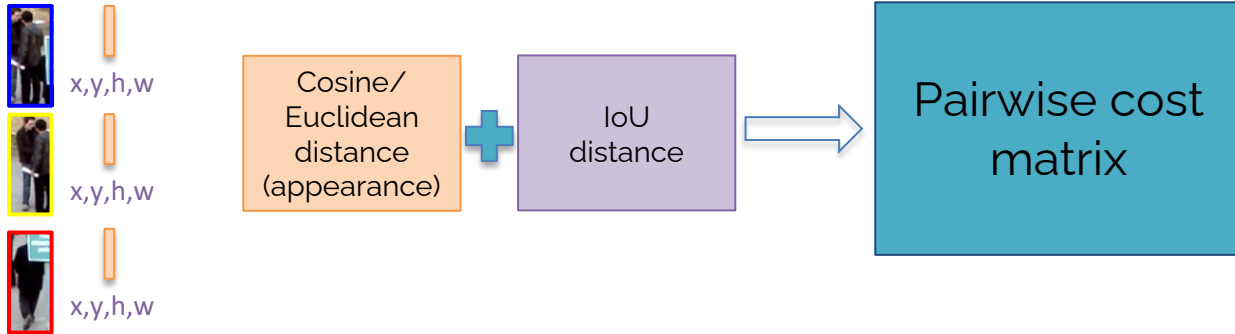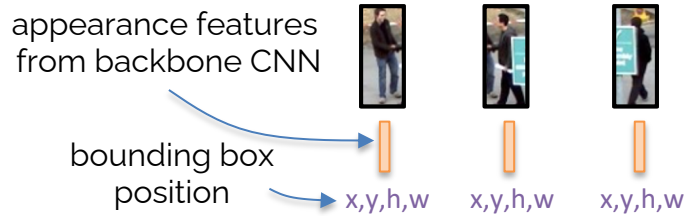1. Remove those issues in exercise 1!
2. Include person ReID in the tracker

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

x,y,h,w   x,y,h,w   x,y,h,w

x,y,h,w

x,y,h,w

x,y,h,w

| Cosine/ Euclidean distance (appearance) | ➕ | IoU distance | ⇒ | Pairwise cost matrix |

What we want...

appearance features
from backbone CNN

Cosine/
Euclidean
distance

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

What we want...
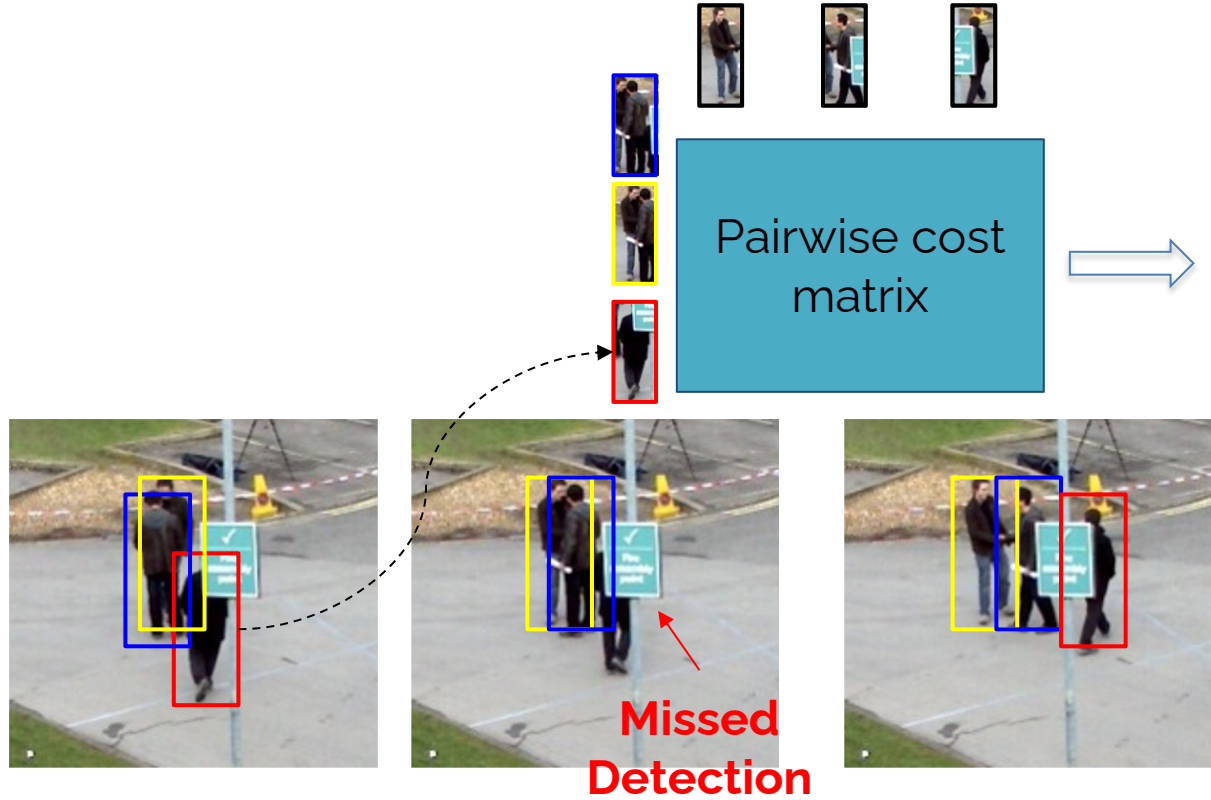
Pairwise cost matrix

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

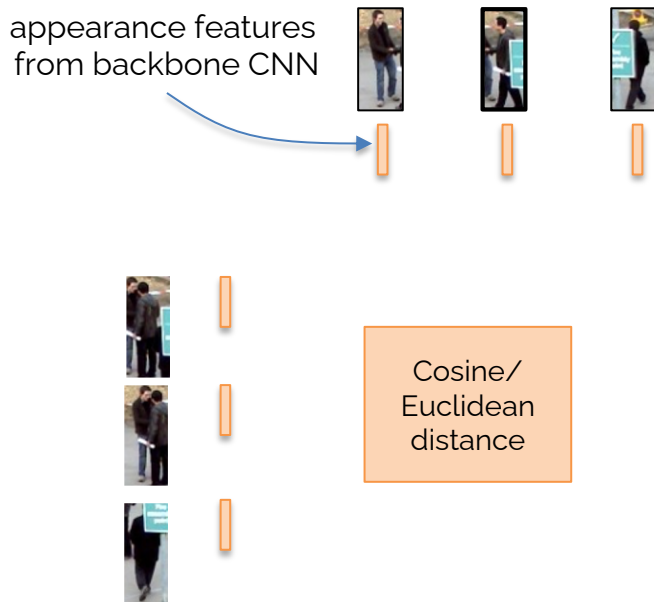# Links

- Test server:
  https://adm9.in.tum.de/embed.php/prakt/cv3dst/
- Exercise 1:
  https://colab.research.google.com/drive/1Agbm-uG-_0eSQfmrIxCWTZQaxgFrQBrs?usp=sharing