November 9, 2018

STUDENT SEMINAR

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Title

Adaptive Bayesian Clinical Trial for Incorporating Historical Data and Early Stopping for Success and Futility

Speaker

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(5th Year Ph.D. student in Statistics, UW-Madison)

Time & Place

Friday, Nov 9, 3pm, SMI 331

Snacks @ 2:45pm, SMI 331

Abstract

Adaptive Bayesian clinical trials have gained increasing popularity over the years due to the significant flexibility they convey over conventional clinical trials. Historical data offers the opportunity for dynamically decreased sample sizes, substantially reducing the cost of a trial. In our implementation, current trial data is augmented by historical data for the treatment and control groups independently, allowing immediate integration of existing, relevant data into one or more arms of a trial. In addition, adaptive Bayesian trials allow early stopping at interim looks by achieving success or futility at the current enrolled sample size, thus reducing patient cost and exposure to potentially inferior treatments. We have developed the bayesCT R package for the design, implementation, and analysis of adaptive Bayesian trials, including the incorporation of historical data and early stopping. Our R package uses novel, efficient Monte Carlo methods for estimating Bayesian posterior probabilities, evaluation of loss to follow up, and imputation of incomplete data. Trial simulation can be carried out using parallel computing to reduce processing time. This presentation introduces basic ideas of Bayesian adaptive design, incorporation of historical data, and demonstrates the capabilities of the bayesCT package. We also present a new approach to input trial parameters using pipes, which makes trial design considerably more transparent than via traditional R functions. The bayesCT R package is available at https://thevaachandereng.github.io/bayesCT/ under a GPL-3 license; a CRAN release will follow shortly.