A BAYESIAN APPROACH TO ESTIMATE LATENT RANDOM EFFECTS: AN APPLICATION TO CLUSTER ANALYSIS OF REPEATED ORDINAL DATA

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Traditional cluster analysis methods used in ordinal data, e.g. k-means, are mostly heuristic and lack statistical inference tools to compare among competing models. To address this, we have developed cluster models based on finite mixtures and applied them to the case of repeated ordinal data within a Bayesian setting. In particular, we present a hierarchical model with data at 3 levels: clusters, individuals and occasions; where only the latter two are observed. That is, we assume that individuals come from a finite mixture of latent clusters. To model the ordinal nature of the data, we use cumulative logit models that include time effects by cluster to account for the correlation between repeated occasions within the same individuals. We estimate this model using Reversible-Jump MCMC (RJMCMC). In order to illustrate the model, we apply it to 2009-2013 self-reported health satisfaction (SRHS) from the New Zealand Attitudes and Values Survey (NZAVS). SRHS is an ordinal variable with 11 levels, ranging from 0 (Completely Dissatisfied) to 10 (Completely Satisfied). The data and resulting clusters are visualized using heatmaps.