Abstract

The receiver operating characteristic (ROC) curve is a tool of extensive use in medical studies to assess the discrimination capability of a diagnostic variable measured on a continuous scale. In certain situations, failing to include covariate information related to the diagnostic variable may lead to a biased assessment of the discriminatory ability of the marker. In this report, we follow an induced methodology ROC regression approach to model the effect of covariates on the diagnostic variable and propose to define the mean and variance functions of the underlying location-scale regression models using penalised cubic B-splines. Therefore, allowing to accommodate nonlinear effects of the covariates as well as the incorporation of multiple continuous and/or categorical covariates in the model. The proposed method is evaluated in a simulation study involving scenarios of varying complexity. In addition, we provide software for the implementation of the method. Finally, the report presents an illustration of the method to a data set concerning diagnosis of Alzheimer's disease.