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# Study of Receiver-operating Characteristic Curve Type Measures When The Gold Standard Is Continuous

Zhanfeng Wang, Yuan-chin Ivan Chang  
Institute of Statistical Science, Academia Sinica, Taipei 115, Taiwan

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## Abstract

The receiver operating characteristic (ROC) curve is a very useful tool in analyzing diagnostic/classification power of instruments/classification schemes as long as a binary-scale gold standard is available. If the gold standard is continuous and there is no confirmative threshold for it is available, then the traditional ROC curve analysis cannot be applied. Hence, we propose a new measure, which extends the ROC curve-type index for measuring the diagnostic power of variables, which is useful in identifying variables with good potential to be used in a diagnostic scheme. The estimate of the proposed index and its asymptotic property is studied. In addition, we propose a threshold gradient descend based algorithm for finding the best linear combination of variables that maximizes this new measure, which is applicable even when the number of variables is huge. The performance of the proposed method is illustrated using both synthesized and real data sets.

Keywords and phrases: ROC curve; area under curve; gold standard; classification.