

Bayesian Approach for Mixture Models with Grouped Data

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Abstract

Finite mixture modeling approach is widely used for the analysis of bimodal or multimodal data that are individually observed in many situations. However, in some applications, the analysis becomes substantially challenging as the available data are grouped into categories. In this work, we assume that the observed data are grouped into distinct non-overlapping intervals and follow a finite mixture of normal distributions. For the inference of the model parameters, we propose a parametric approach that accounts for the categorical features of the data. The main idea of our method is to impute the missing information of the original data through the Bayesian framework using the Gibbs sampling techniques. The proposed method was compared with the maximum likelihood approach, which uses the Expectation-Maximization (EM) algorithm for the estimation of the model parameters.

Keywords: Grouped mixture data; Bayesian analysis; EM algorithm; Gibbs sampling; Mixture model; Maximum likelihood estimation; Latent variables.