

Assessing discriminatory ability of random effects logistic models for clustered binary outcomes

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Abstract

In multicentre studies patients are typically clustered within centres and are likely to be correlated. Typically, random effects logistic models are fitted to clustered binary outcomes. However, limited work has been done to assess the discriminatory ability of these models: the ability of the model to distinguish between low-and high-risk patients. The C-index has been used to assess discrimination in the standard logistic model. For clustered data, the naïve use of the standard C-index may lead to misleading conclusions regarding the model's discriminatory ability. This paper extends the standard C-index to use with random effects logistic models, resulting in an 'Overall' C-index and a Pooled cluster-specific C-index. Both indices have individual interpretation. The 'Overall' approach can produce two different values for the C-indices depending on type of predictions: conditional and marginal predictions. The methods are illustrated using real data on patients following heart valve surgery and their performances are investigated using simulation studies with several scenarios related to clustered data.

Keywords: clustered binary data, random effect model, discrimination, model validation.

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