Comparison of Diagnostic Powers of Biomarkers Via Sequential Optimal Estimates of Partial Areas Under Receiving Operating Characteristic Curve

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Abstract

Due to new technologies, the potential biomarkers are collected in a more efficient manner than before. Thus how to sift effective biomarkers from an abundance of newly discovered ones is an important issue. To this end, an adaptive sequential method is proposed for estimating the diagnostic power based on the partial area under receiving operating characteristic curve of biomarkers in order to screen out the insignificant ones, efficiently. The propose method is proved to be optimal, since it guarantees the accuracy of the performance estimate and maintains the ratio of cases to controls converging to the optimal one in the sense of Janes and Pepe (2006). As the availabilities of two classes are imbalanced or the costs of sampling of them are seriously unequal, this method can include suchlike information as a part of its criteria. In addition, the area under curve can also be employed in a similar way. A similar method for combining diagnostic markers/classifiers is also studied. Numerical studies show that the proposed method is very promising, and the results of applying our method to a benchmark real data set is presented.