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Confidence bounds for a parameter

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Abstract

The subject of the paper - upper confidence bounds - originates from applications to auditing. Auditors are interested in upper confidence bounds for an unknown mean for all sample sizes. The samples are drawn from populations such that often only a few observations are non-zero. The conditional distribution of an observation, given that it is non-zero, usually has a very irregular shape. In such situations parametric models seem to be somewhat unrealistic. In this paper we consider confidence bounds and intervals for an unknown parameter in parametric and non-parametric models. We propose a reduction of the problem to inequalities for tail probabilities of relevant statistics. In the special case of an unknown mean and bounded observations, a similar approach has been used in Bentkus and van Zuijlen (2001) by applying Hoeffding (1963) inequalities for sample means and variances. The bounds can be modified in order to involve a priori information (=professional judgment of an auditor), which leads to improvements of the bounds. Furthermore, the results hold for various sampling schemes and observations from measurable spaces provided that we posses the aforementioned inequalities for tail probabilities.