STATISTICAL INFERENCE BASED ON PARTIALLY RANK ORDERED SET SAMPLES

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Abstract. In this talk, I will introduce a new sampling design for settings, where potential experimental units have a wealth of information to be utilized in the construction of a sampling design. This information does not have to be precise. It may be rough, incomplete, or imprecise, it may even have substantial bias or measurement error. The proposed sampling design selects a set of experimental units. These units are judgment ranked by a ranker pre-experimentally without a measurement by using available rough and imprecise information. Ranking process allows ties among ranks whenever units cannot be ranked accurately with high confidence, and hence, it creates partially rank ordered judgment subsets. A unit for full measurement is then selected from one of these subsets. This process is repeated several times to have a set of fully measured observations. The collection of these fully measured observations is called partially ranked ordered set sample (PROS). PROS design is similar to ranked set sampling with a clear difference that rankers are allowed to declare any two or more units are tied in ranks whenever the units can not be ranked with high confidence. Thus, it has substantially smaller ranking error than the ranking error of a ranked set sample of the same size. Based on this sampling design, we develop statistical inference for one-sample and two-sample problems. We show that the proposed sampling design outperforms its competitors, simple random sample and ranked set sample, of the same size.

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