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The Receiver Operating Characteristic (ROC) curve is a widely used statistical tool for assessing the performance of a binary classification procedure based on a continuous marker. It is particularly relevant in medical research, where the objective is to distinguish healthy and diseased individuals. The ROC curve is constructed by combining, for each potential threshold in the support of the marker, the rate of diseased subjects correctly classified as diseased, or sensitivity, against the rate of healthy subjects incorrectly classified as diseased, that is, 1 - specificity (see, for example, [1]).

In many practical applications, covariates related to the marker are available. In such cases, it becomes important to evaluate the influence that those covariates might have in the performance of the marker in terms of classification ability. Two extensions of the ROC curve have been proposed in the literature: the covariate-specific ROC curve, which is defined in terms of conditional distributions, and the covariate-adjusted ROC curve, which can be seen as a sort of average of the covariate-specific curves. See [2] for a review on the topic.

In this talk, we will present two methods to compare ROC curves in the presence of covariates. First, a test to compare covariate-specific ROC curves will be discussed. In practice, this test would allow to decide if, for a given value of the covariate, the classification capabilities of several markers differ. Second, a method for testing the equality between the ordinary ROC curve and the covariate-adjusted ROC curve will be introduced. This test can be employed to evaluate the convenience of incorporating the covariate to the ROC analysis. The proposed methodologies rely on nonparametric estimation of the involved ROC curves and bootstrap resampling plans to approximate the null distribution of the test statistics. The talk is based on [3], [4] and [5].

Trabajo en conjunto con Arís Fanjul-Hevia (Universidad de Oviedo, España) y Wenceslao González Manteiga (Universidade de Santiago de Compostela, España).

Referencias

- [1] Nakas C, Bantis L, Gatsonis C (2023). ROC analysis for classification and prediction in practice. Chapman and Hall/CRC.
- [2] Pardo-Fernández JC, Rodríguez-Álvarez MX, Van Keilegom I (2014). A review on ROC curves in the presence of covariates. REVSTAT Statistical Journal, 12, 21-41.
- [3] Fanjul-Hevia A, González-Manteiga W, Pardo-Fernández, JC (2021). A non-parametric test for comparing conditional ROC curves. Computational Statistics Data Analysis, 157, 107146.
- [4] Fanjul-Hevia A, Pardo-Fernández JC, Van Keilegom I, González-Manteiga W (2024). A test for comparing conditional ROC curves with multidimensional covariates. Journal of Applied Statistics, 51, 87-113.
- [5] Fanjul-Hevia A, Pardo-Fernández JC, González-Manteiga W (2025). A new test for assessing the covariate effect in ROC curves. Statistics in Medicine, 44, e70284.