A TREE-GROWING ALGORITHM FOR THE ANALYSIS OF GROWTH CURVES

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We propose a new algorithm of the RECPAM family for constructing prediction trees for multivariate longitudinal data. Unlike currently available algorithms, ours includes the following features: a) modeling the longitudinal outcome by polynomial or spline functions; b) variance-covariance matrices varying across leaves; c) linear predictors at the leaves or at the root of the tree; d) amalgamation of leaves to obtain distinct classes; e) adjustment (for given variables) and treatment of nuisance parameters through the concept of "root" and "virtual" variables/parameters. We illustrate some of these features through an analysis of human growth data from a cluster-randomized trial of a breastfeeding promotion intervention. Weight, height and head circumference were measured longitudinally on 3059 children at birth and at 1, 2, 3, 6, 9 and 12 months of age. In addition to treatment assignment, predictors included mother's characteristics and characteristics of the child at birth, including gestational age. We present a tree that identifies three distinct patterns of growth, defined in term of Apgar score and child's gender. We give an example of subgroup analysis: three different patterns of response to the intervention are identified in terms of child's gender and number of children. We also show the utility of the virtual variable concept in adjusting for gestational age.