A Bayesian perspective of the Generalized Symmetry point, an optimal criterion for classification in diagnostic tests

Mónica López Ratón[1,2], Carmen Cadarso Suárez[1], Elisa M. Molanes López[3], Emilio Letón[4]

[1] Unidad de Bioestadística. Departamento de Estadística e Investigación Operativa, USC
[2] Biostatech, Advice, Training & Innovation in Biostatistics, S.L
[3] Departamento de Estadística, UC3M
[4] Departemento de Inteligencia Artificial, UNED

ABSTRACT

In ROC analysis, there exist several criteria to select the optimal threshold of a continuous diagnostic test or biomarker that classifies individuals into two groups, diseased and non-diseased individuals. In this work, we start giving a Bayesian perspective of the Symmetry Point and its generalized version that takes into account the costs associated to the decisions taken (true positives, true negatives, false positives and false negatives). Secondly, we introduce our R package GsymPoint that implements two new methods to construct confidence intervals for the Generalized Symmetry point: one parametric based on the General Pivotal Quantity and the other based on Empirical Likelihood. Finally, we perform a simulation study of this new methodology and illustrate the use of our R package GsymPoint using two real data sets.

Keywords: optimal threshold, ROC, Bayesian, Symmetry Point