Contour-based Bone Axis Detection for X-Ray Guided Surgery on the Knee

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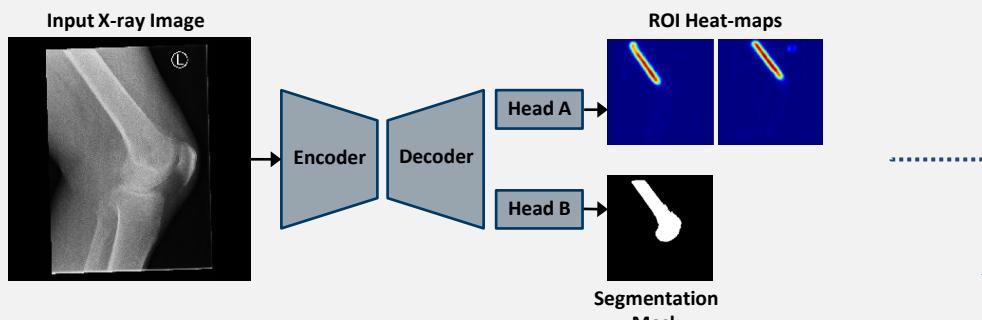
Contribution

Simple and flexible pipeline for **anatomical axis detection** on **X-ray** images of **long bones**
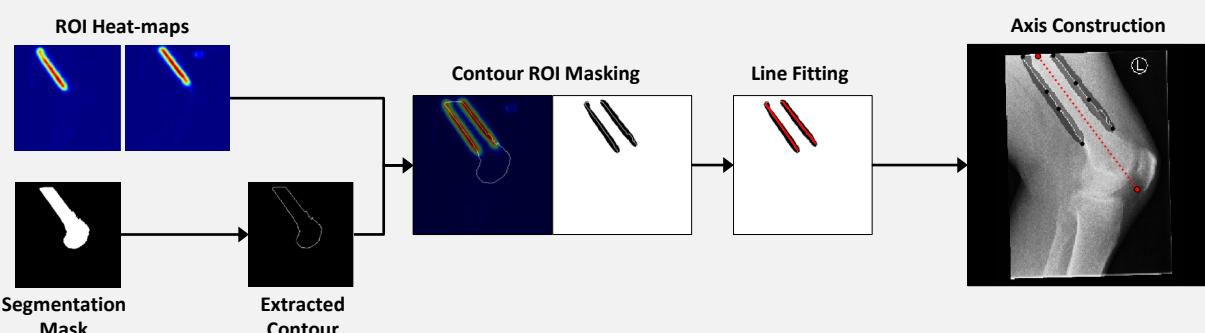
- Low susceptibility to image **truncation/rotation**
- Follows clinical standard and allows **easy post-correction**
- **Extendable** to other anatomies (e.g. radius, humerus)

Method

A

Input X-ray Image → Encoder → Decoder → Head A → ROI Heat-maps

Head B → Segmentation Mask

B

ROI Heat-maps

Segmentation Mask → Extracted Contour → Contour ROI Masking → Line Fitting → Axis Construction

Results

Femur

Angulation Error (deg)
Median: 0.19
$CI_{95\%}$: [0.11, 0.23]

Displacement Error (mm)
Median: 0.13
$CI_{95\%}$: [0.07, 0.15]

Tibia

Angulation Error (deg)
Median: 0.33
$CI_{95\%}$: [0.23, 0.69]

Displacement Error (mm)
Median: 0.17
$CI_{95\%}$: [0.11, 0.21]