New in Regress+ 2.5 (and Beyond)

Regress+ 2.5 was never meant to see the light of day. It was originally just a developmental version—one of many along the road to version 3.0. However, Regress+ 3.0 has evolved into a major undertaking and, in the meantime, many OS X users of Regress+ 2.3.1 have been asking for a carbonized version so that they could avoid the hassle of waiting for Classic to start up.

Hence, this interim offering. Listed below are some items worthy of note.

You will notice that Regress+ 2.5

- Is a PowerMac-only, carbonized application
- Requires either Mac OS X or {Mac OS 9 plus (CarbonLib 1.4 or greater)}
- Looks different (Aqua) in OS X vs. OS 9
- Is no faster than Regress+ 2.3.1
- Has a new Setup dialog with one additional Option (see below)

You will probably not notice that Regress+ 2.5

- Has much of its code rewritten
- Has completely new resources
- Has some different internal algorithms

New Option

The Setup dialog now contains an Option, for deterministic modeling (equations) only, labeled *Simulated Annealing (SA)*.

SA is a general technique for unconstrained optimization but, here, it is used only to help you obtain good initial estimates for the parameters of an equation. Given this initial vector, Regress+ will use its standard simplex algorithm to locate the local optimum.

Regress+ always converges to a local optimum. If you begin with good parameter estimates, this local optimum should also be the desired global optimum assuming that the latter exists and is unique. However, providing a good starting point can sometimes be difficult especially as the dimensionality of the parameter space increases. With only one or two parameters, almost any initial estimates will do but, with three or more, it could be tricky. SA is not a panacea but it can often be very helpful.

To use the SA option, just select it in the Setup. Upon clicking OK, you will be presented with a parameter dialog that expects a *range* of values for each parameter. Do your best to provide a reasonable range for each of them.[1] Do **not** just enter minus infinity to plus infinity!

[1] For a constant parameter, set max = min.

Regress+ will treat these ranges as constraints until the SA phase is finished. The constraints will then be removed for the final convergence.

During the "annealing" phase, the current "temperature" is reported in the status line. This (decreasing) quantity serves as a progress bar. It disappears when SA is finished.

You do not have any control over the SA process. It has been tuned internally and is wholly adaptive.

Since this is just a README file, I shall forego a description of how SA works. Suffice it to say that it is grounded in the science of *statistical mechanics*. Why the latter is even remotely relevant in this context is an exercise left to the reader. You can find a lot of references on the web. Here are two of mine, old but not outdated:

McLaughlin, M., "The Art of Simulated Annealing", *Algorithm*, Vol. 3(4), 16-17, December 1992.

McLaughlin, M., "Simulated Annealing", *Dr. Dobb's Journal of Software Tools*, 26-37, September 1989.

Preview of Coming Attractions

Regress+ 3.0 is well into development and has quite a few new features in addition to those described above. The following is the current list. There might be yet more to come.

- Much larger menu of stochastic models (distributions) with a new categorization
- Option to test whether the residuals of a regression are distributed as required by the optimization criterion
- Enhanced testing for autocorrelation of residuals
- Option to optimize and compare the chosen model to a user-specified alternative
- Option for predicting Y-values, for supplied X-values, with (optional) confidence intervals for the former
- Poisson regression
- Probability (percentile) plot option, similar to Normal probability paper, for continuous distributions
- Publication-quality (EPS) graphical output (as well as bitmap PICT)
- Totally scriptable! (But not recordable) A scripting tutorial, with many examples suitable for use as templates, will be provided.
- Help menu
- Much faster execution, esp. during bootstrap phases
- Automatic utilization of multiple processors, if available
- More robust, e.g., wrt initial parameter estimates for distributions
- More conventional User-model parsing (yacc/bison for those who know/care)
- Limited capability to edit axis labels on graphs
- Direct printing capability
- Almost complete rewrite of source code (probably unnoticeable)

It goes without saying that there will be new documentation plus an updated modeling tutorial in addition to the new scripting tutorial. Also, there will be a new, **much** enhanced edition of the

Compendium of Common Probability Distributions

published at causaScientia.org corresponding to the new menu of distributions in Regress+ 3.0. If you have never seen the current Compendium, it can be accessed at

http://www.causaScientia.org/math_stat/Dists/Compendium.html

As always, Happy Modeling!

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