Stony Brook University

Department of Biomedical Informatics

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Advancing Big Neuroimaging Data Analysis for Precision Diagnostics

Monday, April 9th, 2018 1:30pm—2:30pm

Basic Science Tower, L9 Classroom 145 (Pathology)

Abstract:

Neuroimaging has entered the "big data" era with technologies that produce massive, complex imaging data from multiple modalities that reflect brain structure and function in disease and health. Big neuroimaging data provides unprecedented opportunities to develop computational approaches that can deliver personalized, quantitative disease indexes of diagnostic and prognostic value, and have the potential to quantify the risk of developing a disease, track disease progression or the effect of pharmacological interventions in clinical trials, and deliver patient specific diagnosis before measurable clinical effects occur. I) the high dimensionality of the data may hinder the extraction of interpretable and reproducible information; II) heterogeneity, which is increasingly recognized as a key feature of brain diseases, limits the use of current analytical tools. In this talk, Dr. Sotiras will discuss novel computational approaches that leverage advanced machine learning techniques to address these challenges of I and II. First, he will describe an unsupervised multivariate analysis technique based on non-negative matrix factorization that optimally summarizes high dimensional neuroimaging data through a set of highly interpretable and reproducible imaging patterns. Second, he will discuss a semi-supervised multivariate machine learning technique that aims to reveal disease heterogeneity by jointly performing disease classification and clustering of disease sub-groups. Applications of these approaches in diverse settings highlight their broad impact as well as their role in future directions toward precision medicine.

Questions? Please call the Biomedical Informatics Department at 631-638-2590.