NII International Internship program

Segmented Fusion

Warping method & refinement

20180201

Sylvia

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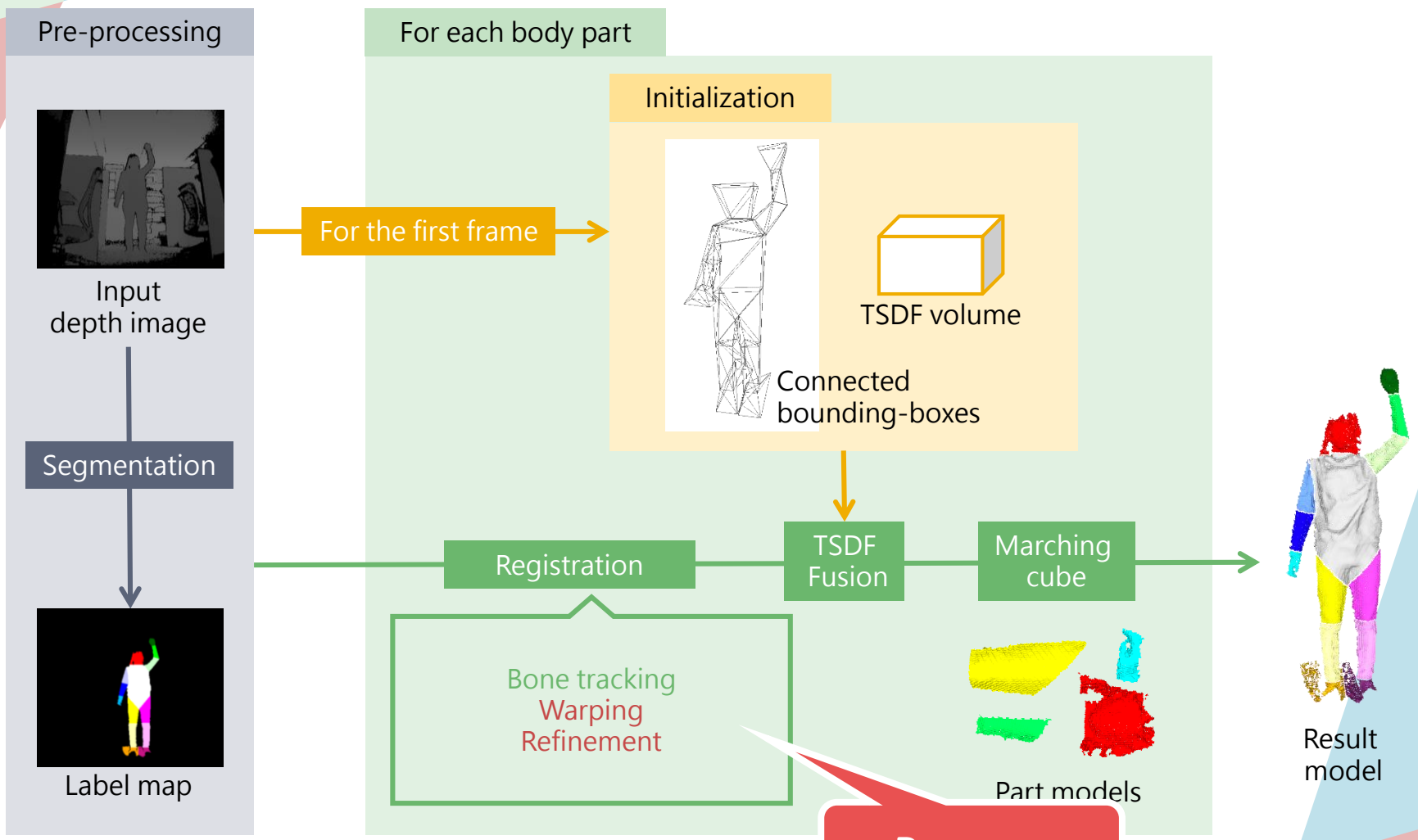
Summary



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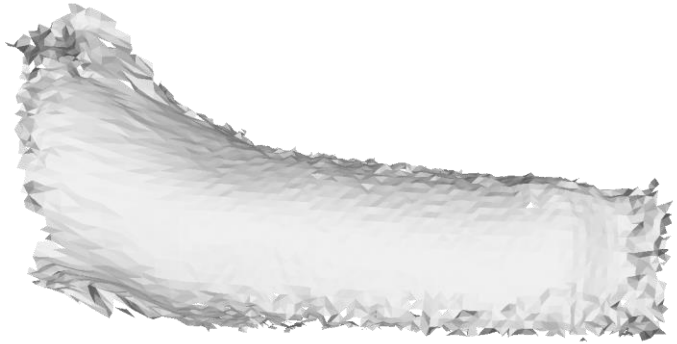
Summary

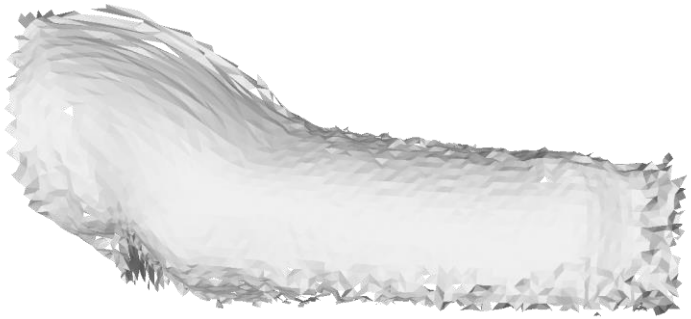
- Previously
  - Complete the fusion step
  - Found the reason of the wrong distortion when warping
- Progress
  - Refined the mesh by using simple ICP

Standard mesh

- If we deform the volume in the first frame and want to save the meshes without deformation, we get the non-straight meshes in volume. However, after fusion, we get more better meshes in volume than the results which we don't warping volume at first frame.



Arm mesh in volume
with deforming volume



Arm mesh in volume
without deforming volume

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Refinement

- Use ICP with SVD to minimize the distance between our integrated mesh and depth value of new frame.

```
ICP(Src, PointCloud):
    For iter = 1 to loop_max:
        Des = NearestNeighbors
              of Src in PointCloud
        Tr = estimateTransform(Src, Dst)
        Src = Transform(Tr, Src)
```

```
estimateTransform(A, B):
    % B = RA + T
    A_c = mean(A)
    B_c = mean(B)
    H = (A - A_c)^T · (B - B_c)
    U, S, V = SVD(H)
    R = VU^T
    T = -R · A_c + B_c
    return Tr = [ R  T ]
                [ 0  1 ]  4x4
```

Reference: http://nghiaho.com/?page_id=671

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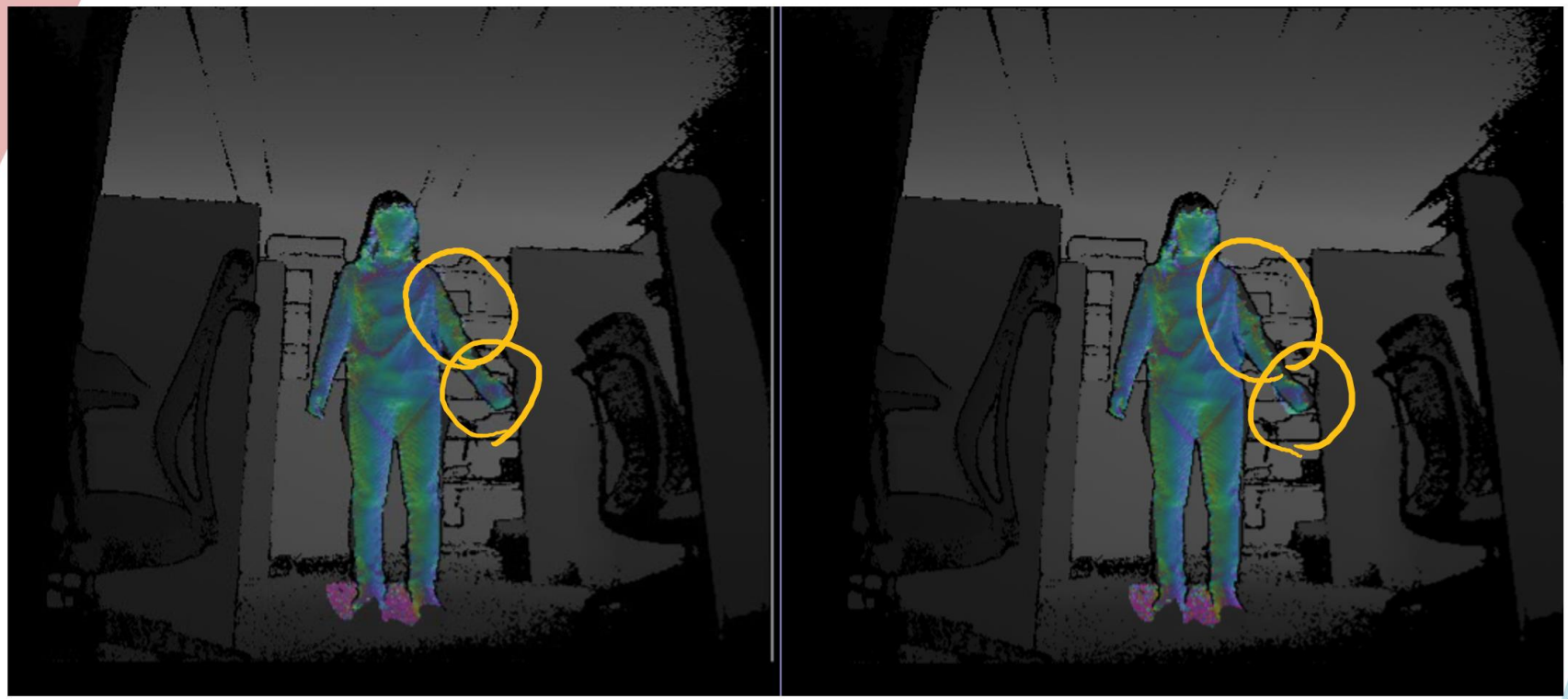
Refinement



Warping with refinement

Warping without refinement

Resource: 031_refinement.avi, 031_warping.avi

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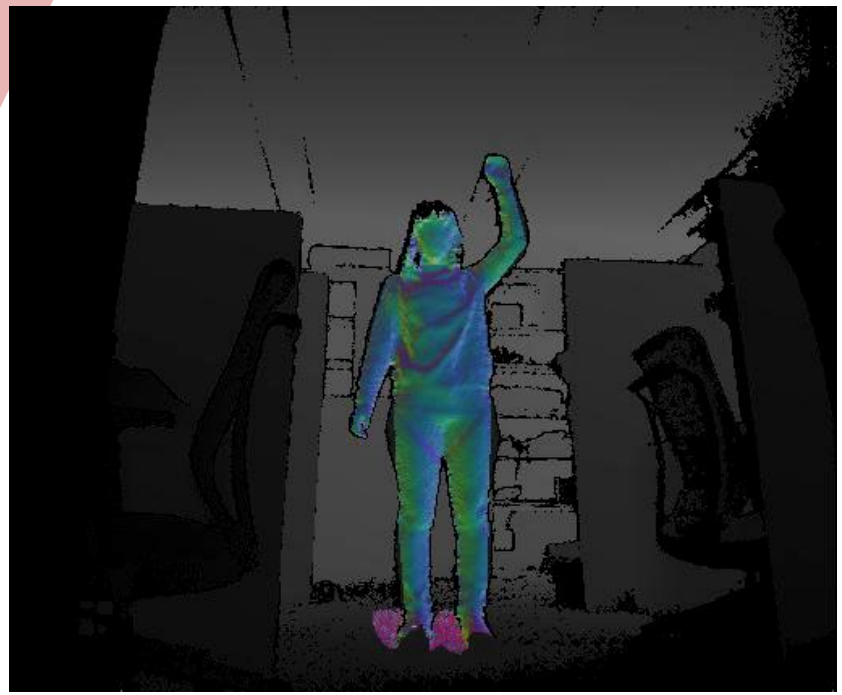
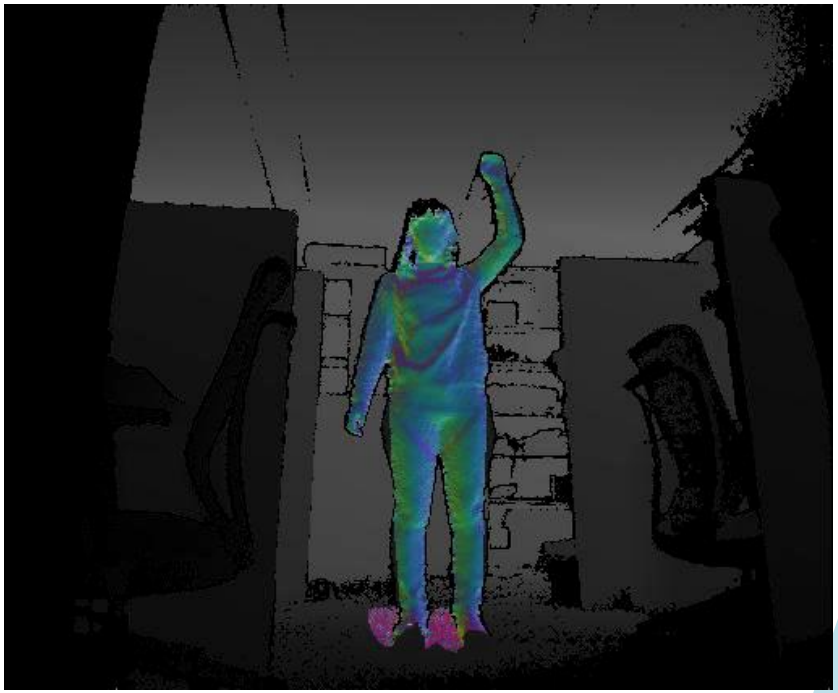
Refinement



Fusion with refinement



Fusion without refinement

Resource: 031_fusion_refine.avi, 031_fusion.avi

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Refinement

Fusion with refinement

Fusion without refinement

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Next step

- Run other data which have other motion part or have camera motion
- Complete the thesis