

A novel overlap-based framework for assessing classifiers of three diagnostic groups

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Abstract

This study presents a novel methodology aimed at finding potential biomarkers for improving diagnostic accuracy in multiclass classification problems, addressing challenges in distinguishing populations divided into three distinct groups rather than the traditional binary setup. Existing tools, such as ROC surfaces and the Volume Under the ROC Surface (VUS), are limited in their ability to fully capture the complexities of such scenarios. Pardo and Franco (2024) explored the advantages of the Overlap measures (OVL) over the ROC summary indices to assess the accuracy of a medical diagnostic test in the binary case. This work introduces parametric and non-parametric approaches for estimating OVL in the case of three class diagnostic problems and evaluates their performance through extensive simulations, comparing them to VUS. The methodology's utility is demonstrated using a biomarker dataset related to Alzheimer's progression, highlighting its potential to improve early-stage diagnosis. Such advancements are essential for enabling timely interventions, facilitating family planning, and enhancing the quality of life for patients at risk of severe neurodegenerative conditions.

References

Pardo, M.C. and Franco-Pereira, A.M. (2024). Overlap measures against ROC summary indices. *Statistical Science*, in press.