

## Algorithms for Fast / Automatic Anatomical Measurement in Cone-Beam CT

### **Project description:**

Develop algorithms to speed-up / assist / automate anatomical measurements of anatomical alignment in cone-beam CT – (viz., foot and ankle joints for orthopedics).

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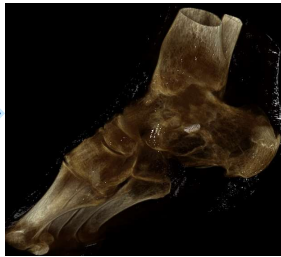
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### **Extremity Cone-Beam CT (CBCT)**



### **New capabilities:**

High resolution 3D  
Weight-bearing



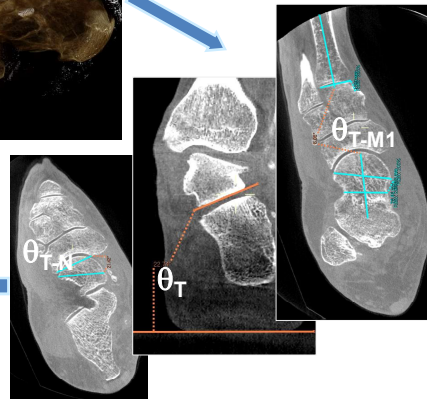
Various measurements of joint alignment are used for diagnosis and to plan surgery.

### **Manual measurement:**

Time consuming  
User variability (training-dependent)

### **Unmet clinical need:**

Software to simplify / assist / automate the measurement of key metrics



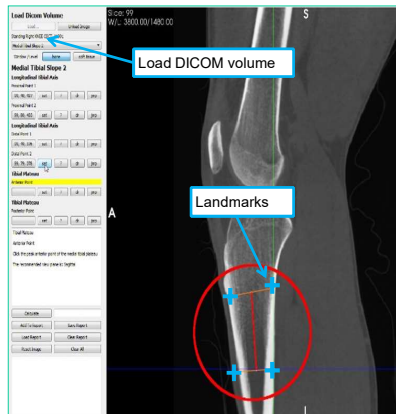
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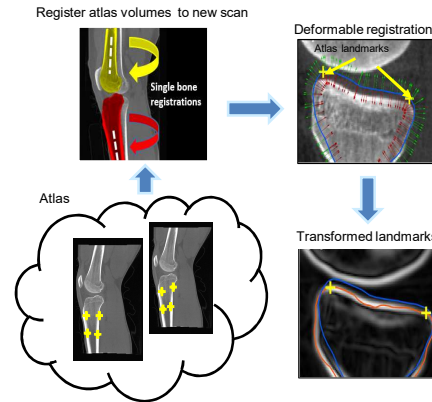


## Algorithms for Fast / Automatic Anatomical Measurement in Cone-Beam CT

JMAT is software that supports anatomical measurements in CBCT data. You will extend JMAT to the metrics of foot and ankle.



JMAT is *semi-automated*: needs user input to select anatomical landmarks. We want to develop a *fully automated* method. You will help to develop, apply and validate it in the foot and ankle.



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### • What Students Will Do / Deliverables:

- Research and document existing anatomical measurements in the foot and ankle
- **Minimum 1:** Implement *semi-automatic* (JMAT workflow) for CBCT of the foot and ankle.
- **Minimum 2:** Interact with clinicians to learn about the anatomical metrics, refine user interface and validate the software
- **Expected:** Data to develop and validate of the metrics: segment CBCT images, annotate anatomical landmarks. (Atlas of 15-20 CBCT datasets)
- **Maximum:** Implement *fully automatic* (atlas-based / active shape model) anatomical measurements in CBCT of the foot and ankle.

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## Algorithms for Fast / Automatic Anatomical Measurement in Cone-Beam CT

- **Size group:** 2
- **Skills:**
  - Programming in C/C++ (basic/intermediate)
  - Programming in Matlab
  - Basic understanding of image segmentation



## Algorithms for Fast / Automatic Anatomical Measurement in Cone-Beam CT

- **Mentors:**
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