

Professor Stephen Pizer

December 3-5, 2001

Brown '62, Kenan Professor of Computer Science, Radiology, Radiation Oncology,
and Biomedical Engineering, Univ. of N.C., Chapel Hill , www.cs.unc.edu/~smp/

Mini-course: Tutorial on object representation: Geometry, statistics, and data structures

Room 190, B&H (Engineering Bldg., 182-4 Hope St.)

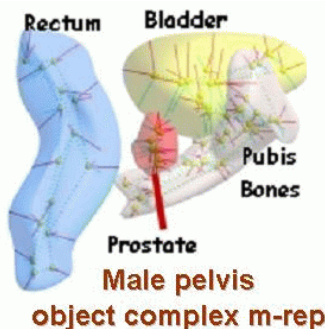
Monday Dec. 3, 2pm-4pm, and Tuesday Dec. 4, Noon-2pm.

Abstract: The geometry of anatomic objects can be described using a variety of different atoms: voxels, landmarks, boundary locations, etc. This geometry can be used as the basis for model-based object segmentation from a (typically 3D) image, for image registration, or for characterization of an object's shape. Probability distributions for geometry or shape can be used as priors in posterior optimization methods for segmentation or registration, or they can be used to discriminate classes of shapes, such as normal and pathological variants of an object. In this tutorial I will describe the various atoms and the sampled and parameterized object descriptions that can be built from them, as well as the spatial correspondences across deformation to which they lead, and I will compare these descriptions.

Seminar: 3D medical image segmentation by deformable m -reps

Room 190, B&H (Engineering Bldg., 182-4 Hope St.)

Tuesday Dec.4, 4pm-5pm.



Abstract: 3D segmentation of objects in 3D images can be usefully done by deforming structural models of anatomic objects into target images, the models having been built from training images. M -reps, sampled medial volume representations, are a means of representing the models that are particularly apt in this framework because they have special capabilities in deformability and intuitiveness, and provide good capabilities of many levels of scale and thus efficiency for any level of performance. After briefly describing m -reps models, this talk will focus on multiscale methods for deforming them into target images to segment objects of interest for radiotherapy treatment planning of the abdomen and male pelvis and for neuroscience of brain structures.

Seminar: Medial geometry

[Co-authors: James Damon, P. Thomas Fletcher, Paul Yushkevich]

Room 110, Div. of Applied Maths. (182 George Street)

Wednesday Dec.5, 4pm-5pm.

Abstract: The geometry of the transformation from boundaries to medial loci and the geometry of the transformation from medial loci to boundaries is not entirely the same. This fact leads to a number of interesting options for the discrete representation in 3D of medial loci and for interpolating the continuous medial locus and the continuous boundary corresponding to the discrete medial representation. Moreover, it is advantageous to look at medial geometry not simply in terms of the zeroth order medial position (x) and medial width (r) functions but also in terms of the medial frame and the medial object angle, which are first order in x and r . With this zeroth plus first order medial geometry, the medial locus can be usefully described as a manifold of medial atoms, each consisting of a medial position and two length r vectors with tails at the medial position x that we call medial sails, each having a head incident to and orthogonal to the corresponding boundary position. We hypothesize that an object-relative non-Euclidean metric space can be built upon this scheme.

Local organization: Prof. David Mumford , www.dam.brown.edu/people/mumford/