Cross-validation and hypothesis testing in neuroimaging

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Tuesday, November 19, 2013
3:30-4:30pm, New PI 6th Floor Multipurpose Room (6602)
Light refreshments provided

Abstract

In the last decade a new mode of hypothesis testing has become popular for predictive analyses with neuroimaging data. The basic idea is to treat some estimate of prediction error, typically derived from cross-validation (CV), as a test statistic, which is referred to a permutation distribution. Tests of this type have recently sparked controversy in the neuroimaging literature. This talk will discuss the conceptual basis and properties of these CV-based permutation tests, and some proposals for improving them. A case study will be presented in which wavelet-domain functional regression was applied to fMRI-derived images from the ADHD-200 Global Competition data set. In that competition, teams were challenged to develop algorithms for image-based automated diagnosis attention deficit / hyperactivity disorder; but the best predictive performance was attained by a team that did not use the image data at all. CV-based permutation tests are shown to provide insight into this surprising outcome.
This is joint work with Lan Huo, Todd Ogden, Yihong Zhao and Clare Kelly.

Biographical Note

Philip Reiss is an Assistant Professor and Deputy Director of the Division of Biostatistics in the Department of Child and Adolescent Psychiatry at the New York University School of Medicine, and a Research Scientist at the Nathan S. Kline Institute for Psychiatric Research. He has been at NYU since 2006, when he completed his Ph.D. in Biostatistics at Columbia under the supervision of Prof. Todd Ogden.

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[1] The PI Biostatistics Seminar Series is held on Tuesdays at New York State Psychiatric Institute. If you are interested in receiving regular announcements for our seminars in the future, or if you need further information, please contact Jina James (jamesji@nyspi.columbia.edu, (212) 543-5589).