

GAUSSX v7.0 Update

By Econotron Software, Inc.

www.Econotron.com

GAUSSTM

Now Available!

New Features

New Estimation Routines

- PLS—Partial Least Squares
- RSM—Response Surface Methodology

New Tools

- Consumer surplus and deadweight loss
- Linear Programming
- Murphy Topel two step estimation
- Interpolation

New Processes

- ARFIMA, ARIMA, ARMA
- NORMAL

Optimization Enhancements

- Global Optimization algorithm
- Nelder-Meade algorithm
- Other enhancements

New Diagnostics and Tests

- Bayesian convergence diagnostics
- CORDIM—Correlation dimension
- LYAPUNOV—Lyapunov exponent
- Hansen test
- Jarque-Bera test
- KPSS test
- Newey-West test

Other

- Bayesian estimation examples
- Maple 9.5 support
- DGP—Data Generation process
- Matrix I/O enhancements
- Cluster enhancement
- Spreadsheet processing enhancement
- FILTER—Data filtering

 Gaussx incorporates a full-featured set of state-of-the-art econometric routines specifically designed for the professional econometrician. This is a major upgrade of the econometric capabilities of Gaussx. A summary of the new routines implemented since Gaussx 6.0 are described below; a more detailed description of these routines is available at

<http://www.econotron.com/gaussx/readme2.htm>

while a full description of Gaussx is available at

<http://www.econotron.com/gaussx>



Product Details:

- ◆ **PLS—partial least squares**
Partial least squares is especially appropriate when the data consists of many predictors relative to the number of observations—PLS can indicate the few underlying predictors that account for most of the variation in the response variable.
- ◆ **RSM—response surface methodology (Multi Response Optimization)**
RSM is a methodology that is used extensively in engineering to solve an optimization problem using simulation. Initially an experimental design is used to fit a set of observed responses to a set of factors; typically this can be modeled by NLS or OLS on polynomial expansion of the factors. A desirability measure or distance metric is specified as a function of the (fitted) responses, and in the second step the optimal factor choice that maximizes this metric is determined by optimization. Since the response surface is not smooth, and typically has many local optima, the default process is to use the genetic algorithm. The following desirability measures/distance metrics are supported:
 - Derringer and Suich desirability function
 - Harrington's desirability function
 - Euclidian distance
 - Standardized Euclidian distance
 - Mahalanobis distance
 - Chebyshev metric
 - Manhattan metric
 - Minkowski metric

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◆ **Consumer surplus and deadweight loss**

The 'Welfare' command evaluates three measures of consumer surplus—compensating variation, equivalent variation and Marshallian surplus—for demand systems given initial and final prices. The standard error of the calculated consumer surplus and the deadweight loss are also evaluated.

◆ **Linear Programming**

A linear programming (LP) module has been added, using standard Gaussx FRMLs.

◆ **Murphy Topel two-step estimation**

The use of a predicted value derived from parameters derived in the first step of a two-step process, and then used as a variate in the second step, results in biased estimates of the parameter standard errors. The Murphy Topel correction at the second step takes into account that the variate is a function of the first step parameters, in order to obtain appropriate standard errors. Gaussx implements the M-T two step process for any two estimation processes using NLS and/or ML.

◆ **Interpolation**

Cubic interpolation has been added as a support function.

◆ **ARFIMA, ARIMA, ARMA**

The Autoregressive Fractionally Integrated Moving Average process permits the estimation of long memory models. These models are estimated in Gaussx using NLS or ML. Stationary and invertibility conditions are satisfied using constrained optimization. ARMA and ARIMA models can be similarly estimated.

◆ **Normal Process**

The Normal process permits the estimation of an equation or system of equations using ML instead of NLS.

◆ **Global Optimization**

Global optimization (GO) has been added to the methods available for NLS and ML. This is a modified Lipschitzian optimization, but does not require an estimate of a Lipschitz constant. It uses a modified global search strategy over potentially optimal hyper cubes. It successfully found the global optimum for a suite of tests from the Maple Global Optimization toolbox. Unlike hill climbing methods, GO will find the global optimum in a

context where there are many local optima (such as kernel estimation), and is not affected by initial starting conditions.

◆ **Nelder-Meade algorithm**

The Nelder-Meade downhill simplex algorithm has been added to the suite of non-linear optimization algorithms.

◆ **Non-Linear Estimation enhancements**

Constrained optimization can now be used with all the non-hill climbing search methods—genetic algorithm, global optimization, Nelder-Meade, and simulated annealing. Step algorithms now include line search, quadratic programming, and trust region.

◆ **Bayesian convergence diagnostics**

The convergence diagnostics include Geweke's NSE (Numerical Standard Error), RNE (Relative Numerical Efficiency), and a Chi-squared test for parameter stability.

◆ **CORDIM—Correlation dimension**

The correlation dimension - an approximation of the fractal dimension - provides the dimension of a time series using the Grassberger and Procaccia method.

◆ **LYAPUNOV—Lyapunov exponent**

The Lyapunov exponent, which provides a measure of how quickly close trajectories diverge over time, is implemented using the Wolf algorithm.

◆ **KPSS test**

The KPSS test provides a test for level and trend stationarity.

◆ **Hansen Test**

The Hansen test provides a test of overidentifying restrictions in an instrumental variables context.

◆ **Jarque-Bera test**

The Jarque Bera test provides a test for normality.

◆ **Newey West D Test**

The Newey West D test permits a test for restrictions in an instrumental variables context.

◆ **Bayesian estimation**

A number of new examples using MCMC have been added. These include POISSON, SURE, and MNP.

◆ **Maple 9.5 support**

Automatic differentiation can now be carried out under either Maple 9.0 or Maple 9.5.

◆ **DGP—data generating process**

DGP provides a method for creating a data vector or matrix of a particular type of process, used either as a GAUSS or Gaussx command. The following processes are supported:

- arfima • arima • arma • arch
- arch_t • fBm • garch • garch_t
- Gaussian • logit • linear • linear_t
- probit • tobit • Wiener

◆ **Matrix I/O**

While the Gauss loadm and save commands allow matrices to be loaded/saved in a binary format, the .fmt format is specific to GAUSS. To use matrices in other applications, it is useful to be able to do matrix I/O as in pure binary or ASCII. GETM returns a matrix from a binary or data file of type double, while PUTM writes a matrix to a binary or ASCII data file of type double.

◆ **Cluster enhancement**

The Chebyshev metric has been added to the distance metric methods

◆ **Spreadsheet processing enhancement**

Gaussx uses the data exchange tool to read and write spreadsheets. This has been upgraded so that all versions of Excel can be read.

◆ **FILTER command**

This command filters data using a variety of filters. Current filters are:

- linear • diff • arma

◆ **FEVAL-FRML evaluation**

The FEVAL statement evaluates a type 2 FRML, and stores the result in the Gaussx workspace.

◆ **FORCST enhancements**

The standard error of the forecast is available for OLS, ARIMA, and ARFIMA. Step ahead modes are available for ARFIMA, ARIMA and ARMA using naïve and best linear predictor. The log likelihood vector is available for ML. The probabilities and category forecasts are available for MNL, MNP, PROBIT(ML) and LOGIT(ML). The conditional variances are available for all GARCH processes.

◆ **Miscellaneous commands**

- polyinv polynomial inversion
- polydiv polynomial division
- deconv inverse convolution
- xgamma extended gamma function
- mroot returns the modulus of the largest root
- pdroot returns the smallest root

 **Platforms**

Available for:

- Windows, LINUX, Mac OS X, and UNIX
- Requires GAUSS 4.0+*



**Contact Aptech or your local dealer
for pricing and information**

See our website for the Dealer nearest you:

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