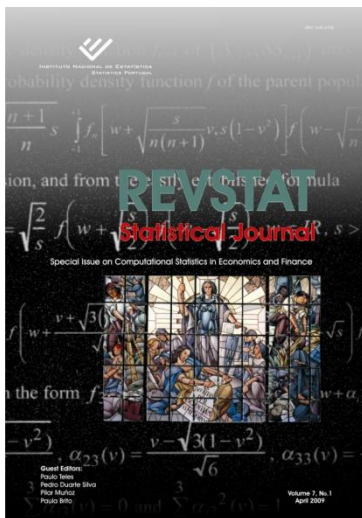


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REVSTAT- STATISTICAL JOURNAL



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This Volume of **REVSTAT: Volume 12, No. 1 - March 2014**, is about "**Statistical Models for Diagnosis and ROC Analysis**" and includes five articles. Their abstracts are presented below:

ROC CURVE ESTIMATION: AN OVERVIEW

Authors: *Luzia Gonçalves, Ana Subtil, M. Rosário Oliveira and Patricia de Zea Bermudez.*

This work overviews recent developments on the estimation of the Receiver Operating Characteristic (ROC) curve. Estimation methods in this area are constantly being developed, adjusted and extended, and it is thus impossible to cover all topics and areas of application in a single paper. Here, we focus on some frequentist and Bayesian methods which have been mostly employed in the medical setting. Although we focus on the medical setting, we also describe links with other fields where related developments have been made, and where some modeling concepts are often known under other designations.

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A REVIEW ON ROC CURVES IN THE PRESENCE OF COVARIATES

Authors: *Juan Carlos Pardo-Fernández, María Xosé Rodríguez-Álvarez and Ingrid Van Keilegom.*

In this paper we review the literature on ROC curves in the presence of covariates. We discuss the different approaches that have been proposed in the literature to define, model, estimate and do asymptotics for ROC curves that incorporate covariates. For reasons of brevity, we mostly focus on nonparametric approaches, although some parametric and semiparametric methods are also discussed. We also analyze endocrinological data on the body mass index to illustrate the methodology. Finally, we mention some research topics that need further investigation or that are still unexplored.

DEVELOPMENTS IN ROC SURFACE ANALYSIS AND ASSESSMENT OF DIAGNOSTIC MARKERS IN THREE-CLASS CLASSIFICATION PROBLEMS

Author: *Christos T. Nakas.*

This article reviews current state of the art of ROC surface analysis and illustrates its use through an application on a pancreatic cancer diagnostic marker. Receiver Operating Characteristic (ROC) surfaces have been studied in the literature essentially only during the last decade and are considered as a natural generalization of ROC curves in three-class diagnostic problems. This article presents the definition, construction, modelling, and utility of the ROC surface while trying to provide an extensive reference list in the topic. It describes methodology for inference based on the Volume Under the ROC surface (VUS) and methodology for decision making through the selection of optimal cut-off points using the notion of the generalized Youden index as the optimality criterion of choice. It ends with a discussion regarding future directions for research in this field of knowledge.

VERIFICATION BIAS—IMPACT AND METHODS FOR CORRECTION WHEN ASSESSING ACCURACY OF DIAGNOSTIC TESTS

Author: *Todd A. Alonzo.*

Sometimes it is not feasible to obtain disease status verification for all study subjects. Analysis of only those with disease ascertainment can result in biased estimates of the accuracy (sensitivity, specificity, ROC curve) of a diagnostic test, screening test, or biomarker if the estimation method does not properly account for the missing disease ascertainment. This paper discusses the impact of this bias, verification bias, when estimating the accuracy of dichotomous and continuous diagnostic tests. In addition, methods to correct for verification bias are described. Areas that require additional attention are also highlighted.

MODELING WITHOUT A GOLD STANDARD: STRATIFICATION WITH STRATUM-DEPENDENT PARAMETERS

Authors: *Francisco Louzada, Gilberto de Araujo Pereira, Márcia M. Ferreira-Silva, Valdirene de Fátima Barbosa, Helio de Moraes-Souza and Gleici S. Castro Perdoná.*

Bayesian latent-class models have been widely applied for assessing the performance of diagnostic tests in the absence of a gold standard. We provide a short discussion on identifiability issues appearing under the absence of a gold standard, and construct an extension of the well-known Hui–Walter stratification model which allows for stratum-dependent parameters. We illustrate our approach using a Chagas disease case study on blood donors from Brazil.