

Treatment of Local Minima in Categorical Multiple Regression

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Keywords: Categorical Data , CATREG, Local Minima, Multiple Regression, Optimal scaling.

Abstract

CATREG is a program for multiple regression analysis when data contain ordinal and/or categorical (nominal) information, and is included in the Categories Module of SPSS (SPSS, 1998). In CATREG the multiple regression criterion is minimized under non-linear transformations of the variables (Meulman & Heiser 1999). The variables are transformed using optimal scaling, resulting in optimal quantifications. The optimal scaling levels can be nominal, ordinal, or numerical (in SPSS Version 10.0), and include monotonic and non-monotonic spline transformations (in SPSS Version 11.0.5). CATREG minimizes a least squares loss function with constraints on the quantification parameters according to the scaling levels. When using ordinal or monotonic spline transformations, the constrained quantifications are allowed to be in disjunct regions of the parameter space. These disjunct regions give rise to multiple local minima of the loss function. Other algorithms for non-linear multiple regression, like MORALS (Young, De Leeuw & Takane, 1976), TRANSREG (SAS, 1989), and ACE (Breiman & Friedman, 1985) also seem to suffer from this problem. This paper presents the results of a (extended) simulation study to assess the performance of several strategies to obtain the global minimum.

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