Probabilistic Morphable Models 2019: Hands-on part

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Plan for the week

1. IDE installation

2. Parametric registration tutorial

3. MCMC part 1: model fitting on partial shapes

4. MCMC part 2: model fitting on images

IDE installation

- You need to move away from Scalismo Lab:
  - Educational tool, not a development environment
  - Older version of Scalismo (v0.10 vs v0.17 now)

- A tutorial for using Scalismo in an IDE can be found here:

  https://unibas-gravis.github.io/scalismo-tutorial/ide.html

- To help with the transition, the Scalismo Lab tutorials have been ported to the latest version here:

  https://unibas-gravis.github.io/scalismo-tutorial/

Parametric registration

- This is our go-to method for mesh to mesh registration

Tutorial is available here:

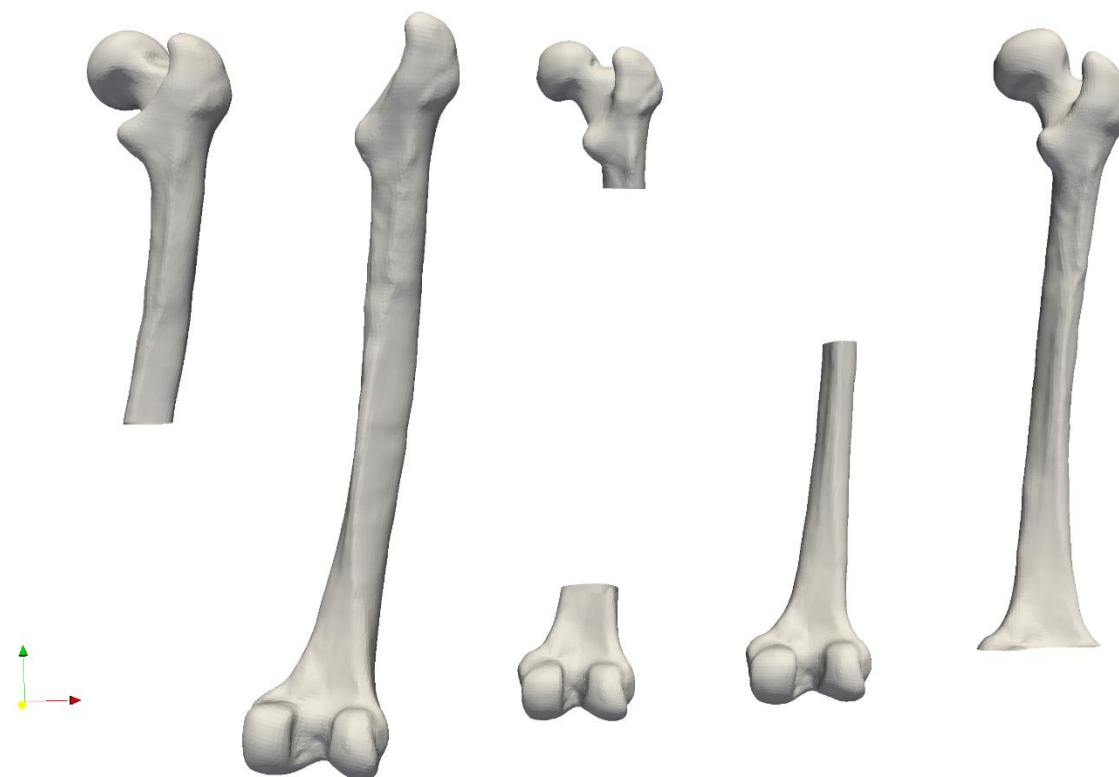**https://unibas-gravis.github.io/scalismo-tutorial/tutorials/tutorial12.html**

(Similar to the quickstart tutorial)

Make sure to download the dataset for the tutorial first:
https://drive.switch.ch/index.php/s/zOJDpqh2ZGxzJJH

MCMC Part 1: partial shapes

- Goal is to fit the model to partial shapes: with MCMC this time

  - The pose needs to be adapted as well

- You are provided with:

  - A Shape Model of the femur (femur-asm.h5)

  - 5 partial meshes to be reconstructed (part1_partial)

MCMC Part 1: partial shapes

Steps:

1. Go through tutorials 14 and 15 on MCMC

2. Download the data containing the Femur model and partial shapes **https://drive.switch.ch/index.php/s/A9IR8Mf1h5JiQRp**

3. Adapt the MCMC chain from the tutorials to perform femur shape completion

   Important: You will have to fit both pose and shape

MCMC part 2: Fitting images

- Goal here is to perform image segmentation with model fitting

- You are provided with:
  - An Active Shape Model of the femur (femur-asm.h5)

  - 5 CT scans with corresponding femur segmentation as STL (test set) (test/)

  - 5 CT scans to be segmented (targets/)

MCMC part 2: Fitting images

Steps:

1. Small detour: go through the Active Shape Model Tutorial (tutorial 13)

   Our goal here is to learn how to use the intensity model of the ASM to evaluate the likelihood of shapes

2. Adapt the previous MCMC chain (part 1) to fit the model to images this time

   Important: Also here, you have to fit the pose as the targets are not fully aligned with the model