



Colloquium
Wednesday April 4, 2007
12pm Room 08-2130

**“NONPARAMETRIC IMAGE REGISTRATION
IN MEDICAL IMAGING”**

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In medical imaging, it is frequently useful to register or align images in order to fuse complementary information or to make quantitative assessments. In many situations (for example, 3D magnetic resonance imaging of the breast), the anatomical object being imaged undergoes a nonrigid deformation between successive images. Traditional image registration techniques that are based on parametric representations of the underlying deformation are not sufficient in these cases. In this talk, we describe how the underlying nonrigid deformation relating two images can be recovered via a functional minimization process. Using the calculus of variations, we transform the solution of the functional minimization problem into the stationary solution of a system of partial differential equations (the Euler-Lagrange equations). We then show how the resulting PDE system can be discretized and solved quickly using Fourier methods, yielding a computationally tractable algorithm for deformable image registration.

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