icomp: Informational complexity measures

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This document provides formulae (from [3]) on which the calculations by icomp are based.

icomp calculates Akaike information criteria (AIC), Schwartz Bayesian information criteria (SBC, SBIC), and Bozdogan’s index of informational complexity (ICOMP). These criteria are used to select the “best” model compromising an adequate goodness of fit and a small number of parameters by adding a penalty for overparametrization to the lack of fit measure (estimate of the maximum likelihood or the residual sum of squares). The best model minimizes the criterion. The three informational measures differ in the penalty term, SBIC penalizing more severely for larger samples, and ICOMP accounting for covariance structure of a model (and, thus, for collinearity between the factors and dependence among the parameter estimates).

\[
AIC = -2 \ln L(\hat{\theta}_k) + 2k; \quad (1)
\]

\[
SBIC = -2 \ln L(\hat{\theta}_k) + k \ln n; \quad (2)
\]

\[
ICOMP = -2 \ln L(\hat{\theta}_k) + s \ln \text{tr}(I^{-1}(\hat{\theta}_k)/s) - \ln |I^{-1}(\hat{\theta}_k)|, \quad (3)
\]

where \( k \) is the number of parameters, \( n \), sample size, \( \hat{\theta}_k \), the parameter estimates, \( I^{-1}(\hat{\theta}_k) = \text{Var}(\hat{\theta}_k) \), inverse of Fisher information matrix, and \( s = \text{rk} I^{-1}(\hat{\theta}_k) \).

Empirical versions of these criteria also use

\[
n \ln \frac{RSS}{n} \quad (4)
\]

as a lack of fit measure plugged as the first term in (1)–(3), where \( RSS \) is the residual sum of squares. This variant is activated by option icomp, rss.

References


