UNIVERSITÄT BERN

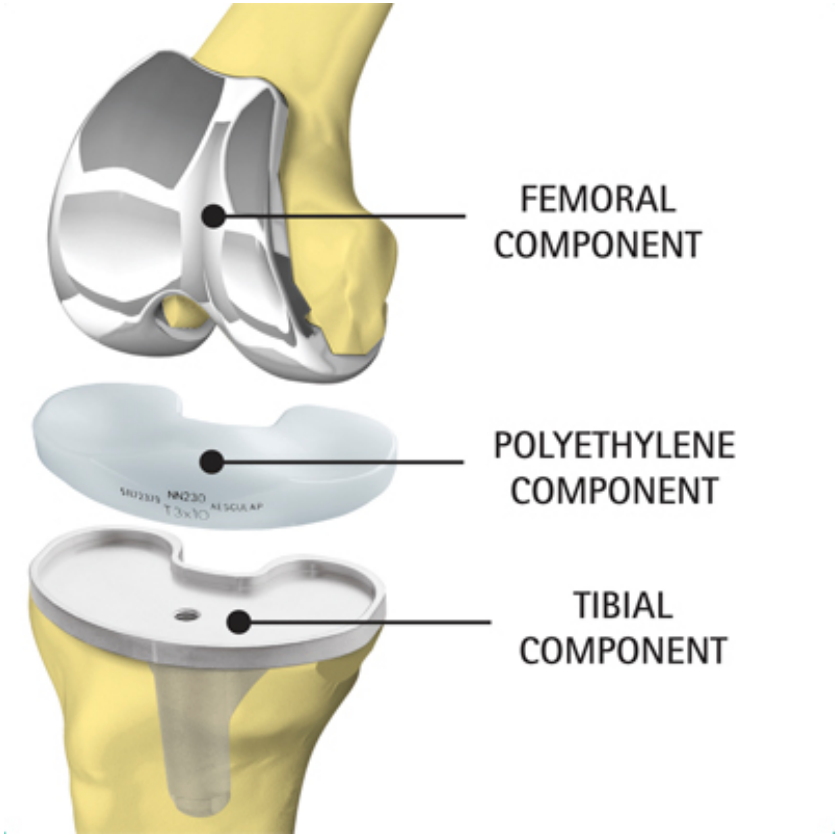
Automatic Femur Segmentation for Femoral Implant Design

Iwan Paolucci, Severin Tobler
University of Bern

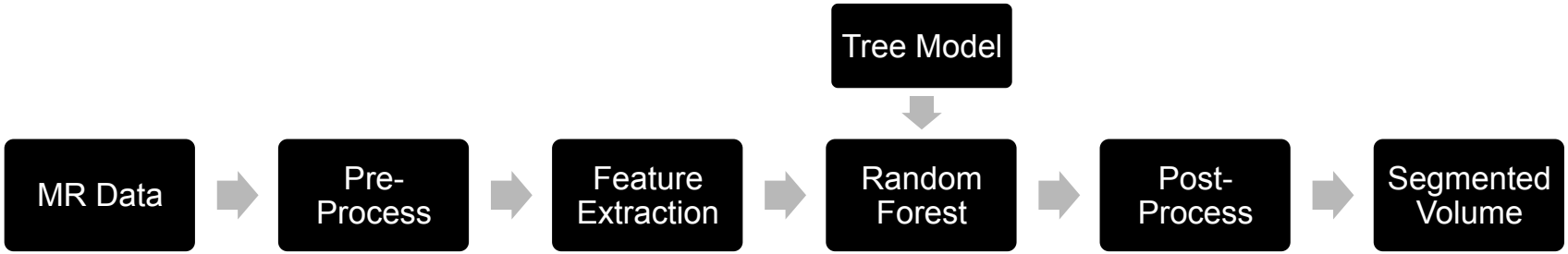
16. December 2015, Medical Image Analysis Lab

Introduction

> Goal: Dice 0.95 with 0.05 std



Methods – Algorithm Pipeline

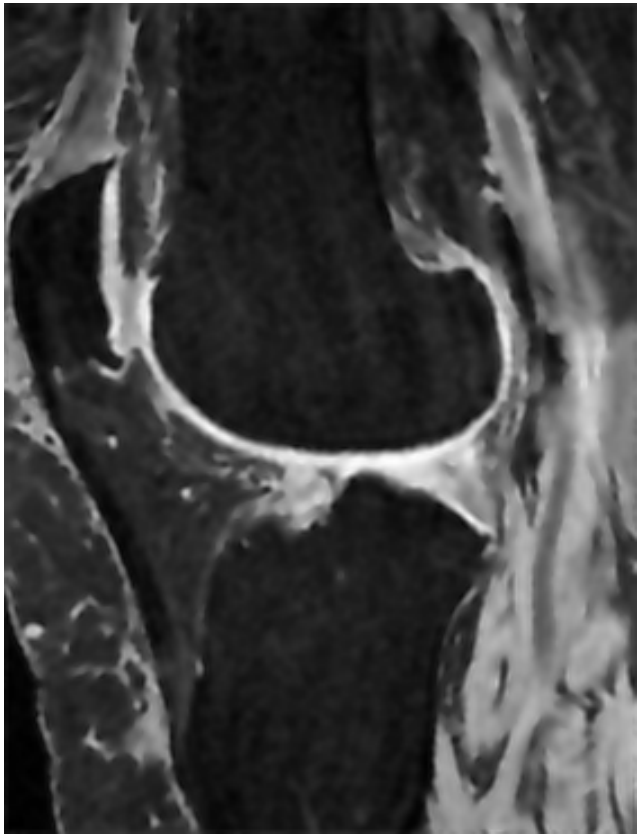


Methods – Pre-Process

- Normalization

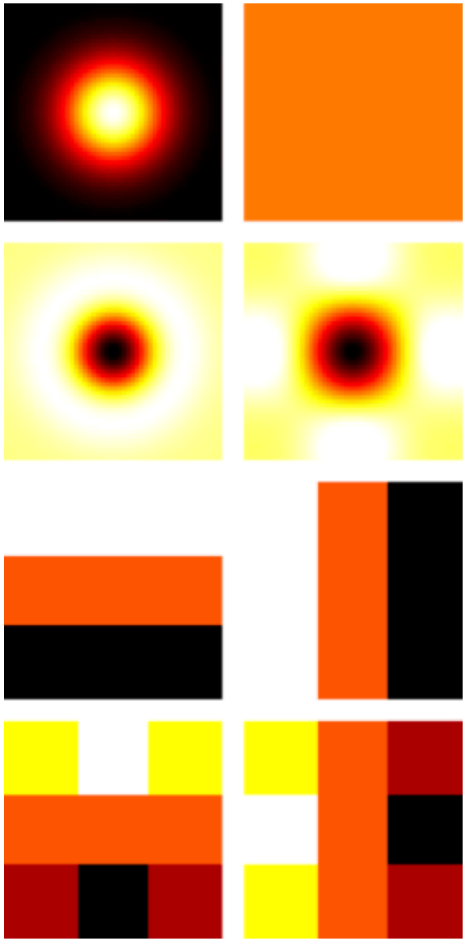
$$I_n = \frac{I - \mu}{\sigma}$$

- Noise removal
  - 3D Wiener filter



Methods – Feature Extraction

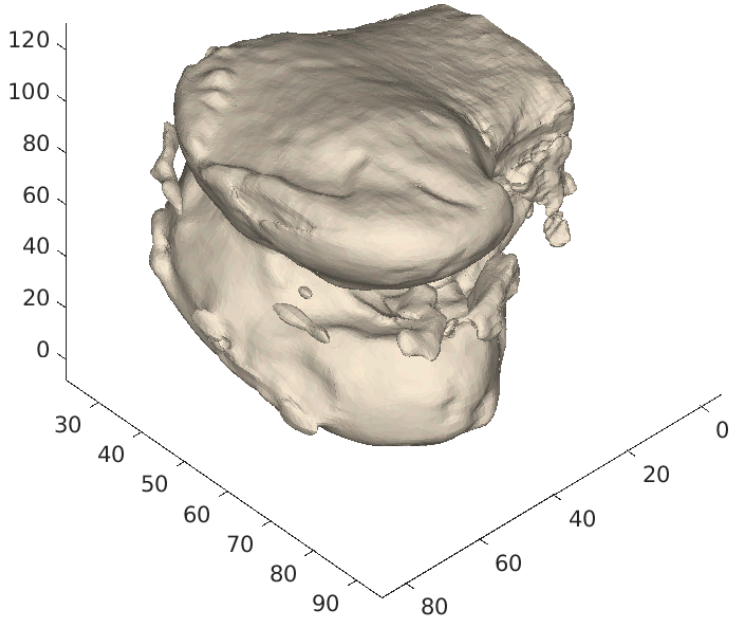
- Standard deviation
- Entropy
- Relative position (3D)
- Gaussian
- Average
- Laplacian of Gaussian
- Laplacian
- Prewitt (horizontal and vertical)
- Sobel (horizontal and vertical)

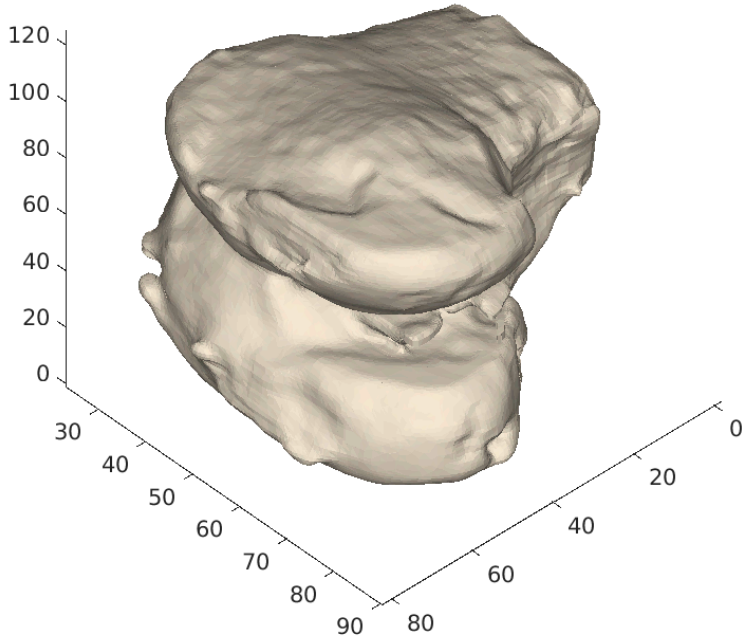


Methods – Post-Processing

UNIVERSITÄT BERN

- Morphological opening
- Keep largest area / volume
- Fill holes





Results

UNIVERSITÄT BERN

- Boxplot mit dice
- Schlechte segmentation

Discussion

- Slim & Fast
- Best / Worst case
- Segmentation is always the Femur
- Dice interpretation

Outlook

- Include prior information
- Investigate 3D features
- Extend to further bone structure

UNIVERSITÄT BERN

Thanks for your attention!

Questions?

Tested but was not good…

UNIVERSITÄT BERN

- ASM
- 3D filter for features
- Histogram bins as features
- Skewness as features