THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS AND DATA SCIENCE

Semiparametric efficient G-estimation with invalid instrumental variables

By

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Abstract

The instrumental variable method is widely used in the health and social sciences for identification and estimation of causal effects in the presence of potential unmeasured confounding. To improve efficiency, multiple instruments are routinely used, raising concerns about bias due to possible violation of the instrumental variable assumptions. To address such concerns, we introduce a new class of G-estimators that are guaranteed to remain consistent and asymptotically normal for the causal effect of interest provided that a set of at least γ out of K candidate instruments are valid, for $\gamma \leqslant K$ set by the analyst ex ante without necessarily knowing the identities of the valid and invalid instruments. We provide formal semiparametric efficiency theory supporting our results. Simulation studies and applications to UK Biobank data demonstrate the superior empirical performance of the proposed estimators compared with competing methods.

Date : **5 May 2023 (Friday)**
Time : **11:00am**
Venue : **Room 5510 (Lifts 25/26)**

All are Welcome!