Information Criteria

Four types of information criteria are available in PROC GLMSELECT: Akaike's information criterion (AIC), corrected Akaike's information criterion (AICC), Sawa Bayesian information criterion (BIC), and Schwarz Bayesian information criterion (SBC). The Corrected AIC should be used in preference to AIC when you work with small sample sizes or relatively few observations per estimated parameter. Each information criterion searches for a model that minimizes the unexplained variability with as few effects in the model as possible. In other words, they search for the most parsimonious model.

Recall that when you compare adjusted R-square values of models, the one with the larger adjusted R-square is considered better. In contrast, when you compare information criterion values, the model with the smaller information criterion is considered better. Information criteria measures relative model fit, and therefore, it's used only to compare models. It isn't used to evaluate the quality of models in any absolute sense. That is, if one model has a lower AIC than another, it's the better model comparing the two. However, both models could be great or both models could be terrible. The information criteria tells us only which one is relatively better.

The calculations of all information criteria begin the same way. They all start with n (the sample size) times the natural log of the sum of squared errors divided by n. Then, each criterion adds a penalty that represents the complexity of the model. The magnitude of the penalty is what differentiates each type of information criterion.

Sometimes when you compare models, all the information criteria point to the same model as being the best. In other cases, not all the criteria agree. When this happens, which information criterion should you look at? You could look at one criterion, more than one, or all of them. The final model that's chosen should be based on your research goals and subject-matter expertise.

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