



The Full Bayesian Significance Test for marginal homogeneity in two-way contingency tables

Helton Graziadei de Carvalho*
University of Sao Paulo, Sao Paulo, Brazil - heltongc@ime.usp.br

Luís Gustavo Esteves
University of Sao Paulo, Sao Paulo, Brazil - lesteves@ime.usp.br

Abstract

Matched sample studies have become increasingly popular in a wide range of areas especially those dealing with categorical variables. For instance, suppose that for a group of individuals, the quality of the vision in each eye is classified into four categories. In this context, a two-way contingency table with the same row and column categories summarizes the data and it is usual to investigate whether the qualities of left and right eyes are the same or, equivalently, if the marginal distributions of the qualities of vision are the same, the so-called Marginal Homogeneity (MH) hypothesis. Classical approaches to the problem of testing MH rely on the asymptotic distribution of the test statistics which may yield imprecise results in certain situations. To overcome these limitations, we develop the Full Bayesian Significance Test (FBST) for MH in two-dimensional contingency tables. The FBST is a procedure that has some important features such as: (i) it obeys the likelihood principle (ii) it does not rely on asymptotic distributions (iii) it does not depend on the elimination of nuisance parameters. Furthermore, we calculate p-values and compare them with the FBST (iv) it is coherent in simultaneous hypothesis testing. To summarize, we propose a coherent measure of evidence to test MH and compare it with classical approaches to the problem.

Keywords: Marginal homogeneity test; Full Bayesian Significance Test; Matched studies.