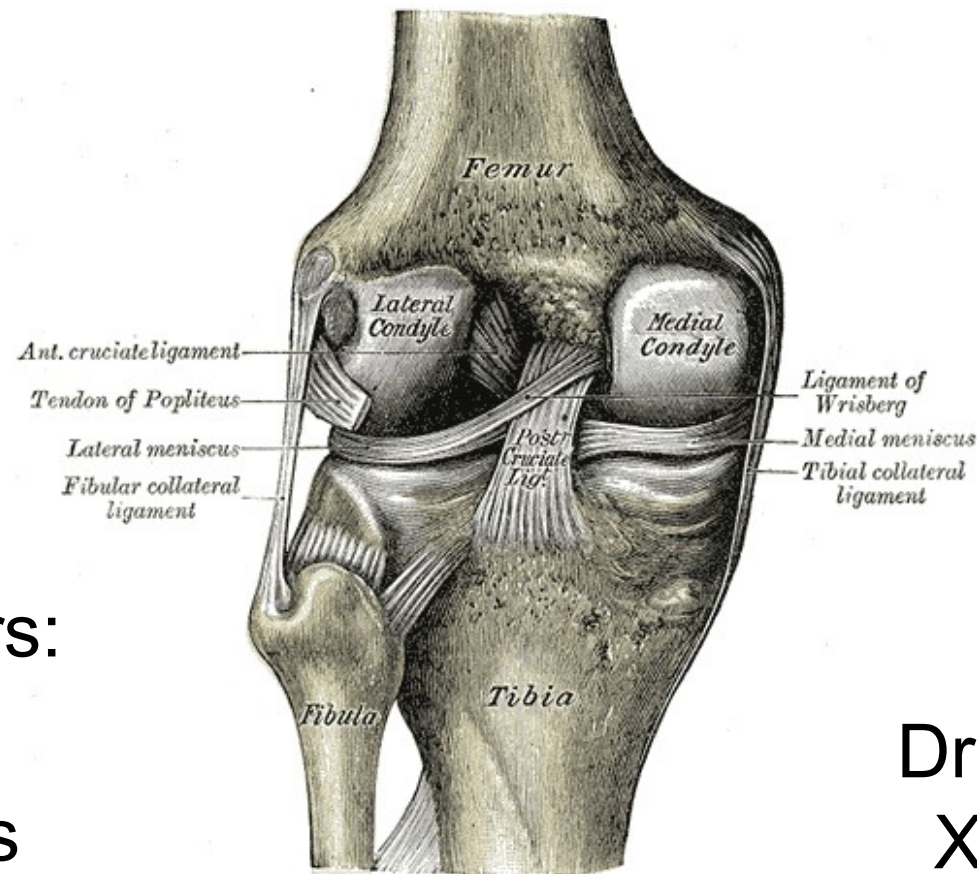


Statistical Atlas of the Knee



Team Members:

Murat Bilgel
Ceylan Tanes

Mentors:




Dr. Russell Taylor
Xin Kang (Ben)

Henry Gray, Anatomy of the Human Body, 1918
<http://www.bartleby.com/107/93.html>

Project Overview

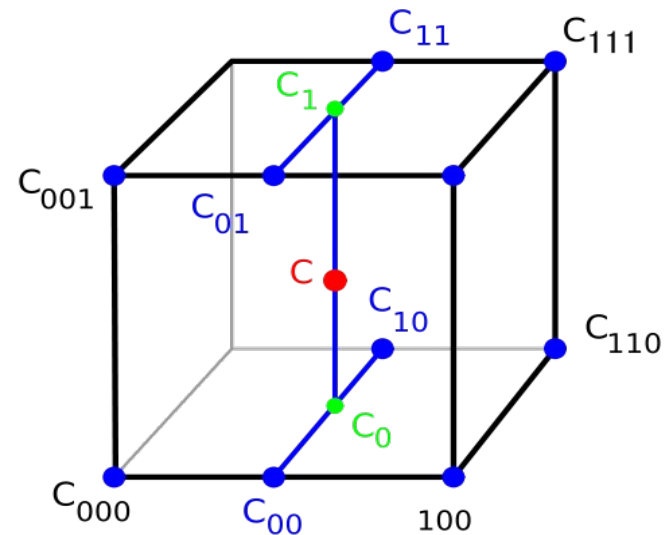
- Improve and automate the statistical atlas building pipeline developed by Dr. Gouthami Chintalapani at the Johns Hopkins University
- Build a statistical atlas of the knee using CT images

Milestones & Progress

Milestone	Status	Planned date	Date accomplished
 <i>Preliminary atlas</i>	Done	2/25	2/25
 <i>Tetrahedral mesh of femur and tibia</i>	Done	3/27	3/25
 <i>Automated pipeline</i>	Done	3/27	3/27
<i>Knee atlas</i>		4/24	
<i>Estimate bone tunnel locations after ACL surgery</i>		5/6	
<i>Joint segmentation – registration method (maximum deliverable)</i>		5/15 (?)	

MJOLNIR Pre-Processing

- MATLAB function to crop and pad all the CT images to ensure same number of voxels in each image
- MATLAB function to make each voxel isotropic by using trilinear interpolation





Problems Running MJOLNIR

- MJOLNIR runs with the provided patient images, their FANTASM segmentation results and the tetrahedral mesh, but gives no output
- No error messages in the log file either!
- Contacted Ben and Dr. Chintalapani to get feedback
- Problem might be related to background intensity values

Management Plan

- Mini-experiments with synthetic data to find the problem
- Experimenting with the fillbackground value in FANTASM
- Dr. Chintalapani has offered to take a look at the images and give feedback
- Expected completion date for the milestone has been pushed back by a week to 4/30

What's next?

Milestone	Status	Planned date	Date accomplished
<i>Preliminary atlas</i>	Done	2/25	2/25
<i>Tetrahedral mesh of femur and tibia</i>	Done	3/27	3/25
<i>Automated pipeline</i>	Done	3/27	3/27
 <i>Knee atlas</i>	Currently working on preprocessing patient images, preliminary FANTASM results	4/30	
 <i>Estimate bone tunnel locations after ACL surgery</i>	2D to 3D registration algorithm implemented by Ben	5/10	

Next Steps

- Register all images onto the template mesh using MJOLNIR
- Perform principal component analysis (PCA) on the vertices to obtain the mean image and the modes
- Estimate bone tunnel locations after ACL surgery by registering X-ray images onto the statistical knee atlas

Documentation

- Documentation for the new MATLAB functions
- Video demonstration of running the pipeline

Thank you!

Questions?