Special Issue
on
Model Selection and Model Fit Measures

Guest Editors' Preface

This special issue of Kwantitatieve Methoden contains a collection of five of the six papers presented at the annual spring meeting of the Social Sciences Section of the Netherlands Society for Statistics and Operations Research, on March 15, 1995. The central topic of the meeting was "Model Selection and Model Fit Measures". Especially in the field of structural equation modeling (SEM), regression analysis, and time series analysis, model fit assessment is an important issue. Over the past decade large numbers of indices and measures for evaluating the overall model fit, and procedures for choosing the best fitting model out of a set of alternatives, have been published. Many of these have also been implemented in the statistical software (e.g. LISREL and EQS for SEM) and so become accessible for a large group of methodologists and practitioners. The sheer number of different indices and procedures, the often contradictory results, and the polemic character of the relevant literature are apt to confuse the users. Or as De Leeuw has remarked: "Unfortunately there seems to be a proliferation of model selection tools, so that it seems likely we will need a tool to select model selection tools in the not to distant future."

In the opening paper by Boomsma "The adequateness of covariance structure models: an overview of measures and indexes" (De adequaatheid van covariantiestructuurmodellen: een overzicht van maten en indexen), a complete inventory of all fit measures computed by the LISREL 8 program is given. Many of these measures are also computed by other SEM programs, for instance EQS and AMOS. From the point of view of the user who wants to choose one model out of a set of alternative models, the fit measures are compared with regard to the statistical question to be answered.

The contribution of Haughton "A review of some aspects of information criteria for model selection" addresses a special class of so-called information measures, introduced in the mathematical statistical literature by Akaike. She explains the rationale behind the information measures and then concentrates on the controversial issue of the asymptotic behaviour of the information criteria as the sample size goes to infinity. She considers both the case that at

least one of the analytic models contains the true parameter vector and the case that all competing models are misspecified.

In "Information and other criteria in structural equation model selection" by Oud, Haughton & Jansen, the results of a Monte Carlo simulation study evaluating the behaviour of the information criterion in comparison with other well-known criteria from the SEM tradition, are presented. In the presence of overfitting, underfitting, and correctly specified analytic models and using sample sizes of $n = 100, 400, 1000, 6000$, the performance of the criteria is assessed by the frequency with which each of the analytic models is selected as the best model according to the criterion. The main conclusion is that information criteria show a better overall performance, although Cudeck and Browne's cross-validation index remains an attractive option.

In "A plea for a new criterion for the selection of regressors" (Pleidooi voor een nieuw criterium voor het selecteren van regressoren) by Van Casteren it is shown that even in univariate linear regression analysis many different fit measures can be derived. The approach of Mallow and Amemiya is generalized by introducing a shrinkage parameter and associated estimator. The quality of the measures is evaluated by means of analytic derivations including asymptotic analysis, and Monte Carlo simulation, resulting in a clear picture with regard to which of the criteria is preferable and which choice of the shrinkage parameter is optimal. The same approach can be used for deriving generalizations of Akaike's AIC and other information measures.

Finally, the paper by Van der Heijden, 't Hart & Dessens "A parametric bootstrap procedure to perform statistical tests in latent class analysis" considers model fit assessment in the context of latent class analysis in huge data sets (many variables). It is argued that the application of fit indices like AIC and BIC is not appropriate in this situation and it is shown how the testing problems can be solved by using a parametric bootstrap procedure.

We hope that this special issue will contribute to the creative and appropriate use of model selection tools and will stimulate discussion and further research. We want to thank all authors and reviewers for their thoughtful contributions.

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