Empirical Likelihood-based Confidence Intervals for the Partial Area Under the ROC Curve

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Accurate diagnosis of disease is a critical part of health care. New diagnostic and screening tests must be evaluated based on their abilities to discriminate diseased conditions from non-diseased conditions. For a continuous-scale diagnostic test, the most commonly used global summary index of the receiver operating characteristic (ROC) curve is the area under the curve (AUC). The partial area under the ROC curve (pAUC) is often used when only a region of the ROC curve is of interest. In this paper we propose an empirical likelihood approach for the inference on the partial AUC. We define an empirical likelihood ratio for the partial AUC and show that its limiting distribution is a scaled chi-square distribution. We then obtain an empirical likelihood based confidence interval for the partial AUC using the scaled chi-square distribution. We also conduct a simulation study to compare the relative performance of the proposed empirical likelihood based intervals with the existing normal approximation based intervals for the partial AUC. The simulation study indicates that the empirical likelihood based method greatly outperforms the existing method.

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