

Adaptive Designs for Optimal Observed Fisher Information

Adam Lane ¹

Expected Fisher information can be found *a priori* and as a result its inverse is the primary variance approximation used in the design of experiments. This is in contrast to the common claim that the inverse of observed Fisher information is a better approximation of the variance of the maximum likelihood estimator. Observed Fisher information cannot be known *a priori*; however, if an experiment is conducted sequentially (in a series of runs) the observed Fisher information from previous runs is known. In the current work two adaptive designs are proposed that use the observed Fisher information from previous runs to design the future runs. The results of a simulation study using a generalized linear model (gamma regression with log link) is used to illustrate the performance of the adaptive designs proposed in this work. It is found that the adaptive designs significantly increase efficiency compared to alternative designs. This is most pronounced when the sample size is small to moderate. For large samples the improvement is still present; however, it is reduced.

¹Department of Pediatrics, University of Cincinnati, Cincinnati, OH 45229, USA,
E-mail: adam.lane@cchmc.org