



The University of Chicago
Department of Statistics

Seminar Series

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University of Wisconsin, Madison

Computational Challenges in Neuroanatomy

MONDAY, January 25, 2010, at 4:00 PM
133 Eckhart Hall, 5734 S. University Avenue

Refreshments following the seminar in Eckhart 110.

ABSTRACT

Computational neuroanatomy is an emerging field that utilizes various non-invasive brain imaging modalities such as magnetic resonance imaging (MRI) and diffusion tensor imaging (DTI) in quantifying the spatiotemporal dynamics of the human brain structures in macroscopic level. This discipline emerged about twenty years ago and has made substantial progress in the past decade. It usually deals with computational problems arising from the quantification of within- and between-subject variations associated with the structure and the function of the human brain. Major challenges in the field are caused by the massive amount of high dimensional non-Euclidean imaging data that are difficult to analyze using traditional methods. This requires new computational solutions that incorporate geometric and topological nature of brain structures. Three computational problems will be showcased: regression on cortical manifolds, topological characterization (using persistence diagrams) of cortical data, and massive brain connectivity graph modeling. The methods are applied to quantifying the abnormal pattern of high functioning autism.

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