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Learning for Contingency Tables and Survival Data Using Imprecise Probabilities

Imprecise probability theory is a generalization of the classical probability theory. A comprehensive collection of the foundations of imprecise probabilities theory is provided by Walley (1991), where the name of "imprecise probability" was proposed. The upper and lower posterior expectations of log-odds ratio are estimated and the degree of imprecision is calculated in this work. Survival data with right-censored observations are considered and represented in a sequence of 2×2 contingency tables, one at each observed death time. A re-parametrization of odds ratio is assumed based on the feature that non-central hypergeometric distribution. Two choices (normal and beta) of imprecise priors are given to the parameters. The findings show that small values of the degree of imprecision appear when the sample size is large and the number of censored observations is small. In contrast, the large values of the degree of imprecision are observed when sample size is small and the number of censored observations is large. In short, the degree of imprecision of the parameter of interest is reduced by having more information, more data, and less censored observations as the results of this work displayed, which is intuitively what one would expect.