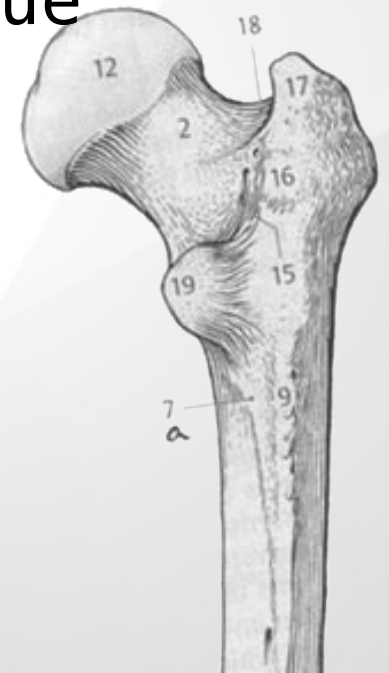
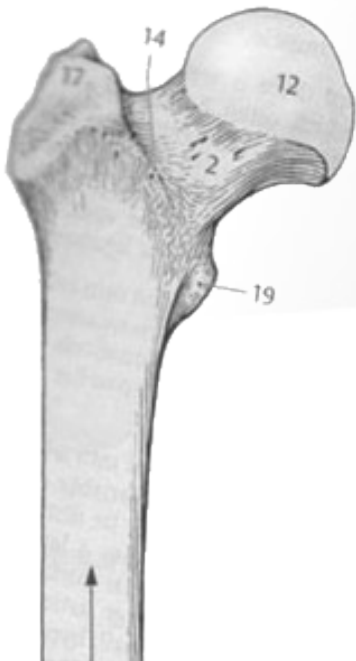


Segmentation and density estimation in femur

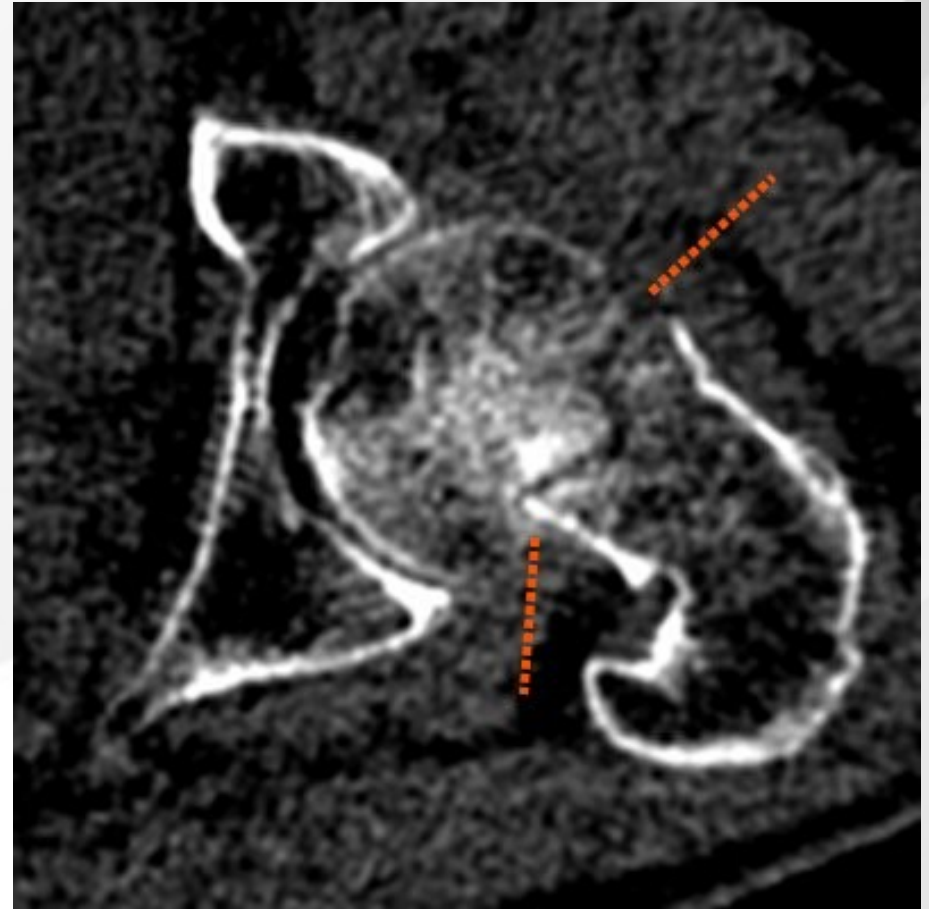
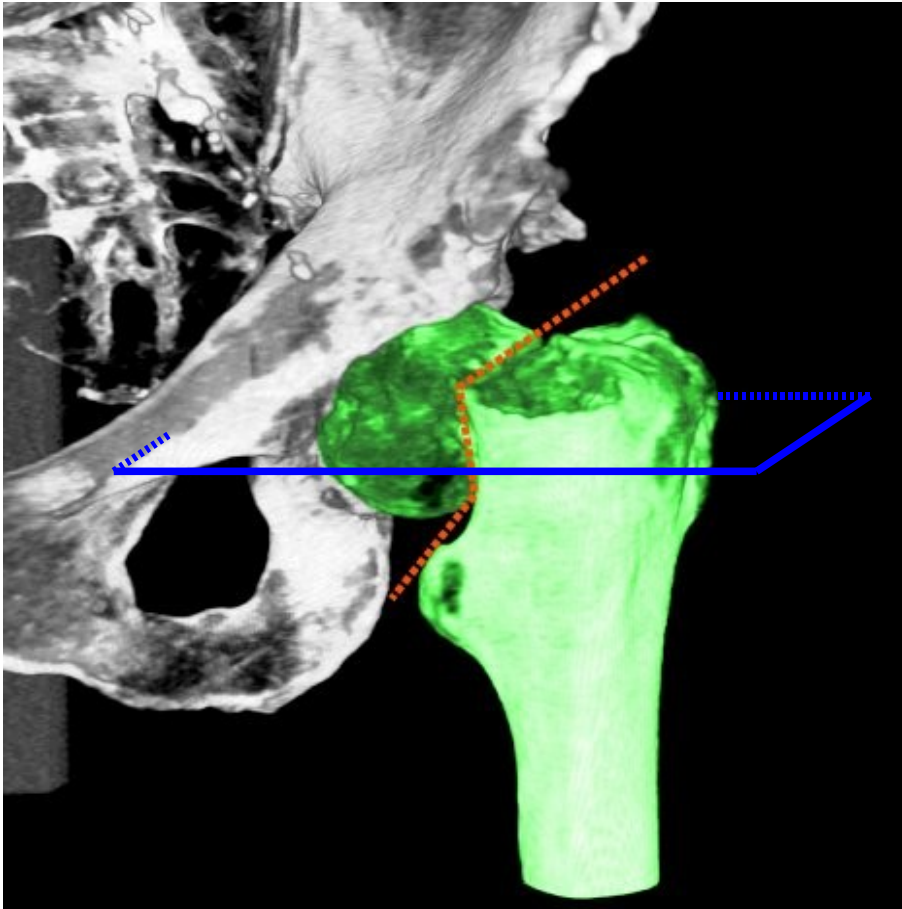
Jan Horáček

Supervisor: Mgr. Lukáš Maršálek

Charles University in Prague
Faculty of Mathematics
and Physics



Femoral neck fracture



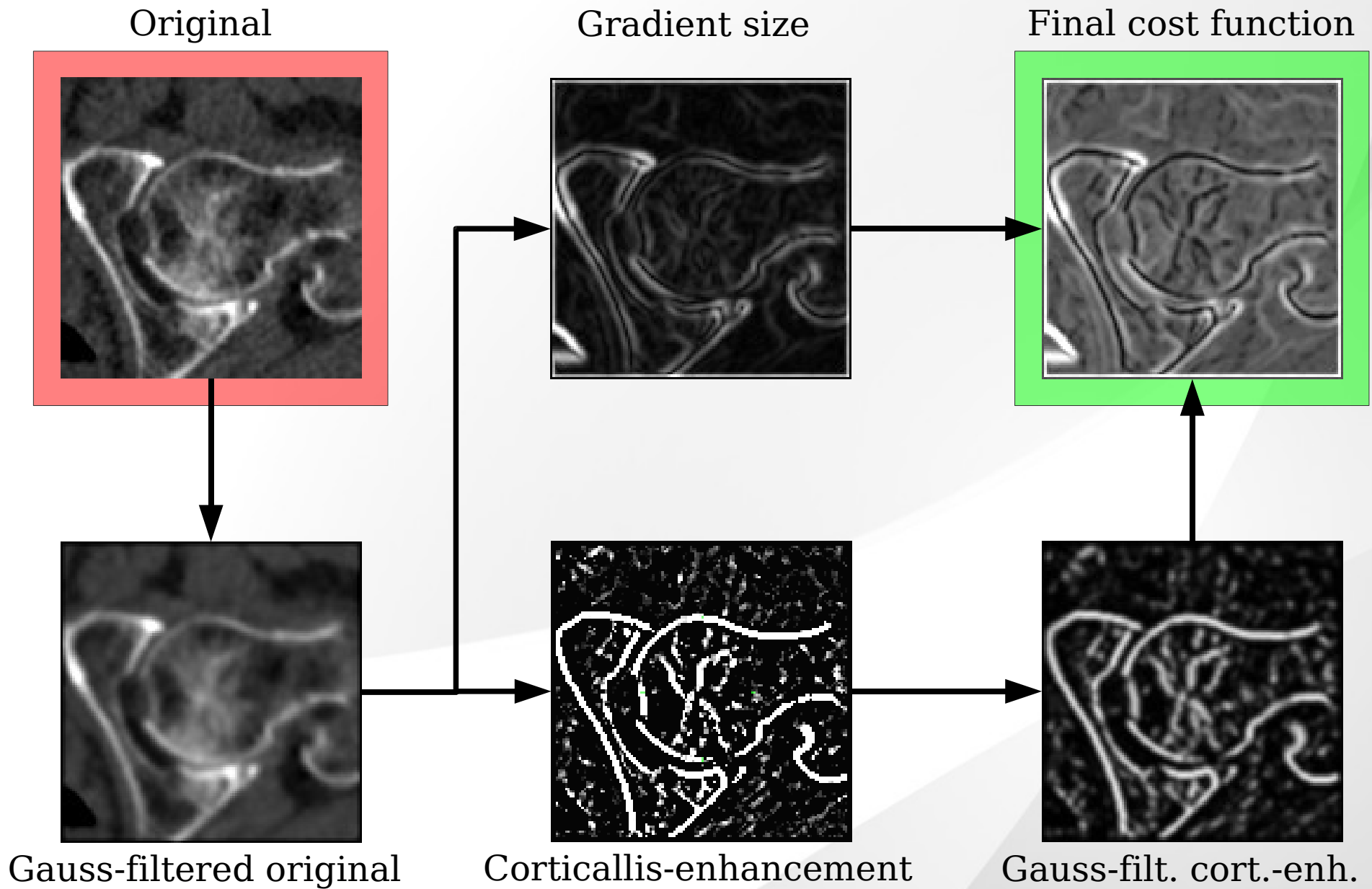
Dynamic hip screw treatment



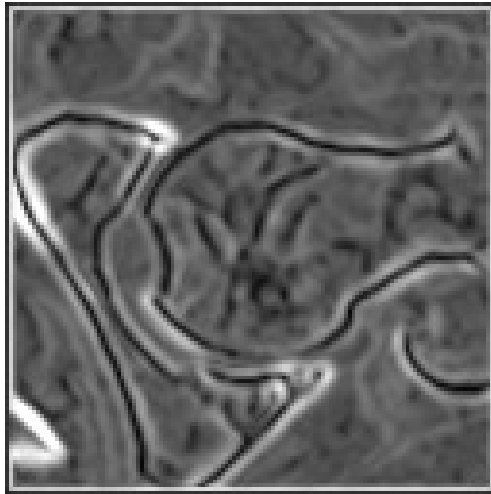
Segmentation strategy

- (1) User-defined control points
- (2) Preprocessing
- (3) Segmentation
- (4) Postprocessing
- (5) Statistical analysis

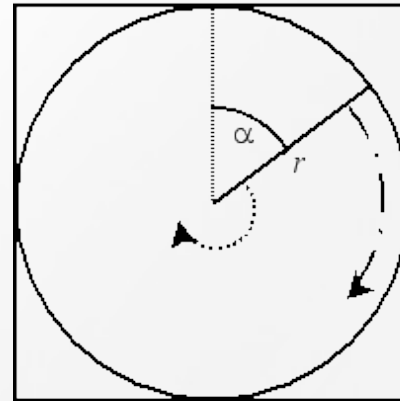
Preprocessing



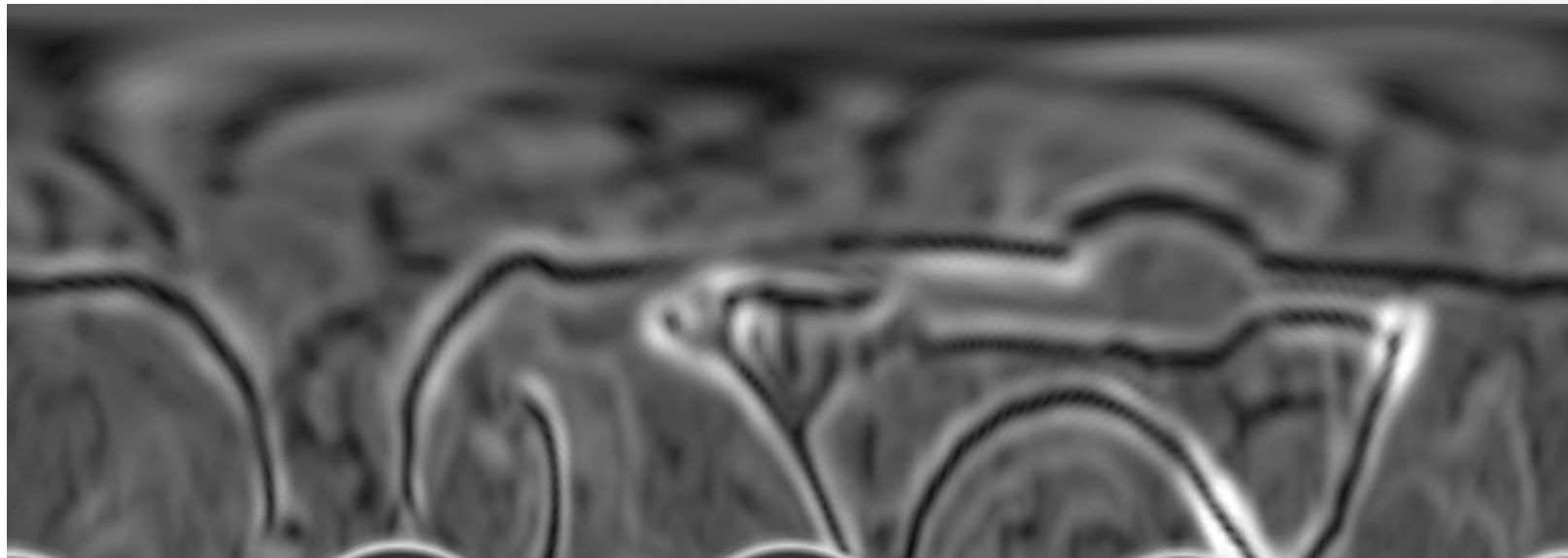
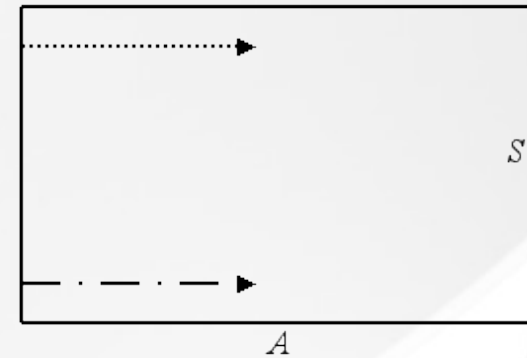
Segmentation in polar coordinates



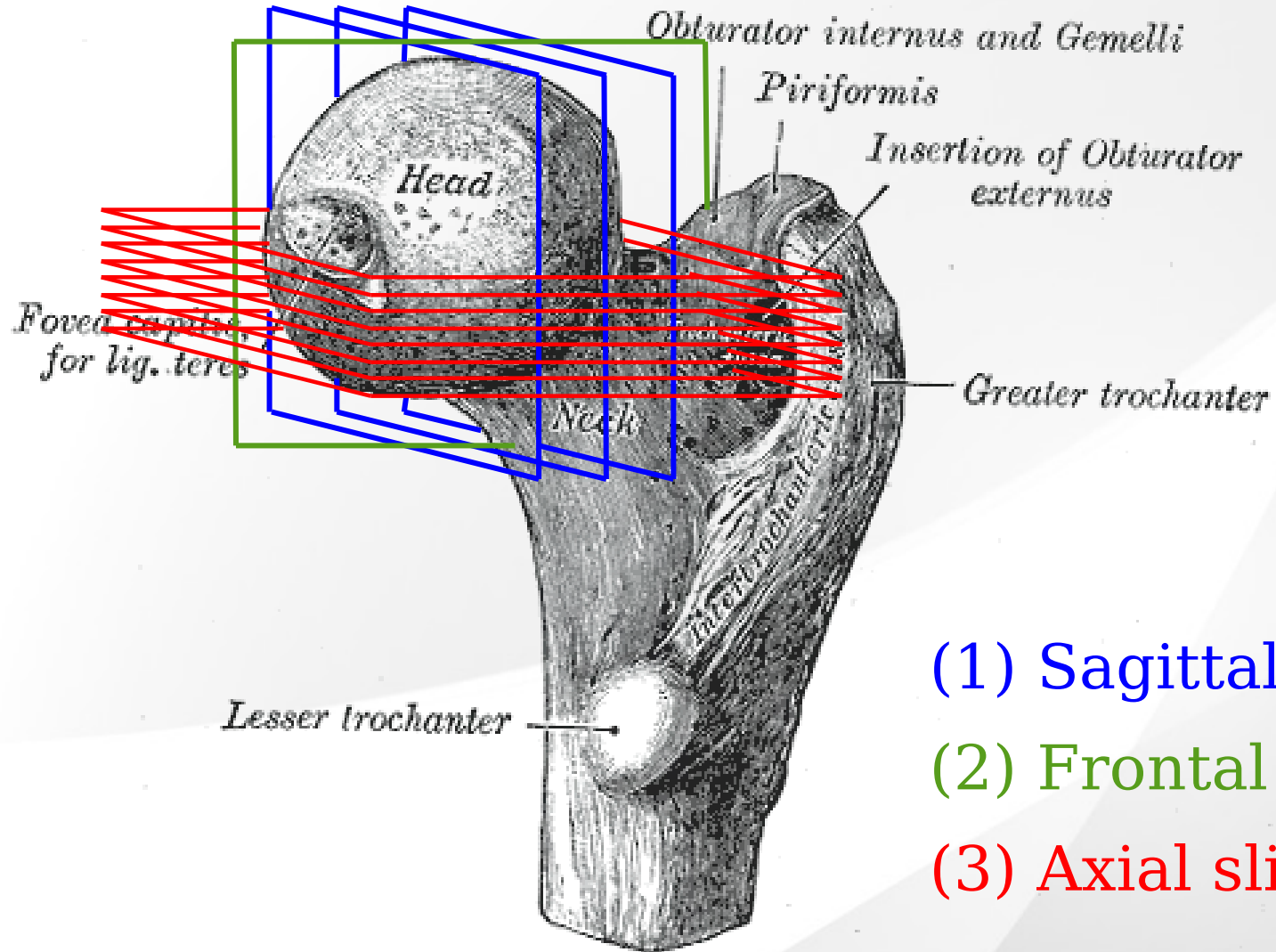
Source slice



Polar cut



Segmentation order



- (1) Sagittal slices
- (2) Frontal slice
- (3) Axial slices

Segmentation results

- Tested on 30 patients
- Average segmentation needs less than 10 clicks

# clicks	patients
1-3	35%
4-10	45%
11-20	14%
20+	6%

Advantages

- Does not explicitly estimate shape
- Fully user-controllable
- Precise result in a few minutes
- Parallelizable
- Fast computation
 - One slice in a fraction of a second
 - Complete segmentation in about 4 seconds (on a quad-core processor)

Disadvantages

- Poor performance when corticalis too sparse (problem of any segmentation algorithm)
- User needs information about the method

Currently used at Bulovka Hospital

- Point out patients with high probability of femoral neck fracture for further osteological treatment
- Additional info before applying dynamic hip screw

Another utilization



Scope of the work

- Theoretical development of a new method from the ground up
- Implementation of the method in a working application
- Practical application used for real-life tasks

Thank you
for your attention