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Abstract

The limit of detection (LOD) commonly happens in many practical situations due to technique limitation or instrument accuracy. When variables measured subject to LOD are used in classification or medical diagnosis, classical diagnostic power evaluations should be used with caution. Direct application of classical routines might lead to incorrect conclusion. Many discussions on the receiver operating characteristic (ROC) curve of a variable under LOD can be found in the literature. Especially, the area under ROC curve (AUC) of a variable subject to LOD is usually biased no matter what kinds of replacement strategies are used. However, there is a lack of similar studies for the partial area under curve (pAUC), which is an important index in medical diagnosis. In this paper, we study the pAUC for variables that measured with detection limit. Unlike the estimate of AUC under LOD, we found that for some cases, consistently estimating pAUC under LOD is possible. Even when a consistent estimate is not available in theory, the bias of the proposed estimate tends to be close 0; that is, this estimate can still be a useful approximate. Numerical studies using simulated data sets and a real data example are reported.

Keywords: ROC curve, AUC, partial AUC, Limit of detection
