Colloquium

Algorithmic Problems in Surface-based Morphometry for Medical Image Analysis

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1:30 p.m.
Room 1111 Biotech Center

Abstract

Statistical morphometric analysis is used in biomedical imaging to study various structures of interest, and aims to identify morphometric abnormalities associated with a particular condition in order to aid diagnosis and treatment. We present computational techniques for surface-based morphometry, where two key issues are (1) how to model 3D surfaces and (2) how to perform statistical analysis with these surface models. We employ the spherical harmonic (SPHARM) method for surface modeling, and then perform high-dimensional pattern classification and statistical inference based on random field theory to localize regionally specific shape changes between groups of 3D objects. Although SPHARM has been shown to be promising, algorithmic problems related to its robustness and scalability need to be solved before it can be of broad use. To address these issues, we present new methods usable in three crucial steps for modeling SPHARM surfaces: (1) spherical parameterization, (2) 3D shape registration, and (3) spherical harmonic expansion. We demonstrate these methods in several biomedical imaging studies.
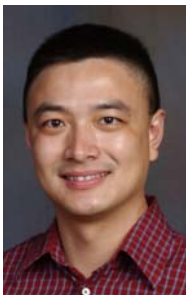
Bio: Dr. Shen received his Ph.D. in Computer Science from Dartmouth College in 2004. He is currently an assistant professor in the Department of Computer and Information Science at University of Massachusetts Dartmouth where he leads the Image and Pattern Analysis Lab. His research focuses on topics in medical image analysis, geometric modeling, statistical shape analysis, data mining, biomedical imaging and informatics. He has published over 60 journal and conference papers in his research areas.
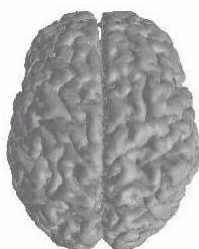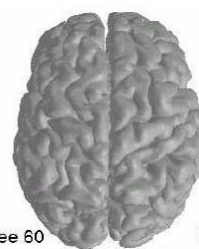

Degree 10   Degree 20   Degree 60   Degree 100