INDIAN STATISTICAL INSTITUTE

203 B.T. Road, Kolkata-700108

Theoretical Statistics and Mathematics Unit

Monday Colloquium

Date: May 22, 2023 Time: 04:15 P.M.

Venue: L-infinity, Stat-Math Unit (5th Floor, A.N. Kolmogorov Bhavan), ISI Kolkata

Bikram Karmakar

Department of Statistics, University of Florida

TITLE:

Inferring the Effect of a Confounded Treatment by Calibrating Resistant Population's Variance

ABSTRACT:

We endeavor causal inference from non-experimental studies without the critical assumption that all confounders are observed. Unlike existing attempts towards this aim, we do not require additional knowledge of an exogenous source of variability in the treatment, e.g., an instrument or another outcome unaffected by the treatment. Instead, we require (a) a nondeterministic treatment assignment, (b) that all effect modifiers are measured, and (c) a resistant population that was not exposed to the treatment or, if exposed, is unaffected by the treatment. Assumption (a) is generally unavoidable, and (b) is mild and can be relaxed. We view assumption (c), a new assumption that we introduce to the literature, to be central to our method. We show that a resistant population is often available in practice. A resistant population allows us to calibrate the conditional variance of the outcome in the absence of the treatment, which identifies the magnitude of bias induced by the nonrandom treatment assignment. However, while the magnitude of the bias can be found, the direction cannot. Therefore, our method assumes much less and avoids any unconfoundedness or exogenous variability conditions while costing us a bit of ambiguity in the inference.

We develop a methodology for large sample inference and demonstrate our proposed method in a study of the effect of surface mining in central Appalachia on birth weight. In this study we determine the direction of the bias on scientific grounds. Consequently, using our method, we find a harmful effect of surface, which is substantially larger for babies born after little prenatal care.

(Joint work with Z. Qin)

ALL ARE CORDIALLY INVITED