Recent Developments in RRT Models

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Abstract:

Randomized response models, introduced by Warner (1965, *Journal of the American Statistical Association*), are important data acquisition tools in social and behavioral sciences where researchers are often faced with sensitive questions. These models allow respondents to provide a scrambled response offering them complete privacy. The researcher is able to unscramble the responses at an aggregate level but not at an individual level. These models are very useful in social sciences research but have also been used in many other fields such as business, criminology, medicine and public health.

Among the newer RRT models are the one-stage and two-stage optional randomized response models. An Optional RRT model, introduced by Gupta, Gupta and Singh (2002, *Journal of Statistical Planning and Inference*), is a variation of the usual randomized response model and is based on the premise that a question may be sensitive for one respondent but may not be sensitive for another, and hence the choice to provide a truthful response or a scrambled response should be left to the respondent. Gupta, Shabbir and Sehra (2010, *Journal of Statistical Planning and Inference*) have recently introduced a two-stage quantitative response optional RRT model where a randomly selected pre-determined proportion (T) of the subjects is asked to provide a truthful response and rest of the respondents are asked to provide a response using the optional RRT model. One would expect a two-stage model to always perform better than the one-stage model regardless of the value of T but we observe that this is not true in general. We will discuss how to choose an optimal value of T.

Recently Gupta et al. (2012, *Journal of Statistical Theory and Practice*) have introduced a different two-stage model which is more efficient than the Gupta, Shabbir and Sehra (2010, *Journal of Statistical Planning and Inference*) and is more user-friendly

In this talk, we will discuss

- Background of RRT models
- Philosophy behind two-stage models
- Some optimality issues, and
- Various scrambling operators