URL: http://cxc.harvard.edu/ciao3.4/method.html
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AHELP for CIAO 3.4

method

Context: sherpa

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Synopsis

Specifies the optimization method. The command SEARCHMETHOD is equivalent.

Syntax

```
sherpa> {METHOD | SEARCHMETHOD} <sherpa_methodname>
```

Description

The following optimization methods are featured in Sherpa:

Description of Sherpa's Optimization Methods

<sherpa_methodname>	Description
GRID	A grid search of parameter space, with no optimization.
GRID−POWELL	A grid search of parameter space, with optimization done starting from each grid point, using the Powell method.
{LEVENBERG−MARQUARDT | LEV−MAR | LM}	Levenberg−Marquardt optimization.
MONTECARLO	A Monte Carlo search of parameter space, with no optimization.
MONTE−LM	A Monte Carlo search of parameter space, with optimization done starting from each randomly selected point, using the LEVENBERG−MARQUARDT method.
MONTE−POWELL	A Monte Carlo search of parameter space, with optimization done starting from each randomly selected point, using the POWELL method.
POWELL	Powell optimization.
{SIGMA−REJECTION | SIG−REJ}	Optimization combined with data cleansing: outliers are filtered from the data.
SIMPLEX	Simplex optimization.
SIMUL−ANN−1	A simulated annealing search, with one parameter varied at each step and no optimization.

SIMUL−ANN−2	A simulated annealing search, with all parameters varied at each step and no optimization.
SIMUL−POW−1	A combination of SIMUL−ANN−1 with POWELL optimization.
SIMUL−POW−2	A combination of SIMUL−ANN−2 with POWELL optimization.
USERMETHOD	A user−defined method of optimization.

The default optimization method in CIAO 3.0 is LEVENBERG−MARQUARDT.

The current optimization method, and its parameter names and values, may be listed with the command SHOW METHOD. Values for these optimization parameters may be set individually using one of the following command syntax options:

```
sherpa> <sherpa_methodname>.<paramname> = <value>
sherpa> <sherpa_methodname>.<paramname>.VALUE = <value>
sherpa> <sherpa_methodname>.<#> = <value>
sherpa> <sherpa_methodname>.<#>.VALUE = <value>
```

where:

- {<paramname> | <#>}: Specifies the parameter whose value is to be set.
- <value>: The numerical (or string) value to which the parameter should be set.

Parameter listings for each optimization method are given in the Sherpa Methods chapter. (Alternatively, one may peruse the documentation for each <sherpa_methodname>.)

The user may access a string giving the name of the current optimization method via the Sherpa/S−Lang module function get_method_expr.

Example 1

Specify an optimization method to be used; set an optimization parameter value:

```
sherpa> METHOD POWELL
sherpa> SHOW METHOD
Optimization Method: Powell

      Name       Value         Min         Max                     Description
      ----       -----         ---         ---                     -----------
 1   iters        2000           1       10000    Maximum number of iterations
 2     eps       1e−06       1e−09       1e−03              Fractional accuracy
 3     tol       1e−06       1e−08         0.1              Tolerance in lnmnop
 4    huge       1e+10        1000       1e+12              Fractional accuracy

sherpa> POWELL.eps = .0009
sherpa> SHOW METHOD
Optimization Method: Powell

      Name       Value         Min         Max                     Description
      ----       -----         ---         ---                     -----------
 1   iters        2000           1       10000    Maximum number of iterations
 2     eps       9e−04       1e−09       1e−03              Fractional accuracy
 3     tol       1e−06       1e−08         0.1              Tolerance in lnmnop
 4    huge       1e+10        1000       1e+12              Fractional accuracy
```

Example 2

Set an optimization parameter value:

```
sherpa> POWELL.1 = 100
sherpa> SHOW METHOD
Optimization Method: Powell

      Name       Value         Min         Max                   Description
      ----       -----         ---         ---                   -----------
 1   iters         100           1       10000    Maximum number of iterations
 2     eps       1e−06       1e−09       1e−03             Fractional accuracy
 3     tol       1e−06       1e−08         0.1             Tolerance in lnmnop
 4    huge       1e+10        1000       1e+12             Fractional accuracy
```

Example 3

Set an optimization parameter value:

```
sherpa> POWELL.eps.VALUE = .0007
sherpa> SHOW METHOD
Optimization Method: Powell

      Name       Value         Min         Max                   Description
      ----       -----         ---         ---                   -----------
 1   iters        2000           1       10000    Maximum number of iterations
 2     eps       7e−04       1e−09       1e−03             Fractional accuracy
 3     tol       1e−06       1e−08         0.1             Tolerance in lnmnop
 4    huge       1e+10        1000       1e+12             Fractional accuracy
```

Example 4

Set an optimization parameter value:

```
sherpa> POWELL.1.VALUE = 100
sherpa> SHOW METHOD
Optimization Method: Powell

      Name       Value         Min         Max                   Description
      ----       -----         ---         ---                   -----------
 1   iters         100           1       10000    Maximum number of iterations
 2     eps       1e−06       1e−09       1e−03             Fractional accuracy
 3     tol       1e−06       1e−08         0.1             Tolerance in lnmnop
 4    huge       1e+10        1000       1e+12             Fractional accuracy
```

Bugs

See the Sherpa bug pages online for an up−to−date listing of known bugs.

See Also

sherpa

get_method_expr, grid, grid−powell, levenberg−marquardt, monte−lm, monte−powell, montecarlo, powell, sigma−rejection, simplex, simul−ann−1, simul−ann−2, simul−pow−1, simul−pow−2, usermethod

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