POINTS FOR CONSIDERATION IN DICUSSION OF CONVERGENCE PROBLEMS ENCOUNTERED IN THE USE OF ADMB

MARAM Group

ADMB Convergence

Typically difficulties arise from objective function (usually negative log-likelihood) surfaces that are near flat in some parameters (perhaps even multimodal in regions well separated from the global minimum). This often gives rise to the "Hessian not positive definite" response. That in turn precludes both the computation of Hessian-based CVs, and also initiation MCMC for extension to compute Bayesian posteriors.

1. A "quick fix" is to add penalty functions. Are there other better solutions?
2. Any tips for choosing phases for parameters
3. What to look for in the gradient vector/ what to do if gradients of certain parameters are not getting small enough – how reliable is this statistic as a determinant of (non-)convergence?
4. The use of ***posfun*** – is this always OK, or are there problems and if so for what should one look in output to identify that a problem has occurred?
5. Any tips for choosing starting positions for parameters
6. Any tips on what to do if the final estimates are highly sensitive to small changes in relative terms to initial parameter value choices?
7. How best to deal with contradicting trends in data?

MCMC

Chains can take enormously long times to converge in terms of standard convergence tests, perhaps as a result of near-aliasing of certain parameters or data that are hardly informative. In practice, how is this situation best addressed in a typical fisheries assessment context?

1. Fix certain parameters at their penalised MLE values before starting the MCMC: e.g., if the extent of stock depletion is the measure of key concern, fixing some selectivity-at-age parameters in this way may hardly impact results.
2. Select successive portions of chains and calculate statistics of the posterior distribution of the parameter of interest for each. If these show little variability, despite formal convergence tests failing, are results for those parameters at least sufficiently reliable?
3. Place bounds on certain parameters (i.e. reduce the range of prior distributions, particularly of intended "uninformative" ones) as problems often seem associated with outlying values: e.g. putting an upper bound on *K* can stabilise situations where difficulties are associated with rather uninformative stock-recruitment data.