GAUSS™ APPLICATIONS

Time Series MT

Panel Data

- Estimate balanced and unbalanced panel data models
- Bias corrected coefficients
- Fixed effects OLS estimator
- Random effects estimator using GLS
- Constrained OLS estimator

Autoregressive Models

Compute estimates of the parameters and standard errors for a regression model with autoregressive errors. Can be used for models for which the Cochrane-Orcutt or similar procedures are used. Also computes autocovariances and autocorrelations of the error term.

VARMA & ARIMA Library

- Full Information Maximum Likelihood estimation (exact, unconditional) of VARMA, 5ARIMA, ARIMAX, and Error Correction Models
- Impose Linear and Nonlinear Constraints
- Unit Root and Cointegration Tests
- Multivariate ACF and Indicator Matrices
- Portmanteau Statistics
- Forecasting: Univariate and Multivariate
- Univariate Simulation

Constrained Optimization

Constrained Optimization (CO) minimizes an arbitrary function with general equality and inequality constraints and bounds on the parameters. Algorithms and step length methods may be modified "on the fly."

The default selections let you use CO with a minimum of programming effort. Supply a function and start values and CO does the rest.

FANPAC MT - Financial Analysis Package

FANPAC is a GAUSS package for the analysis of time-series data. It includes univariate and multivariate models: ARIMA, VAR, VARMA, GARCH, EGARCH, FIGARCH, ARMA-GARCH, ARMA-FIGARCH, Diagonal Vech ARMA-GARMA, Diagonal Vech ARMA-FIGARCH, and BEKK. FANPAC MT supports the structures and n-dimensional array features of GAUSS.

For all models, there are in-mean versions, in-CV versions (i.e., independent variables in the conditional variance equations), Normal and t-distributions, QML inference, and Box-Cox transformations. FANPAC MT contains a simulation bounds method for constructing confidence intervals for models with restricted parameter spaces (Andrews, D.W.K., 1999).

Maximum Likelihood

Users may write their own likelihood function or use one of the numerous likelihood functions provided in the module. Choose among several optimization methods, including BFGS, Newton-Raphson, BHHH, and others. Several methods for statistical inference are provided, including QML, profile likelihood, bootstrap, and Bayesian. Bootstrap with new random number generators, based on Marsaglia's "Kiss-Monster" algorithm, with a period of 2^3859.

The new maximum likelihood module contains several new procedures that are up to 800% faster than their predecessors.

Discrete Choice

Discrete Choice is a package for the fitting of a variety of models with categorical dependent variables, including the nested logit and several types of multinomial logit models, and Poisson and Probit models with truncation, censoring, and zero-inflation. Output includes full information maximum likelihood estimates with either standard or quasi-maximum likelihood inference. Marginal effects are computed with respect to means of exogenous variables or as average partials with respect to exogenous variables.

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Constrained Maximum Likelihood MT

Constrained Maximum Likelihood MT (CMLmt) performs maximum likelihood estimation with general equality and inequality constraints and bounds on the parameters.
Procedures are included for computing correct standard errors for inequality constrained parameters.

CMLmt includes bootstrapping and Bayesian inference with kernel density plots, histograms and surface plot output, and likelihood profile and profile t traces.

Optimization

OPTMUM optimizes functions. It has many features, including a wide selection of descent algorithms, step-length methods, and "on-the-fly" algorithm switching.

Default selections let you use OPTMUM with a minimum of programming effort. All you provide is the function to be optimized and start values. OPTMUM does the rest.

Algorithmic Derivatives

The Algorithmic Derivatives (AD) module is an application program for generating GAUSS procedures for computing algorithmic derviatives. AD works independently of any application to improve derivatives, and it can be used with any application that uses derivatives.

Linear Regression MT

The Linear Regression MT module is a set of procedures for estimating single equations or a simultaneous system of equations. The module allows constraints on coefficients, and heteroskedastic consistent standard errors. It includes two-stage least squares, three-stage least squares, and seemingly unrelated regression procedures.

Descriptive Statistics MT

The procedures in DSTAT provides basic statistics for the variables in GAUSS data sets. These statistics describe the numerical characteristics of random variables and provides information for further analysis.

Nonlinear Equations MT

The Nonlinear Equations MT module solves systems of nonlinear equations where there are as many equations as unknowns. The current version utilizes new GAUSS functions, significantly increasing accuracy and computational speed.

Loglinear Analysis MT

The Loglinear Analysis MT module contains procedures for the analysis of categorical data using loglinear analysis.

Econometrics: AD, Discrete Choice, Linear Regression, Time Series MT, Constrained Maximum Likelihood MT, Maximum Likelihood, FANPAC MT, Descriptive Statistics MT, Constrained Optimization, Optimization

Finance: AD, Linear Regression MT, Time Series MT, FANPAC MT, Descriptive Statistics MT, Linear Programming MT, Constrained Optimization, Optimization, Constrained Maximum Likelihood MT, Maximum Likelihood

Engineering/Physics: AD, CurveFit, Nonlinear Equations MT, Constrained Optimization, Optimization

Social Sciences: AD, Discrete Choice, Descriptive Statistics MT, Loglinear Analysis MT, Constrained Maximum Likelihood MT, Maximum Likelihood

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Linear Programming MT

The Linear Programming MT module is designed to solve small- and large-scale linear programming problems.

- Sparse constraint matrix
- Thread-safe execution
- Solve minimization or maximization problems
- Can return multiple optimal solutions if they exist
- Upper and lower finite bounds can be provided for variables and constraints
- Returns primal and dual solutions
- Retrieve basis variables, dual variables, and solution quality
- Constraint types ($\geq$, $\leq$, $=$)
- Choose tolerances
- Definte pivoting rules
- Problems with 2000-3000 constraints and more than 6000 variables have been tested on ordinary PCs
- Can generate an iterations log and/or final report if requested

CurveFit

CurveFit applies the Levenberg-Marquardt descent method to the least squares fitting of a nonlinear function or set of nonlinear functions. It includes likelihood profile and profile t traces, and bootstrapped estimation with histogram and surface plot output.