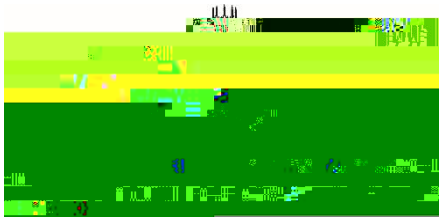

Department of Mathematics, Statistics and Computer Science

COLLOQUIUM ANNOUNCEMENT

Bayesian Spatial Binary Regression for Label Fusion in Structural Neuroimaging

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Cudahy Hall, Room 401

Abstract

Most analyses of neuroimaging data involve studying one or more regions of interest (ROIs) in a brain image. In order to do so, each ROI must first be identified. Since every brain is unique, the location, size, and shape of each ROI varies across subjects. Thus, each ROI in a brain image must either be manually identified or (semi-) automatically delineated, a task referred to as segmentation. Automatic segmentation often involves mapping a previously manually segmented image to a new brain image and propagating the labels to obtain an estimate of where each ROI is located in the new image. A more recent approach to this problem is to propagate labels from multiple manually segmented atlases and combine the results using a process known as label fusion. To date, most label fusion algorithms either employ voting procedures or impose prior structure and subsequently find the maximum a posteriori (MAP) estimator (i.e., the posterior mode) through optimization. We propose using a fully Bayesian spatial regression model for label fusion that facilitates direct incorporation of covariate information while making accessible the entire posterior distribution. We discuss the implementation of our model via Markov chain Monte Carlo and illustrate the procedure through both simulation and application to segmentation of the hippocampus, an anatomical structure known to be associated with Alzheimer's disease.
