A Generalized Cross Entropy formulation for matrix balancing with both positive and negative entries

Topic: 516Z IO Accounts and Statistics (1)
Author: Esteban FERNANDEZ-VAZQUEZ

This paper presents a matrix balancing technique based on Generalized Cross Entropy (GCE) that can be suitable for matrices containing both positive and negative entries. This technique makes possible sing flips in the cells of the initial and the estimated matrices, which can be something desirable in situations where assuming sign-prevention for all the entries of the matrix could be too restrictive. An additional advantage is that GCE allows for doing some inference with the estimates, something not possible when using biproportional balancing techniques like Generalized RAS (GRAS), which is the method commonly applied to balance matrices with positive and negative cells. The basic idea of the proposed GCE method is to assume each cell of the target matrix as a random variable for which we have partial information in the initial matrix. The GCE procedure assumes each observation in this matrix as a specific realization of a random process that generates the cells and it requires setting exogenously some bounds for the maximum and minimum values that this random process could generate. From this information, together with some partial data on the target matrix, the adjustment process is approached as a -constrained- minimization problem of a Kullback-Leibler divergence. A simple illustrative example shows how GCE works when adjusting a matrix characterized by having positive and negative entries within a Supply and Use (SUT) framework. Additionally, its performance is evaluated by means of a numerical simulation.