A "Paradox" in Confidence Interval Construction Using Sufficient Statistics

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May 2018

Abstract

Statistical inference about parameters should depend on raw data through sufficient statistics – the well known sufficiency principle. In particular, inference should depend on minimal sufficient statistics if these are simpler than the raw data. In this talk, we construct one-sided confidence intervals for a proportion which depend on the raw binary data and are uniformly shorter than the smallest one-sided confidence intervals which depend on the binomial random variable, a minimal sufficient statistic, surprisingly violating the aforementioned principle if we restrict the optimal interval search within the class of nonrandomized confidence intervals. Similar results occur for other discrete distributions. An application in Phase II clinical trial is discussed.

About the speaker: Weizhen Wang received his B.S. and M.S. at Peking University in 1987 and 1990, respectively, and completed his Ph.D. in Statistics at Cornell University in 1995. After one-year visit at Purdue University, he joined Wright State University, and has been a Professor of Statistics since 2007. His research includes bioequivalence, exact parametric and nonparametric inference, saturated and adaptive designs, categorical data analysis, foundation of statistics, statistical computation, dose-response study, causal inference and machine learning. His current primary interests are exact statistical inference and computational statistics using R.