Dynamic fusion

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Internship Week 24
Segmented Fusion
4th August 2017

Last meeting

- Previously
  - Correct part based fusion
  - Tracking : three tries
  - Explanation of transformations
- Plan for today's meeting:
  - Skeleton Tracking
  - Reports

Segmented Fusion Pipeline

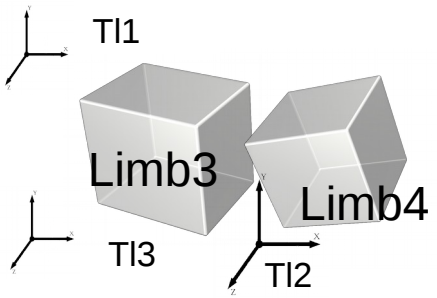
For each part

0 Bounding Box (PCA)

Compute dimensions

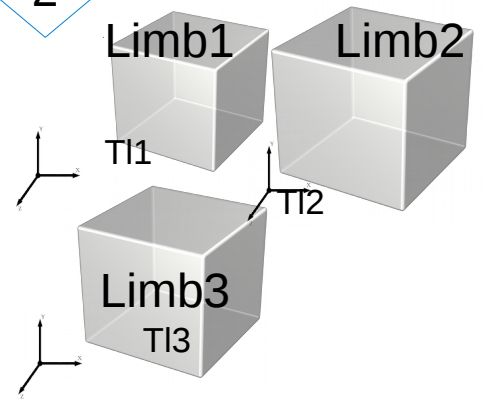
1 Create Volumes

Limb1



Local to Global coordinates

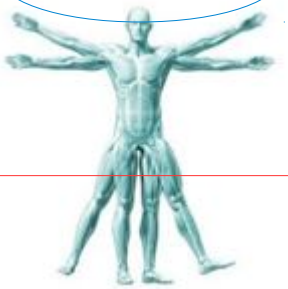
2



Transform in current pose

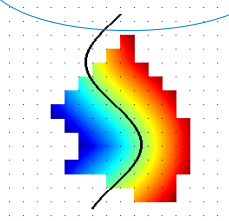
3

Align Pose

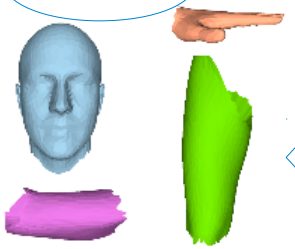


Projection in current image

4 TSDF Fusion

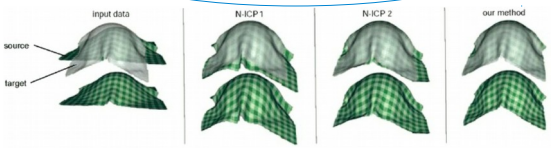


5 Mesh



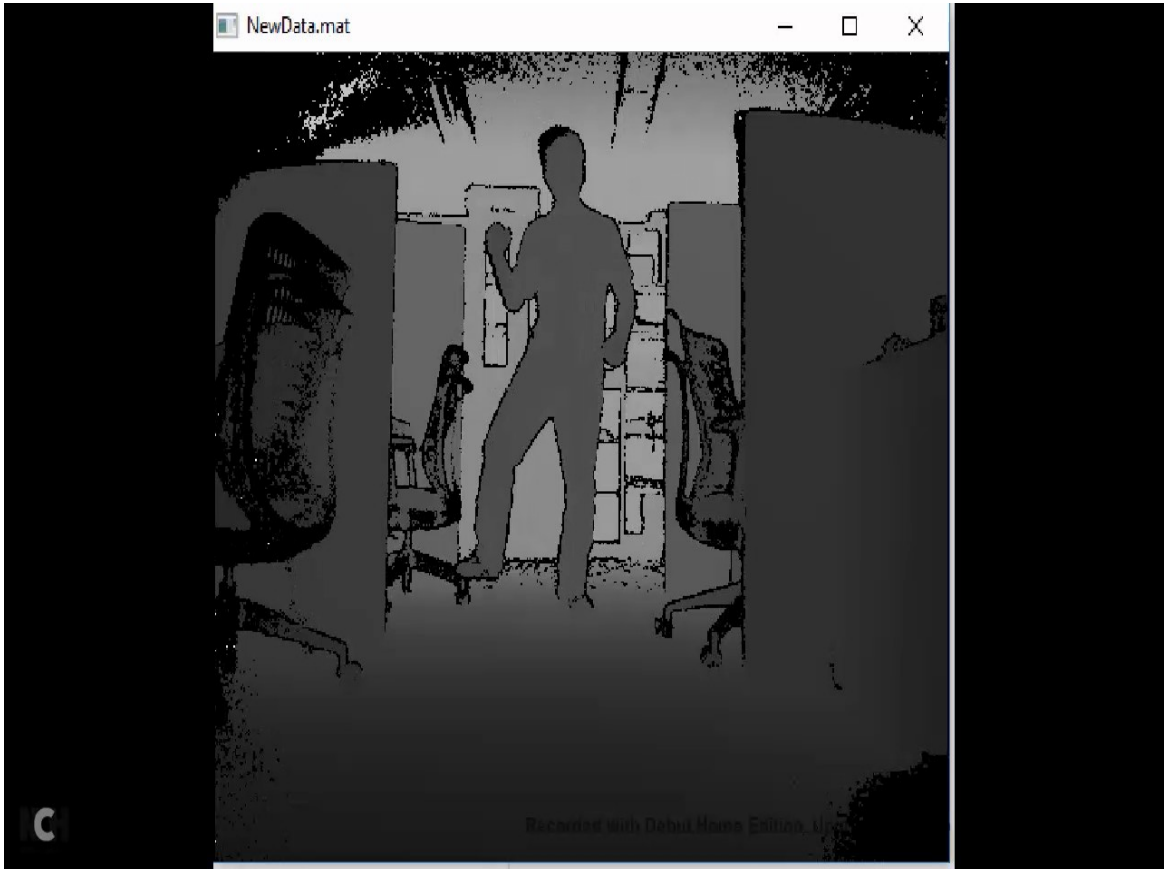
6 Assembling mesh

7 Rigid Alignment



End of 1

Dataset



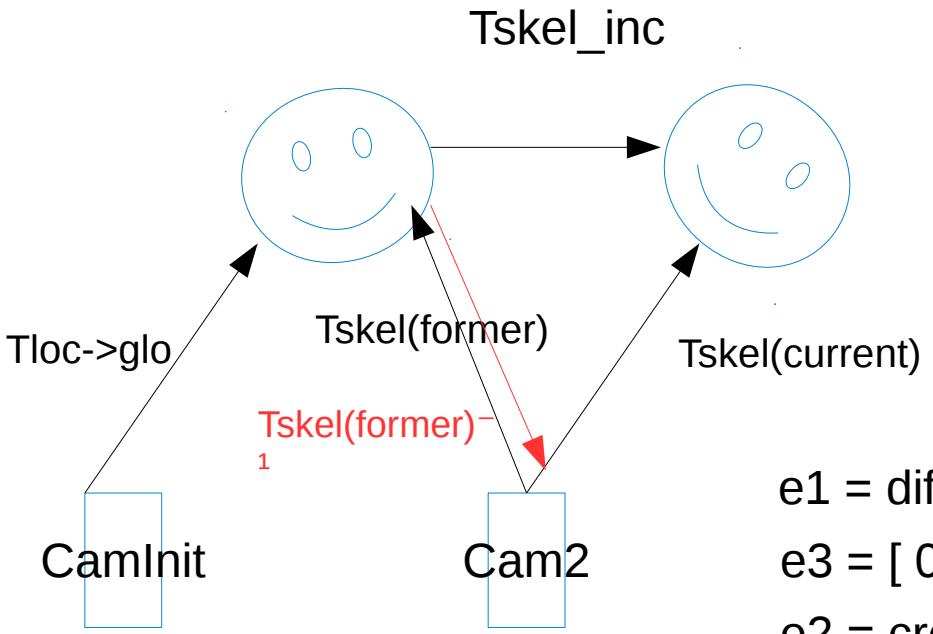
Data issues : empty images

Segmentation issues: some segmentation create empty cluster

=>use of some data.

Skeleton tracking

Head image 1 Head image 2



Tskel_inc = Tskel(current) * Tskel(former)$^{-1}$

Tskel : e1 e2 e3 Ctr

$$\begin{bmatrix} e11 & e21 & e31 & c1 \\ e12 & e22 & e32 & c2 \\ e13 & e23 & e33 & c3 \\ 0. & 0. & 0. & 1. \end{bmatrix}$$

e1 = difference of perspective transform of two junctions

e3 = [0.0, 0.0, depth of center of cloud of point]

e2 = cross(e1,e3)

e13 = depth of vertex at junction 1

e23 = depth of vertex at junction 2

c1,c2 = perspective transform of mean of junctions

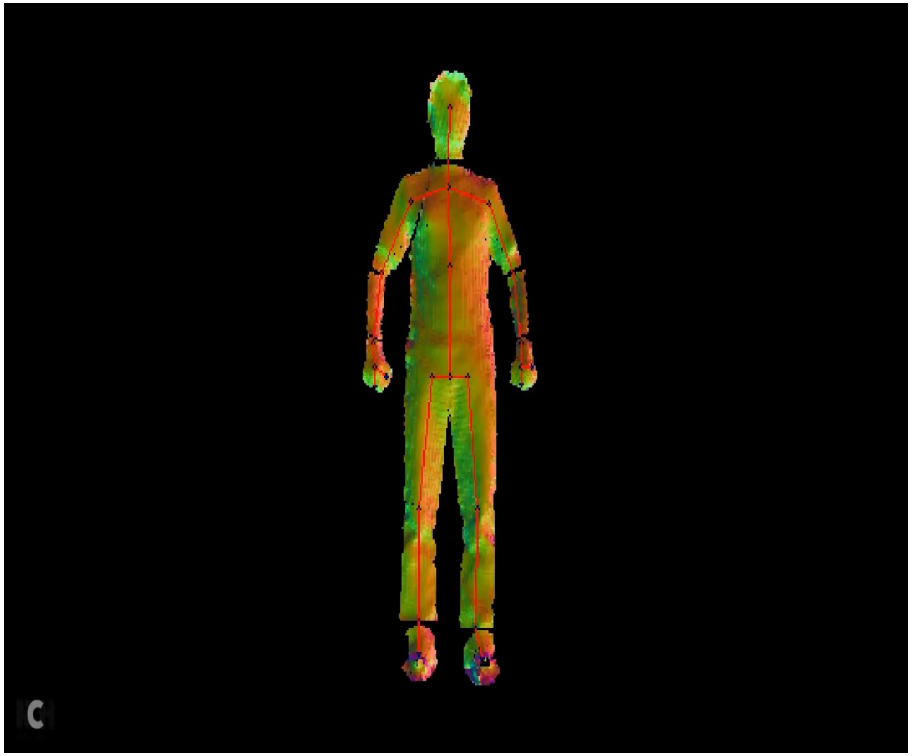
c3 = e33

Skeleton tracking

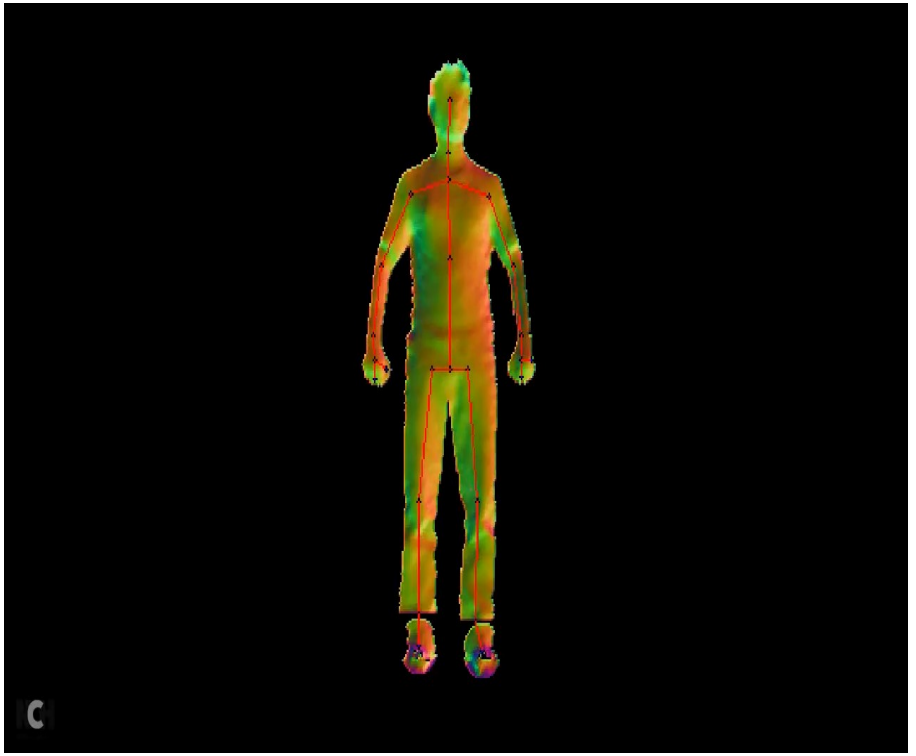
- Algo:
- Initialization : compute all body part 3D model and transform it in global frame.
- For each following image increment this transform with Tskel_inc
- Tskel_inc = Tskel(current) * Tskel(former)$^{-1}$

Skeleton tracking

Sequence 80-100 with stitching

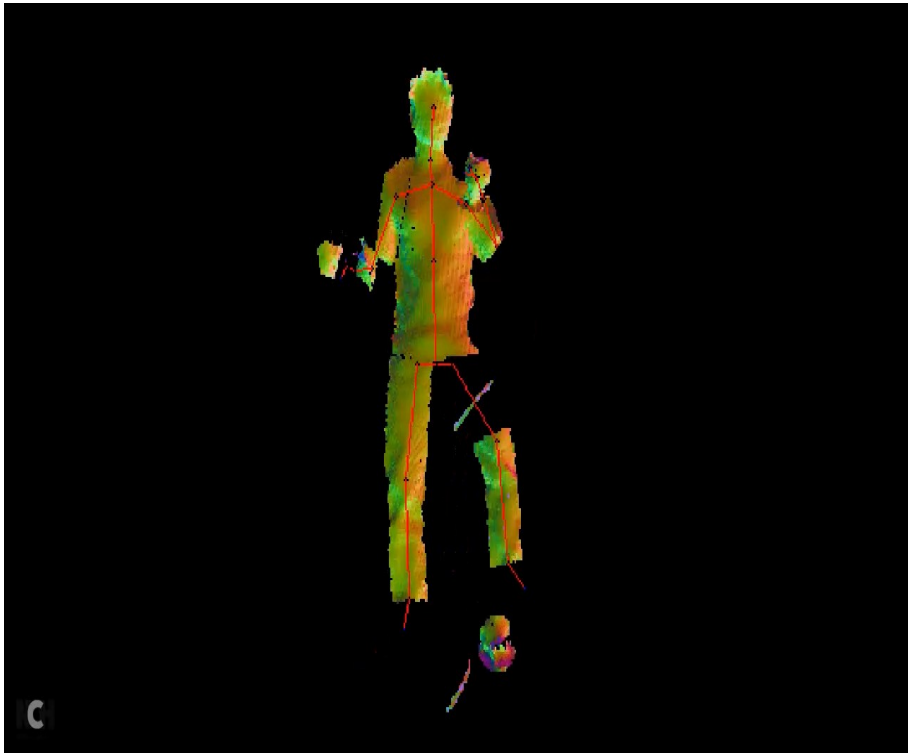


Sequence 80-100 with depth map

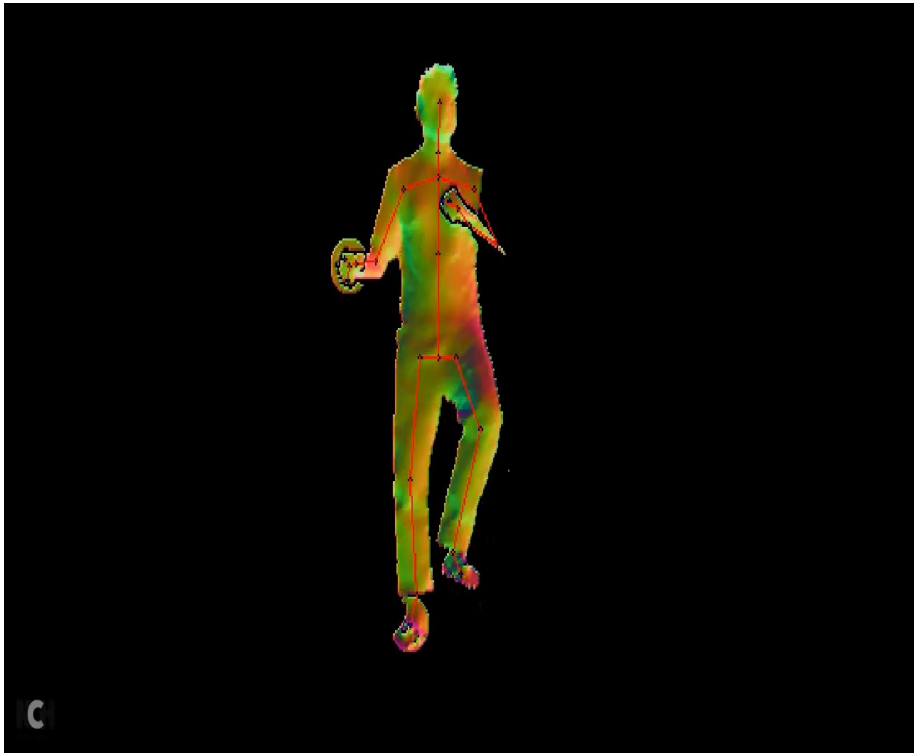


Skeleton tracking

Sequence 20-40 with stitching



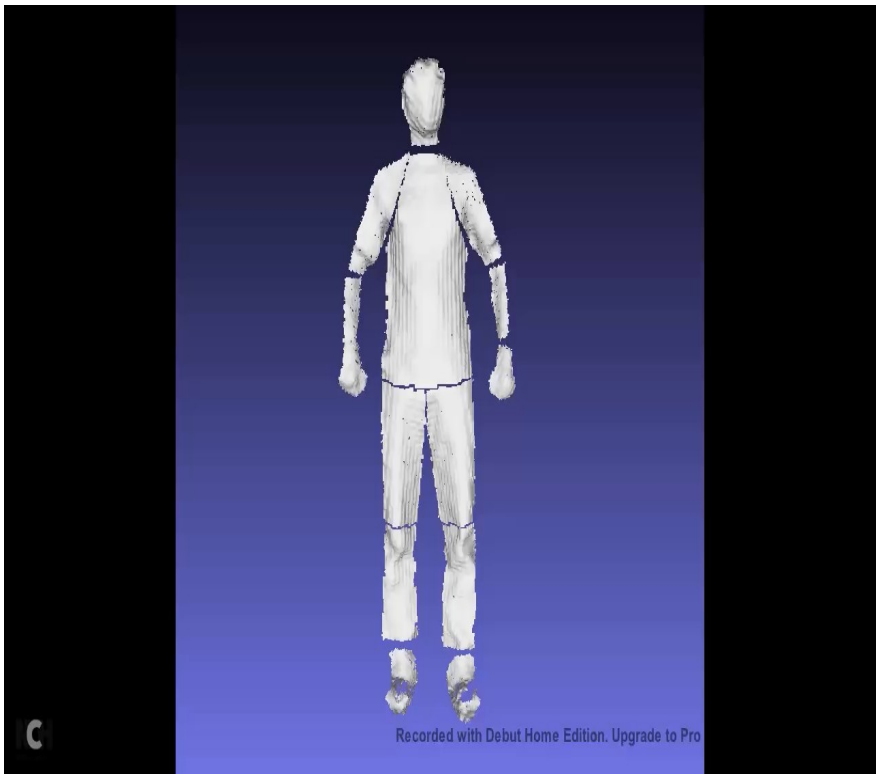
Sequence 20-40 with depth map



Skeleton tracking

Sequence 20-40 with stitching

Sequence 80-100 with stitching



Skeleton tracking

Sequence 20-40 with stitching

Big movement

Most of the body parts follow well the skeleton

Segmentation error?
Shape of body parts changes?
Depth computation (same depth for joints)?

Sequence 80-100

Condition : small change, no shape change

Works well

Action plan

- Segmented fusion
  - Skeleton Tracking
- Clean code

Q&A

- Structure of code
- Any questions about the code?
- Report : complementary elements?