LOW-TUBAL-RANK TENSOR RECOVERY FROM ONE-BIT MEASUREMENT

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Abstract: Simultaneous control on true positive rate and false positive rate is of significant importance in the performance evaluation of diagnostic tests. Most of the established literature utilizes partial area under receiver operating characteristic (ROC) curve with restrictions only on false positive rate (FPR), called FPR pAUC, as a performance measure. However, its indirect control on true positive rate (TPR) is conceptually and practically misleading. In this paper, a novel and intuitive performance measure, named as two-way pAUC, is proposed, which directly quantifies partial area under ROC curve with explicit restrictions on both TPR and FPR. To estimate two-way pAUC, we devise a nonparametric estimator. Based on the estimator, a bootstrap-assisted testing method for two-way pAUC comparison is established. Moreover, to evaluate possible covariate effects on two-way pAUC, a regression analysis framework is constructed. Asymptotic normalities of the methods are provided. Advantages of the proposed methods are illustrated by simulation and Wisconsin Breast Cancer Data. We encode the methods as a publicly available R package tpAUC.