



## Bayesian Estimation for Mixture of Simplex Distribution with Unknown Number of Components: Human Development Index Analysis in Brazil

Rosineide F. da Paz\*

Universidade Federal de São Carlos / Universidade de São Paulo, UFSCar/USP, São Carlos - SP, Brazil - rfpaz@icmc.usp.br

Jorge Luis Bazán

Universidade de São Paulo, Instituto de Ciências Matemáticas e de Computação, São Carlos - SP, Brazil - lbazan@icmc.usp.br

Luis Aparecido Milan

Universidade Federal de São Carlos, São Carlos - SP, Brazil - dlam@ufscar.br

Variable taking value on  $(0, 1)$ , such as rates or proportions, are frequently analyzed by researchers, for instance, political data as well as Human Development Index. However, sometime this type of data cannot be modelled adequately using a unique distribution. In this case, we can use a mixture of distribution that is a powerful and flexible probabilistic tool. This paper deals with a mixture of simplex distribution for model proportional data. A Bayesian approach is considered in the inference process with Reversible-jump Markov Chain Monte Carlo method. The usefulness of the proposed approach is confirmed using simulated mixture data for several different scenarios and through an interesting application to analyze the municipal Human Development Index data set considering cities of the Northeast region of Brazil and São Paulo state.

**Keywords:** Mixture model, Simplex distribution, Bayesian Analysis.