neighboring CpG sites. In this talk, I will discuss a number of methods that take sample variability into account when detecting DMLs. I will also discuss a Bayesian smoothing Curve (BCurve) method to detect DMRs using credible bands. In particular, I will highlight the feature of BCurve that takes correlation into consideration.

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› Principles of Neuroimaging

Martin A. Lindquist*, Johns Hopkins University

Understanding the brain is arguably among the most complex, important and challenging issues in science today. Neuroimaging is an umbrella term for an ever-increasing number of minimally invasive techniques designed to study the brain. These include a variety of rapidly evolving technologies for measuring brain properties, such as structure, function and disease pathophysiology. These technologies are currently being applied in a vast collection of medical and scientific areas of inquiry. This talk briefly discusses some of the critical issues involved in neuroimaging data analysis (NDA). This includes problems related to image reconstruction, registration, segmentation, and shape analysis. In addition, we will discuss various statistical models for conducting group analysis, connectivity analysis, brain decoding, and the analysis of multi-modal data. We conclude with discussing some open research problems in NDA.

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› Treatment Selection Based on the Conditional Quantile Treatment Effect Curve

Xiao-Hua Andrew Zhou*, University of Washington

In this talk, we introduce a statistical framework for treatment assignment for a subgroup of patients, using their biomarker values based on casual inference. This new method is based on conditional quantile treatment effect (CQTE) curve, and CQTE curve's simultaneous confidence bands (SCBs), which can be used to represent the quantile treatment effect for a given value of the biomarker and select an optimal treatment for one particular patient. We then propose B-splines methods for estimating the CQTE curves and constructing simultaneous confidence bands for the CQTE curves. We derive the asymptotic properties of the proposed methods. We also conduct extensive simulation studies to evaluate finite-sample properties of the proposed simultaneous confidence bands. Finally, we illustrate the application of the CQTE curve and its simultaneous confidence bands in optimal treatment selection with a real-world data set. This is a joint work with Kaishan Han.

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106. Genomics Integration

› Hierarchical Approaches for Integrating Various Types of Genomic Datasets

Marie Denis*, CIRAD, France
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Advances in high-throughput technologies have led to the acquisition of various types of -omic data on the same biological samples. Each data type gives independent and complementary information that can explain the biological mechanisms of interest. While several studies performing independent analyses of each dataset have led to significant results, a better understanding of complex biological mechanisms requires an integrative analysis of different sources of –omic data. The proposed approach allows the integration of various genomic data types at the gene level by considering biological relationships between the different molecular features. Several scenarios and a flexible modeling, based on penalized likelihood approaches and EM algorithms, are studied and tested. The method is applied to genomic datasets from Glioblastoma Multiforme samples collected as part of the Cancer Genome Atlas project in order to elucidate biological mechanisms of the disease and identify markers associated with patients' survival.

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