

NA-MIC National Alliance for Medical Image Computing http://na-mic.org

### **Slicer3 Tutorial**

# Registration Library Case 05: Knee MRI: model/surface registration

Dominik Meier, Ron Kikinis Sept. 2010



- We have knee MRI images from two separate individuals, incl. segmented femur and tibia from which surface models have been created.
- We seek to roughly align the two spaces for purposes of using presegmented atlases as initial estimates for segmentation
- Because the MRI images themselves provide insufficient contrast for a robust registration, we use the surface models to determine the affine transform.



subject 1

subject 2



# Surface based alignment

#### Open the *Surface Registration* module

Wizards		
Informatics	×	
Registration	▶ ∧ RegistrationWelcome	
Segmentation	↑ Transforms	
Quantification	ACPC Transform	
Diffusion		
IGT	Fast Affine registration	
Filtering	Fast Nonrigid BSpline registration	
Surface Models	Expert Automated Registration	
Converters	✓ Linear registration	
Endoscopy	Model Transform	
Developer Tools	BRAINSDemonWarp	
4D	BRAINSFit	
4D Diffusion Weighted	SRAINSResample	
	BRAINSVectorDemonWarping	
	◇ Fiducial Registration	
	🖉 🔿 Robust Miltiresolution Affine Registratio	
	Surface Registration	



### Surface based alignment

Femur model fo subject 1

Femur model fo subject 2





# **Surface Registration**

		Surface Registration
		Parameter set Xf1_Surf_S02-S01 =
		Status Idle
		* Surface ICP Registration Parameters
		Landmark transform mode 🔲 RigidBot 🗏 Similari 🔳 Affir
		Mean distance mode 🔳 RMS 🔲 Absolute Value
Input Surface:	S02_femur	Maximum number of iterations 50
Target Surface:	S01 femur	Maximum number of landmarks 200
	Sol_leniu	Start by matching centro
Output Transform:	Xf1 surf S2-S1	Check mean distance 🗹
		Maximum mean distance 0.01
		▲ IO
		Initial transform None 🖃 🚔
		Input Surface   =
		Target Surface   =
		Output Surface 📃 🛋
		Output transform
		Default Cancel Apply



Data Module:

Move S02\_femur.stl inside the new transform node to see the result (see animated gif below)

MRML Tree
白 <sub>丁</sub> Scene
— View
— Default Scene Camera
—🐲 SO1_femur.stl
— S01_mri
—💭 S01_patella.sti
—💓 SO2_femur.stl
— S02_mri
—💭 S02_patella.sti
——⊊ S02_tibia.stl
└─Xf1_surf_S2-S1

#### animated gif, view in presentation mode





## Acknowledgements



National Alliance for Medical Image Computing NIH U54EB005149



Neuroimage Analysis Center NIH P41RR013218 -12S1 (ARRA Suppl)