DETECTING STAGE-WISE OUTLIERS IN HIERARCHICAL BAYESIAN LINEAR MODELS OF REPEATED MEASURES DATA

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Abstract. We propose numerical and graphical methods for outlier detection in hierarchical Bayes modeling and analyses of repeated measures regression data from multiple subjects; data from a single subject are generically called a "curve." The first-stage of our model has curve-specific regression coefficients with possibly autoregressive errors of a prespecified order. The first-stage regression vectors for different curves are linked in a second-stage modeling step, possibly involving additional regression variables. Detection of the *stage* at which the curve appears to be an outlier and the *magnitude and specific component* of the violation at that stage is accomplished by embedding the null model into a larger parametric model that can accommodate such unusual observations. We give two examples to illustrate the diagnostics, develop a BUGS program to compute them using MCMC techniques, and examine the sensitivity of the conclusions to the prior modeling assumptions.

Key words and phrases: Autoregressive errors, BUGS, graphical diagnostics, model-based diagnostics, outlier accommodation models, diagnostics for multi-stage models.