Use of the Area under a Receiver Operating Characteristics (ROC) Curve in Medical Research

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Receiver operating characteristic (ROC) curves are frequently used in medical research to evaluate classification and prediction models for decision support, diagnosis, and prognosis. The discrimination capacity of logistic regression models is often measured by cross-classifying observations and predictions in a two-by-two table. An alternative approach is described which measures discrimination capacity in terms of the area under a relative operating characteristic (ROC) curve relating relative proportions of correctly and incorrectly classified predictions over a wide and continuous range of threshold levels.

In this paper, we will intricate on the meaning of the ROC curve, using the links between it and other statistical concepts. Although ROC graphs are apparently simple, there are some common misconceptions and pitfalls when using them in practice. The purpose of this paper is to serve as an introduction to ROC graphs and as a guide for using them in research.