New Procedures of Estimating Proportion and Sensitivity Using Randomized Response in a Dichotomous Finite Population

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The problem of estimating the population proportion possessing a sensitive attribute using simple random sampling with replacement (SRSWR) is advocated. Two new procedures are proposed. The suggested models are more efficient than the Huang (2004) randomized response technique under some realistic conditions. Numerical and graphic illustrations are given.

Keywords: Randomized response technique, direct response, estimation of proportion, privacy of respondents, sensitive characteristics

Introduction

Socioeconomic investigations often relate to certain personal features that people desire to hide from others in comprehensive inquiries, detailed questionnaires include numerous items. Direct questioning of respondents about them is likely to result either in non–response or in a deliberately incorrect answer. Social stigma and fear of reprisals often lead respondents to give biased, misleading, or even erroneous responses when approached with a direct response (DR) survey method. Even for the reason of merely being unwilling to reveal secrets to strangers, many individuals attempt to avoid certain questions put to them by interviewers.

Consider a dichotomous population in which every person belongs to either a sensitive group A or to the non–sensitive complement A^c. The aim is to estimate π , the population proportion of individuals who are members of A. To do so, a simple random sample of size *n* is drawn from the population with replacement. Let *T* be the probability that the respondents belong to A report the truth. The respondents

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