Pedestrian tracking

VUT FIT POVa

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Task Inspiration

- Marauder's Map from Harry Potter
  - Magic parchment that reveals the current location of anyone on Hogwarts grounds

http://harrypotter.wikia.com/wiki/Marauder%27s_Map

Task definition

- Multiple people walking in a scene
- Multiple stationary cameras
  - Initial calibration
- Individual path tracking

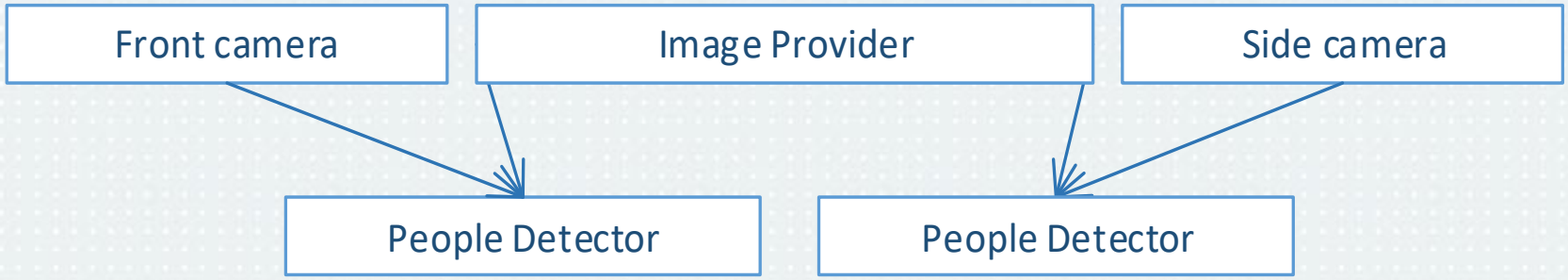
Processing pipeline

Front camera

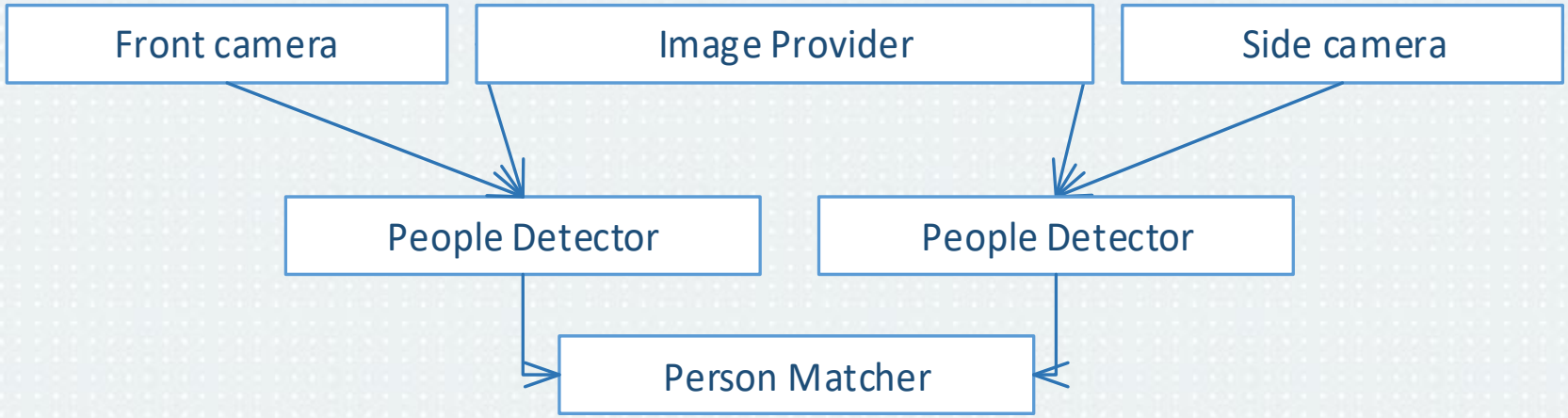
Side camera

Processing pipeline

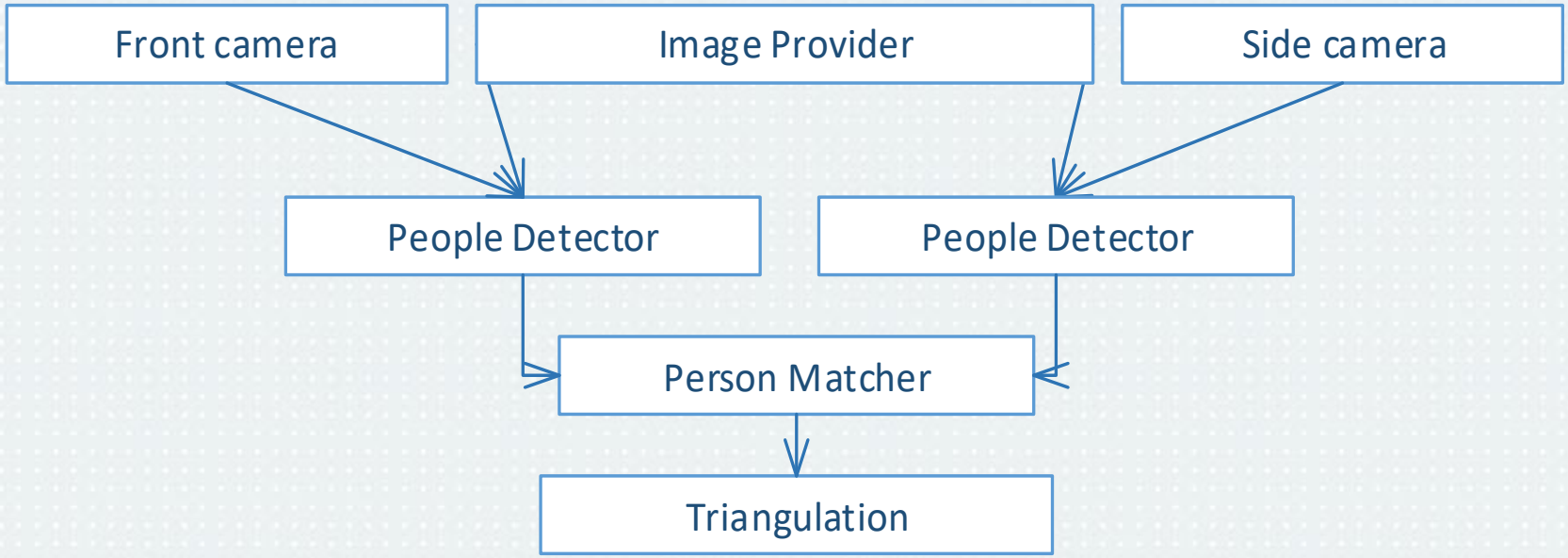
Processing pipeline



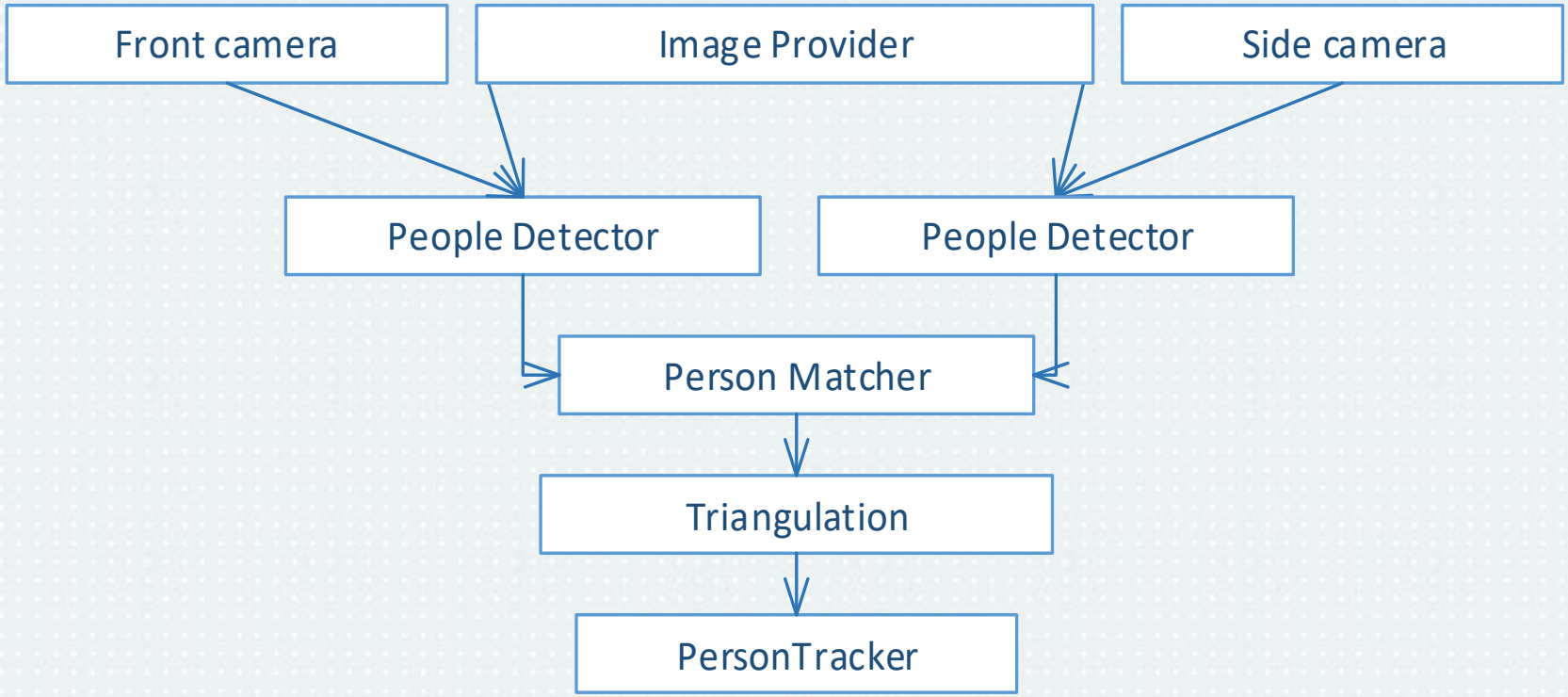
Processing pipeline



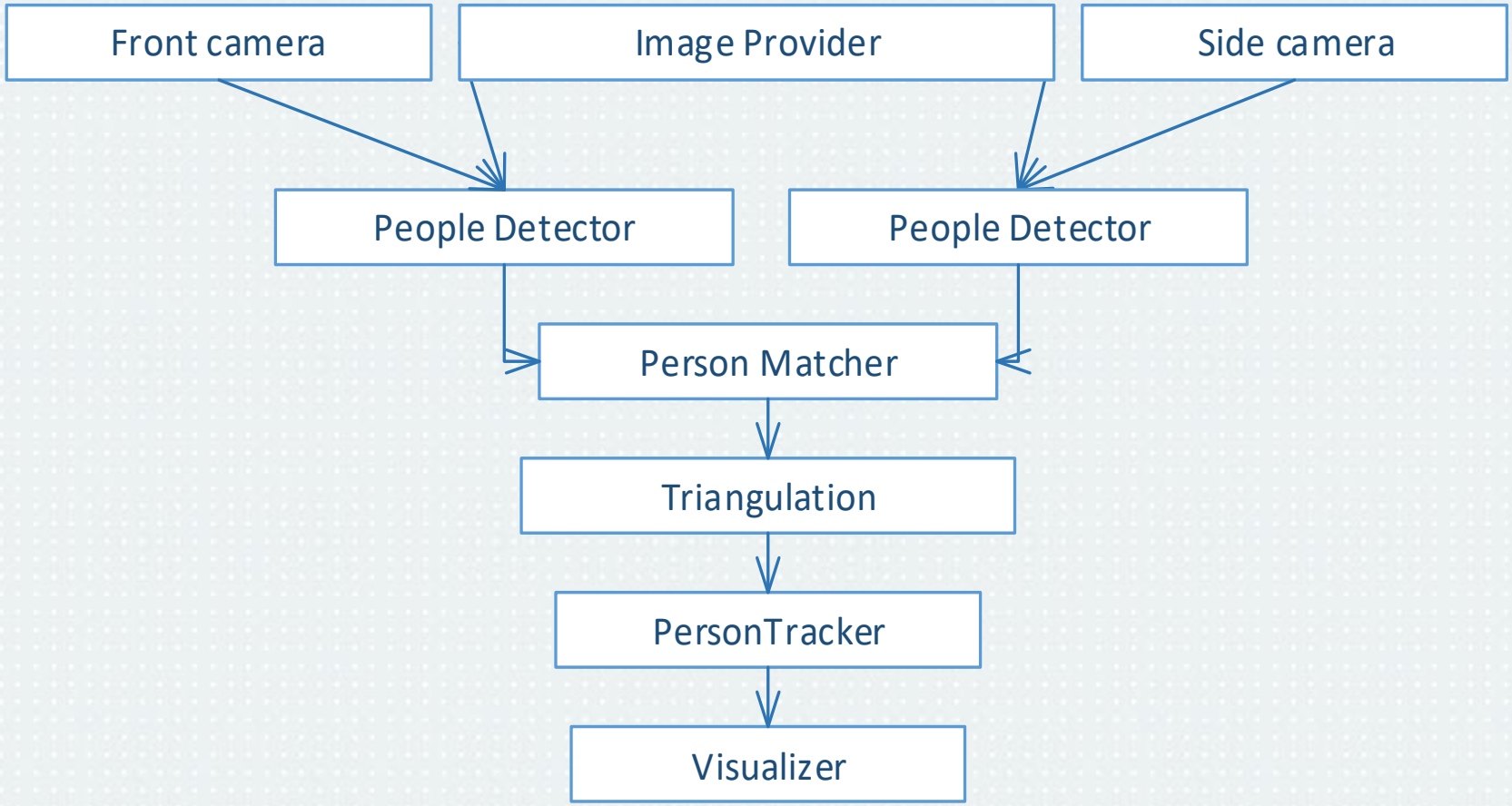
Processing pipeline



Processing pipeline



Processing pipeline



Human Detection in 2D

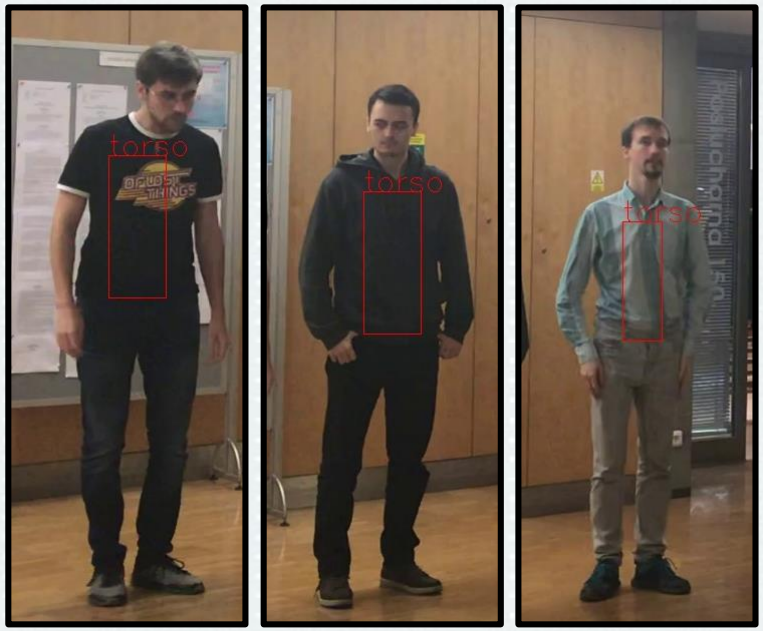
- OpenPose deep neural network
- Pretrained model with COCO dataset
- Left hip, right hip, neck → bounding box

Human Detection in 2D

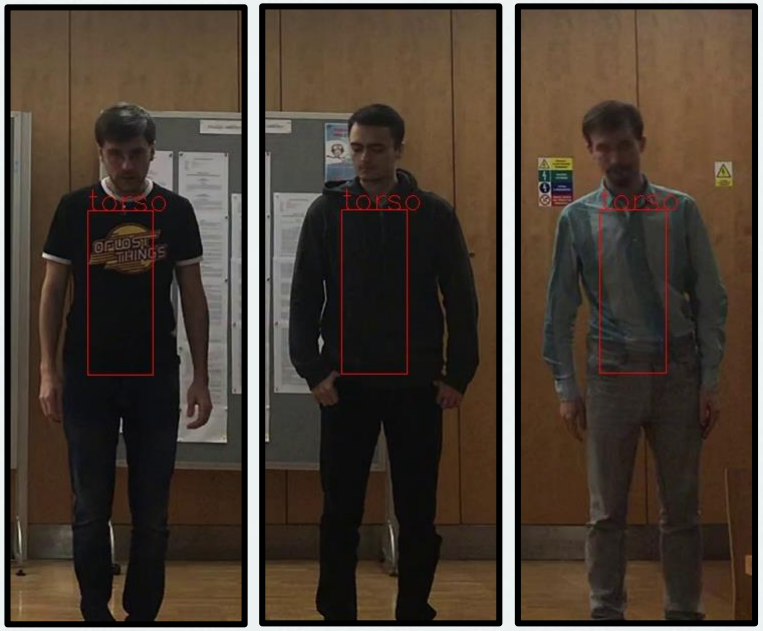
- TODO graph speed
  - OpenPoseDetector
  - OpenPoseBinaryDetector CPU
  - OpenPoseBinaryDetector GPU

Person View Matching

Similar torso histograms → same person



Side person views

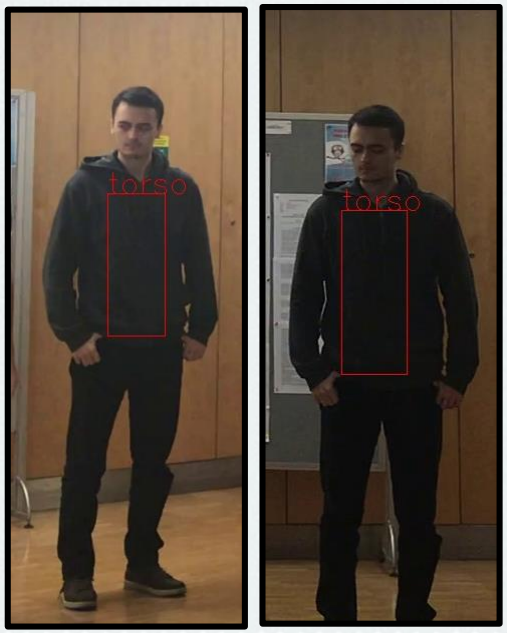


Front person views

Person View Matching

Similar torso histograms → same person

PersonTimeFrame A



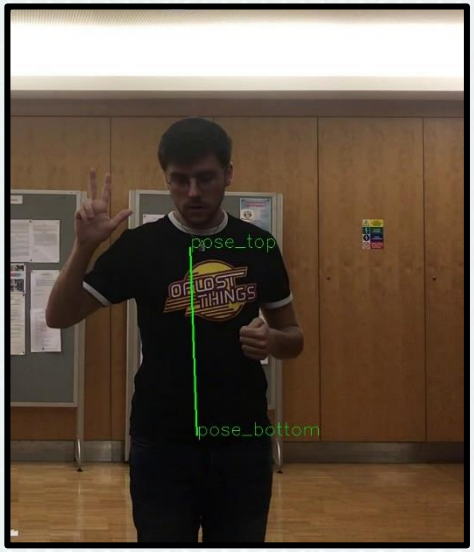
PersonTimeFrame B

PersonTimeFrame C

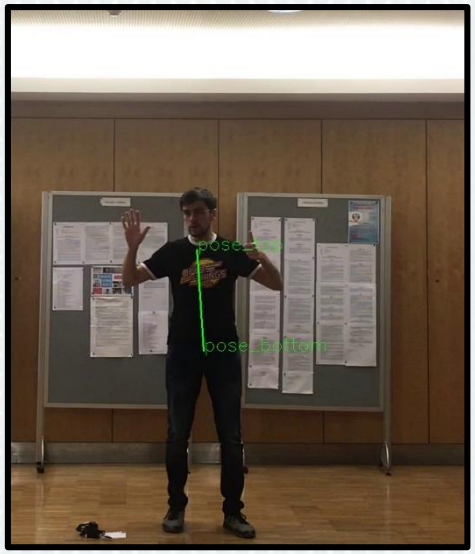
Triangulation

Average person's torso → distance from camera

$y = 2$ m



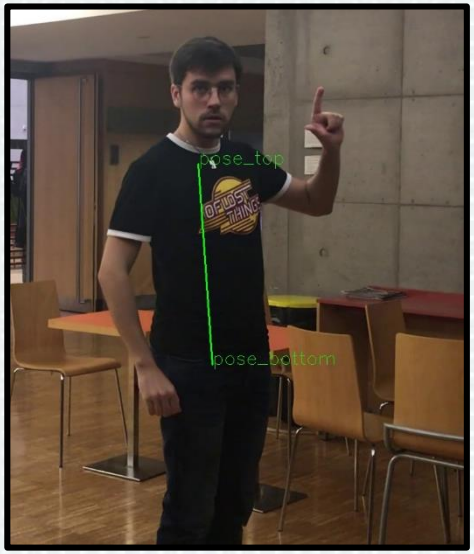
$y = 3$ m



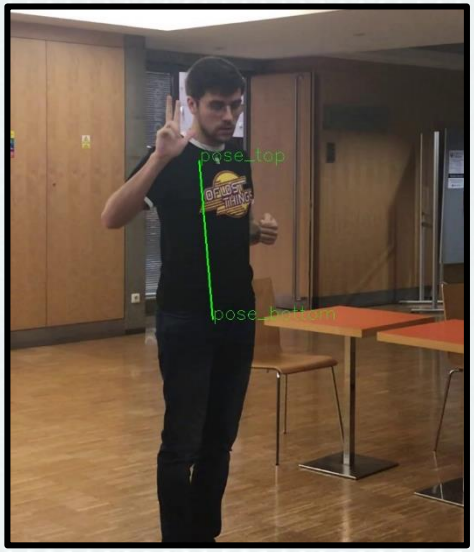
$y = 6$ m

Triangulation

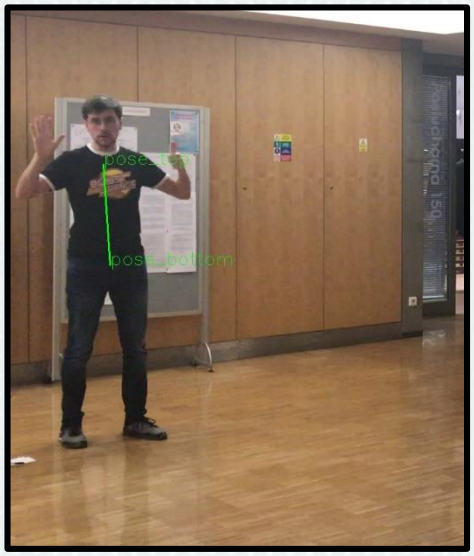
Average person's torso → distance from camera



$y = 2$ m



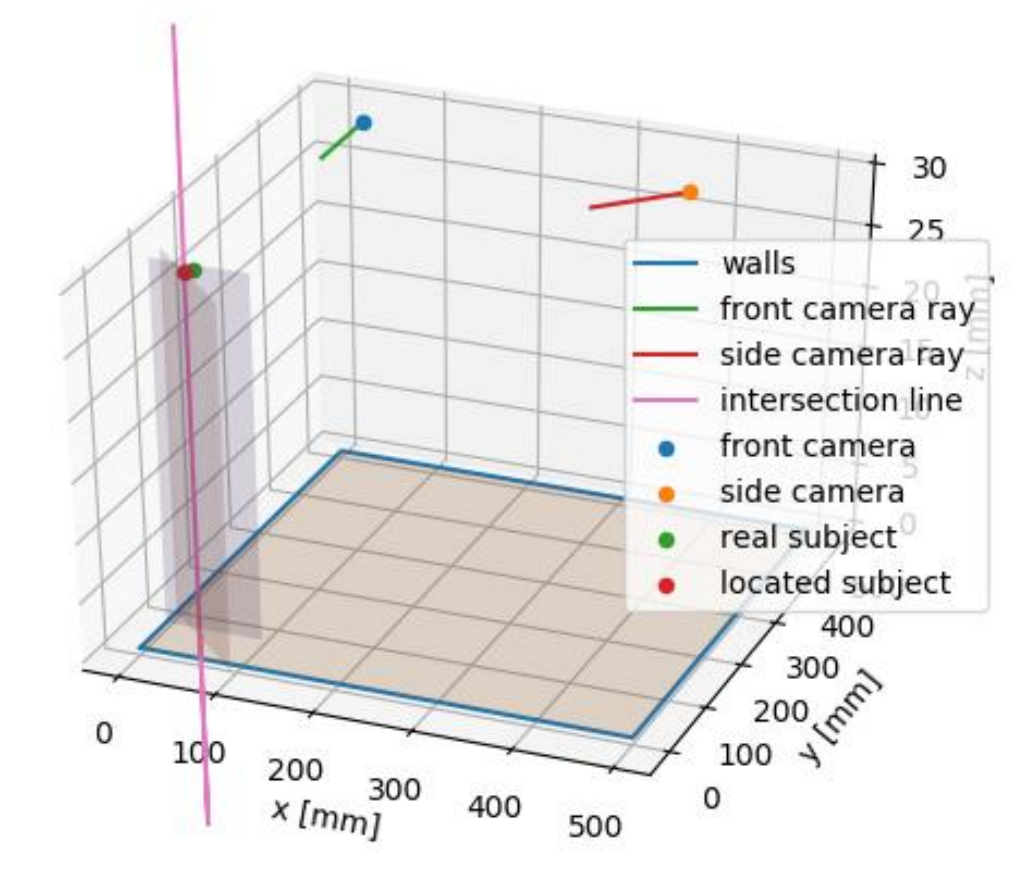
$y = 3$ m



$y = 6$ m

Triangulation

Intersection of distance planes → person‘s position

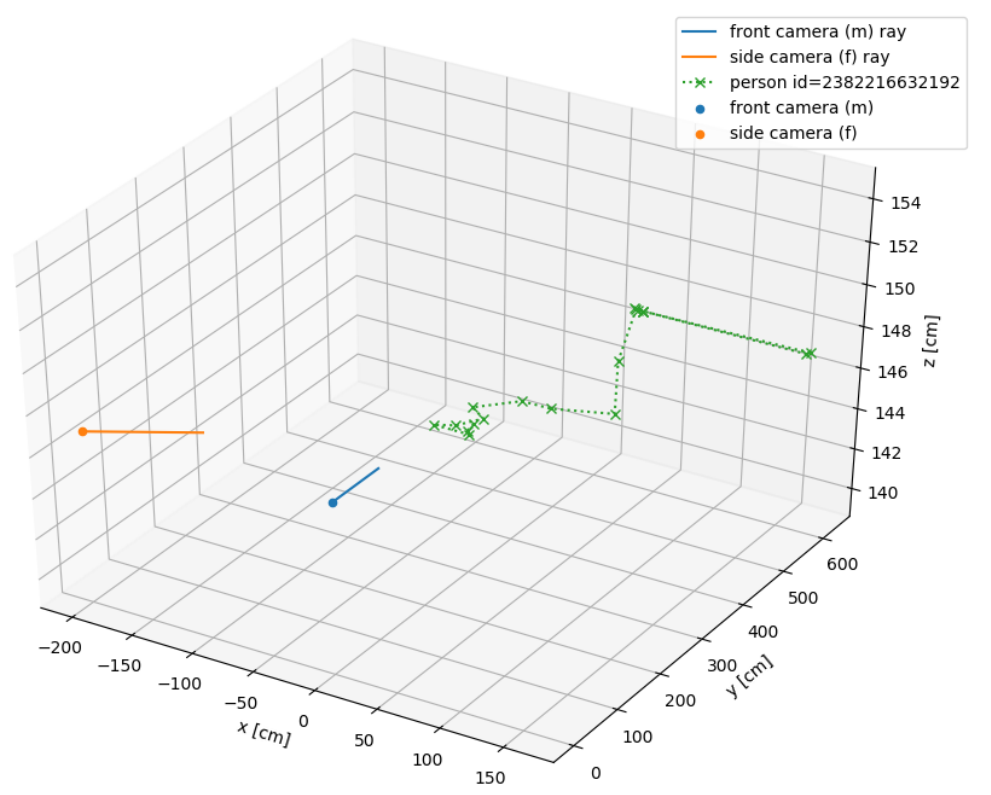


Person Tracking

- Based on image histograms
- TODO persontimeframes

Visualisation

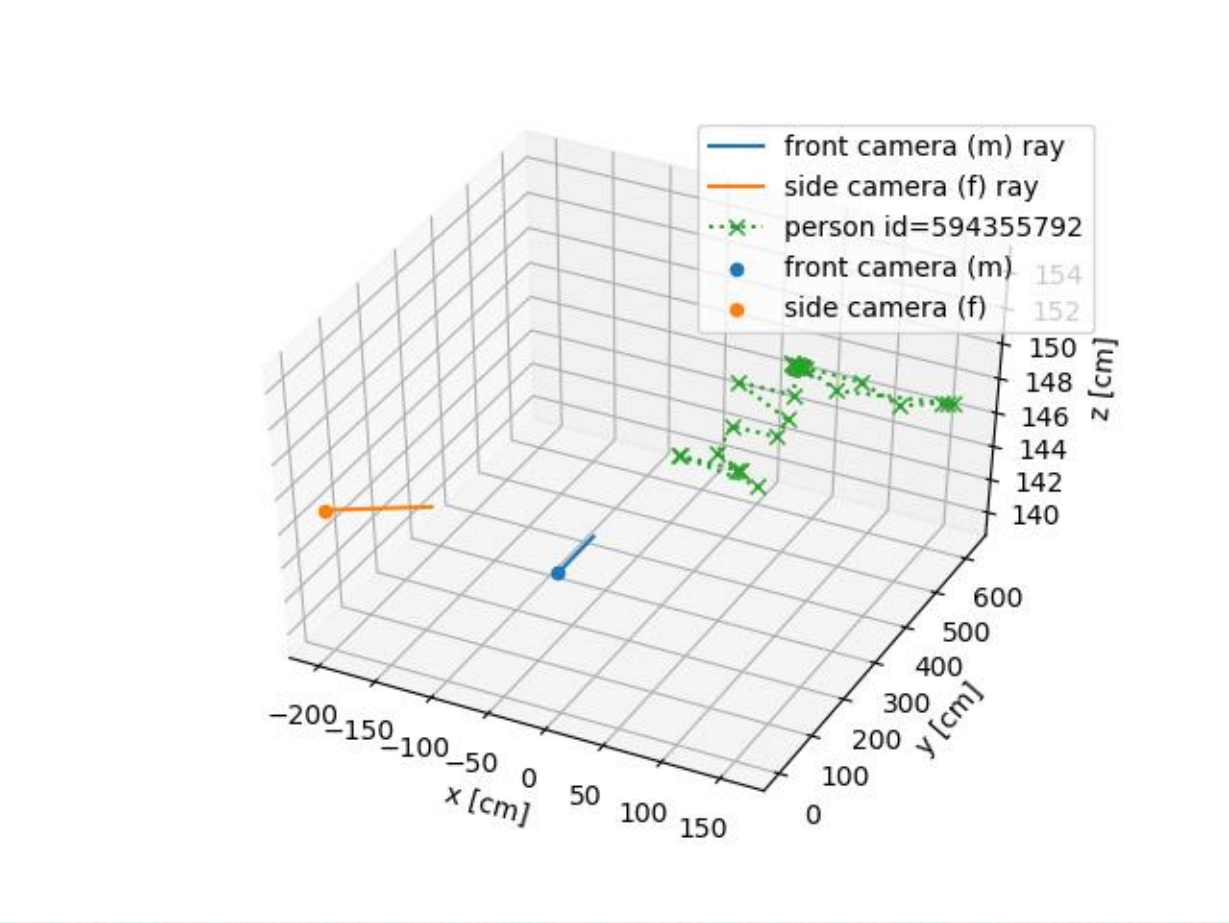
- Paths of all tracked people, positions of cameras
- Interactive 3D model

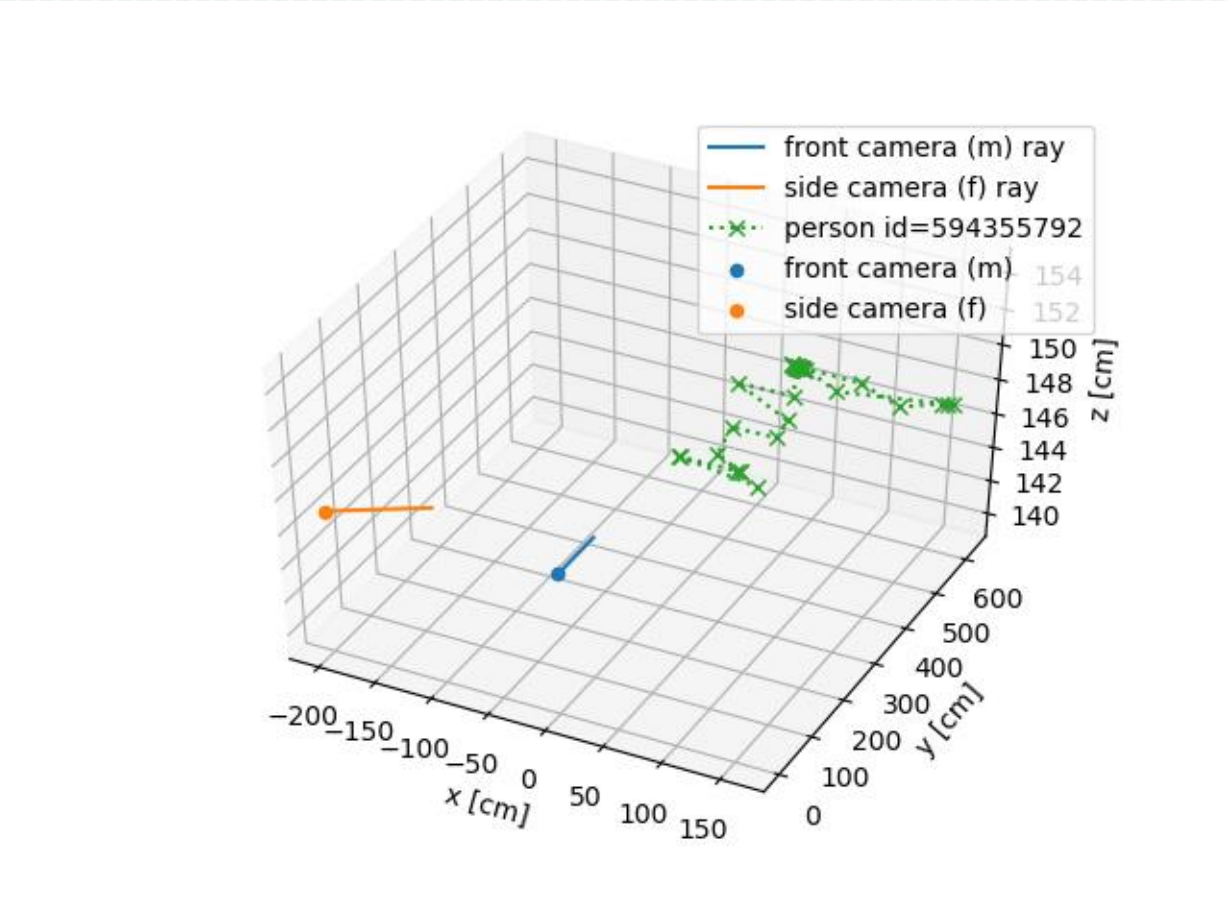


Testing Data

- Own images, COCO dataset for OpenPose

Evaluation


front camera (m) ray
side camera (f) ray
person id=594355792
front camera (m)
side camera (f)
x [cm]
y [cm]
z [cm]



Thank you for your attention.