Data Science Seminar

Hosted by Department of Mathematical Sciences

- Date: Tuesday, April 5, 2022
- Time: 12:00pm – 1:00pm
- Room: Zoom
- Speaker: Dr. Soumik Banerjee (Internal)
- Title: Multistage Minimum Risk Point Estimation (MRPE) with First-Order and Second-Order Asymptotic Properties

Abstract

This talk consists of three research topics in multistage methodologies handling a fundamental estimation problem, namely the minimum risk point estimation (MRPE) problems for the unknown normal mean (mu)□and any function of normal mean g(mu) when the variance □2 is assumed unknown. I will begin with an introduction and then lay down our first research problem by revisiting Mukhopadhyay and Bapat (2016,2017), dealing with the purely sequential strategies under Linex loss plus the cost of sampling. A number of important asymptotic first-order and asymptotic second-order properties characteristics have been developed and proved thoroughly. Extensive sets of simulations tend to validate nearly all these asymptotic properties for small to medium to large optimal fixed sample sizes. Then, I describe our second research based on Hamdy (1988,1998) and Mukhopadhyay (1990), which thoroughly develops a very broad general theory of three-stage estimation strategies. We begin with a generic expression of an optimal fixed-sample-size n*□ which has an expression □lambda g(theta) with □ lambda> 0 and g(□theta) > 0 where theta□ is an unknown parameter. A consistent estimator of theta is a sample mean of independent and identically distributed (i.i.d.) random variables. Under a fairly relaxed set of conditions on g(.), we have developed a general theory of three-stage sampling strategy detailing requisite mathematical techniques for proving both asymptotic (as □lambda goes to infinity) first-order and second-order analyses. Finally, extending the research of Mukhopadhyay and Wang (2019), my third research explores the asymptotic first- and second-order properties for the sequential risk associated with weighted powered absolute error loss (PAEL) function plus sampling cost under purely sequential, accelerated sequential, and three-stage MRPE methodologies to estimate a general function of unknown normal mean g(□mu) when the variance □sigma^2 is assumed unknown. In each research problem, I (i) detail every appropriate asymptotic theory and (ii) Report summaries from simulated performances. Overall, we empirically feel confident that our newly developed multi-stage estimation methodologies are asymptotically efficient in terms of first-order and second-order properties.

Biography of the speaker: Dr. Banerjee is a new Robert Riley Visiting Assistant Professor in the Department of Mathematical Sciences since 2021. He obtained his Ph.D. in Statistics from the University of Connecticut in 2021. His research mainly focuses on developing multistage sampling procedures to estimate parameters under a given model. It is a combination of including both point and interval estimation scenarios. It proves to be useful whenever a fixed sample technique fails to deliver the desired results.