



Estimation of domain means under Multinomial Randomised Response Model

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Abstract

Often, when conducting surveys concerning the inquiry of sensitive questions, we are unable to obtain truthful responses from our respondents, who may choose instead to provide a socially accepted response or to avoid even providing a response. This is because they are fretful that providing a truthful response may lead to negative judgement by others on themselves. False responses and non-responses yield inaccurate and unreliable estimates of the sensitive attributes that we are attempting to study. Hence, the randomised response technique (RRT) was introduced to ensure anonymity in the respondents' responses and eliminate bias, by prompting more truthful responses.

Over the years, many modifications and extensions have been made to the RRT. One such version was provided by Liu and Chow (1976) [1], which presented a new discrete quantitative RRT using a predetermined combination of balls in the randomising device.

In this project, we will use Liu and Chow's model [1] and randomising device to study domain means of a non-sensitive attribute (Y) at different values of a sensitive attribute (W). Eventually, we aim to provide reliable and efficient estimates of the domain mean of Y at different values of W . i.e. μ_j , where j is the value of W . We derive unbiased estimates of μ_j and their variance-covariance matrix to study their efficiencies. Analysis is conducted on the variance expressions to study the best allocation of balls in achieving a balance between the highest efficiency and anonymity.