学术报告

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MATHEMATICS

Improved Horvitz-Thompson estimator and related theory of model-assisted estimation

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摘要： The Horvitz-Thompson (HT) estimator is widely used in survey sampling. However, the variance of the HT estimator becomes large when the inclusion probabilities are highly heterogeneous. To overcome this shortcoming, in this paper, a hard-threshold method is used for the first-order inclusion probabilities, that is, we carefully choose a threshold value, then replace the small inclusion probabilities by the threshold. By this shrinkage strategy, we propose a novel estimator called improved Horvitz-Thompson (IHT) estimator to estimate the population total. The IHT estimator increases the estimation accuracy although it brings bias which is relatively small. We derive the IHT estimator's MSE and its unbiased estimator, and theoretically compare the IHT estimator with the HT estimator. We also apply our idea to construct the improved ratio and regression estimators. We numerically analyze simulated and real data sets to illustrate that the proposed estimators are more efficient and robust than the classical estimators.

个人简介： 邹国华，首都师范大学特聘教授。博士毕业于中国科学院系统科学研究所，是国家杰出青年基金获得者、“新世纪百千万人才工程”国家级人选、中国科学院“百人计划”入选者、享受国务院政府特殊津贴，曾获中国科学院优秀研究生指导教师称号。主要从事统计学的理论研究及其在经济金融、生物医学中的应用研究工作，在统计模型选择与平均、抽样调查的设计与分析、决策函数的优良性、疾病与基因的关联分析等方面的研究中取得了一系列重要成果，得到了国内外同行的好评与肯定，并被广泛引用。共出版教材2本，发表学术论文130余篇；主持和参加过近30项国家科学基金项目以及全国性的实际课题，提出的预测方法被实际部门所采用。

邀请人： 田玉斌、 虞俊

时间　：2023年5月12日 11：00-12：00

地点　：文萃楼F503

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