MOT & Reconstruction W13

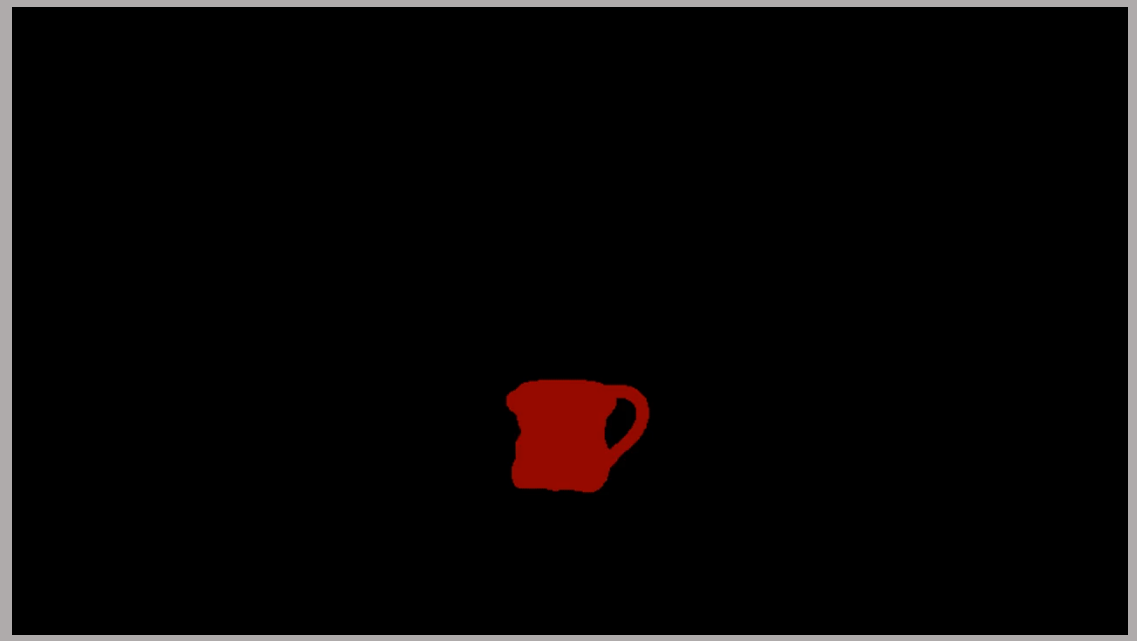
- Recap week 12 progresses
- Poses and reconstructions scores algorithms
  - ADD Score
  - CD Score
- New papers

MOT & Reconstruction W12

- Recorded 21 new videos
  - RGBD using the Kinect Azure
  - 500 frames each
  - 1280x720
  - 5 objects:
    - “Teddy mug”
    - Spray-paint can
    - Metal mug
    - Glass mug
    - CD-ROM

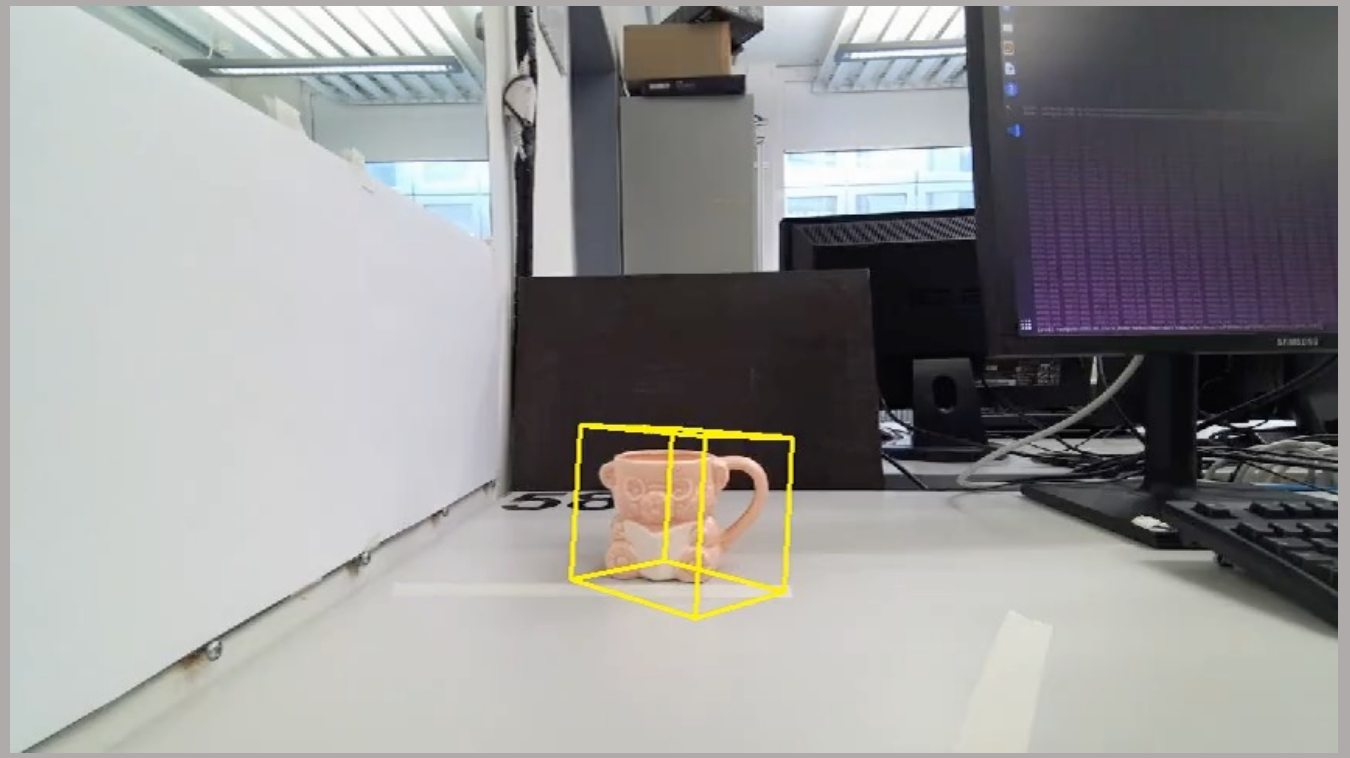
MOT & Reconstruction W12

Teddy mug



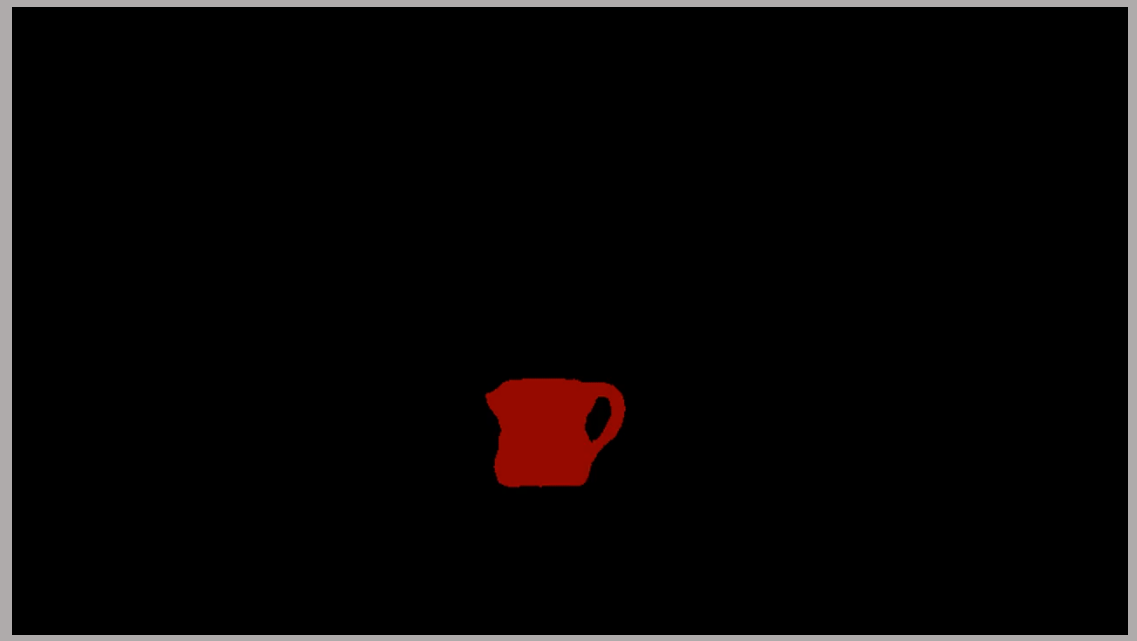
MOT & Reconstruction W12

Teddy mug



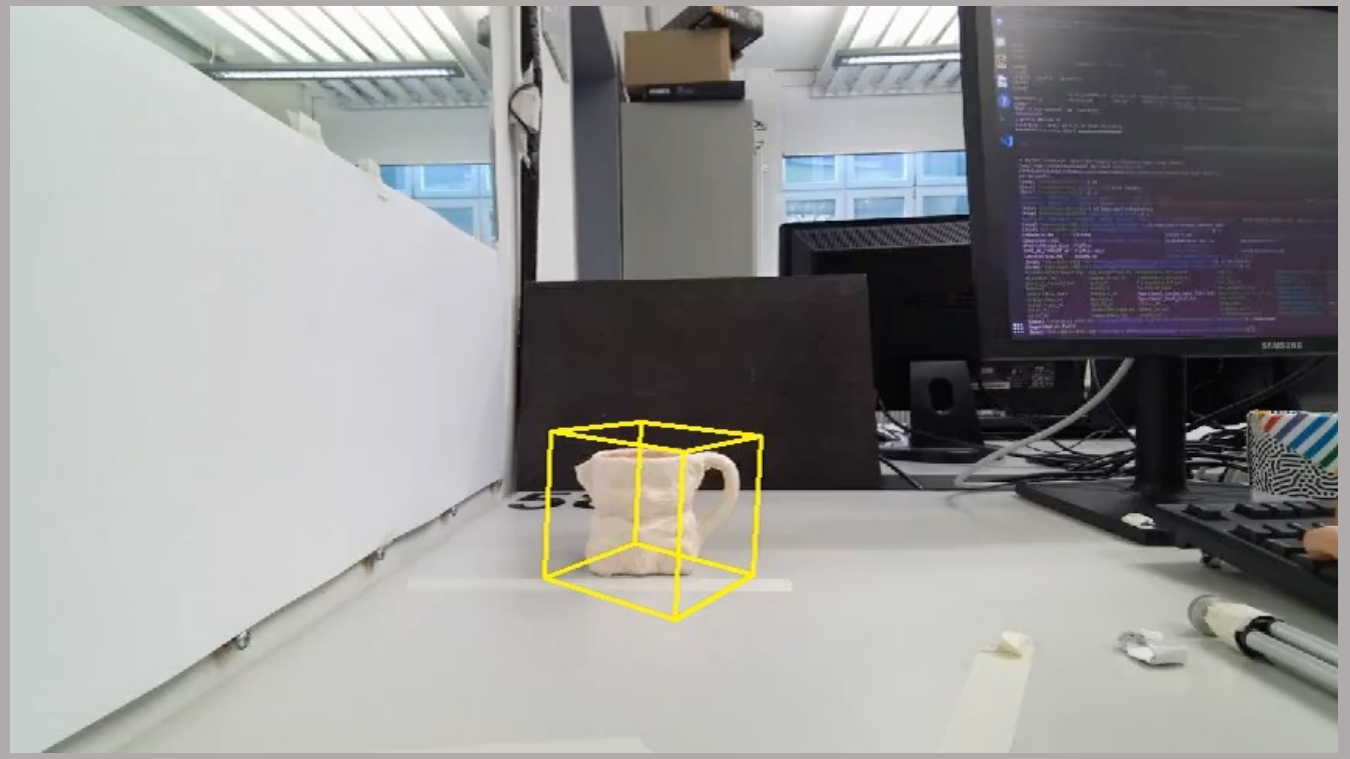
MOT & Reconstruction W12

Teddy mug



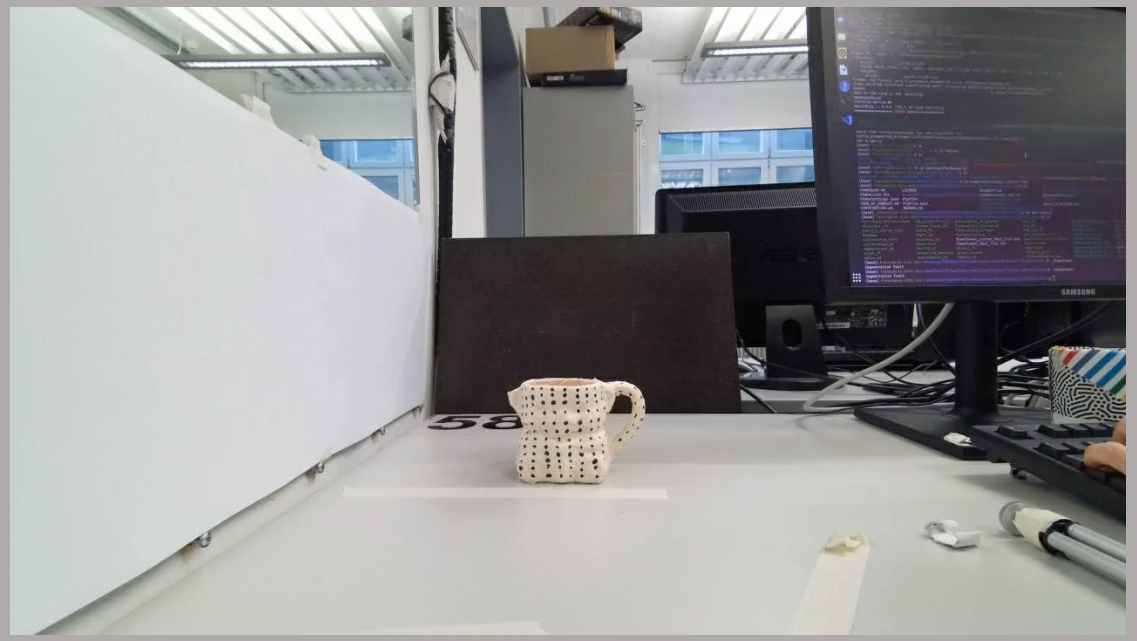
MOT & Reconstruction W12

Teddy mug



MOT & Reconstruction W12

Teddy mug

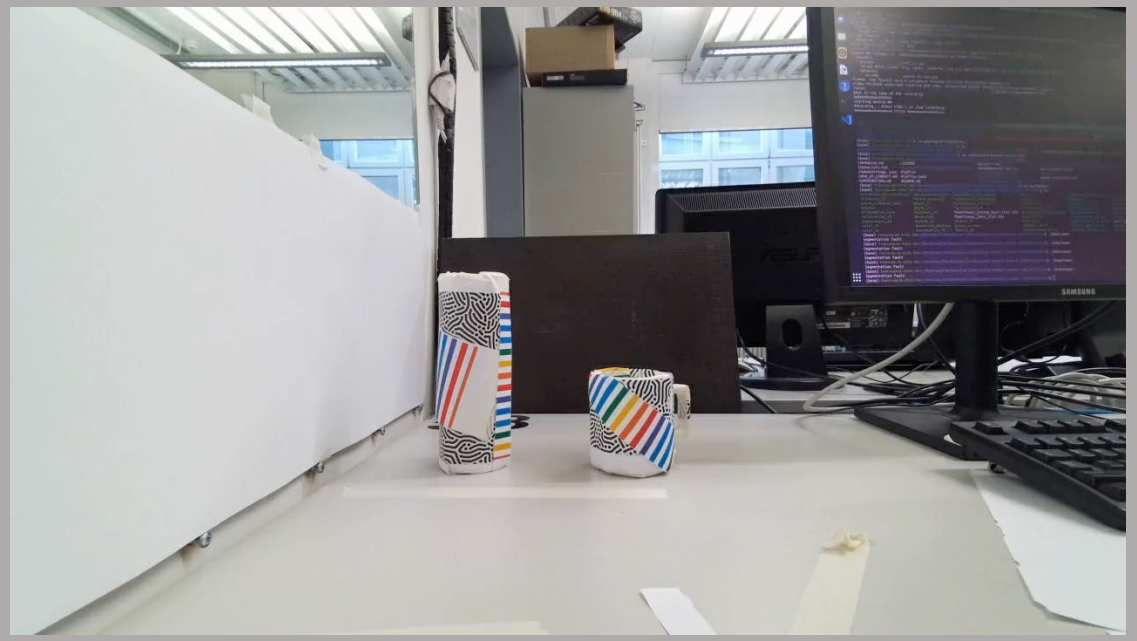


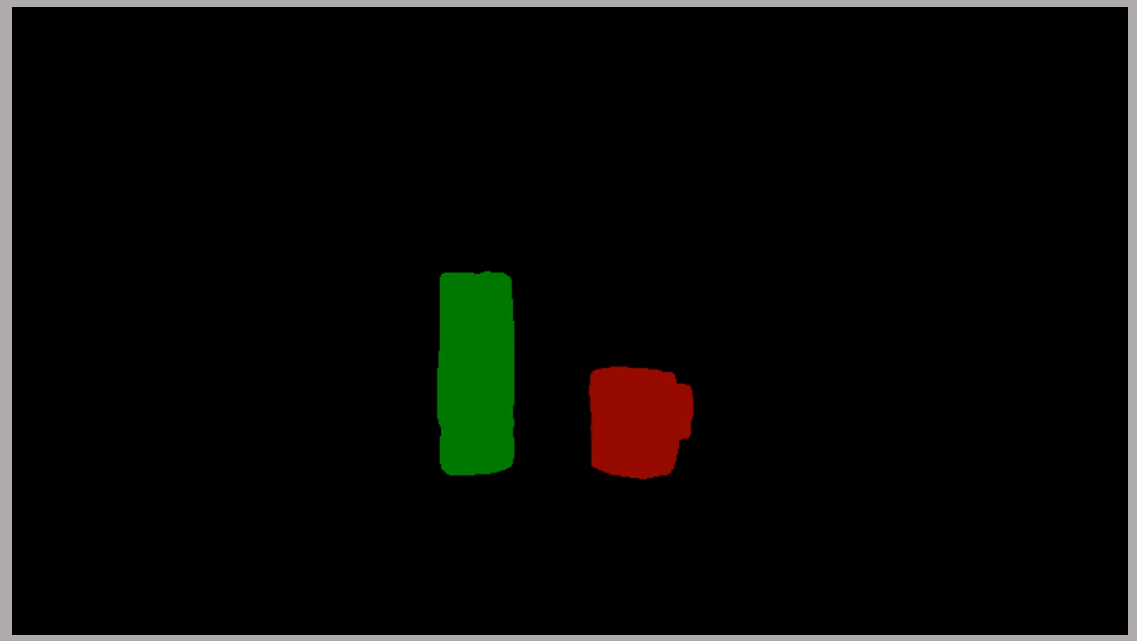
MOT & Reconstruction W12

Teddy mug

MOT & Reconstruction W12

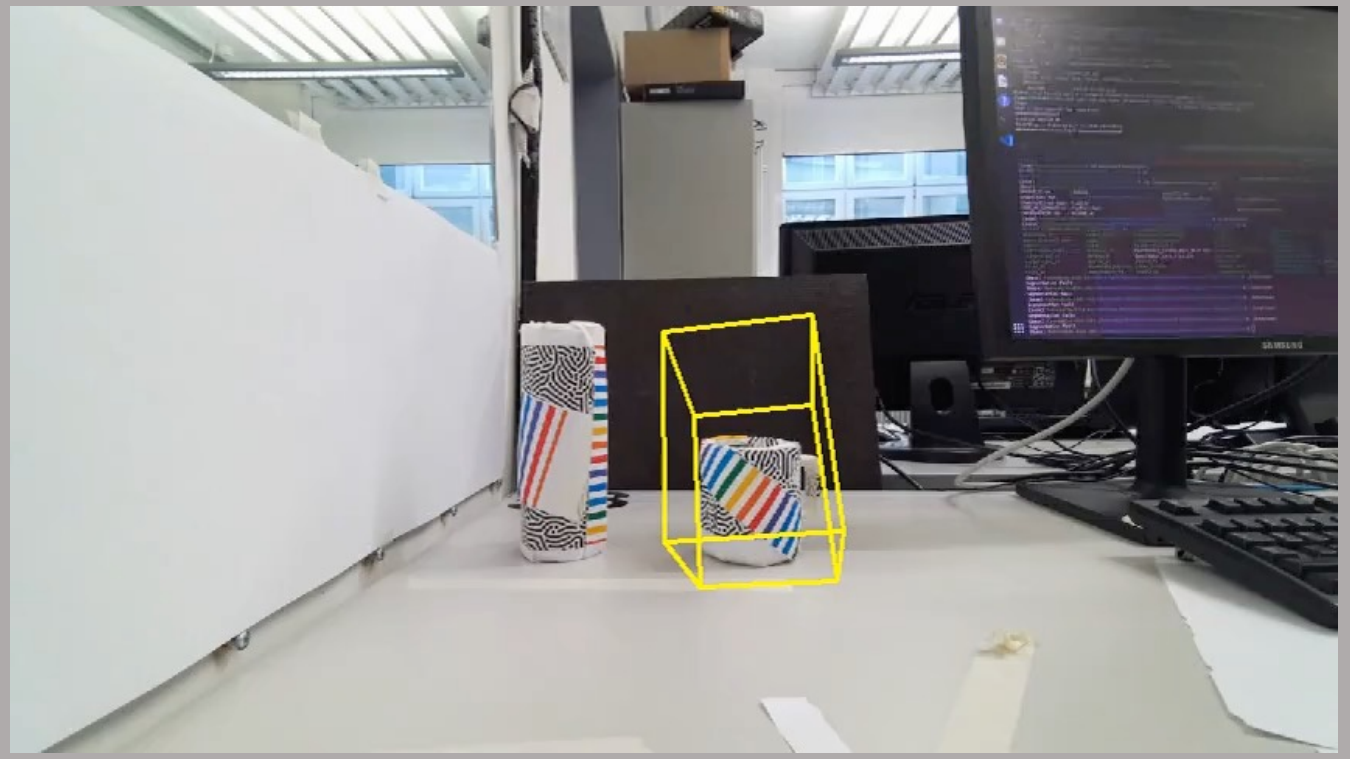
Spray-paint with mug





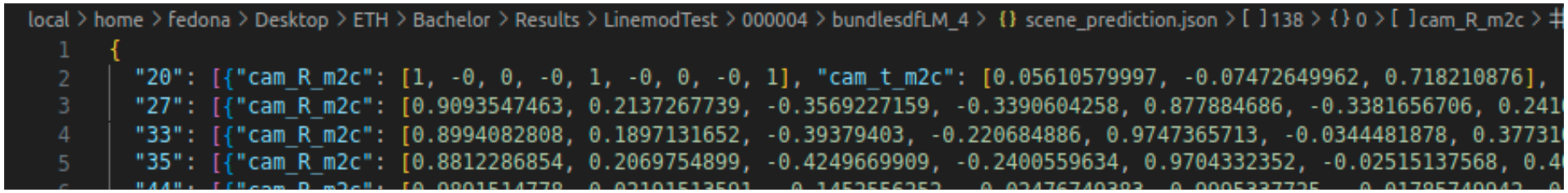
MOT & Reconstruction W12

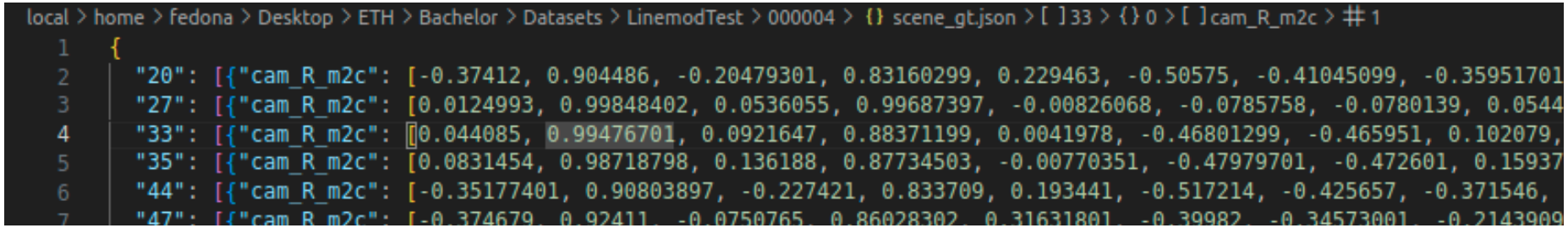
Spray-paint with mug



Pose Score

- BundleSDF uses ADD-S and ADD scores metrics during the evaluation
  - Average distance 3D, point to point
  - Initial standard pose in BundleSDF

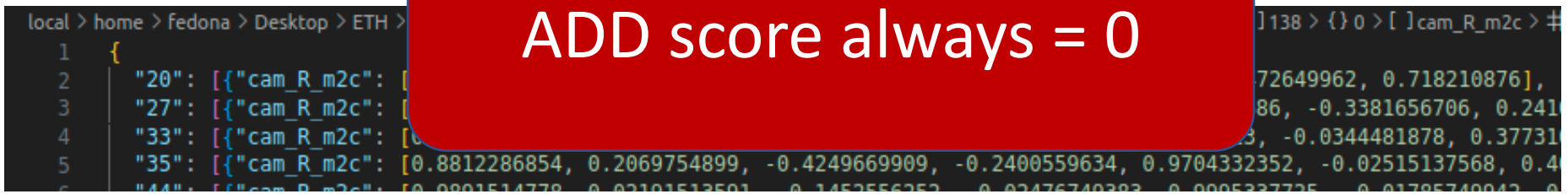


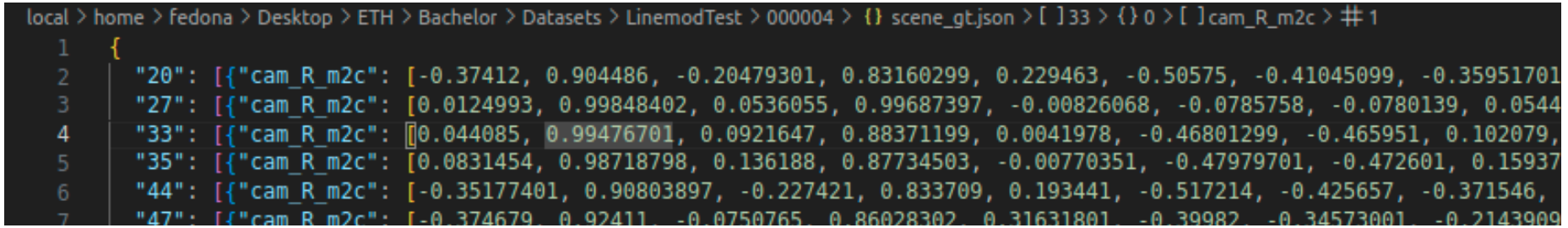


Pose Score

- BundleSDF uses ADD-S and ADD scores metrics during the evaluation
  - Average distance 3D, point to point
  - Initial standa

ADD score always = 0

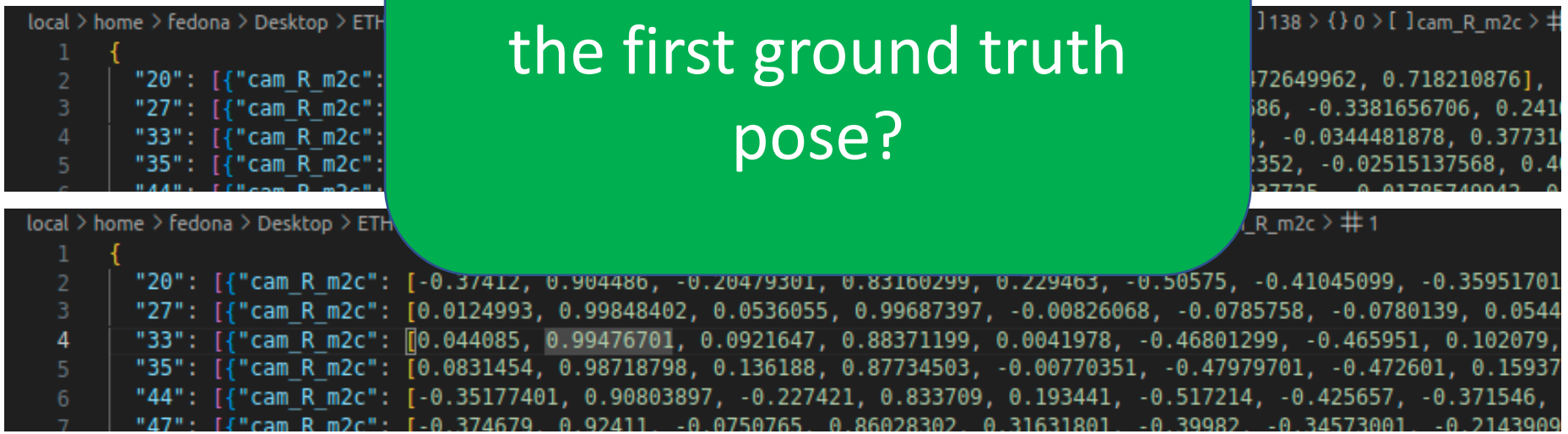




Pose Score

- BundleSDF uses ADD-S and ADD scores metrics during the evaluation
  - Average dist
  - Initial standa

Should I align the first frame predicted pose with the first ground truth pose?



Reconstruction Score

- BundleSDF uses Chamfer Distance
- $CD(A,B) = \frac{1}{|A|}\Sigma_{a\in A} min_{b\in B}\left||a-b|\right| + \frac{1}{|B|}\Sigma_{b\in B} min_{a\in A}||b-a||$

Reconstruction Score

- BundleSDF uses Chamfer Distance
- $CD(A,B) = \frac{1}{|A|}\Sigma_{a\in A} min_{b\in B}\left||a-b|\right| + \frac{1}{|B|}\Sigma_{b\in B} min_{a\in A}||b-a||$
  - What if a mesh is not “centered”?
    - Compute centroid fails with artifacts…

BundleSDF fail

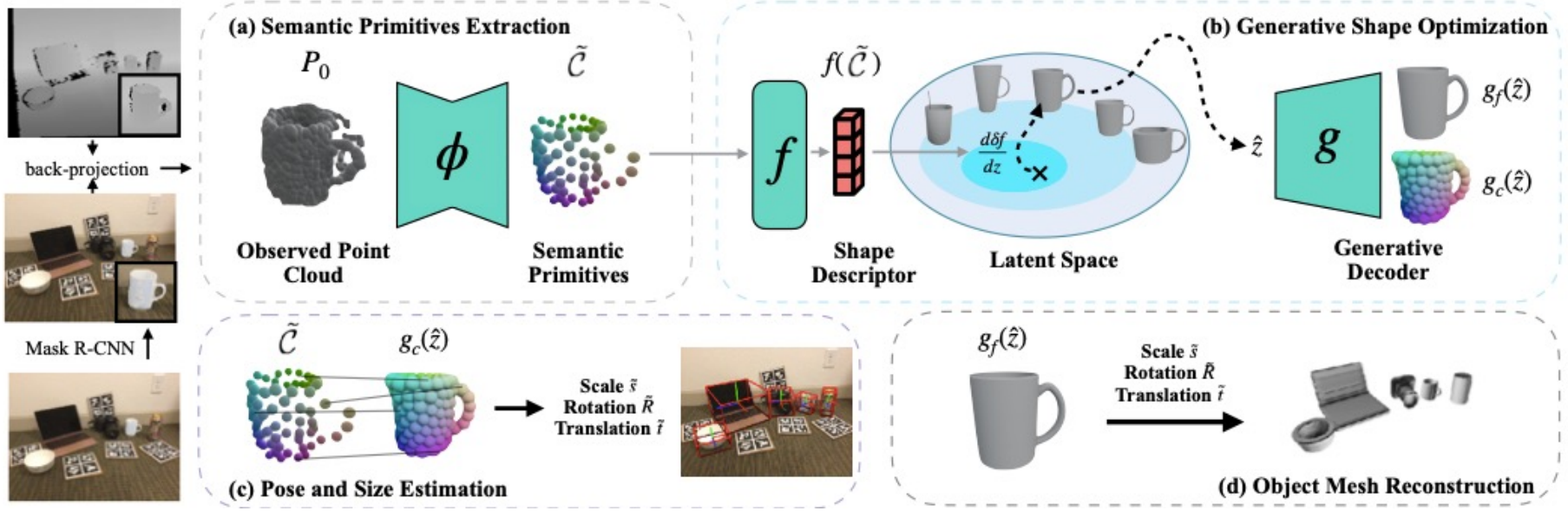
- The code did fail sometimes to reconstruct the objects
  - ”bug fixed” with new version of the code (Nov 4th)
  - Much slower to run
    - Every time it has too few matches it interrupts and asks if should continue
      - On Linemod Dataset keeps interrupting
      - Still have to try modify the code and re-run on the videos

New papers?

- Hard to find something similar to BundleSDF
  - There would be BundleTrack (-> fails to build)
- Simpler to find codes for either pose estimation or 3D reconstruction
  - Pose estimation:
    - Gasp: Generative Category-Level Shape and Pose Estimation with Semantic Primitives
    - DOPE: Deep Object Pose Estimation - ROS Inference
    - HybridPose: 6D Object Pose Estimation under Hybrid Representations

Gasp

- Shape Estimation is focused on Object semantics (recognize an object between a fixed amount of categories)

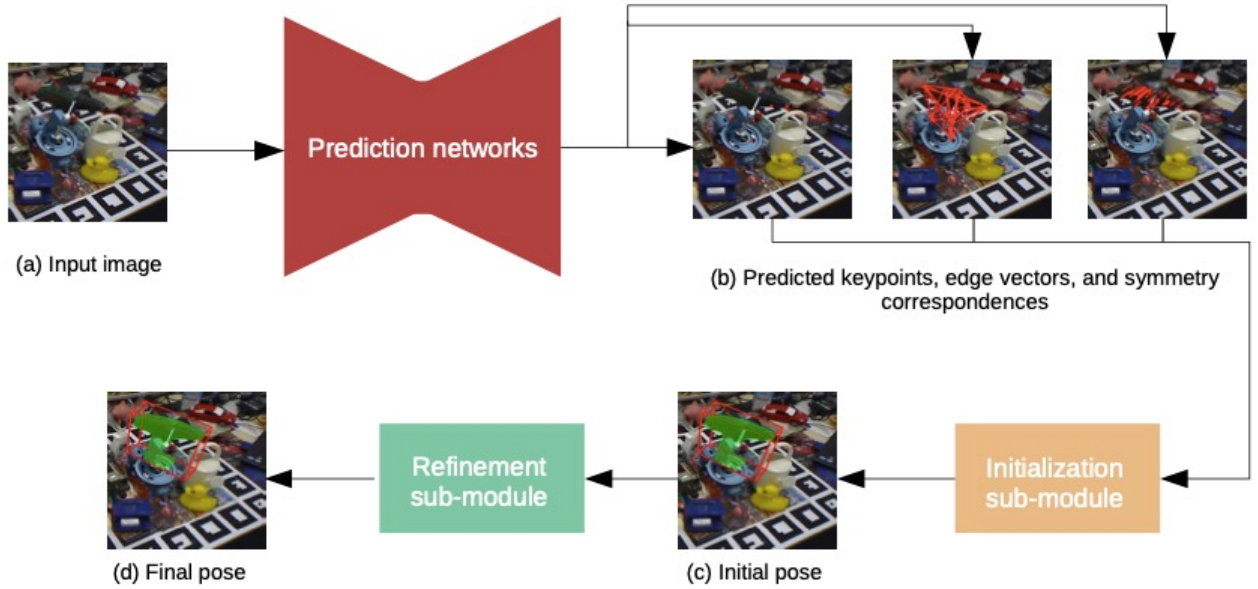


DOPE

- Nvidia Project, 2018
- RGB

Hybrid Pose

- 2020
- Tested on Linemod
- Real Time, SOTA performance



Other Papers?

- KinectFusion
  - No official code available?
- DPOD: Dense Pose Object Detector