

**Semiparametric ROC Models with Multiple Biomarkers**

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In medical diagnostic research, biomarkers are used as the basis for detecting or predicting disease. There has been an increased interest in using the receiver operating characteristic (ROC) curve to assess the accuracy of biomarkers. However, even though numerous methods have been developed for a single biomarker, few statistical methods exist to accommodate multiple biomarkers simultaneously. In this paper, we propose a multivariate binormal ROC model to assess multiple biomarkers. Our model assumes that biomarkers follow multivariate normal distribution after unknown and marker-specific transformations. Random effects are introduced to account for within-subject correlation among biomarkers. Nonparametric maximum likelihood estimation is used for inference and parameter estimators are shown to be asymptotically normal and efficient. Both simulation study and real data application are used to illustrate the proposed method.