Marshall University Department of Mathematics
Advanced Research Initiative

Invited Speaker

Dr. Thomas Mathew

Presidential Research Professor
University of Maryland, Baltimore County

"Methodology and Some Applications"

Tuesday, November 19, 2013 • CH 105 • 4:00pm

Standard likelihood based methods that are usually used to analyze data arising from a parametric model are typically accurate to the first order. Higher order inference procedures provide major improvements in accuracy, and are available for discrete as well as for continuous data. In the talk, two applications of higher order inference will be described. Both the applications deal with the computation of an upper tolerance limit: a limit that is expected to capture a specified proportion or more of a population with a given confidence level. The limit is constructed using a random sample, and the confidence level refers to the resulting sampling variability.

The first application that will be discussed is on the computation of tolerance limits under the logistic regression model for binary data. The data consist of binary responses, and upper tolerance limits are to be constructed for the number of positive responses in future trials corresponding to a fixed level of the covariates. The problem has been motivated by an application of interest to the U.S. Army, dealing with the testing of ballistic armor plates for protecting soldiers from projectiles and shrapnel, where the probability of penetration of the armor plate depends on covariates such as the projectile velocity, size of the armor plate, etc. The second application is on the computation of upper tolerance limits under a general mixed effects model with balanced or unbalanced data. Higher order inference procedures will be used to obtain accurate solutions in both the applications. Numerical results, examples and data analysis will also be reported.