Title of the short course:
Small Area Estimation

Name and contact information of the instructor:
Dr. Partha Lahiri, Professor and Director, Joint Program in Survey Methodology and Professor, Department of Mathematics, University of Maryland, College Park, USA; E-mail: plahiri@umd.edu; Website: https://jpsm.umd.edu/facultyprofile/lahiri/partha

Description of course:
The demand for various socio-economic and health statistics for small geographical areas is steadily increasing at a time when survey agencies are constantly looking for ways to reduce costs to meet fixed budgetary requirements. In the current survey environment, the application of standard sample survey methods for small areas, which require a large sample, is generally not feasible when considering the costs. One of the key factors that led to the success of small area estimation (SAE) methodology is the availability of strong auxiliary variables. The accessibility of Big Data from different sources (e.g., administrative/register records, social media data, mobile phone data, sensor data, satellite date, etc.) is now bringing new opportunities for statisticians to develop innovative SAE methods. We will begin the course by presenting a brief history of small area estimation, basic concepts and issues. Then we will discuss different existing methods for producing small area estimates with examples. We will illustrate available R packages for data analysis. Active participation from the attendees will be strongly encouraged.

Proposed course length:
Three-day

Course Text and Materials:
The course will be based on the presenter’s lecture slides.

Target Audience and Prerequisites:
The course is intended for practitioners and should be accessible to graduate students and early career researchers. An undergraduate level course in mathematical statistics and applied regression analysis are required.
Course content

1. Introduction
2. Direct Estimation
3. Synthetic Methods
4. Area Level Models
5. Unit Level Models
6. SAE R packages

Presenters

Dr. Partha Lahiri is Professor and Director of the Joint Program in Survey Methodology (JPSM) and Professor of Department of Mathematics at the University of Maryland College Park (UMD), and an Adjunct Research Professor of the Institute of Social Research, University of Michigan, Ann Arbor. Prior to joining UMD, Dr. Lahiri was the Milton Mohr Professor of Statistics at the University of Nebraska-Lincoln. He has been recently appointed as the President-Elect of the International Association of Survey Statisticians. His research interests include survey statistics, Bayesian statistics, data integration, and small-area estimation. He published over 80 papers in peer-reviewed journals, delivered 17 plenary/keynote speeches and over 80 invited talks in professional meetings worldwide. Over the years, Dr. Lahiri served on the editorial board of several international journals, including the Journal of the American Statistical Association and Survey Methodology. He served on several advisory committees, including the U.S. Census Advisory committee and U.S. National Academy panel and served as consultant for international organizations such as the United Nations and the World Bank. Dr. Lahiri is an elected Fellow of the American Statistical Association and the Institute of Mathematical Statistics and an elected member of the International Statistical Institute. He received the 2021 SAE Award at the 63rd World Statistics Congress Satellite Meeting on Small Area Estimation in recognition of lifetime contributions to small area estimation research. More recently, Dr. Lahiri was awarded the Neyman Medal at a joint session of the 3rd Congress of Polish Statistics and 2022 International Association of Official Statistics (IAOS) held in Krakow, Poland, for outstanding contributions to the development of statistical sciences.

Homepage: https://jpsm.umd.edu/facultyprofile/lahiri/partha
Agenda:

**Monday: MAY 6, 2024** 9:15 -
10:15 Introduction
10:15-10:30 Discussion
10:30 - 10:45 Morning Break.
10:45 - 11:45 Direct Estimation
11:45 - 12:00 Discussion
12:00 - 1:00 Lunch Break
1:00 - 2:00 Synthetic Methods
2:00 – 2:15 Discussion

**Tuesday: MAY 7, 2024**
9:15 - 10:15 Area Level Models
10:15-10:30 Discussion
10:30 - 10:45 Morning Break.
10:45 - 11:45 Area Level Models
11:45 – 12:00 Discussion
12:00 - 1:00 Lunch Break
1:00 - 2:00 Unit Level Models
2:00 – 2:15 Discussion

**Wednesday: MAY 8, 2024**
9:15 - 10:15 Unit Level Models
10:15-10:30 Discussion
10:30 - 10:45 Morning Break
10:45 - 11:45 SAE R packages
11:45 – 12:30 Discussion