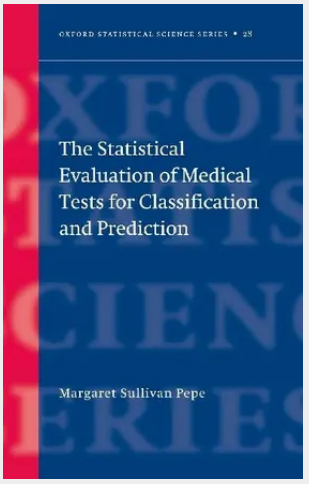
Pepe

STATIST EVAL MED TESTS CLASSIF OSSS 31 C

The use of clinical and laboratory information to detect conditions and predict patient outcomes is a mainstay of medical practice. Modern biotechnology offers increasing potential to develop sophisticated tests for these purposes. This book describes the statistical concepts and techniques for evaluating the accuracy of medical tests. Worked examples include applications to cancer biomarker studies, prospective disease screening studies, diagnostic radiology studies and audiology testing studies. The statistical methodology can be broadly applied for evaluating classifiers and to problems beyond medical settings. Several measures for quantifying test accuracy are described including the Receiver Operating Characteristic Curve. Pepe presents statistical procedures for the estimation and comparison of those measures among tests. Regression frameworks for assessing factors that influence test accuracy and for comparing tests while adjusting for such factors are presented. The sequence of research steps involved in the development of a test is considered in some detail. Sample size calculations and other issues pertinent to study design are described for tests at various phases of development. In addition, the impacts of missing data and imperfect reference data are addressed. These problems often occur in practice, and modern statistical procedures for dealing with them are discussed. Additional topics that are covered include: meta-analysis for summarizing the results of multiple studies of a test; the evaluation of markers for predicting event time data; and procedures for combining the results of multiple tests to improve classification. This book should be of interest to quantitative researchers and practicing statisticians. The book also covers the theoretical foundations for statistical inference and should therefore be of interest to academic statisticians including those involved in statistical methodological research in this field.

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