



The Department of Mathematics, Physics and Statistics inviting you Prof. Balgobin Nandram Lecture series on Undergraduate Research in Mathematics and Statistics

Title of Lecture 1 : Bayesian Data Integration

Date: Monday, 9th May, 2022

Time: 6PM – 8 PM

About Prof. Balgobin Nandram

- Prof. Balgobin Nandram (Bal) is a native of Guyana. He received his Bachelor of Science Degree in Mathematics (Passed with Distinction) from the Department of Mathematics, Faculty of Natural Sciences, University of Guyana in 1977. He also received Diploma in Education (Mathematics Education) from the Faculty of Education, University of Guyana in 1979.

Prof Bal earned a Master's degree in Applied Statistics at Imperial College of Science, Technology and Medicine in 1981. He then returned to Guyana, and after three years, he came to the United States, August 1984. He studied at first at the State University of New York at Albany, and after one year, he moved to the University of Iowa where he earned the Ph.D. in statistics after an additional four years.

Currently (Since 2003) Prof Bal is working as a full Professor of Statistics at the Department of Mathematical Sciences, Worcester Polytechnic Institute, Massachusetts, USA. Prof Bal also served at the Department of Mathematics, University of Guyana, at the level of Lecture I and Lecture II from 1981 to 1984, and Head (ag.) of the department 1982-1984. Prof Bal has published nearly 200 peer reviewed research articles, guided more than 20 students for PhD degree in Statistics, and nearly 30 students for the MS degree (also in Statistics). He is a fellow of the American Statistical Association, an elected member the International Statistical Institute and Sigma Xi, the scientific society of America.

Lecture 1 – Abstract

We describe two problems of data integration, currently a very hot topic worldwide, and near and dear to me for more than three decades. First, we consider small area estimation, where

data are available from several small areas (e.g., villages, hospitals, schools, etc), and we want to estimate some parameter for each area's sub-population. The problem is that it is not reliable to use an estimate solely from each area, so we need to borrow strength from the ensemble. Second, we consider the problem where two samples, a non-probability sample and a relatively smaller probability sample, are to be combined to infer about the population. The probability sample can come from an observational study (e.g., crowd sourcing, mall intercepts, market gathering, etc.), but the probability sample comes from a well designed survey. It is very expensive to execute a survey and there may be a high rate of non-responders, but it is much cheaper to run a non-probability sample. The problem is that the non-probability sample gives biased estimate with small variance and the probability sample gives unbiased estimate with large variance. The survey weights from the non-probability sample are unknown, and there is a need to estimate them in order to combine the two samples to reduce bias and increase precision. We show how to use Bayesian statistics, particularly the hierarchical Bayesian model, which is of worldwide practical importance and also near and dear to me, to solve these two problems. The first problem will be presented using a tutorial style and the second a colloquium style.