MPCOTool

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Chapter 1

MPCOTool

:gb:english :es:español

The Multi-Purposes Calibration and Optimization Tool. A software to perform calibrations or optimizations of empirical parameters.

VERSIONS

- 4.4.6: Stable and recommended version.

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WINDOWS EXECUTABLE FILES

This repository contains source and example files with the latest version of MPCOTool. Stable versions with executable files and manuals for Microsoft Windows systems can be downloaded in digital.csic

TOOLS AND LIBRARIES REQUIRED TO BUILD THE EXECUTABLE

- gcc or clang (to compile the source code)
- make (to build the executable file)
- autoconf (to generate the Makefile in different operative systems)
- automake (to check the operative system)
- pkg-config (to find the libraries to compile)
- gsl (to generate random numbers)
- libxml (to deal with XML files)
- glib (extended utilities of C to work with data, lists, mapped files, regular expressions, using multicores in shared memory machines, ...)
- json-glib (to deal with JSON files)
- genetic (genetic algorithm)

OPTIONAL TOOLS AND LIBRARIES

- `gettext` (to work with different locales)
- `gtk+3` (to create the interactive GUI tool)
- `openmpi` or `mpich` (to run in parallelized tasks on multiple computers)
- `doxygen` (standard comments format to generate documentation)
- `latex` (to build the PDF manuals)

FILES

The source code has to have the following files:

- 4.4.6/configure.ac: configure generator.
- 4.4.6/Makefile.in: Makefile generator.
- 4.4.6/config.h.in: config header generator.
- 4.4.6/∗.c: source code files.
- 4.4.6/∗.h: header code files.
- 4.4.6/mpcotool.ico: icon file.
- 4.4.6/build.sh: shell script to build all.
- 4.4.6/logo.png: logo figure.
- 4.4.6/Doxyfile: configuration file to generate doxygen documentation.
- TODO: tasks to do.
- README.md: this file.
- license.md: license file.
- tests/testX/∗: several tests to check the program working.
- locales/∗/LC_MESSAGES/mpcotool.po: translation files.
- manuals/∗.eps: manual figures in EPS format.
- manuals/∗.png: manual figures in PNG format.
- manuals/∗.tex: documentation source files.
- applications/∗/∗: several practical application cases.
- check_errors/∗.xml: several mistaken files to check error handling.

BUILDING INSTRUCTIONS

On Microsoft Windows systems you have to install MSYS2 and the required libraries and utilities. You can follow detailed instructions in install-unix. Optional Windows binary package can be built doing in the terminal:

$ make windist

On NetBSD 9.3, to compile with last GCC version you have to do first on the building terminal:

$ export PATH=/usr/pkg/gcc8/bin:$PATH" </blockquote> On OpenBSD 7.2 you have to do first on the building terminal to select adequate versions and deactivate OpenMPI (does not link) building with CLang: <blockquote>$ export AUTOCONF_VERSION=2.69 AUTOMAKE_VERSION=1.16 CC=clang </blockquote> On OpenIndiana Hipster, in order to enable OpenMPI compilation, do in a terminal: <blockquote>$ export PATH=$PATH:/usr/lib/openmpi/gcc/bin </blockquote> On OpenSUSE Leap, in order to enable OpenMPI compilation, in 64 bits version do in a terminal (OpenMPI configure script does not work in last OpenSUSE versions then does not apply this step): <blockquote>$ export PATH=$PATH:/usr/lib64/mpi/gcc/openmpi/bin </blockquote> This software has been built and tested in the following operative systems: ∗ Arch Linux ∗ Debian Linux 11 ∗ Devuan Linux 4 ∗ DragonFly BSD 6.4 ∗ Fedora Linux 37 ∗ FreeBSD 13.1 ∗ Gentoo Linux ∗ Linux Mint DE 5 ∗ MacOS Catalina + Homebrew ∗ Manjaro Linux ∗ Microsoft Windows 10 ∗ NetBSD 9.3 ∗ OpenBSD 7.2 ∗ OpenInidiana Hipster ∗ OpenSUSE Linux Leap 15.4 ∗ Ubuntu Linux 22.10 Probably, it can be built in other systems, distributions, or versions but it has not been tested. 1. Download the latest genetic doing on a terminal: <blockquote>$ git clone https://github.com/jburguete/genetic.git </blockquote> 2. Build the genetic library: <blockquote>$ cd genetic/3.0.1 $ sh build.sh </blockquote> 3. Download this repository: <blockquote>$ cd ../.. $ git clone https://github.com/jburguete/mpcotool.git </blockquote> 4. Link the latest genetic version to genetic: <blockquote>$ cd mpcotool/4.4.6 $ ln -s ../../genetic/3.0.1 genetic $ ln -s genetic/libgenetic.so (or .dll in Windows systems) </blockquote> 5. Build doing on a terminal: <blockquote>$ sh build.sh </blockquote> Building no-GUI version on servers <hr> On servers or clusters, where no-GUI with MPI parallelization is desirable, replace the 5th step of the previous section by: <blockquote>$ sh build_without_gui.sh </blockquote>Linking as an external library <hr> MPCOTool can also be used as an external library: 1. First copy the dynamic libraries (libmpcotool.so and libgenetic.so on Unix systems or libmpcotool.dll and libgenetic.dll on Windows systems) to your program directory. 2. Include the function header in your source code: <blockquote>extern int mpcotool (int argn, char ∗∗argc); </blockquote> 3. Build the executable file with the linker and compiler flags: <blockquote>$ gcc -L. -Wl,-rpath=. -lmpcotool -lgenetic ... `pkg-config –cflags –libs gsl glib-2.0 json-glib-1.0 ...\' </blockquote> 4. Calling to this function is equivalent to command line order (see next chapter USER INSTRUCTIONS): ∗ argn: number of arguments ∗ argc[0]: "mpcotool" ∗ argc[1]: first command line argument. ... ∗ argc[argn-1]: last argument. FINAL VERSIONS <hr> Optionally, final compact versions without debug information can be built doing on the terminal: <blockquote>$ make strip </blockquote> <h1>MAKING MANUALS INSTRUCTIONS </h1> On UNIX type systems you need texlive installed. On Windows systems you need MiKTeX. In order to compile the manuals you can type on a terminal: <blockquote>$ make manuals </blockquote> <h1>MAKING TESTS INSTRUCTIONS </h1> In order to build the tests follow the next instructions: 1. Link some tests that needs genetic library doing in a terminal (assuming that you are in the directory mpcotool/4.4.6): <blockquote>$ cd ../tests/test2 $ ln -s ../../../genetic/3.0.1 genetic $ ln -s genetic/libgenetic.so (or .dll on Windows systems) $ cd ../test3 $ ln -s ../../../genetic/3.0.1 genetic $ ln -s genetic/libgenetic.so (or .dll on Windows systems) $ cd ../test4 $ ln -s ../../../genetic/3.0.1 genetic $ ln -s genetic/libgenetic.so (or .dll on Windows systems) </blockquote> 2. Build all tests doing in the same terminal: <blockquote>$ cd ../../4.4.6 $ make tests </blockquote> <h1>USER INSTRUCTIONS </h1> Optional arguments are typed in square brackets. ∗ Command line in sequential mode (where X is the number of threads to execute and S is a seed for the pseudo-random numbers generator): <blockquote>$ ./mpcotoolbin [-nthreads X] [-seed S] input_file.xml [result_file] [variables_file] </blockquote> ∗ Command line in parallelized mode (where X is the number of threads to open for every node and S is a seed for the pseudo-random numbers generator): <blockquote>$ mpirun [MPI options] ./mpcotoolbin [-nthreads

X] [-seed S] input_file.xml [result_file] [variables_file] </blockquote> * The syntax of the simulator has to be: <blockquote>$ ./simulator_name input_file_1 [input_file_2] [input_file_3] [input_file_4] output_file </blockquote> * The syntax of the program to evaluate the objetive function has to be (where the first data in the results file has to be the objective function value): <blockquote>$ ./evaluator_name simulated_file data_file results_file </blockquote> * On UNIX type systems the GUI application can be open doing on a terminal: <blockquote>$ ./mpcotool </blockquote> <h1>INPUT FILE FORMAT </h1> The format of the main input file is as: @code{xml} <?xml version="1.0"?> <optimize simulator="simulator_name" evaluator="evaluator_name" algorithm="algorithm_type" nsimulations="simulations_number" niterations="iterations_number" tolerance="tolerance_value" nbest="best_number" npopulation="population_number" ngenerations="generations_number" mutation="mutation_ratio" reproduction="reproduction_ratio" adaptation="adaptation_ratio" direction="direction_search_type" nsteps="steps_number" relaxation="relaxation_parameter" nestimates="estimates_number" threshold="threshold_parameter" norm="norm_type" p="p_parameter" seed="random_seed" result_file="result_file" variables_file="variables_file"> <experiment name="data_file_1" template1="template_1_1" template2="template_1_2" ... weight="weight_1"/> ... <experiment name="data_file_N" template1="template_N_1" template2="template_N_2" ... weight="weight_N"/> <variable name="variable_1" minimum="min_value" maximum="max_value" precision="precision_digits" sweeps="sweeps_number" nbits="bits_number" step="step_size"/> ... <variable name="variable_M" minimum="min_value" maximum="max_value" precision="precision_digits" sweeps="sweeps_number" nbits="bits_number" step="step_size"/> </optimize> @endcode with: * simulator: simulator executable file name. * evaluator: optional. When needed is the evaluator executable file name. * seed: optional. Seed of the pseudo-random numbers generator (default value is 7007). * result_file: optional. It is the name of the optime result file (default name is "result"). * variables_file: optional. It is the name of all simulated variables file (default name is "variables"). * precision: optional, defined for each variable. Number of precision digits to evaluate the variable. 0 apply for integer numbers (default value is 14). * weight: optional, defined for each experiment. Multiplies the objective value obtained for each experiment in the final objective function value (default value is 1). * threshold: optional, to stop the simulations if objective function value less than the threshold is obtained (default value is 0). * algorithm: optimization algorithm type. * norm: error norm type. Implemented algorithms are: * sweep: Sweep brute force algorithm. It requires for each variable: * sweeps: number of sweeps to generate for each variable in every experiment. The total number of simulations to run is: <blockquote>(number of experiments) x (variable 1 number of sweeps) x ... x (variable n number of sweeps) x (number of iterations) </blockquote> * Monte-Carlo: Monte-Carlo brute force algorithm. It requires on calibrate: * nsimulations: number of simulations to run in every experiment. The total number of simulations to run is: <blockquote>(number of experiments) x (number of simulations) x (number of iterations) </blockquote> * orthogonal: Orthogonal sampling brute force algorithm. It requires for each variable: * sweeps: number of sweeps to generate for each variable in every experiment. The total number of simulations to run is: <blockquote>(number of experiments) x (variable 1 number of sweeps) x ... x (variable n number of sweeps) x (number of iterations) </blockquote> * Three former brute force algorithms can be iterated to improve convergence by using the following parameters: * nbest: number of best simulations to calculate convergence interval on next iteration (default 1). * tolerance: tolerance parameter to increase convergence interval (default 0). * niterations: number of iterations (default 1). It multiplies the total number of simulations: <blockquote>x (number of iterations) </blockquote> * Moreover, brute force algorithms can be coupled with a direction search method by using: * direction: method to estimate the optimal direction. Two options are currently available: * coordinates: coordinates descent method. It increases the total number of simulations by: <blockquote>(number of experiments) x (number of iterations) x (number of steps) x 2 x (number of variables) * random: random method. It requires: * nestimates: number of random checks to estimate the optimal direction. </blockquote> It increases the total number of simulations by: <blockquote>(number of experiments) x (number of iterations) x (number of steps) x (number of estimates) </blockquote> Former methods require also: * nsteps: number of steps to perform the direction search method, * relaxation: relaxation parameter, and for each variable: * step: initial step size for the direction search method. * genetic: Genetic algorithm. It requires the following parameters: *

npopulation: number of population. ∗ ngenerations: number of generations. ∗ mutation: mutation ratio. ∗ reproduction: reproduction ratio. ∗ adaptation: adaptation ratio. and for each variable: ∗ nbits: number of bits to encode each variable. The total number of simulations to run is: <blockquote>(number of experiments) x (npopulation) x [1 + (ngenerations - 1) x (mutation + reproduction + adaptation)] </blockquote> Implemented error noms are: ∗ euclidian: Euclidian norm. ∗ maximum: maximum norm. ∗ p: p-norm. It requires the parameter: ∗ p: p exponent. ∗ taxicab: Taxicab norm. Alternatively, the input file can be also written in JSON format as: @code{json} { "simulator": "simulator_↩ name", "evaluator": "evaluator_name", "algorithm": "algorithm_type", "nsimulations": "simulations_↩ number", "niterations": "iterations_number", "tolerance": "tolerance_value", "nbest": "best_number", "npopulation": "population_number", "ngenerations": "generations_number", "mutation": "mutation↩ _ratio", "reproduction": "reproduction_ratio", "adaptation": "adaptation_ratio", "direction": "direction↩ _search_type", "nsteps": "steps_number", "relaxation": "relaxation_parameter", "nestimates"↩ : "estimates_number", "threshold": "threshold_parameter", "norm": "norm_type", "p": "p_parameter", "seed": "random_seed", "result_file": "result_file", "variables_file": "variables_file", "experiments"↩ : [{ "name": "data_file_1", "template1": "template_1_1", "template2": "template_1_2", ... "weight": "weight_1", }, ... { "name": "data_file_N", "template1": "template_N_1", "template2": "template_↩ N_2", ... "weight": "weight_N", }], "variables": [{ "name": "variable_1", "minimum": "min_value", "maximum": "max_value", "precision": "precision_digits", "sweeps": "sweeps_number", "nbits": "bits↩ _number", "step": "step_size", }, ... { "name": "variable_M", "minimum": "min_value", "maximum": "max_value", "precision": "precision_digits", "sweeps": "sweeps_number", "nbits": "bits_number", "step": "step_size", }] } @endcode <h1>SOME EXAMPLES OF INPUT FILES </h1> Example 1 <hr> ∗ The simulator program name is: pivot ∗ The syntax is: <blockquote>$ ./pivot input_file output_file </blockquote> ∗ The program to evaluate the objective function is: compare ∗ The syntax is: <blockquote>$ ./compare simulated_file data_file result_file </blockquote> ∗ The calibration is performed with a sweep brute force algorithm. ∗ The experimental data files are: <blockquote>27-48.txt 42.txt 52.txt 100.txt </blockquote> ∗ Templates to get input files to simulator for each experiment are: <blockquote>template1.js template2.js template3.js template4.js </blockquote> ∗ The variables to calibrate, ranges, precision and sweeps number to perform are: <blockquote>alpha1, [179.70, 180.20], 2, 5 alpha2, [179.30, 179.60], 2, 5 random, [0.00, 0.20], 2, 5 boot-time, [0.0, 3.0], 1, 5 </blockquote> ∗ Then, the number of simulations to run is: 4x5x5x5x5=2500. ∗ The input file is: @code{xml} <?xml version="1.0"?> <optimize simulator="pivot" evaluator="compare" algorithm="sweep"> <experiment name="27-48.↩ txt" template1="template1.js"/> <experiment name="42.txt" template1="template2.js"/> <experiment name="52.txt" template1="template3.js"/> <experiment name="100.txt" template1="template4.↩ js"/> <variable name="alpha1" minimum="179.70" maximum="180.20" precision="2" nsweeps="5"/> <variable name="alpha2" minimum="179.30" maximum="179.60" precision="2" nsweeps="5"/> <variable name="random" minimum="0.00" maximum="0.20" precision="2" nsweeps="5"/> <variable name="boot-time" minimum="0.0" maximum="3.0" precision="1" nsweeps="5"/> </optimize> @endcode ∗ A template file as template1.js: @code{json} { "towers" : [{ "length" : 50.11, "velocity" : 0.02738, "@variable1" : @value1@, "@variable2@" : @value2@, "@variable3@" ↩ : @value3@, "@variable4@" : @value4@ }, { "length" : 50.11, "velocity" : 0.02824, "@variable1@" : @value1@, "@variable2@" : @value2@, "@variable3@" : @value3@, "@variable4@" : @value4@ }, { "length" : 50.11, "velocity" : 0.03008, "@variable1@" : @value1@, "@variable2@" : @value2@, "@variable3@" : @value3@, "@variable4@" : @value4@ }, { "length" : 50.11, "velocity" : 0.03753, "@variable1@" : @value1@, "@variable2@" : @value2@, "@variable3@" : @value3@, "@variable4@" : @value4@ }], "cycle-time" : 71.0, "plot-time" : 1.0, "comp-time-step": 0.1, "active-percent" : 27.48 }

- produces simulator input files to reproduce the experimental data file *27-48.txt* as:

```
{
  "towers" :
  [
    {
      "length"      :  50.11,
      "velocity"    :  0.02738,
      "alpha1" :  179.95,
      "alpha2" :  179.45,
      "random" :  0.10,
      "boot-time" :  1.5
    },
```

```
    {
      "length"    :  50.11,
      "velocity"  :  0.02824,
      "alpha1" :  179.95,
      "alpha2" :  179.45,
      "random" :  0.10,
      "boot-time" :  1.5
    },
    {
      "length"    :  50.11,
      "velocity"  :  0.03008,
      "alpha1" :  179.95,
      "alpha2" :  179.45,
      "random" :  0.10,
      "boot-time" :  1.5
    },
    {
      "length"    :  50.11,
      "velocity"  :  0.03753,
      "alpha1" :  179.95,
      "alpha2" :  179.45,
      "random" :  0.10,
      "boot-time" :  1.5
    }
  ],
  "cycle-time"     :  71.0,
  "plot-time"     :  1.0,
  "comp-time-step":  0.1,
  "active-percent" :  27.48
}
```

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 4

Data Structure Documentation

4.1 Experiment Struct Reference

Struct to define the experiment data.

`#include <experiment.h>`

Data Fields

- char * name
  File name.
- char * stencil [MAX_NINPUTS]
  Array of template names of input files.
- double weight
  Objective function weight.
- unsigned int ninputs
  Number of input files to the simulator.

4.1.1 Detailed Description

Struct to define the experiment data.

Definition at line 45 of file experiment.h.

4.1.2 Field Documentation

4.1.2.1 name

`char* Experiment::name`

File name.

Definition at line 47 of file experiment.h.

4.1.2.2 ninputs

```
unsigned int Experiment::ninputs
```

Number of input files to the simulator.

Definition at line 50 of file experiment.h.

4.1.2.3 stencil

```
char* Experiment::stencil[MAX_NINPUTS]
```

Array of template names of input files.

Definition at line 48 of file experiment.h.

4.1.2.4 weight

```
double Experiment::weight
```

Objective function weight.

Definition at line 49 of file experiment.h.

The documentation for this struct was generated from the following file:

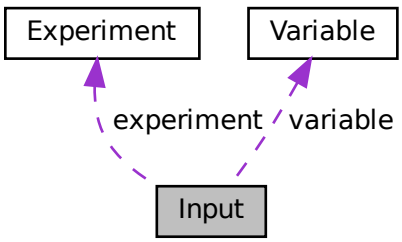
- experiment.h

4.2 Input Struct Reference

Struct to define the optimization input file.

```
#include <input.h>
```

Collaboration diagram for Input:



Data Fields

- Experiment * experiment

  Array or experiments.
- Variable * variable

  Array of variables.
- char * result

  Name of the result file.
- char * variables

  Name of the variables file.
- char * simulator

  Name of the simulator program.
- char * evaluator

  Name of the program to evaluate the objective function.
- char * directory

  Working directory.
- char * name

  Input data file name.
- double tolerance

  Algorithm tolerance.
- double mutation_ratio

  Mutation probability.
- double reproduction_ratio

  Reproduction probability.
- double adaptation_ratio

  Adaptation probability.
- double relaxation

  Relaxation parameter.
- double p

  Exponent of the P error norm.
- double threshold

  Threshold to finish the optimization.
- unsigned long int seed

  Seed of the pseudo-random numbers generator.
- unsigned int nvariables

  Variables number.
- unsigned int nexperiments

  Experiments number.
- unsigned int nsimulations

  Simulations number per experiment.
- unsigned int algorithm

  Algorithm type.
- unsigned int nsteps

  Number of steps to do the hill climbing method.
- unsigned int climbing

  Method to estimate the hill climbing.
- unsigned int nestimates

  Number of simulations to estimate the hill climbing.
- unsigned int niterations

  Number of algorithm iterations.
- unsigned int nbest

Number of best simulations.

- unsigned int norm

  Error norm type.

- unsigned int type

  Type of input file.

4.2.1 Detailed Description

Struct to define the optimization input file.

Definition at line 65 of file input.h.

4.2.2 Field Documentation

4.2.2.1 adaptation_ratio

```
double Input::adaptation_ratio
```

Adaptation probability.

Definition at line 79 of file input.h.

4.2.2.2 algorithm

```
unsigned int Input::algorithm
```

Algorithm type.

Definition at line 88 of file input.h.

4.2.2.3 climbing

```
unsigned int Input::climbing
```

Method to estimate the hill climbing.

Definition at line 91 of file input.h.

4.2.2.4 directory

```
char* Input::directory
```

Working directory.

Definition at line 74 of file input.h.

4.2.2.5 evaluator

```
char* Input::evaluator
```

Name of the program to evaluate the objective function.

Definition at line 72 of file input.h.

4.2.2.6 experiment

```
Experiment* Input::experiment
```

Array or experiments.

Definition at line 67 of file input.h.

4.2.2.7 mutation_ratio

```
double Input::mutation_ratio
```

Mutation probability.

Definition at line 77 of file input.h.

4.2.2.8 name

```
char* Input::name
```

Input data file name.

Definition at line 75 of file input.h.

4.2.2.9 nbest

```
unsigned int Input::nbest
```

Number of best simulations.

Definition at line 95 of file input.h.

4.2.2.10 nestimates

```
unsigned int Input::nestimates
```

Number of simulations to estimate the hill climbing.

Definition at line 92 of file input.h.

4.2.2.11 nexperiments

```
unsigned int Input::nexperiments
```

Experiments number.

Definition at line 86 of file input.h.

4.2.2.12 niterations

```
unsigned int Input::niterations
```

Number of algorithm iterations.

Definition at line 94 of file input.h.

4.2.2.13 norm

```
unsigned int Input::norm
```

Error norm type.

Definition at line 96 of file input.h.

4.2.2.14 nsimulations

```
unsigned int Input::nsimulations
```

Simulations number per experiment.

Definition at line 87 of file input.h.

4.2.2.15 nsteps

```
unsigned int Input::nsteps
```

Number of steps to do the hill climbing method.

Definition at line 89 of file input.h.

4.2.2.16 nvariables

```
unsigned int Input::nvariables
```

Variables number.

Definition at line 85 of file input.h.

4.2.2.17 p

```
double Input::p
```

Exponent of the P error norm.

Definition at line 81 of file input.h.

4.2.2.18 relaxation

```
double Input::relaxation
```

Relaxation parameter.

Definition at line 80 of file input.h.

4.2.2.19 reproduction_ratio

```
double Input::reproduction_ratio
```

Reproduction probability.

Definition at line 78 of file input.h.

4.2.2.20 result

```
char* Input::result
```

Name of the result file.

Definition at line 69 of file input.h.

4.2.2.21 seed

```
unsigned long int Input::seed
```

Seed of the pseudo-random numbers generator.

Definition at line 83 of file input.h.

4.2.2.22 simulator

```
char* Input::simulator
```

Name of the simulator program.

Definition at line 71 of file input.h.

4.2.2.23 threshold

```
double Input::threshold
```

Threshold to finish the optimization.

Definition at line 82 of file input.h.

4.2.2.24 tolerance

```
double Input::tolerance
```

Algorithm tolerance.

Definition at line 76 of file input.h.

4.2.2.25 type

```
unsigned int Input::type
```

Type of input file.

Definition at line 97 of file input.h.

4.2.2.26 variable

```
Variable* Input::variable
```

Array of variables.

Definition at line 68 of file input.h.

4.2.2.27 variables

```
char* Input::variables
```

Name of the variables file.

Definition at line 70 of file input.h.

The documentation for this struct was generated from the following file:

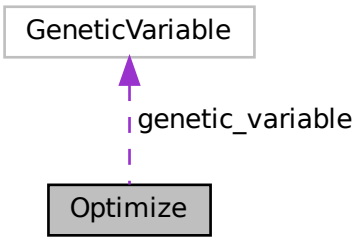
- input.h

4.3 Optimize Struct Reference

Struct to define the optimization ation data.

`#include <optimize.h>`

Collaboration diagram for Optimize:



Data Fields

- GMappedFile ** file [MAX_NINPUTS]
  Matrix of input template files.
- char ** experiment
  Array of experimental data file names.
- char ** label
  Array of variable names.
- gsl_rng * rng
  GSL random number generator.
- **GeneticVariable** * genetic_variable
  Array of variables for the genetic algorithm.
- FILE * file_result
  Result file.
- FILE * file_variables
  Variables file.
- char * result
  Name of the result file.
- char * variables
  Name of the variables file.
- char * simulator
  Name of the simulator program.
- char * evaluator
  Name of the program to evaluate the objective function.
- double * value
  Array of variable values.
- double * rangemin
  Array of minimum variable values.

- double * rangemax

  Array of maximum variable values.
- double * rangeminabs

  Array of absolute minimum variable values.
- double * rangemaxabs

  Array of absolute maximum variable values.
- double * error_best

  Array of the best minimum errors.
- double * weight

  Array of the experiment weights.
- double * step

  Array of hill climbing method step sizes.
- double * climbing

  Vector of hill climbing estimation.
- double * value_old

  Array of the best variable values on the previous step.
- double * error_old

  Array of the best minimum errors on the previous step.
- unsigned int * precision

  Array of variable precisions.
- unsigned int * nsweeps

  Array of sweeps of the sweep algorithm.
- unsigned int * nbits

  Array of bits number of the genetic algorithm.
- unsigned int * thread

  Array of simulation numbers to calculate on the thread.
- unsigned int * thread_climbing
- unsigned int * simulation_best

  Array of best simulation numbers.
- double tolerance

  Algorithm tolerance.
- double mutation_ratio

  Mutation probability.
- double reproduction_ratio

  Reproduction probability.
- double adaptation_ratio

  Adaptation probability.
- double relaxation

  Relaxation parameter.
- double calculation_time

  Calculation time.
- double p

  Exponent of the P error norm.
- double threshold

  Threshold to finish the optimization.
- unsigned long int seed

  Seed of the pseudo-random numbers generator.
- unsigned int nvariables

  Variables number.
- unsigned int nexperiments

  Experiments number.

- unsigned int ninputs
  Number of input files to the simulator.
- unsigned int nsimulations
  Simulations number per experiment.
- unsigned int nsteps
  Number of steps for the hill climbing method.
- unsigned int nestimates
  Number of simulations to estimate the climbing.
- unsigned int algorithm
  Algorithm type.
- unsigned int nstart
  Beginning simulation number of the task.
- unsigned int nend
  Ending simulation number of the task.
- unsigned int nstart_climbing
  Beginning simulation number of the task for the hill climbing method.
- unsigned int nend_climbing
  Ending simulation number of the task for the hill climbing method.
- unsigned int niterations
  Number of algorithm iterations.
- unsigned int nbest
  Number of best simulations.
- unsigned int nsaveds
  Number of saved simulations.
- unsigned int stop
  To stop the simulations.
- int mpi_rank
  Number of MPI task.

4.3.1 Detailed Description

Struct to define the optimization ation data.

Definition at line 45 of file optimize.h.

4.3.2 Field Documentation

4.3.2.1 adaptation_ratio

```
double Optimize::adaptation_ratio
```

Adaptation probability.

Definition at line 86 of file optimize.h.

4.3.2.2 algorithm

```
unsigned int Optimize::algorithm
```

Algorithm type.

Definition at line 101 of file optimize.h.

4.3.2.3 calculation_time

```
double Optimize::calculation_time
```

Calculation time.

Definition at line 88 of file optimize.h.

4.3.2.4 climbing

```
double* Optimize::climbing
```

Vector of hill climbing estimation.

Definition at line 68 of file optimize.h.

4.3.2.5 error_best

```
double* Optimize::error_best
```

Array of the best minimum errors.

Definition at line 65 of file optimize.h.

4.3.2.6 error_old

```
double* Optimize::error_old
```

Array of the best minimum errors on the previous step.

Definition at line 71 of file optimize.h.

4.3.2.7 evaluator

```
char* Optimize::evaluator
```

Name of the program to evaluate the objective function.

Definition at line 58 of file optimize.h.

4.3.2.8 experiment

```
char** Optimize::experiment
```

Array of experimental data file names.

Definition at line 48 of file optimize.h.

4.3.2.9 file

```
GMappedFile** Optimize::file[MAX_NINPUTS]
```

Matrix of input template files.

Definition at line 47 of file optimize.h.

4.3.2.10 file_result

```
FILE* Optimize::file_result
```

Result file.

Definition at line 53 of file optimize.h.

4.3.2.11 file_variables

```
FILE* Optimize::file_variables
```

Variables file.

Definition at line 54 of file optimize.h.

4.3.2.12 genetic_variable

```
GeneticVariable* Optimize::genetic_variable
```

Array of variables for the genetic algorithm.

Definition at line 51 of file optimize.h.

4.3.2.13 label

```
char** Optimize::label
```

Array of variable names.

Definition at line 49 of file optimize.h.

4.3.2.14 mpi_rank

```
int Optimize::mpi_rank
```

Number of MPI task.

Definition at line 113 of file optimize.h.

4.3.2.15 mutation_ratio

```
double Optimize::mutation_ratio
```

Mutation probability.

Definition at line 84 of file optimize.h.

4.3.2.16 nbest

```
unsigned int Optimize::nbest
```

Number of best simulations.

Definition at line 109 of file optimize.h.

4.3.2.17 nbits

```
unsigned int* Optimize::nbits
```

Array of bits number of the genetic algorithm.

Definition at line 75 of file optimize.h.

4.3.2.18 nend

```
unsigned int Optimize::nend
```

Ending simulation number of the task.

Definition at line 103 of file optimize.h.

4.3.2.19 nend_climbing

```
unsigned int Optimize::nend_climbing
```

Ending simulation number of the task for the hill climbing method.

Definition at line 106 of file optimize.h.

4.3.2.20 nestimates

```
unsigned int Optimize::nestimates
```

Number of simulations to estimate the climbing.

Definition at line 99 of file optimize.h.

4.3.2.21 nexperiments

```
unsigned int Optimize::nexperiments
```

Experiments number.

Definition at line 94 of file optimize.h.

4.3.2.22 ninputs

```
unsigned int Optimize::ninputs
```

Number of input files to the simulator.

Definition at line 95 of file optimize.h.

4.3.2.23 niterations

```
unsigned int Optimize::niterations
```

Number of algorithm iterations.

Definition at line 108 of file optimize.h.

4.3.2.24 nsaveds

```
unsigned int Optimize::nsaveds
```

Number of saved simulations.

Definition at line 110 of file optimize.h.

4.3.2.25 nsimulations

```
unsigned int Optimize::nsimulations
```

Simulations number per experiment.

Definition at line 96 of file optimize.h.

4.3.2.26 nstart

```
unsigned int Optimize::nstart
```

Beginning simulation number of the task.

Definition at line 102 of file optimize.h.

4.3.2.27 nstart_climbing

```
unsigned int Optimize::nstart_climbing
```

Beginning simulation number of the task for the hill climbing method.

Definition at line 104 of file optimize.h.

4.3.2.28 nsteps

```
unsigned int Optimize::nsteps
```

Number of steps for the hill climbing method.

Definition at line 97 of file optimize.h.

4.3.2.29 nsweeps

```
unsigned int* Optimize::nsweeps
```

Array of sweeps of the sweep algorithm.

Definition at line 74 of file optimize.h.

4.3.2.30 nvariables

```
unsigned int Optimize::nvariables
```

Variables number.

Definition at line 93 of file optimize.h.

4.3.2.31 p

```
double Optimize::p
```

Exponent of the P error norm.

Definition at line 89 of file optimize.h.

4.3.2.32 precision

```
unsigned int* Optimize::precision
```

Array of variable precisions.

Definition at line 73 of file optimize.h.

4.3.2.33 rangemax

```
double* Optimize::rangemax
```

Array of maximum variable values.

Definition at line 62 of file optimize.h.

4.3.2.34 rangemaxabs

```
double* Optimize::rangemaxabs
```

Array of absolute maximum variable values.

Definition at line 64 of file optimize.h.

4.3.2.35 rangemin

```
double* Optimize::rangemin
```

Array of minimum variable values.

Definition at line 61 of file optimize.h.

4.3.2.36 rangeminabs

```
double* Optimize::rangeminabs
```

Array of absolute minimum variable values.

Definition at line 63 of file optimize.h.

4.3.2.37 relaxation

```
double Optimize::relaxation
```

Relaxation parameter.

Definition at line 87 of file optimize.h.

4.3.2.38 reproduction_ratio

```
double Optimize::reproduction_ratio
```

Reproduction probability.

Definition at line 85 of file optimize.h.

4.3.2.39 result

```
char* Optimize::result
```

Name of the result file.

Definition at line 55 of file optimize.h.

4.3.2.40 rng

```
gsl_rng* Optimize::rng
```

GSL random number generator.

Definition at line 50 of file optimize.h.

4.3.2.41 seed

```
unsigned long int Optimize::seed
```

Seed of the pseudo-random numbers generator.

Definition at line 91 of file optimize.h.

4.3.2.42 simulation_best

```
unsigned int* Optimize::simulation_best
```

Array of best simulation numbers.

Definition at line 82 of file optimize.h.

4.3.2.43 simulator

```
char* Optimize::simulator
```

Name of the simulator program.

Definition at line 57 of file optimize.h.

4.3.2.44 step

```
double* Optimize::step
```

Array of hill climbing method step sizes.

Definition at line 67 of file optimize.h.

4.3.2.45 stop

```
unsigned int Optimize::stop
```

To stop the simulations.

Definition at line 111 of file optimize.h.

4.3.2.46 thread

```
unsigned int* Optimize::thread
```

Array of simulation numbers to calculate on the thread.

Definition at line 77 of file optimize.h.

4.3.2.47 thread_climbing

```
unsigned int* Optimize::thread_climbing
```

Array of simulation numbers to calculate on the thread for the hill climbing method.

Definition at line 79 of file optimize.h.

4.3.2.48 threshold

```
double Optimize::threshold
```

Threshold to finish the optimization.

Definition at line 90 of file optimize.h.

4.3.2.49 tolerance

```
double Optimize::tolerance
```

Algorithm tolerance.

Definition at line 83 of file optimize.h.

4.3.2.50 value

```
double* Optimize::value
```

Array of variable values.

Definition at line 60 of file optimize.h.

4.3.2.51 value_old

```
double* Optimize::value_old
```

Array of the best variable values on the previous step.

Definition at line 69 of file optimize.h.

4.3.2.52 variables

```
char* Optimize::variables
```

Name of the variables file.

Definition at line 56 of file optimize.h.

4.3.2.53 weight

```
double* Optimize::weight
```

Array of the experiment weights.

Definition at line 66 of file optimize.h.

The documentation for this struct was generated from the following file:

- optimize.h

4.4 Options Struct Reference

Struct to define the options dialog.

```
#include <interface.h>
```

Data Fields

- GtkDialog * dialog
  Main GtkDialog.
- GtkGrid * grid
  Main GtkGrid.
- GtkLabel * label_seed
  Pseudo-random numbers generator seed GtkLabel.
- GtkSpinButton * spin_seed
  Pseudo-random numbers generator seed GtkSpinButton.
- GtkLabel * label_threads
  Threads number GtkLabel.
- GtkSpinButton * spin_threads
  Threads number GtkSpinButton.
- GtkLabel * label_climbing
  Climbing threads number GtkLabel.
- GtkSpinButton * spin_climbing
  Climbing threads number GtkSpinButton.

4.4.1 Detailed Description

Struct to define the options dialog.

Definition at line 48 of file interface.h.

4.4.2 Field Documentation

4.4.2.1 dialog

```
GtkDialog* Options::dialog
```

Main GtkDialog.

Definition at line 50 of file interface.h.

4.4.2.2 grid

```
GtkGrid* Options::grid
```

Main GtkGrid.

Definition at line 51 of file interface.h.

4.4.2.3 label_climbing

```
GtkLabel* Options::label_climbing
```

Climbing threads number GtkLabel.

Definition at line 58 of file interface.h.

4.4.2.4 label_seed

```
GtkLabel* Options::label_seed
```

Pseudo-random numbers generator seed GtkLabel.

Definition at line 52 of file interface.h.

4.4.2.5 label_threads

```
GtkLabel* Options::label_threads
```

Threads number GtkLabel.

Definition at line 56 of file interface.h.

4.4.2.6 spin_climbing

```
GtkSpinButton* Options::spin_climbing
```

Climbing threads number GtkSpinButton.

Definition at line 59 of file interface.h.

4.4.2.7 spin_seed

```
GtkSpinButton* Options::spin_seed
```

Pseudo-random numbers generator seed GtkSpinButton.

Definition at line 54 of file interface.h.

4.4.2.8 spin_threads

```
GtkSpinButton* Options::spin_threads
```

Threads number GtkSpinButton.

Definition at line 57 of file interface.h.

The documentation for this struct was generated from the following file:

- interface.h

4.5 ParallelData Struct Reference

Struct to pass to the GThreads parallelized function.

```
#include <optimize.h>
```

Data Fields

- unsigned int thread
  Thread number.

4.5.1 Detailed Description

Struct to pass to the GThreads parallelized function.

Definition at line 121 of file optimize.h.

4.5.2 Field Documentation

4.5.2.1 thread

```
unsigned int ParallelData::thread
```

Thread number.

Definition at line 123 of file optimize.h.

The documentation for this struct was generated from the following file:

- optimize.h

4.6 Running Struct Reference

Struct to define the running dialog.

```
#include <interface.h>
```

Data Fields

- GtkDialog * dialog
  Main GtkDialog.
- GtkLabel * label
  Label GtkLabel.
- GtkSpinner * spinner
  Animation GtkSpinner.
- GtkGrid * grid
  Grid GtkGrid.

4.6.1 Detailed Description

Struct to define the running dialog.

Definition at line 66 of file interface.h.

4.6.2 Field Documentation

4.6.2.1 dialog

```
GtkDialog* Running::dialog
```

Main GtkDialog.

Definition at line 68 of file interface.h.

4.6.2.2 grid

```
GtkGrid* Running::grid
```

Grid GtkGrid.

Definition at line 71 of file interface.h.

4.6.2.3 label

```
GtkLabel* Running::label
```

Label GtkLabel.

Definition at line 69 of file interface.h.

4.6.2.4 spinner

```
GtkSpinner* Running::spinner
```

Animation GtkSpinner.

Definition at line 70 of file interface.h.

The documentation for this struct was generated from the following file:

- interface.h

4.7 Variable Struct Reference

Struct to define the variable data.

`#include <variable.h>`

Data Fields

- char * name
  Variable name.
- double rangemin
  Minimum variable value.
- double rangemax
  Maximum variable value.
- double rangeminabs
  Absolute minimum variable value.
- double rangemaxabs
  Absolute maximum variable value.
- double step
  Hill climbing method step size.
- unsigned int precision
  Variable precision.
- unsigned int nsweeps
  Sweeps of the sweep algorithm.
- unsigned int nbits
  Bits number of the genetic algorithm.

4.7.1 Detailed Description

Struct to define the variable data.

Definition at line 54 of file variable.h.

4.7.2 Field Documentation

4.7.2.1 name

`char* Variable::name`

Variable name.

Definition at line 56 of file variable.h.

4.7.2.2 nbits

```
unsigned int Variable::nbits
```

Bits number of the genetic algorithm.

Definition at line 64 of file variable.h.

4.7.2.3 nsweeps

```
unsigned int Variable::nsweeps
```

Sweeps of the sweep algorithm.

Definition at line 63 of file variable.h.

4.7.2.4 precision

```
unsigned int Variable::precision
```

Variable precision.

Definition at line 62 of file variable.h.

4.7.2.5 rangemax

```
double Variable::rangemax
```

Maximum variable value.

Definition at line 58 of file variable.h.

4.7.2.6 rangemaxabs

```
double Variable::rangemaxabs
```

Absolute maximum variable value.

Definition at line 60 of file variable.h.

4.7.2.7 rangemin

`double Variable::rangemin`

Minimum variable value.

Definition at line 57 of file variable.h.

4.7.2.8 rangeminabs

`double Variable::rangeminabs`

Absolute minimum variable value.

Definition at line 59 of file variable.h.

4.7.2.9 step

`double Variable::step`

Hill climbing method step size.

Definition at line 61 of file variable.h.

The documentation for this struct was generated from the following file:

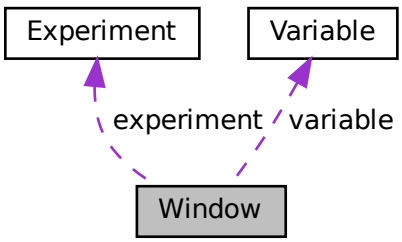
- variable.h

4.8 Window Struct Reference

Struct to define the main window.

`#include <interface.h>`

Collaboration diagram for Window:



Data Fields

- GtkWindow * window

  Main GtkWindow.
- GtkGrid * grid

  Main GtkGrid.
- GtkBox * box_buttons

  GtkBox to store the main buttons.
- GtkButton * button_open

  Open GtkButton.
- GtkButton * button_save

  Save GtkButton.
- GtkButton * button_run

  Run GtkButton.
- GtkButton * button_options

  Options GtkButton.
- GtkButton * button_help

  Help GtkButton.
- GtkButton * button_about

  Help GtkButton.
- GtkButton * button_exit

  Exit GtkButton.
- GtkGrid * grid_files

  Files GtkGrid.
- GtkLabel * label_simulator

  Simulator program GtkLabel.
- GtkButton * button_simulator

  Simulator program GtkButton.
- GtkCheckButton * check_evaluator

  Evaluator program GtkCheckButton.
- GtkButton * button_evaluator

  Evaluator program GtkButton.
- GtkLabel * label_result

  Result file GtkLabel.
- GtkEntry * entry_result

  Result file GtkEntry.
- GtkLabel * label_variables

  Variables file GtkLabel.
- GtkEntry * entry_variables

  Variables file GtkEntry.
- GtkFrame * frame_norm

  GtkFrame to set the error norm.
- GtkGrid * grid_norm

  GtkGrid to set the error norm.
- GtkRadioButton * button_norm [NNORMS]

  Array of GtkRadioButtons to set the error norm.
- GtkLabel * label_p

  GtkLabel to set the p parameter.
- GtkSpinButton * spin_p

  GtkSpinButton to set the p parameter.
- GtkScrolledWindow * scrolled_p

GtkScrolledWindow to set the p parameter.

- GtkFrame * frame_algorithm

  GtkFrame to set the algorithm.
- GtkGrid * grid_algorithm

  GtkGrid to set the algorithm.
- GtkRadioButton * button_algorithm [NALGORITHMS]

  Array of GtkRadioButtons to set the algorithm.
- GtkLabel * label_simulations

  GtkLabel to set the simulations number.
- GtkSpinButton * spin_simulations

  GtkSpinButton to set the simulations number.
- GtkLabel * label_iterations

  GtkLabel to set the iterations number.
- GtkSpinButton * spin_iterations

  GtkSpinButton to set the iterations number.
- GtkLabel * label_tolerance

  GtkLabel to set the tolerance.
- GtkSpinButton * spin_tolerance

  GtkSpinButton to set the tolerance.
- GtkLabel * label_bests

  GtkLabel to set the best number.
- GtkSpinButton * spin_bests

  GtkSpinButton to set the best number.
- GtkLabel * label_population

  GtkLabel to set the population number.
- GtkSpinButton * spin_population

  GtkSpinButton to set the population number.
- GtkLabel * label_generations

  GtkLabel to set the generations number.
- GtkSpinButton * spin_generations

  GtkSpinButton to set the generations number.
- GtkLabel * label_mutation

  GtkLabel to set the mutation ratio.
- GtkSpinButton * spin_mutation

  GtkSpinButton to set the mutation ratio.
- GtkLabel * label_reproduction

  GtkLabel to set the reproduction ratio.
- GtkSpinButton * spin_reproduction

  GtkSpinButton to set the reproduction ratio.
- GtkLabel * label_adaptation

  GtkLabel to set the adaptation ratio.
- GtkSpinButton * spin_adaptation

  GtkSpinButton to set the adaptation ratio.
- GtkCheckButton * check_climbing

  GtkCheckButton to check running the hill climbing method.
- GtkGrid * grid_climbing

  GtkGrid to pack the hill climbing method widgets.
- GtkRadioButton * button_climbing [NCLIMBINGS]

  Array of GtkRadioButtons array to set the hill climbing method.
- GtkLabel * label_steps

  GtkLabel to set the steps number.

- GtkSpinButton * spin_steps

  GtkSpinButton to set the steps number.
- GtkLabel * label_estimates

  GtkLabel to set the estimates number.
- GtkSpinButton * spin_estimates

  GtkSpinButton to set the estimates number.
- GtkLabel * label_relaxation

  GtkLabel to set the relaxation parameter.
- GtkSpinButton * spin_relaxation

  GtkSpinButton to set the relaxation parameter.
- GtkLabel * label_threshold

  GtkLabel to set the threshold.
- GtkSpinButton * spin_threshold

  GtkSpinButton to set the threshold.
- GtkScrolledWindow * scrolled_threshold

  GtkScrolledWindow to set the threshold.
- GtkFrame * frame_variable

  Variable GtkFrame.
- GtkGrid * grid_variable

  Variable GtkGrid.
- GtkComboBoxText * combo_variable

  GtkComboBoxEntry to select a variable.
- GtkButton * button_add_variable

  GtkButton to add a variable.
- GtkButton * button_remove_variable

  GtkButton to remove a variable.
- GtkLabel * label_variable

  Variable GtkLabel.
- GtkEntry * entry_variable

  GtkEntry to set the variable name.
- GtkLabel * label_min

  Minimum GtkLabel.
- GtkSpinButton * spin_min

  Minimum GtkSpinButton.
- GtkScrolledWindow * scrolled_min

  Minimum GtkScrolledWindow.
- GtkLabel * label_max

  Maximum GtkLabel.
- GtkSpinButton * spin_max

  Maximum GtkSpinButton.
- GtkScrolledWindow * scrolled_max

  Maximum GtkScrolledWindow.
- GtkCheckButton * check_minabs

  Absolute minimum GtkCheckButton.
- GtkSpinButton * spin_minabs

  Absolute minimum GtkSpinButton.
- GtkScrolledWindow * scrolled_minabs

  Absolute minimum GtkScrolledWindow.
- GtkCheckButton * check_maxabs

  Absolute maximum GtkCheckButton.
- GtkSpinButton * spin_maxabs

Absolute maximum GtkSpinButton.

- GtkScrolledWindow * scrolled_maxabs

  Absolute maximum GtkScrolledWindow.
- GtkLabel * label_precision

  Precision GtkLabel.
- GtkSpinButton * spin_precision

  Precision digits GtkSpinButton.
- GtkLabel * label_sweeps

  Sweeps number GtkLabel.
- GtkSpinButton * spin_sweeps

  Sweeps number GtkSpinButton.
- GtkLabel * label_bits

  Bits number GtkLabel.
- GtkSpinButton * spin_bits

  Bits number GtkSpinButton.
- GtkLabel * label_step

  GtkLabel to set the step.
- GtkSpinButton * spin_step

  GtkSpinButton to set the step.
- GtkScrolledWindow * scrolled_step

  step GtkScrolledWindow.
- GtkFrame * frame_experiment

  Experiment GtkFrame.
- GtkGrid * grid_experiment

  Experiment GtkGrid.
- GtkComboBoxText * combo_experiment

  Experiment GtkComboBoxEntry.
- GtkButton * button_add_experiment

  GtkButton to add a experiment.
- GtkButton * button_remove_experiment

  GtkButton to remove a experiment.
- GtkLabel * label_experiment

  Experiment GtkLabel.
- GtkButton * button_experiment

  GtkButton to set the experimental data file.
- GtkLabel * label_weight

  Weight GtkLabel.
- GtkSpinButton * spin_weight

  Weight GtkSpinButton.
- GtkCheckButton * check_template [MAX_NINPUTS]

  Array of GtkCheckButtons to set the input templates.
- GtkButton * button_template [MAX_NINPUTS]

  Array of GtkButtons to set the input templates.
- GdkPixbuf * logo

  Logo GdkPixbuf.
- Experiment * experiment

  Array of experiments data.
- Variable * variable

  Array of variables data.
- char * application_directory

  Application directory.

- gulong id_experiment

  Identifier of the combo_experiment signal.
- gulong id_experiment_name

  Identifier of the button_experiment signal.
- gulong id_variable

  Identifier of the combo_variable signal.
- gulong id_variable_label

  Identifier of the entry_variable signal.
- gulong id_template [MAX_NINPUTS]

  Array of identifiers of the check_template signal.
- gulong id_input [MAX_NINPUTS]

  Array of identifiers of the button_template signal.
- unsigned int nexperiments

  Number of experiments.
- unsigned int nvariables

  Number of variables.

4.8.1 Detailed Description

Struct to define the main window.

Definition at line 78 of file interface.h.

4.8.2 Field Documentation

4.8.2.1 application_directory

```
char* Window::application_directory
```

Application directory.

Definition at line 215 of file interface.h.

4.8.2.2 box_buttons

```
GtkBox* Window::box_buttons
```

GtkBox to store the main buttons.

Definition at line 82 of file interface.h.

4.8.2.3 button_about

```
GtkButton* Window::button_about
```

Help GtkButton.

Definition at line 88 of file interface.h.

4.8.2.4 button_add_experiment

```
GtkButton* Window::button_add_experiment
```

GtkButton to add a experiment.

Definition at line 201 of file interface.h.

4.8.2.5 button_add_variable

```
GtkButton* Window::button_add_variable
```

GtkButton to add a variable.

Definition at line 173 of file interface.h.

4.8.2.6 button_algorithm

```
GtkRadioButton* Window::button_algorithm[NALGORITHMS]
```

Array of GtkRadioButtons to set the algorithm.

Definition at line 115 of file interface.h.

4.8.2.7 button_climbing

```
GtkRadioButton* Window::button_climbing[NCLIMBINGS]
```

Array of GtkRadioButtons array to set the hill climbing method.

Definition at line 150 of file interface.h.

4.8.2.8 button_evaluator

```
GtkButton* Window::button_evaluator
```

Evaluator program GtkButton.

Definition at line 94 of file interface.h.

4.8.2.9 button_exit

```
GtkButton* Window::button_exit
```

Exit GtkButton.

Definition at line 89 of file interface.h.

4.8.2.10 button_experiment

```
GtkButton* Window::button_experiment
```

GtkButton to set the experimental data file.

Definition at line 204 of file interface.h.

4.8.2.11 button_help

```
GtkButton* Window::button_help
```

Help GtkButton.

Definition at line 87 of file interface.h.

4.8.2.12 button_norm

```
GtkRadioButton* Window::button_norm[NNORMS]
```

Array of GtkRadioButtons to set the error norm.

Definition at line 102 of file interface.h.

4.8.2.13 button_open

```
GtkButton* Window::button_open
```

Open GtkButton.

Definition at line 83 of file interface.h.

4.8.2.14 button_options

```
GtkButton* Window::button_options
```

Options GtkButton.

Definition at line 86 of file interface.h.

4.8.2.15 button_remove_experiment

```
GtkButton* Window::button_remove_experiment
```

GtkButton to remove a experiment.

Definition at line 202 of file interface.h.

4.8.2.16 button_remove_variable

```
GtkButton* Window::button_remove_variable
```

GtkButton to remove a variable.

Definition at line 174 of file interface.h.

4.8.2.17 button_run

```
GtkButton* Window::button_run
```

Run GtkButton.

Definition at line 85 of file interface.h.

4.8.2.18 button_save

```
GtkButton* Window::button_save
```

Save GtkButton.

Definition at line 84 of file interface.h.

4.8.2.19 button_simulator

```
GtkButton* Window::button_simulator
```

Simulator program GtkButton.

Definition at line 92 of file interface.h.

4.8.2.20 button_template

```
GtkButton* Window::button_template[MAX_NINPUTS]
```

Array of GtkButtons to set the input templates.

Definition at line 210 of file interface.h.

4.8.2.21 check_climbing

```
GtkCheckButton* Window::check_climbing
```

GtkCheckButton to check running the hill climbing method.

Definition at line 145 of file interface.h.

4.8.2.22 check_evaluator

```
GtkCheckButton* Window::check_evaluator
```

Evaluator program GtkCheckButton.

Definition at line 93 of file interface.h.

4.8.2.23 check_maxabs

```
GtkCheckButton* Window::check_maxabs
```

Absolute maximum GtkCheckButton.

Definition at line 186 of file interface.h.

4.8.2.24 check_minabs

```
GtkCheckButton* Window::check_minabs
```

Absolute minimum GtkCheckButton.

Definition at line 183 of file interface.h.

4.8.2.25 check_template

```
GtkCheckButton* Window::check_template[MAX_NINPUTS]
```

Array of GtkCheckButtons to set the input templates.

Definition at line 208 of file interface.h.

4.8.2.26 combo_experiment

```
GtkComboBoxText* Window::combo_experiment
```

Experiment GtkComboBoxEntry.

Definition at line 200 of file interface.h.

4.8.2.27 combo_variable

```
GtkComboBoxText* Window::combo_variable
```

GtkComboBoxEntry to select a variable.

Definition at line 171 of file interface.h.

4.8.2.28 entry_result

```
GtkEntry* Window::entry_result
```

Result file GtkEntry.

Definition at line 96 of file interface.h.

4.8.2.29 entry_variable

```
GtkEntry* Window::entry_variable
```

GtkEntry to set the variable name.

Definition at line 176 of file interface.h.

4.8.2.30 entry_variables

```
GtkEntry* Window::entry_variables
```

Variables file GtkEntry.

Definition at line 98 of file interface.h.

4.8.2.31 experiment

```
Experiment* Window::experiment
```

Array of experiments data.

Definition at line 213 of file interface.h.

4.8.2.32 frame_algorithm

```
GtkFrame* Window::frame_algorithm
```

GtkFrame to set the algorithm.

Definition at line 112 of file interface.h.

4.8.2.33 frame_experiment

```
GtkFrame* Window::frame_experiment
```

Experiment GtkFrame.

Definition at line 198 of file interface.h.

4.8.2.34 frame_norm

```
GtkFrame* Window::frame_norm
```

GtkFrame to set the error norm.

Definition at line 99 of file interface.h.

4.8.2.35 frame_variable

```
GtkFrame* Window::frame_variable
```

Variable GtkFrame.

Definition at line 169 of file interface.h.

4.8.2.36 grid

```
GtkGrid* Window::grid
```

Main GtkGrid.

Definition at line 81 of file interface.h.

4.8.2.37 grid_algorithm

```
GtkGrid* Window::grid_algorithm
```

GtkGrid to set the algorithm.

Definition at line 113 of file interface.h.

4.8.2.38 grid_climbing

```
GtkGrid* Window::grid_climbing
```

GtkGrid to pack the hill climbing method widgets.

Definition at line 147 of file interface.h.

4.8.2.39 grid_experiment

```
GtkGrid* Window::grid_experiment
```

Experiment GtkGrid.

Definition at line 199 of file interface.h.

4.8.2.40 grid_files

```
GtkGrid* Window::grid_files
```

Files GtkGrid.

Definition at line 90 of file interface.h.

4.8.2.41 grid_norm

```
GtkGrid* Window::grid_norm
```

GtkGrid to set the error norm.

Definition at line 100 of file interface.h.

4.8.2.42 grid_variable

```
GtkGrid* Window::grid_variable
```

Variable GtkGrid.

Definition at line 170 of file interface.h.

4.8.2.43 id_experiment

```
gulong Window::id_experiment
```

Identifier of the combo_experiment signal.

Definition at line 216 of file interface.h.

4.8.2.44 id_experiment_name

```
gulong Window::id_experiment_name
```

Identifier of the button_experiment signal.

Definition at line 217 of file interface.h.

4.8.2.45 id_input

```
gulong Window::id_input[MAX_NINPUTS]
```

Array of identifiers of the button_template signal.

Definition at line 222 of file interface.h.

4.8.2.46 id_template

```
gulong Window::id_template[MAX_NINPUTS]
```

Array of identifiers of the check_template signal.

Definition at line 220 of file interface.h.

4.8.2.47 id_variable

```
gulong Window::id_variable
```

Identifier of the combo_variable signal.

Definition at line 218 of file interface.h.

4.8.2.48 id_variable_label

```
gulong Window::id_variable_label
```

Identifier of the entry_variable signal.

Definition at line 219 of file interface.h.

4.8.2.49 label_adaptation

```
GtkLabel* Window::label_adaptation
```

GtkLabel to set the adaptation ratio.

Definition at line 142 of file interface.h.

4.8.2.50 label_bests

```
GtkLabel* Window::label_bests
```

GtkLabel to set the best number.

Definition at line 129 of file interface.h.

4.8.2.51 label_bits

```
GtkLabel* Window::label_bits
```

Bits number GtkLabel.

Definition at line 193 of file interface.h.

4.8.2.52 label_estimates

```
GtkLabel* Window::label_estimates
```

GtkLabel to set the estimates number.

Definition at line 158 of file interface.h.

4.8.2.53 label_experiment

```
GtkLabel* Window::label_experiment
```

Experiment GtkLabel.

Definition at line 203 of file interface.h.

4.8.2.54 label_generations

```
GtkLabel* Window::label_generations
```

GtkLabel to set the generations number.

Definition at line 134 of file interface.h.

4.8.2.55 label_iterations

```
GtkLabel* Window::label_iterations
```

GtkLabel to set the iterations number.

Definition at line 124 of file interface.h.

4.8.2.56 label_max

```
GtkLabel* Window::label_max
```

Maximum GtkLabel.

Definition at line 180 of file interface.h.

4.8.2.57 label_min

```
GtkLabel* Window::label_min
```

Minimum GtkLabel.

Definition at line 177 of file interface.h.

4.8.2.58 label_mutation

```
GtkLabel* Window::label_mutation
```

GtkLabel to set the mutation ratio.

Definition at line 137 of file interface.h.

4.8.2.59 label_p

```
GtkLabel* Window::label_p
```

GtkLabel to set the p parameter.

Definition at line 108 of file interface.h.

4.8.2.60 label_population

```
GtkLabel* Window::label_population
```

GtkLabel to set the population number.

Definition at line 131 of file interface.h.

4.8.2.61 label_precision

```
GtkLabel* Window::label_precision
```

Precision GtkLabel.

Definition at line 189 of file interface.h.

4.8.2.62 label_relaxation

```
GtkLabel* Window::label_relaxation
```

GtkLabel to set the relaxation parameter.

Definition at line 161 of file interface.h.

4.8.2.63 label_reproduction

```
GtkLabel* Window::label_reproduction
```

GtkLabel to set the reproduction ratio.

Definition at line 139 of file interface.h.

4.8.2.64 label_result

```
GtkLabel* Window::label_result
```

Result file GtkLabel.

Definition at line 95 of file interface.h.

4.8.2.65 label_simulations

```
GtkLabel* Window::label_simulations
```

GtkLabel to set the simulations number.

Definition at line 121 of file interface.h.

4.8.2.66 label_simulator

```
GtkLabel* Window::label_simulator
```

Simulator program GtkLabel.

Definition at line 91 of file interface.h.

4.8.2.67 label_step

```
GtkLabel* Window::label_step
```

GtkLabel to set the step.

Definition at line 195 of file interface.h.

4.8.2.68 label_steps

```
GtkLabel* Window::label_steps
```

GtkLabel to set the steps number.

Definition at line 156 of file interface.h.

4.8.2.69 label_sweeps

```
GtkLabel* Window::label_sweeps
```

Sweeps number GtkLabel.

Definition at line 191 of file interface.h.

4.8.2.70 label_threshold

```
GtkLabel* Window::label_threshold
```

GtkLabel to set the threshold.

Definition at line 165 of file interface.h.

4.8.2.71 label_tolerance

```
GtkLabel* Window::label_tolerance
```

GtkLabel to set the tolerance.

Definition at line 127 of file interface.h.

4.8.2.72 label_variable

```
GtkLabel* Window::label_variable
```

Variable GtkLabel.

Definition at line 175 of file interface.h.

4.8.2.73 label_variables

```
GtkLabel* Window::label_variables
```

Variables file GtkLabel.

Definition at line 97 of file interface.h.

4.8.2.74 label_weight

```
GtkLabel* Window::label_weight
```

Weight GtkLabel.

Definition at line 206 of file interface.h.

4.8.2.75 logo

```
GdkPixbuf* Window::logo
```

Logo GdkPixbuf.

Definition at line 212 of file interface.h.

4.8.2.76 nexperiments

```
unsigned int Window::nexperiments
```

Number of experiments.

Definition at line 224 of file interface.h.

4.8.2.77 nvariables

```
unsigned int Window::nvariables
```

Number of variables.

Definition at line 225 of file interface.h.

4.8.2.78 scrolled_max

```
GtkScrolledWindow* Window::scrolled_max
```

Maximum GtkScrolledWindow.

Definition at line 182 of file interface.h.

4.8.2.79 scrolled_maxabs

```
GtkScrolledWindow* Window::scrolled_maxabs
```

Absolute maximum GtkScrolledWindow.

Definition at line 188 of file interface.h.

4.8.2.80 scrolled_min

```
GtkScrolledWindow* Window::scrolled_min
```

Minimum GtkScrolledWindow.

Definition at line 179 of file interface.h.

4.8.2.81 scrolled_minabs

```
GtkScrolledWindow* Window::scrolled_minabs
```

Absolute minimum GtkScrolledWindow.

Definition at line 185 of file interface.h.

4.8.2.82 scrolled_p

```
GtkScrolledWindow* Window::scrolled_p
```

GtkScrolledWindow to set the p parameter.

Definition at line 110 of file interface.h.

4.8.2.83 scrolled_step

```
GtkScrolledWindow* Window::scrolled_step
```

step GtkScrolledWindow.

Definition at line 197 of file interface.h.

4.8.2.84 scrolled_threshold

```
GtkScrolledWindow* Window::scrolled_threshold
```

GtkScrolledWindow to set the threshold.

Definition at line 167 of file interface.h.

4.8.2.85 spin_adaptation

```
GtkSpinButton* Window::spin_adaptation
```

GtkSpinButton to set the adaptation ratio.

Definition at line 143 of file interface.h.

4.8.2.86 spin_bests

```
GtkSpinButton* Window::spin_bests
```

GtkSpinButton to set the best number.

Definition at line 130 of file interface.h.

4.8.2.87 spin_bits

```
GtkSpinButton* Window::spin_bits
```

Bits number GtkSpinButton.

Definition at line 194 of file interface.h.

4.8.2.88 spin_estimates

```
GtkSpinButton* Window::spin_estimates
```

GtkSpinButton to set the estimates number.

Definition at line 159 of file interface.h.

4.8.2.89 spin_generations

```
GtkSpinButton* Window::spin_generations
```

GtkSpinButton to set the generations number.

Definition at line 135 of file interface.h.

4.8.2.90 spin_iterations

```
GtkSpinButton* Window::spin_iterations
```

GtkSpinButton to set the iterations number.

Definition at line 125 of file interface.h.

4.8.2.91 spin_max

```
GtkSpinButton* Window::spin_max
```

Maximum GtkSpinButton.

Definition at line 181 of file interface.h.

4.8.2.92 spin_maxabs

```
GtkSpinButton* Window::spin_maxabs
```

Absolute maximum GtkSpinButton.

Definition at line 187 of file interface.h.

4.8.2.93 spin_min

```
GtkSpinButton* Window::spin_min
```

Minimum GtkSpinButton.

Definition at line 178 of file interface.h.

4.8.2.94 spin_minabs

```
GtkSpinButton* Window::spin_minabs
```

Absolute minimum GtkSpinButton.

Definition at line 184 of file interface.h.

4.8.2.95 spin_mutation

```
GtkSpinButton* Window::spin_mutation
```

GtkSpinButton to set the mutation ratio.

Definition at line 138 of file interface.h.

4.8.2.96 spin_p

```
GtkSpinButton* Window::spin_p
```

GtkSpinButton to set the p parameter.

Definition at line 109 of file interface.h.

4.8.2.97 spin_population

```
GtkSpinButton* Window::spin_population
```

GtkSpinButton to set the population number.

Definition at line 132 of file interface.h.

4.8.2.98 spin_precision

```
GtkSpinButton* Window::spin_precision
```

Precision digits GtkSpinButton.

Definition at line 190 of file interface.h.

4.8.2.99 spin_relaxation

```
GtkSpinButton* Window::spin_relaxation
```

GtkSpinButton to set the relaxation parameter.

Definition at line 163 of file interface.h.

4.8.2.100 spin_reproduction

```
GtkSpinButton* Window::spin_reproduction
```

GtkSpinButton to set the reproduction ratio.

Definition at line 140 of file interface.h.

4.8.2.101 spin_simulations

```
GtkSpinButton* Window::spin_simulations
```

GtkSpinButton to set the simulations number.

Definition at line 122 of file interface.h.

4.8.2.102 spin_step

```
GtkSpinButton* Window::spin_step
```

GtkSpinButton to set the step.

Definition at line 196 of file interface.h.

4.8.2.103 spin_steps

```
GtkSpinButton* Window::spin_steps
```

GtkSpinButton to set the steps number.

Definition at line 157 of file interface.h.

4.8.2.104 spin_sweeps

```
GtkSpinButton* Window::spin_sweeps
```

Sweeps number GtkSpinButton.

Definition at line 192 of file interface.h.

4.8.2.105 spin_threshold

```
GtkSpinButton* Window::spin_threshold
```

GtkSpinButton to set the threshold.

Definition at line 166 of file interface.h.

4.8.2.106 spin_tolerance

```
GtkSpinButton* Window::spin_tolerance
```

GtkSpinButton to set the tolerance.

Definition at line 128 of file interface.h.

4.8.2.107 spin_weight

```
GtkSpinButton* Window::spin_weight
```

Weight GtkSpinButton.

Definition at line 207 of file interface.h.

4.8.2.108 variable

```
Variable* Window::variable
```

Array of variables data.

Definition at line 214 of file interface.h.

4.8.2.109 window

```
GtkWindow* Window::window
```

Main GtkWindow.

Definition at line 80 of file interface.h.

The documentation for this struct was generated from the following file:

- interface.h

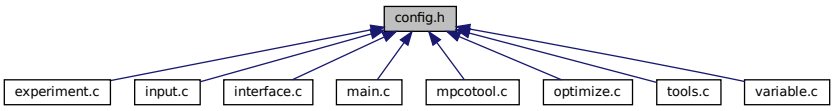
Chapter 5

File Documentation

5.1 config.h File Reference

Configuration header file.

This graph shows which files directly or indirectly include this file:



Macros

- #define MAX_NINPUTS 8

  Maximum number of input files in the simulator program.
- #define NALGORITHMS 4

  Number of stochastic algorithms.
- #define NCLIMBINGS 2

  Number of hill climbing estimate methods.
- #define NNORMS 4

  Number of error norms.
- #define NPRECISIONS 15

  Number of precisions.
- #define DEFAULT_PRECISION (NPRECISIONS - 1)

  Default precision digits.
- #define DEFAULT_RANDOM_SEED 7007

  Default pseudo-random numbers seed.
- #define DEFAULT_RELAXATION 1.

  Default relaxation parameter.
- #define LOCALE_DIR "locales"

  Locales directory.
- #define PROGRAM_INTERFACE "mpcotool"

Name of the interface program.

- #define LABEL_ABSOLUTE_MINIMUM "absolute_minimum"

  absolute minimum label.
- #define LABEL_ABSOLUTE_MAXIMUM "absolute_maximum"

  absolute maximum label.
- #define LABEL_ADAPTATION "adaptation"

  adaption label.
- #define LABEL_ALGORITHM "algorithm"

  algoritm label.
- #define LABEL_CLIMBING "climbing"

  climbing label.
- #define LABEL_COORDINATES "coordinates"

  coordinates label.
- #define LABEL_EUCLIDIAN "euclidian"

  euclidian label.
- #define LABEL_EVALUATOR "evaluator"

  evaluator label.
- #define LABEL_EXPERIMENT "experiment"

  experiment label.
- #define LABEL_EXPERIMENTS "experiments"

  experiment label.
- #define LABEL_GENETIC "genetic"

  genetic label.
- #define LABEL_MINIMUM "minimum"

  minimum label.
- #define LABEL_MAXIMUM "maximum"

  maximum label.
- #define LABEL_MONTE_CARLO "Monte-Carlo"

  Monte-Carlo label.
- #define LABEL_MUTATION "mutation"

  mutation label.
- #define LABEL_NAME "name"

  name label.
- #define LABEL_NBEST "nbest"

  nbest label.
- #define LABEL_NBITS "nbits"

  nbits label.
- #define LABEL_NESTIMATES "nestimates"

  nestimates label.
- #define LABEL_NGENERATIONS "ngenerations"

  ngenerations label.
- #define LABEL_NITERATIONS "niterations"

  niterations label.
- #define LABEL_NORM "norm"

  norm label.
- #define LABEL_NPOPULATION "npopulation"

  npopulation label.
- #define LABEL_NSIMULATIONS "nsimulations"

  nsimulations label.
- #define LABEL_NSTEPS "nsteps"

  nsteps label.

- #define LABEL_NSWEEPS "nsweeps"

  nsweeps label.
- #define LABEL_OPTIMIZE "optimize"

  optimize label.
- #define LABEL_ORTHOGONAL "orthogonal"

  orthogonal label.
- #define LABEL_P "p"

  p label.
- #define LABEL_PRECISION "precision"

  precision label.
- #define LABEL_RANDOM "random"

  random label.
- #define LABEL_RELAXATION "relaxation"

  relaxation label.
- #define LABEL_REPRODUCTION "reproduction"

  reproduction label.
- #define LABEL_RESULT_FILE "result_file"

  result_file label.
- #define LABEL_SIMULATOR "simulator"

  simulator label.
- #define LABEL_SEED "seed"

  seed label.
- #define LABEL_STEP "step"

  step label.
- #define LABEL_SWEEP "sweep"

  sweep label.
- #define LABEL_TAXICAB "taxicab"

  taxicab label.
- #define LABEL_TEMPLATE1 "template1"

  template1 label.
- #define LABEL_TEMPLATE2 "template2"

  template2 label.
- #define LABEL_TEMPLATE3 "template3"

  template3 label.
- #define LABEL_TEMPLATE4 "template4"

  template4 label.
- #define LABEL_TEMPLATE5 "template5"

  template5 label.
- #define LABEL_TEMPLATE6 "template6"

  template6 label.
- #define LABEL_TEMPLATE7 "template7"

  template7 label.
- #define LABEL_TEMPLATE8 "template8"

  template8 label.
- #define LABEL_THRESHOLD "threshold"

  threshold label.
- #define LABEL_TOLERANCE "tolerance"

  tolerance label.
- #define LABEL_VARIABLE "variable"

  variable label.
- #define LABEL_VARIABLES "variables"

variables label.

- #define LABEL_VARIABLES_FILE "variables_file"

  variables label.

- #define LABEL_WEIGHT "weight"

  weight label.

Enumerations

- enum INPUT_TYPE { INPUT_TYPE_XML = 0 , INPUT_TYPE_JSON = 1 }

  Enum to define the input file types.

5.1.1 Detailed Description

Configuration header file.

Authors

Javier Burguete and Borja Latorre.

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Definition in file config.h.

5.1.2 Macro Definition Documentation

5.1.2.1 DEFAULT_PRECISION

```
#define DEFAULT_PRECISION (NPRECISIONS - 1)
```

Default precision digits.

Definition at line 55 of file config.h.

5.1.2.2 DEFAULT_RANDOM_SEED

```
#define DEFAULT_RANDOM_SEED 7007
```

Default pseudo-random numbers seed.

Definition at line 56 of file config.h.

5.1.2.3 DEFAULT_RELAXATION

```
#define DEFAULT_RELAXATION 1.
```

Default relaxation parameter.

Definition at line 57 of file config.h.

5.1.2.4 LABEL_ABSOLUTE_MAXIMUM

```
#define LABEL_ABSOLUTE_MAXIMUM "absolute_maximum"
```

absolute maximum label.

Definition at line 69 of file config.h.

5.1.2.5 LABEL_ABSOLUTE_MINIMUM

```
#define LABEL_ABSOLUTE_MINIMUM "absolute_minimum"
```

absolute minimum label.

Definition at line 67 of file config.h.

5.1.2.6 LABEL_ADAPTATION

```
#define LABEL_ADAPTATION "adaptation"
```

adaption label.

Definition at line 70 of file config.h.

5.1.2.7 LABEL_ALGORITHM

```
#define LABEL_ALGORITHM "algorithm"
```

algoritm label.

Definition at line 71 of file config.h.

5.1.2.8 LABEL_CLIMBING

```
#define LABEL_CLIMBING "climbing"
```

climbing label.

Definition at line 72 of file config.h.

5.1.2.9 LABEL_COORDINATES

```
#define LABEL_COORDINATES "coordinates"
```

coordinates label.

Definition at line 73 of file config.h.

5.1.2.10 LABEL_EUCLIDIAN

```
#define LABEL_EUCLIDIAN "euclidian"
```

euclidian label.

Definition at line 74 of file config.h.

5.1.2.11 LABEL_EVALUATOR

```
#define LABEL_EVALUATOR "evaluator"
```

evaluator label.

Definition at line 75 of file config.h.

5.1.2.12 LABEL_EXPERIMENT

```
#define LABEL_EXPERIMENT "experiment"
```

experiment label.

Definition at line 76 of file config.h.

5.1.2.13 LABEL_EXPERIMENTS

```
#define LABEL_EXPERIMENTS "experiments"
```

experiment label.

Definition at line 77 of file config.h.

5.1.2.14 LABEL_GENETIC

```
#define LABEL_GENETIC "genetic"
```

genetic label.

Definition at line 78 of file config.h.

5.1.2.15 LABEL_MAXIMUM

```
#define LABEL_MAXIMUM "maximum"
```

maximum label.

Definition at line 80 of file config.h.

5.1.2.16 LABEL_MINIMUM

```
#define LABEL_MINIMUM "minimum"
```

minimum label.

Definition at line 79 of file config.h.

5.1.2.17 LABEL_MONTE_CARLO

```
#define LABEL_MONTE_CARLO "Monte-Carlo"
```

Monte-Carlo label.

Definition at line 81 of file config.h.

5.1.2.18 LABEL_MUTATION

```
#define LABEL_MUTATION "mutation"
```

mutation label.

Definition at line 82 of file config.h.

5.1.2.19 LABEL_NAME

```
#define LABEL_NAME "name"
```

name label.

Definition at line 83 of file config.h.

5.1.2.20 LABEL_NBEST

```
#define LABEL_NBEST "nbest"
```

nbest label.

Definition at line 84 of file config.h.

5.1.2.21 LABEL_NBITS

```
#define LABEL_NBITS "nbits"
```

nbits label.

Definition at line 85 of file config.h.

5.1.2.22 LABEL_NESTIMATES

```
#define LABEL_NESTIMATES "nestimates"
```

nestimates label.

Definition at line 86 of file config.h.

5.1.2.23 LABEL_NGENERATIONS

```
#define LABEL_NGENERATIONS "ngenerations"
```

ngenerations label.

Definition at line 87 of file config.h.

5.1.2.24 LABEL_NITERATIONS

```
#define LABEL_NITERATIONS "niterations"
```

niterations label.

Definition at line 88 of file config.h.

5.1.2.25 LABEL_NORM

```
#define LABEL_NORM "norm"
```

norm label.

Definition at line 89 of file config.h.

5.1.2.26 LABEL_NPOPULATION

```
#define LABEL_NPOPULATION "npopulation"
```

npopulation label.

Definition at line 90 of file config.h.

5.1.2.27 LABEL_NSIMULATIONS

```
#define LABEL_NSIMULATIONS "nsimulations"
```

nsimulations label.

Definition at line 91 of file config.h.

5.1.2.28 LABEL_NSTEPS

```
#define LABEL_NSTEPS "nsteps"
```

nsteps label.

Definition at line 92 of file config.h.

5.1.2.29 LABEL_NSWEEPS

```
#define LABEL_NSWEEPS "nsweeps"
```

nsweeps label.

Definition at line 93 of file config.h.

5.1.2.30 LABEL_OPTIMIZE

```
#define LABEL_OPTIMIZE "optimize"
```

optimize label.

Definition at line 94 of file config.h.

5.1.2.31 LABEL_ORTHOGONAL

```
#define LABEL_ORTHOGONAL "orthogonal"
```

orthogonal label.

Definition at line 95 of file config.h.

5.1.2.32 LABEL_P

```
#define LABEL_P "p"
```

p label.

Definition at line 96 of file config.h.

5.1.2.33 LABEL_PRECISION

```
#define LABEL_PRECISION "precision"
```

precision label.

Definition at line 97 of file config.h.

5.1.2.34 LABEL_RANDOM

```
#define LABEL_RANDOM "random"
```

random label.

Definition at line 98 of file config.h.

5.1.2.35 LABEL_RELAXATION

```
#define LABEL_RELAXATION "relaxation"
```

relaxation label.

Definition at line 99 of file config.h.

5.1.2.36 LABEL_REPRODUCTION

```
#define LABEL_REPRODUCTION "reproduction"
```

reproduction label.

Definition at line 100 of file config.h.

5.1.2.37 LABEL_RESULT_FILE

```
#define LABEL_RESULT_FILE "result_file"
```

result_file label.

Definition at line 101 of file config.h.

5.1.2.38 LABEL_SEED

```
#define LABEL_SEED "seed"
```

seed label.

Definition at line 103 of file config.h.

5.1.2.39 LABEL_SIMULATOR

```
#define LABEL_SIMULATOR "simulator"
```

simulator label.

Definition at line 102 of file config.h.

5.1.2.40 LABEL_STEP

```
#define LABEL_STEP "step"
```

step label.

Definition at line 104 of file config.h.

5.1.2.41 LABEL_SWEEP

```
#define LABEL_SWEEP "sweep"
```

sweep label.

Definition at line 105 of file config.h.

5.1.2.42 LABEL_TAXICAB

```
#define LABEL_TAXICAB "taxicab"
```

taxicab label.

Definition at line 106 of file config.h.

5.1.2.43 LABEL_TEMPLATE1

```
#define LABEL_TEMPLATE1 "template1"
```

template1 label.

Definition at line 107 of file config.h.

5.1.2.44 LABEL_TEMPLATE2

```
#define LABEL_TEMPLATE2 "template2"
```

template2 label.

Definition at line 108 of file config.h.

5.1.2.45 LABEL_TEMPLATE3

```
#define LABEL_TEMPLATE3 "template3"
```

template3 label.

Definition at line 109 of file config.h.

5.1.2.46 LABEL_TEMPLATE4

```
#define LABEL_TEMPLATE4 "template4"
```

template4 label.

Definition at line 110 of file config.h.

5.1.2.47 LABEL_TEMPLATE5

```
#define LABEL_TEMPLATE5 "template5"
```

template5 label.

Definition at line 111 of file config.h.

5.1.2.48 LABEL_TEMPLATE6

```
#define LABEL_TEMPLATE6 "template6"
```

template6 label.

Definition at line 112 of file config.h.

5.1.2.49 LABEL_TEMPLATE7

```
#define LABEL_TEMPLATE7 "template7"
```

template7 label.

Definition at line 113 of file config.h.

5.1.2.50 LABEL_TEMPLATE8

```
#define LABEL_TEMPLATE8 "template8"
```

template8 label.

Definition at line 114 of file config.h.

5.1.2.51 LABEL_THRESHOLD

```
#define LABEL_THRESHOLD "threshold"
```

threshold label.

Definition at line 115 of file config.h.

5.1.2.52 LABEL_TOLERANCE

```
#define LABEL_TOLERANCE "tolerance"
```

tolerance label.

Definition at line 116 of file config.h.

5.1.2.53 LABEL_VARIABLE

```
#define LABEL_VARIABLE "variable"
```

variable label.

Definition at line 117 of file config.h.

5.1.2.54 LABEL_VARIABLES

```
#define LABEL_VARIABLES "variables"
```

variables label.

Definition at line 118 of file config.h.

5.1.2.55 LABEL_VARIABLES_FILE

```
#define LABEL_VARIABLES_FILE "variables_file"
```

variables label.

Definition at line 119 of file config.h.

5.1.2.56 LABEL_WEIGHT

```
#define LABEL_WEIGHT "weight"
```

weight label.

Definition at line 120 of file config.h.

5.1.2.57 LOCALE_DIR

```
#define LOCALE_DIR "locales"
```

Locales directory.

Definition at line 61 of file config.h.

5.1.2.58 MAX_NINPUTS

```
#define MAX_NINPUTS 8
```

Maximum number of input files in the simulator program.

Definition at line 47 of file config.h.

5.1.2.59 NALGORITHMS

```
#define NALGORITHMS 4
```

Number of stochastic algorithms.

Definition at line 48 of file config.h.

5.1.2.60 NCLIMBINGS

```
#define NCLIMBINGS 2
```

Number of hill climbing estimate methods.

Definition at line 49 of file config.h.

5.1.2.61 NNORMS

```
#define NNORMS 4
```

Number of error norms.

Definition at line 50 of file config.h.

5.1.2.62 NPRECISIONS

```
#define NPRECISIONS 15
```

Number of precisions.

Definition at line 51 of file config.h.

5.1.2.63 PROGRAM_INTERFACE

```
#define PROGRAM_INTERFACE "mpcotool"
```

Name of the interface program.

Definition at line 62 of file config.h.

5.1.3 Enumeration Type Documentation

5.1.3.1 INPUT_TYPE

```
enum INPUT_TYPE
```

Enum to define the input file types.

Enumerator

INPUT_TYPE_XML	XML input file.
INPUT_TYPE_JSON	JSON input file.

Definition at line 125 of file config.h.

```
00126 {
00127   INPUT_TYPE_XML = 0,
00128   INPUT_TYPE_JSON = 1
00129 };
```

5.2 config.h

Go to the documentation of this file.

```
00001 /* config.h.    Generated from config.h.in by configure.    */
00002 /*
00003 MPCOTool:
00004 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00005 calibrations or optimizations of empirical parameters.
00006
00007 AUTHORS: Javier Burguete and Borja Latorre.
00008
00009 Copyright 2012-2018, AUTHORS.
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00025 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
```

```
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00028 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00029 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00030 OF SUCH DAMAGE.
00031 */
00032
00039 #ifndef CONFIG__H
00040 #define CONFIG__H 1
00041
00042 /* #undef HAVE_MPI */
00043
00044 // Array sizes
00045
00046 #define MAX_NINPUTS 8
00048 #define NALGORITHMS 4
00049 #define NCLIMBINGS 2
00050 #define NNORMS 4
00051 #define NPRECISIONS 15
00052
00053 // Default choices
00054
00055 #define DEFAULT_PRECISION (NPRECISIONS - 1)
00056 #define DEFAULT_RANDOM_SEED 7007
00057 #define DEFAULT_RELAXATION 1.
00058
00059 // Interface labels
00060
00061 #define LOCALE_DIR "locales"
00062 #define PROGRAM_INTERFACE "mpcotool"
00063
00064 // Labels
00065
00066 #define LABEL_ABSOLUTE_MINIMUM "absolute_minimum"
00068 #define LABEL_ABSOLUTE_MAXIMUM "absolute_maximum"
00070 #define LABEL_ADAPTATION "adaptation"
00071 #define LABEL_ALGORITHM "algorithm"
00072 #define LABEL_CLIMBING "climbing"
00073 #define LABEL_COORDINATES "coordinates"
00074 #define LABEL_EUCLIDIAN "euclidian"
00075 #define LABEL_EVALUATOR "evaluator"
00076 #define LABEL_EXPERIMENT "experiment"
00077 #define LABEL_EXPERIMENTS "experiments"
00078 #define LABEL_GENETIC "genetic"
00079 #define LABEL_MINIMUM "minimum"
00080 #define LABEL_MAXIMUM "maximum"
00081 #define LABEL_MONTE_CARLO "Monte-Carlo"
00082 #define LABEL_MUTATION "mutation"
00083 #define LABEL_NAME "name"
00084 #define LABEL_NBEST "nbest"
00085 #define LABEL_NBITS "nbits"
00086 #define LABEL_NESTIMATES "nestimates"
00087 #define LABEL_NGENERATIONS "ngenerations"
00088 #define LABEL_NITERATIONS "niterations"
00089 #define LABEL_NORM "norm"
00090 #define LABEL_NPOPULATION "npopulation"
00091 #define LABEL_NSIMULATIONS "nsimulations"
00092 #define LABEL_NSTEPS "nsteps"
00093 #define LABEL_NSWEEPS "nsweeps"
00094 #define LABEL_OPTIMIZE "optimize"
00095 #define LABEL_ORTHOGONAL "orthogonal"
00096 #define LABEL_P "p"
00097 #define LABEL_PRECISION "precision"
00098 #define LABEL_RANDOM "random"
00099 #define LABEL_RELAXATION "relaxation"
00100 #define LABEL_REPRODUCTION "reproduction"
00101 #define LABEL_RESULT_FILE "result_file"
00102 #define LABEL_SIMULATOR "simulator"
00103 #define LABEL_SEED "seed"
00104 #define LABEL_STEP "step"
00105 #define LABEL_SWEEP "sweep"
00106 #define LABEL_TAXICAB "taxicab"
00107 #define LABEL_TEMPLATE1 "template1"
00108 #define LABEL_TEMPLATE2 "template2"
00109 #define LABEL_TEMPLATE3 "template3"
00110 #define LABEL_TEMPLATE4 "template4"
00111 #define LABEL_TEMPLATE5 "template5"
00112 #define LABEL_TEMPLATE6 "template6"
00113 #define LABEL_TEMPLATE7 "template7"
00114 #define LABEL_TEMPLATE8 "template8"
00115 #define LABEL_THRESHOLD "threshold"
00116 #define LABEL_TOLERANCE "tolerance"
00117 #define LABEL_VARIABLE "variable"
00118 #define LABEL_VARIABLES "variables"
00119 #define LABEL_VARIABLES_FILE "variables_file"
00120 #define LABEL_WEIGHT "weight"
00121
```

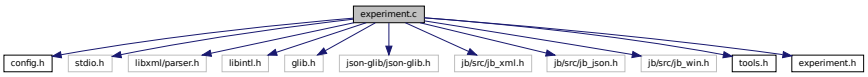
```
00122 // Enumerations
00123
00125 enum INPUT_TYPE
00126 {
00127   INPUT_TYPE_XML = 0,
00128   INPUT_TYPE_JSON = 1
00129 };
00130
00131 #endif
```

5.3 experiment.c File Reference

Source file to define the experiment data.

```
#include "config.h"
#include <stdio.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <json-glib/json-glib.h>
#include "jb/src/jb_xml.h"
#include "jb/src/jb_json.h"
#include "jb/src/jb_win.h"
#include "tools.h"
#include "experiment.h"
```

Include dependency graph for experiment.c:



Macros

- #define DEBUG_EXPERIMENT 0

  Macro to debug experiment functions.

Functions

- static void experiment_new (Experiment *experiment)
- void experiment_free (Experiment *experiment, unsigned int type)
- void experiment_error (Experiment *experiment, char *message)
- int experiment_open_xml (Experiment *experiment, xmlNode *node, unsigned int ninputs)
- int experiment_open_json (Experiment *experiment, JsonNode *node, unsigned int ninputs)

Variables

- const char * stencil [MAX_NINPUTS]

  Array of xmlChar strings with stencil labels.

5.3.1 Detailed Description

Source file to define the experiment data.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file experiment.c.

5.3.2 Macro Definition Documentation

5.3.2.1 DEBUG_EXPERIMENT

```
#define DEBUG_EXPERIMENT 0
```

Macro to debug experiment functions.

Definition at line 51 of file experiment.c.

5.3.3 Function Documentation

5.3.3.1 experiment_error()

```
void experiment_error (
            Experiment * experiment,
            char * message )
```

Function to print a message error opening an Experiment struct.

Parameters

experiment	Experiment struct.
message	Error message.

Definition at line 112 of file experiment.c.

```
00114 {
00115   if (!experiment->name)
```

```
00116     error_message = g_strconcat (_("Experiment"), ":  ", message, NULL);
00117   else
00118     error_message = g_strconcat (_("Experiment"), " ", experiment->name, ":  ",
00119                                  message, NULL);
00120 }
```

5.3.3.2 experiment_free()

```
void experiment_free (
             Experiment * experiment,
             unsigned int type )
```

Function to free the memory of an Experiment struct.

Parameters

experiment	Experiment struct.
type	Type of input file.

Definition at line 83 of file experiment.c.

```
00085 {
00086   unsigned int i;
00087 #if DEBUG_EXPERIMENT
00088   fprintf (stderr, "experiment_free:  start\n");
00089 #endif
00090   if (type == INPUT_TYPE_XML)
00091     {
00092       for (i = 0; i < experiment->ninputs; ++i)
00093         xmlFree (experiment->stencil[i]);
00094       xmlFree (experiment->name);
00095     }
00096   else
00097     {
00098       for (i = 0; i < experiment->ninputs; ++i)
00099         g_free (experiment->stencil[i]);
00100       g_free (experiment->name);
00101     }
00102   experiment->ninputs = 0;
00103 #if DEBUG_EXPERIMENT
00104   fprintf (stderr, "experiment_free:  end\n");
00105 #endif
00106 }
```

5.3.3.3 experiment_new()

```
static void experiment_new (
             Experiment * experiment )  [static]
```

Function to create a new Experiment struct.

Parameters

experiment	Experiment struct.

Definition at line 64 of file experiment.c.

```
00065 {
00066   unsigned int i;
```

```
00067 #if DEBUG_EXPERIMENT
00068   fprintf (stderr, "experiment_new:  start\n");
00069 #endif
00070   experiment->name = NULL;
00071   experiment->ninputs = 0;
00072   for (i = 0; i < MAX_NINPUTS; ++i)
00073     experiment->stencil[i] = NULL;
00074 #if DEBUG_EXPERIMENT
00075   fprintf (stderr, "input_new:  end\n");
00076 #endif
00077 }
```

5.3.3.4 experiment_open_json()

```
int experiment_open_json (
              Experiment * experiment,
              JsonNode * node,
              unsigned int ninputs )
```

Function to open the Experiment struct on a XML node.

Returns

1 on success, 0 on error.

Parameters

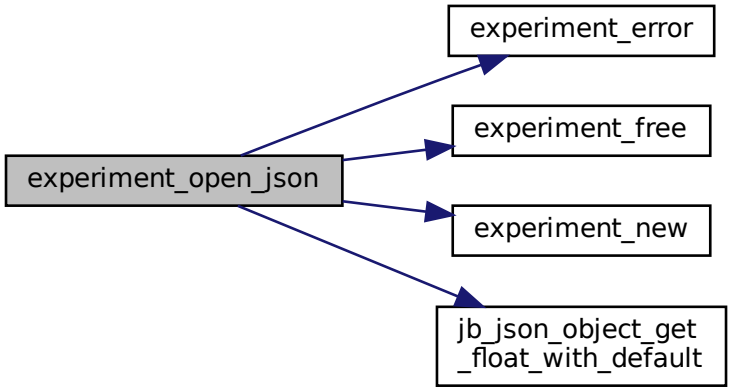
experiment	Experiment struct.
node	JSON node.
ninputs	Number of the simulator input files.

Definition at line 231 of file experiment.c.

```
00235 {
00236   char buffer[64];
00237   JsonObject *object;
00238   const char *name;
00239   int error_code;
00240   unsigned int i;
00241
00242 #if DEBUG_EXPERIMENT
00243   fprintf (stderr, "experiment_open_json:  start\n");
00244 #endif
00245
00246   // Resetting experiment data
00247   experiment_new (experiment);
00248
00249   // Getting JSON object
00250   object = json_node_get_object (node);
00251
00252   // Reading the experimental data
00253   name = json_object_get_string_member (object, LABEL_NAME);
00254   if (!name)
00255     {
00256       experiment_error (experiment, _("no data file name"));
00257       goto exit_on_error;
00258     }
00259   experiment->name = g_strdup (name);
00260 #if DEBUG_EXPERIMENT
00261   fprintf (stderr, "experiment_open_json:  name=%s\n", experiment->name);
00262 #endif
00263   experiment->weight
00264     = jb_json_object_get_float_with_default (object, LABEL_WEIGHT, &error_code,
00265                                              1.);
00266   if (!error_code)
00267     {
00268       experiment_error (experiment, _("bad weight"));
00269       goto exit_on_error;
```

```
00270     }
00271 #if DEBUG_EXPERIMENT
00272   fprintf (stderr, "experiment_open_json:  weight=%lg\n", experiment->weight);
00273 #endif
00274   name = json_object_get_string_member (object, stencil[0]);
00275   if (name)
00276     {
00277 #if DEBUG_EXPERIMENT
00278       fprintf (stderr, "experiment_open_json:  experiment=%s template1=%s\n",
00279                name, stencil[0]);
00280 #endif
00281       ++experiment->ninputs;
00282     }
00283   else
00284     {
00285       experiment_error (experiment, _("no template"));
00286       goto exit_on_error;
00287     }
00288   experiment->stencil[0] = g_strdup (name);
00289   for (i = 1; i < MAX_NINPUTS; ++i)
00290     {
00291 #if DEBUG_EXPERIMENT
00292       fprintf (stderr, "experiment_open_json:  stencil%u\n", i + 1);
00293 #endif
00294       if (json_object_get_member (object, stencil[i]))
00295         {
00296           if (ninputs && ninputs <= i)
00297             {
00298               experiment_error (experiment, _("bad templates number"));
00299               goto exit_on_error;
00300             }
00301           name = json_object_get_string_member (object, stencil[i]);
00302 #if DEBUG_EXPERIMENT
00303           fprintf (stderr,
00304                    "experiment_open_json:  experiment=%s stencil%u=%s\n",
00305                    experiment->nexperiments, name, stencil[i]);
00306 #endif
00307           experiment->stencil[i] = g_strdup (name);
00308           ++experiment->ninputs;
00309         }
00310       else if (ninputs && ninputs > i)
00311         {
00312           snprintf (buffer, 64, "%s%u", _("no template"), i + 1);
00313           experiment_error (experiment, buffer);
00314           goto exit_on_error;
00315         }
00316       else
00317         break;
00318     }
00319
00320 #if DEBUG_EXPERIMENT
00321   fprintf (stderr, "experiment_open_json:  end\n");
00322 #endif
00323   return 1;
00324
00325 exit_on_error:
00326   experiment_free (experiment, INPUT_TYPE_JSON);
00327 #if DEBUG_EXPERIMENT
00328   fprintf (stderr, "experiment_open_json:  end\n");
00329 #endif
00330   return 0;
00331 }
```

Here is the call graph for this function:



5.3.3.5 experiment_open_xml()

```
int experiment_open_xml (
              Experiment * experiment,
              xmlNode * node,
              unsigned int ninputs )
```

Function to open the Experiment struct on a XML node.

Returns

1 on success, 0 on error.

Parameters

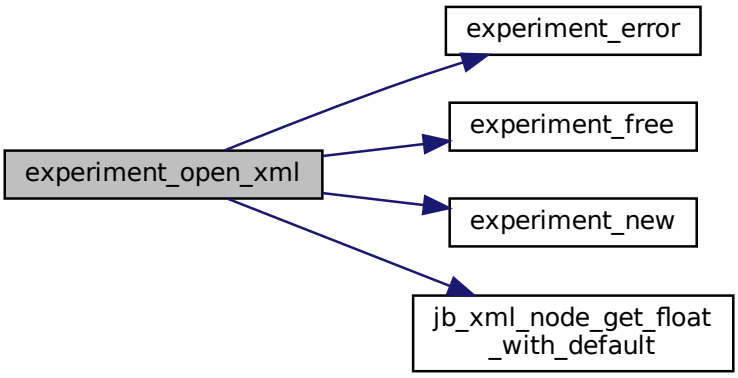
experiment	Experiment struct.
node	XML node.
ninputs	Number of the simulator input files.

Definition at line 128 of file experiment.c.

```
00132 {
00133   char buffer[64];
00134   int error_code;
00135   unsigned int i;
00136
00137 #if DEBUG_EXPERIMENT
00138   fprintf (stderr, "experiment_open_xml:  start\n");
00139 #endif
00140
00141   // Resetting experiment data
00142   experiment_new (experiment);
00143
```

```
00144   // Reading the experimental data
00145   experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00146   if (!experiment->name)
00147     {
00148       experiment_error (experiment, _("no data file name"));
00149       goto exit_on_error;
00150     }
00151 #if DEBUG_EXPERIMENT
00152   fprintf (stderr, "experiment_open_xml:  name=%s\n", experiment->name);
00153 #endif
00154   experiment->weight
00155     = jb_xml_node_get_float_with_default (node, (const xmlChar *) LABEL_WEIGHT,
00156                                           &error_code, 1.);
00157   if (!error_code)
00158     {
00159       experiment_error (experiment, _("bad weight"));
00160       goto exit_on_error;
00161     }
00162 #if DEBUG_EXPERIMENT
00163   fprintf (stderr, "experiment_open_xml:  weight=%lg\n", experiment->weight);
00164 #endif
00165   experiment->stencil[0]
00166     = (char *) xmlGetProp (node, (const xmlChar *) stencil[0]);
00167   if (experiment->stencil[0])
00168     {
00169 #if DEBUG_EXPERIMENT
00170       fprintf (stderr, "experiment_open_xml:  experiment=%s stencil1=%s\n",
00171                experiment->name, stencil[0]);
00172 #endif
00173       ++experiment->ninputs;
00174     }
00175   else
00176     {
00177       experiment_error (experiment, _("no template"));
00178       goto exit_on_error;
00179     }
00180   for (i = 1; i < MAX_NINPUTS; ++i)
00181     {
00182 #if DEBUG_EXPERIMENT
00183       fprintf (stderr, "experiment_open_xml:  stencil%u\n", i + 1);
00184 #endif
00185       if (xmlHasProp (node, (const xmlChar *) stencil[i]))
00186         {
00187           if (ninputs && ninputs <= i)
00188             {
00189               experiment_error (experiment, _("bad templates number"));
00190               goto exit_on_error;
00191             }
00192           experiment->stencil[i]
00193             = (char *) xmlGetProp (node, (const xmlChar *) stencil[i]);
00194 #if DEBUG_EXPERIMENT
00195           fprintf (stderr,
00196                    "experiment_open_xml:  experiment=%s stencil%u=%s\n",
00197                    experiment->nexperiments, experiment->name,
00198                    experiment->stencil[i]);
00199 #endif
00200           ++experiment->ninputs;
00201         }
00202       else if (ninputs && ninputs > i)
00203         {
00204           snprintf (buffer, 64, "%s%u", _("no template"), i + 1);
00205           experiment_error (experiment, buffer);
00206           goto exit_on_error;
00207         }
00208       else
00209         break;
00210     }
00211
00212 #if DEBUG_EXPERIMENT
00213   fprintf (stderr, "experiment_open_xml:  end\n");
00214 #endif
00215   return 1;
00216
00217 exit_on_error:
00218   experiment_free (experiment, INPUT_TYPE_XML);
00219 #if DEBUG_EXPERIMENT
00220   fprintf (stderr, "experiment_open_xml:  end\n");
00221 #endif
00222   return 0;
00223 }
```

Here is the call graph for this function:



5.3.4 Variable Documentation

5.3.4.1 stencil

```
const char* stencil[MAX_NINPUTS]
```

Initial value:

```
= {
  LABEL_TEMPLATE1, LABEL_TEMPLATE2, LABEL_TEMPLATE3, LABEL_TEMPLATE4,
  LABEL_TEMPLATE5, LABEL_TEMPLATE6, LABEL_TEMPLATE7, LABEL_TEMPLATE8
}
```

Array of xmlChar strings with stencil labels.

Definition at line 53 of file experiment.c.

5.4 experiment.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
00012
00013 1.  Redistributions of source code must retain the above copyright notice,
00014 this list of conditions and the following disclaimer.
00015
00016 2.  Redistributions in binary form must reproduce the above copyright notice,
```

```
00017 this list of conditions and the following disclaimer in the
00018 documentation and/or other materials provided with the distribution.
00019
00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <libxml/parser.h>
00042 #include <libintl.h>
00043 #include <glib.h>
00044 #include <json-glib/json-glib.h>
00045 #include "jb/src/jb_xml.h"
00046 #include "jb/src/jb_json.h"
00047 #include "jb/src/jb_win.h"
00048 #include "tools.h"
00049 #include "experiment.h"
00050
00051 #define DEBUG_EXPERIMENT 0
00052
00053 const char *stencil[MAX_NINPUTS] = {
00054   LABEL_TEMPLATE1, LABEL_TEMPLATE2, LABEL_TEMPLATE3, LABEL_TEMPLATE4,
00055   LABEL_TEMPLATE5, LABEL_TEMPLATE6, LABEL_TEMPLATE7, LABEL_TEMPLATE8
00056 };
00057
00059
00063 static void
00064 experiment_new (Experiment * experiment)
00065 {
00066   unsigned int i;
00067 #if DEBUG_EXPERIMENT
00068   fprintf (stderr, "experiment_new:  start\n");
00069 #endif
00070   experiment->name = NULL;
00071   experiment->ninputs = 0;
00072   for (i = 0; i < MAX_NINPUTS; ++i)
00073     experiment->stencil[i] = NULL;
00074 #if DEBUG_EXPERIMENT
00075   fprintf (stderr, "input_new:  end\n");
00076 #endif
00077 }
00078
00082 void
00083 experiment_free (Experiment * experiment,
00084                  unsigned int type)
00085 {
00086   unsigned int i;
00087 #if DEBUG_EXPERIMENT
00088   fprintf (stderr, "experiment_free:  start\n");
00089 #endif
00090   if (type == INPUT_TYPE_XML)
00091     {
00092       for (i = 0; i < experiment->ninputs; ++i)
00093         xmlFree (experiment->stencil[i]);
00094       xmlFree (experiment->name);
00095     }
00096   else
00097     {
00098       for (i = 0; i < experiment->ninputs; ++i)
00099         g_free (experiment->stencil[i]);
00100       g_free (experiment->name);
00101     }
00102   experiment->ninputs = 0;
00103 #if DEBUG_EXPERIMENT
00104   fprintf (stderr, "experiment_free:  end\n");
00105 #endif
00106 }
00107
00111 void
00112 experiment_error (Experiment * experiment,
00113                   char *message)
00114 {
00115   if (!experiment->name)
00116     error_message = g_strconcat (_("Experiment"), ":  ", message, NULL);
00117   else
00118     error_message = g_strconcat (_("Experiment"), " ", experiment->name, ":  ",
00119                                  message, NULL);
```

```
00120 }
00121
00127 int
00128 experiment_open_xml (Experiment * experiment,
00129                      xmlNode * node,
00130                      unsigned int ninputs)
00132 {
00133   char buffer[64];
00134   int error_code;
00135   unsigned int i;
00136
00137 #if DEBUG_EXPERIMENT
00138   fprintf (stderr, "experiment_open_xml:  start\n");
00139 #endif
00140
00141   // Resetting experiment data
00142   experiment_new (experiment);
00143
00144   // Reading the experimental data
00145   experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00146   if (!experiment->name)
00147     {
00148       experiment_error (experiment, _("no data file name"));
00149       goto exit_on_error;
00150     }
00151 #if DEBUG_EXPERIMENT
00152   fprintf (stderr, "experiment_open_xml:  name=%s\n", experiment->name);
00153 #endif
00154   experiment->weight
00155     = jb_xml_node_get_float_with_default (node, (const xmlChar *) LABEL_WEIGHT,
00156                                           &error_code, 1.);
00157   if (!error_code)
00158     {
00159       experiment_error (experiment, _("bad weight"));
00160       goto exit_on_error;
00161     }
00162 #if DEBUG_EXPERIMENT
00163   fprintf (stderr, "experiment_open_xml:  weight=%lg\n", experiment->weight);
00164 #endif
00165   experiment->stencil[0]
00166     = (char *) xmlGetProp (node, (const xmlChar *) stencil[0]);
00167   if (experiment->stencil[0])
00168     {
00169 #if DEBUG_EXPERIMENT
00170       fprintf (stderr, "experiment_open_xml:  experiment=%s stencil1=%s\n",
00171                experiment->name, stencil[0]);
00172 #endif
00173       ++experiment->ninputs;
00174     }
00175   else
00176     {
00177       experiment_error (experiment, _("no template"));
00178       goto exit_on_error;
00179     }
00180   for (i = 1; i < MAX_NINPUTS; ++i)
00181     {
00182 #if DEBUG_EXPERIMENT
00183       fprintf (stderr, "experiment_open_xml:  stencil%u\n", i + 1);
00184 #endif
00185       if (xmlHasProp (node, (const xmlChar *) stencil[i]))
00186         {
00187           if (ninputs && ninputs <= i)
00188             {
00189               experiment_error (experiment, _("bad templates number"));
00190               goto exit_on_error;
00191             }
00192           experiment->stencil[i]
00193             = (char *) xmlGetProp (node, (const xmlChar *) stencil[i]);
00194 #if DEBUG_EXPERIMENT
00195           fprintf (stderr,
00196                    "experiment_open_xml:  experiment=%s stencil%u=%s\n",
00197                    experiment->nexperiments, experiment->name,
00198                    experiment->stencil[i]);
00199 #endif
00200           ++experiment->ninputs;
00201         }
00202       else if (ninputs && ninputs > i)
00203         {
00204           snprintf (buffer, 64, "%s%u", _("no template"), i + 1);
00205           experiment_error (experiment, buffer);
00206           goto exit_on_error;
00207         }
00208       else
00209         break;
00210     }
00211
00212 #if DEBUG_EXPERIMENT
```

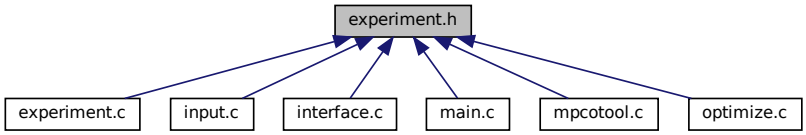
```
00213   fprintf (stderr, "experiment_open_xml:  end\n");
00214 #endif
00215   return 1;
00216
00217 exit_on_error:
00218   experiment_free (experiment, INPUT_TYPE_XML);
00219 #if DEBUG_EXPERIMENT
00220   fprintf (stderr, "experiment_open_xml:  end\n");
00221 #endif
00222   return 0;
00223 }
00224
00230 int
00231 experiment_open_json (Experiment * experiment,
00232                       JsonNode * node,
00233                       unsigned int ninputs)
00235 {
00236   char buffer[64];
00237   JsonObject *object;
00238   const char *name;
00239   int error_code;
00240   unsigned int i;
00241
00242 #if DEBUG_EXPERIMENT
00243   fprintf (stderr, "experiment_open_json:  start\n");
00244 #endif
00245
00246   // Resetting experiment data
00247   experiment_new (experiment);
00248
00249   // Getting JSON object
00250   object = json_node_get_object (node);
00251
00252   // Reading the experimental data
00253   name = json_object_get_string_member (object, LABEL_NAME);
00254   if (!name)
00255     {
00256       experiment_error (experiment, _("no data file name"));
00257       goto exit_on_error;
00258     }
00259   experiment->name = g_strdup (name);
00260 #if DEBUG_EXPERIMENT
00261   fprintf (stderr, "experiment_open_json:  name=%s\n", experiment->name);
00262 #endif
00263   experiment->weight
00264     = jb_json_object_get_float_with_default (object, LABEL_WEIGHT, &error_code,
00265                                              1.);
00266   if (!error_code)
00267     {
00268       experiment_error (experiment, _("bad weight"));
00269       goto exit_on_error;
00270     }
00271 #if DEBUG_EXPERIMENT
00272   fprintf (stderr, "experiment_open_json:  weight=%lg\n", experiment->weight);
00273 #endif
00274   name = json_object_get_string_member (object, stencil[0]);
00275   if (name)
00276     {
00277 #if DEBUG_EXPERIMENT
00278       fprintf (stderr, "experiment_open_json:  experiment=%s template1=%s\n",
00279                name, stencil[0]);
00280 #endif
00281       ++experiment->ninputs;
00282     }
00283   else
00284     {
00285       experiment_error (experiment, _("no template"));
00286       goto exit_on_error;
00287     }
00288   experiment->stencil[0] = g_strdup (name);
00289   for (i = 1; i < MAX_NINPUTS; ++i)
00290     {
00291 #if DEBUG_EXPERIMENT
00292       fprintf (stderr, "experiment_open_json:  stencil%u\n", i + 1);
00293 #endif
00294       if (json_object_get_member (object, stencil[i]))
00295         {
00296           if (ninputs && ninputs <= i)
00297             {
00298               experiment_error (experiment, _("bad templates number"));
00299               goto exit_on_error;
00300             }
00301           name = json_object_get_string_member (object, stencil[i]);
00302 #if DEBUG_EXPERIMENT
00303           fprintf (stderr,
00304                    "experiment_open_json:  experiment=%s stencil%u=%s\n",
00305                    experiment->nexperiments, name, stencil[i]);
```

```
00306 #endif
00307           experiment->stencil[i] = g_strdup (name);
00308           ++experiment->ninputs;
00309         }
00310       else if (ninputs && ninputs > i)
00311         {
00312           snprintf (buffer, 64, "%s%u", _("no template"), i + 1);
00313           experiment_error (experiment, buffer);
00314           goto exit_on_error;
00315         }
00316       else
00317         break;
00318     }
00319
00320 #if DEBUG_EXPERIMENT
00321   fprintf (stderr, "experiment_open_json:  end\n");
00322 #endif
00323   return 1;
00324
00325 exit_on_error:
00326   experiment_free (experiment, INPUT_TYPE_JSON);
00327 #if DEBUG_EXPERIMENT
00328   fprintf (stderr, "experiment_open_json:  end\n");
00329 #endif
00330   return 0;
00331 }
```

5.5 experiment.h File Reference

Header file to define the experiment data.

This graph shows which files directly or indirectly include this file:



Data Structures

- struct Experiment

  Struct to define the experiment data.

Functions

- void experiment_free (Experiment *experiment, unsigned int type)
- void experiment_error (Experiment *experiment, char *message)
- int experiment_open_xml (Experiment *experiment, xmlNode *node, unsigned int ninputs)
- int experiment_open_json (Experiment *experiment, JsonNode *node, unsigned int ninputs)

Variables

- const char * stencil [MAX_NINPUTS]

  Array of xmlChar strings with stencil labels.

5.5.1 Detailed Description

Header file to define the experiment data.

Authors

Javier Burguete.

Copyright

Definition in file experiment.h.

5.5.2 Function Documentation

5.5.2.1 experiment_error()

```
void experiment_error (
            Experiment * experiment,
            char * message )
```

Function to print a message error opening an Experiment struct.

Parameters

experiment	Experiment struct.
message	Error message.

Definition at line 112 of file experiment.c.

```
00114 {
00115   if (!experiment->name)
00116     error_message = g_strconcat (_("Experiment"), ":  ", message, NULL);
00117   else
00118     error_message = g_strconcat (_("Experiment"), " ", experiment->name, ":  ",
00119                                  message, NULL);
00120 }
```

5.5.2.2 experiment_free()

```
void experiment_free (
            Experiment * experiment,
            unsigned int type )
```

Function to free the memory of an Experiment struct.

Parameters

experiment	Experiment struct.
type	Type of input file.

Definition at line 83 of file experiment.c.

```
00085 {
00086   unsigned int i;
00087 #if DEBUG_EXPERIMENT
00088   fprintf (stderr, "experiment_free:  start\n");
00089 #endif
00090   if (type == INPUT_TYPE_XML)
00091     {
00092       for (i = 0; i < experiment->ninputs; ++i)
00093         xmlFree (experiment->stencil[i]);
00094       xmlFree (experiment->name);
00095     }
00096   else
00097     {
00098       for (i = 0; i < experiment->ninputs; ++i)
00099         g_free (experiment->stencil[i]);
00100       g_free (experiment->name);
00101     }
00102   experiment->ninputs = 0;
00103 #if DEBUG_EXPERIMENT
00104   fprintf (stderr, "experiment_free:  end\n");
00105 #endif
00106 }
```

5.5.2.3 experiment_open_json()

```
int experiment_open_json (
              Experiment * experiment,
              JsonNode * node,
              unsigned int ninputs )
```

Function to open the Experiment struct on a XML node.

Returns

1 on success, 0 on error.

Parameters

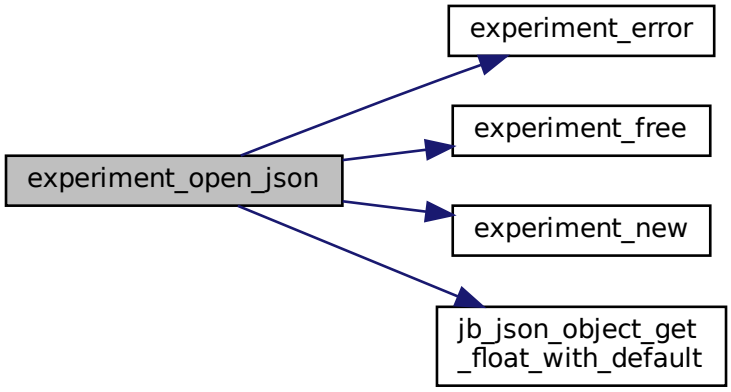
experiment	Experiment struct.
node	JSON node.
ninputs	Number of the simulator input files.

Definition at line 231 of file experiment.c.

```
00235 {
00236   char buffer[64];
00237   JsonObject *object;
00238   const char *name;
00239   int error_code;
00240   unsigned int i;
00241
00242 #if DEBUG_EXPERIMENT
00243   fprintf (stderr, "experiment_open_json:  start\n");
00244 #endif
00245
00246   // Resetting experiment data
00247   experiment_new (experiment);
```

```
00248
00249   // Getting JSON object
00250   object = json_node_get_object (node);
00251
00252   // Reading the experimental data
00253   name = json_object_get_string_member (object, LABEL_NAME);
00254   if (!name)
00255     {
00256       experiment_error (experiment, _("no data file name"));
00257       goto exit_on_error;
00258     }
00259   experiment->name = g_strdup (name);
00260 #if DEBUG_EXPERIMENT
00261   fprintf (stderr, "experiment_open_json:  name=%s\n", experiment->name);
00262 #endif
00263   experiment->weight
00264     = jb_json_object_get_float_with_default (object, LABEL_WEIGHT, &error_code,
00265                                              1.);
00266   if (!error_code)
00267     {
00268       experiment_error (experiment, _("bad weight"));
00269       goto exit_on_error;
00270     }
00271 #if DEBUG_EXPERIMENT
00272   fprintf (stderr, "experiment_open_json:  weight=%lg\n", experiment->weight);
00273 #endif
00274   name = json_object_get_string_member (object, stencil[0]);
00275   if (name)
00276     {
00277 #if DEBUG_EXPERIMENT
00278       fprintf (stderr, "experiment_open_json:  experiment=%s template1=%s\n",
00279                name, stencil[0]);
00280 #endif
00281       ++experiment->ninputs;
00282     }
00283   else
00284     {
00285       experiment_error (experiment, _("no template"));
00286       goto exit_on_error;
00287     }
00288   experiment->stencil[0] = g_strdup (name);
00289   for (i = 1; i < MAX_NINPUTS; ++i)
00290     {
00291 #if DEBUG_EXPERIMENT
00292       fprintf (stderr, "experiment_open_json:  stencil%u\n", i + 1);
00293 #endif
00294       if (json_object_get_member (object, stencil[i]))
00295         {
00296           if (ninputs && ninputs <= i)
00297             {
00298               experiment_error (experiment, _("bad templates number"));
00299               goto exit_on_error;
00300             }
00301           name = json_object_get_string_member (object, stencil[i]);
00302 #if DEBUG_EXPERIMENT
00303           fprintf (stderr,
00304                    "experiment_open_json:  experiment=%s stencil%u=%s\n",
00305                    experiment->nexperiments, name, stencil[i]);
00306 #endif
00307           experiment->stencil[i] = g_strdup (name);
00308           ++experiment->ninputs;
00309         }
00310       else if (ninputs && ninputs > i)
00311         {
00312           snprintf (buffer, 64, "%s%u", _("no template"), i + 1);
00313           experiment_error (experiment, buffer);
00314           goto exit_on_error;
00315         }
00316       else
00317         break;
00318     }
00319
00320 #if DEBUG_EXPERIMENT
00321   fprintf (stderr, "experiment_open_json:  end\n");
00322 #endif
00323   return 1;
00324
00325 exit_on_error:
00326   experiment_free (experiment, INPUT_TYPE_JSON);
00327 #if DEBUG_EXPERIMENT
00328   fprintf (stderr, "experiment_open_json:  end\n");
00329 #endif
00330   return 0;
00331 }
```

Here is the call graph for this function:



5.5.2.4 experiment_open_xml()

```
int experiment_open_xml (
              Experiment * experiment,
              xmlNode * node,
              unsigned int ninputs )
```

Function to open the Experiment struct on a XML node.

Returns

1 on success, 0 on error.

Parameters

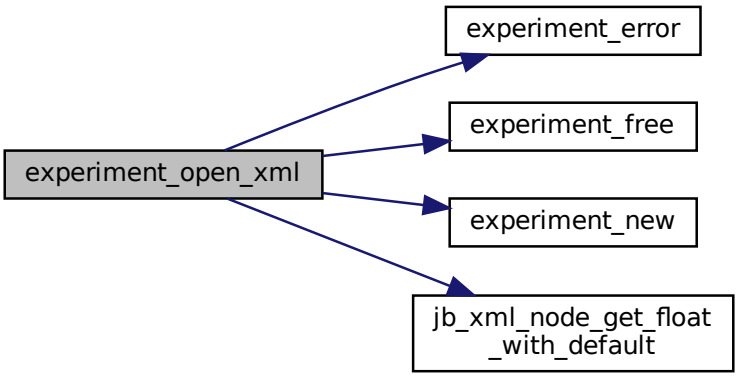
experiment	Experiment struct.
node	XML node.
ninputs	Number of the simulator input files.

Definition at line 128 of file experiment.c.

```
00132 {
00133   char buffer[64];
00134   int error_code;
00135   unsigned int i;
00136
00137 #if DEBUG_EXPERIMENT
00138   fprintf (stderr, "experiment_open_xml:  start\n");
00139 #endif
00140
00141   // Resetting experiment data
00142   experiment_new (experiment);
00143
```

```
00144   // Reading the experimental data
00145   experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00146   if (!experiment->name)
00147     {
00148       experiment_error (experiment, _("no data file name"));
00149       goto exit_on_error;
00150     }
00151 #if DEBUG_EXPERIMENT
00152   fprintf (stderr, "experiment_open_xml:  name=%s\n", experiment->name);
00153 #endif
00154   experiment->weight
00155     = jb_xml_node_get_float_with_default (node, (const xmlChar *) LABEL_WEIGHT,
00156                                           &error_code, 1.);
00157   if (!error_code)
00158     {
00159       experiment_error (experiment, _("bad weight"));
00160       goto exit_on_error;
00161     }
00162 #if DEBUG_EXPERIMENT
00163   fprintf (stderr, "experiment_open_xml:  weight=%lg\n", experiment->weight);
00164 #endif
00165   experiment->stencil[0]
00166     = (char *) xmlGetProp (node, (const xmlChar *) stencil[0]);
00167   if (experiment->stencil[0])
00168     {
00169 #if DEBUG_EXPERIMENT
00170       fprintf (stderr, "experiment_open_xml:  experiment=%s stencil1=%s\n",
00171                experiment->name, stencil[0]);
00172 #endif
00173       ++experiment->ninputs;
00174     }
00175   else
00176     {
00177       experiment_error (experiment, _("no template"));
00178       goto exit_on_error;
00179     }
00180   for (i = 1; i < MAX_NINPUTS; ++i)
00181     {
00182 #if DEBUG_EXPERIMENT
00183       fprintf (stderr, "experiment_open_xml:  stencil%u\n", i + 1);
00184 #endif
00185       if (xmlHasProp (node, (const xmlChar *) stencil[i]))
00186         {
00187           if (ninputs && ninputs <= i)
00188             {
00189               experiment_error (experiment, _("bad templates number"));
00190               goto exit_on_error;
00191             }
00192           experiment->stencil[i]
00193             = (char *) xmlGetProp (node, (const xmlChar *) stencil[i]);
00194 #if DEBUG_EXPERIMENT
00195           fprintf (stderr,
00196                    "experiment_open_xml:  experiment=%s stencil%u=%s\n",
00197                    experiment->nexperiments, experiment->name,
00198                    experiment->stencil[i]);
00199 #endif
00200           ++experiment->ninputs;
00201         }
00202       else if (ninputs && ninputs > i)
00203         {
00204           snprintf (buffer, 64, "%s%u", _("no template"), i + 1);
00205           experiment_error (experiment, buffer);
00206           goto exit_on_error;
00207         }
00208       else
00209         break;
00210     }
00211
00212 #if DEBUG_EXPERIMENT
00213   fprintf (stderr, "experiment_open_xml:  end\n");
00214 #endif
00215   return 1;
00216
00217 exit_on_error:
00218   experiment_free (experiment, INPUT_TYPE_XML);
00219 #if DEBUG_EXPERIMENT
00220   fprintf (stderr, "experiment_open_xml:  end\n");
00221 #endif
00222   return 0;
00223 }
```

Here is the call graph for this function:



5.5.3 Variable Documentation

5.5.3.1 stencil

```
const char* stencil[MAX_NINPUTS]  [extern]
```

Array of xmlChar strings with stencil labels.

Definition at line 53 of file experiment.c.

5.6 experiment.h

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
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00013 1.  Redistributions of source code must retain the above copyright notice,
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00015
00016 2.  Redistributions in binary form must reproduce the above copyright notice,
00017 this list of conditions and the following disclaimer in the
00018 documentation and/or other materials provided with the distribution.
00019
00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
```

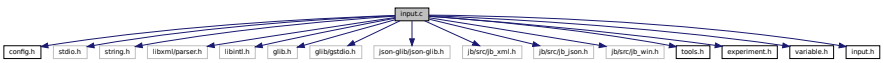
```
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #ifndef EXPERIMENT__H
00039 #define EXPERIMENT__H 1
00040
00045 typedef struct
00046 {
00047   char *name;
00048   char *stencil[MAX_NINPUTS];
00049   double weight;
00050   unsigned int ninputs;
00051 } Experiment;
00052
00053 extern const char *stencil[MAX_NINPUTS];
00054
00055 // Public functions
00056 void experiment_free (Experiment * experiment, unsigned int type);
00057 void experiment_error (Experiment * experiment, char *message);
00058 int experiment_open_xml (Experiment * experiment, xmlNode * node,
00059                          unsigned int ninputs);
00060 int experiment_open_json (Experiment * experiment, JsonNode * node,
00061                           unsigned int ninputs);
00062
00063 #endif
```

5.7 input.c File Reference

Source file to define the input functions.

```
#include "config.h"
#include <stdio.h>
#include <string.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <glib/gstdio.h>
#include <json-glib/json-glib.h>
#include "jb/src/jb_xml.h"
#include "jb/src/jb_json.h"
#include "jb/src/jb_win.h"
#include "tools.h"
#include "experiment.h"
#include "variable.h"
#include "input.h"
```

Include dependency graph for input.c:



Macros

- #define DEBUG_INPUT 0

  Macro to debug input functions.

Functions

- void input_new ()
- void input_free ()
- static void input_error (char *message)
- static int input_open_xml (xmlDoc *doc)
- static int input_open_json (JsonParser *parser)
- int input_open (char *filename)

Variables

- Input input [1]

  Global Input struct to set the input data.
- const char * result_name = "result"

  Name of the result file.
- const char * variables_name = "variables"

  Name of the variables file.

5.7.1 Detailed Description

Source file to define the input functions.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file input.c.

5.7.2 Macro Definition Documentation

5.7.2.1 DEBUG_INPUT

```
#define DEBUG_INPUT 0
```

Macro to debug input functions.

Definition at line 55 of file input.c.

5.7.3 Function Documentation

5.7.3.1 input_error()

```
static void input_error (
            char * message )  [static]
```

Function to print an error message opening an Input struct.

Parameters

message	Error message.

Definition at line 122 of file input.c.

```
00123 {
00124   error_message = g_strconcat (_("Input"), ":  ", message, "\n", NULL);
00125 }
```

5.7.3.2 input_free()

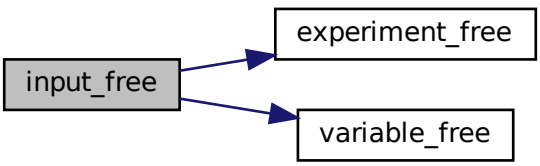
```
void input_free ( )
```

Function to free the memory of the input file data.

Definition at line 84 of file input.c.

```
00085 {
00086   unsigned int i;
00087 #if DEBUG_INPUT
00088   fprintf (stderr, "input_free:  start\n");
00089 #endif
00090   g_free (input->name);
00091   g_free (input->directory);
00092   for (i = 0; i < input->nexperiments; ++i)
00093     experiment_free (input->experiment + i, input->type);
00094   for (i = 0; i < input->nvariables; ++i)
00095     variable_free (input->variable + i, input->type);
00096   g_free (input->experiment);
00097   g_free (input->variable);
00098   if (input->type == INPUT_TYPE_XML)
00099     {
00100       xmlFree (input->evaluator);
00101       xmlFree (input->simulator);
00102       xmlFree (input->result);
00103       xmlFree (input->variables);
00104     }
00105   else
00106     {
00107       g_free (input->evaluator);
00108       g_free (input->simulator);
00109       g_free (input->result);
00110       g_free (input->variables);
00111     }
00112   input->nexperiments = input->nvariables = input->nsteps = 0;
00113 #if DEBUG_INPUT
00114   fprintf (stderr, "input_free:  end\n");
00115 #endif
00116 }
```

Here is the call graph for this function:



5.7.3.3 input_new()

```
void input_new ( )
```

Function to create a new Input struct.

Definition at line 66 of file input.c.

```
00067 {
00068 #if DEBUG_INPUT
00069   fprintf (stderr, "input_new:  start\n");
00070 #endif
00071   input->nvariables = input->nexperiments = input->nsteps = 0;
00072   input->simulator = input->evaluator = input->directory = input->name = NULL;
00073   input->experiment = NULL;
00074   input->variable = NULL;
00075 #if DEBUG_INPUT
00076   fprintf (stderr, "input_new:  end\n");
00077 #endif
00078 }
```

5.7.3.4 input_open()

```
int input_open (
              char * filename )
```

Function to open the input file.

Returns

1_on_success, 0_on_error.

Parameters

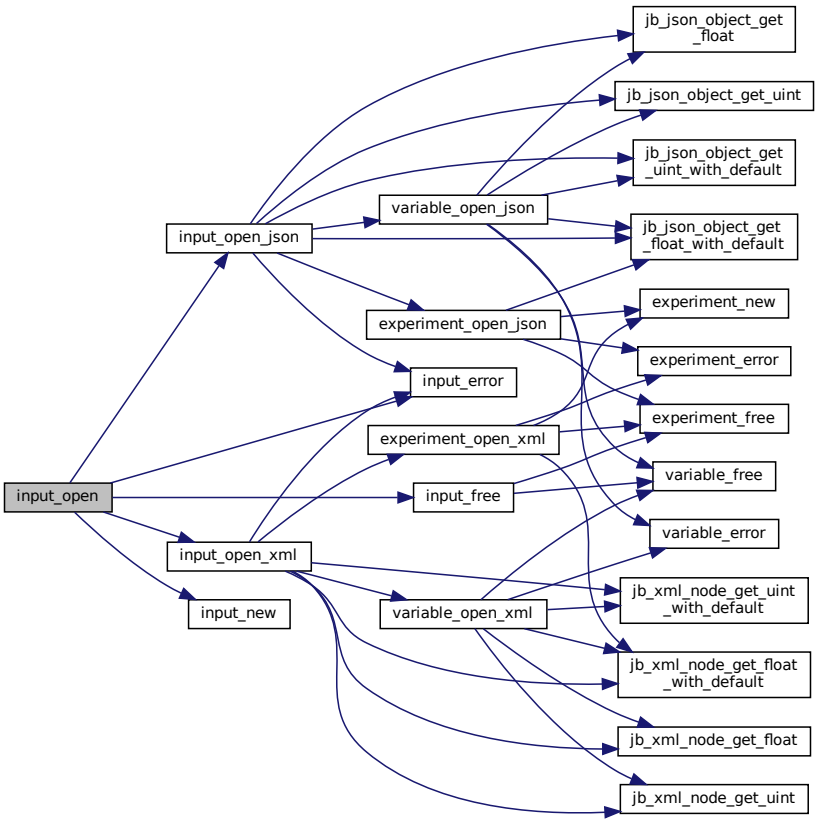
filename	Input data file name.

Definition at line 961 of file input.c.

```
00962 {
00963   xmlDoc *doc;
00964   JsonParser *parser;
00965
00966 #if DEBUG_INPUT
00967   fprintf (stderr, "input_open:  start\n");
00968 #endif
00969
00970   // Resetting input data
00971   input_new ();
00972
00973   // Opening input file
00974 #if DEBUG_INPUT
00975   fprintf (stderr, "input_open:  opening the input file %s\n", filename);
00976   fprintf (stderr, "input_open:  trying XML format\n");
00977 #endif
00978   doc = xmlParseFile (filename);
00979   if (!doc)
00980     {
00981 #if DEBUG_INPUT
00982       fprintf (stderr, "input_open:  trying JSON format\n");
00983 #endif
00984       parser = json_parser_new ();
00985       if (!json_parser_load_from_file (parser, filename, NULL))
00986         {
00987           input_error (_("Unable to parse the input file"));
00988           goto exit_on_error;
00989         }
00990       if (!input_open_json (parser))
```

```
00991         goto exit_on_error;
00992       }
00993     else if (!input_open_xml (doc))
00994       goto exit_on_error;
00995
00996     // Getting the working directory
00997     input->directory = g_path_get_dirname (filename);
00998     input->name = g_path_get_basename (filename);
00999
01000 #if DEBUG_INPUT
01001     fprintf (stderr, "input_open:  end\n");
01002 #endif
01003     return 1;
01004
01005 exit_on_error:
01006     jbw_show_error (error_message);
01007     g_free (error_message);
01008     input_free ();
01009 #if DEBUG_INPUT
01010     fprintf (stderr, "input_open:  end\n");
01011 #endif
01012     return 0;
01013 }
```

Here is the call graph for this function:



5.7.3.5 input_open_json()

```
static int input_open_json (
            JsonParser * parser )  [inline], [static]
```

Function to open the input file in JSON format.

Returns

1_on_success, 0_on_error.

Parameters

parser	JsonParser struct.

Definition at line 570 of file input.c.

```
00571 {
00572   JsonNode *node, *child;
00573   JsonObject *object;
00574   JsonArray *array;
00575   const char *buffer;
00576   int error_code;
00577   unsigned int i, n;
00578
00579 #if DEBUG_INPUT
00580   fprintf (stderr, "input_open_json:  start\n");
00581 #endif
00582
00583   // Resetting input data
00584   input->type = INPUT_TYPE_JSON;
00585
00586   // Getting the root node
00587 #if DEBUG_INPUT
00588   fprintf (stderr, "input_open_json:  getting the root node\n");
00589 #endif
00590   node = json_parser_get_root (parser);
00591   object = json_node_get_object (node);
00592
00593   // Getting result and variables file names
00594   if (!input->result)
00595     {
00596       buffer = json_object_get_string_member (object, LABEL_RESULT_FILE);
00597       if (!buffer)
00598         buffer = result_name;
00599       input->result = g_strdup (buffer);
00600     }
00601   else
00602     input->result = g_strdup (result_name);
00603   if (!input->variables)
00604     {
00605       buffer = json_object_get_string_member (object, LABEL_VARIABLES_FILE);
00606       if (!buffer)
00607         buffer = variables_name;
00608       input->variables = g_strdup (buffer);
00609     }
00610   else
00611     input->variables = g_strdup (variables_name);
00612
00613   // Opening simulator program name
00614   buffer = json_object_get_string_member (object, LABEL_SIMULATOR);
00615   if (!buffer)
00616     {
00617       input_error (_("Bad simulator program"));
00618       goto exit_on_error;
00619     }
00620   input->simulator = g_strdup (buffer);
00621
00622   // Opening evaluator program name
00623   buffer = json_object_get_string_member (object, LABEL_EVALUATOR);
00624   if (buffer)
00625     input->evaluator = g_strdup (buffer);
00626
00627   // Obtaining pseudo-random numbers generator seed
00628   input->seed
00629     = jb_json_object_get_uint_with_default (object, LABEL_SEED,
00630                                             &error_code, DEFAULT_RANDOM_SEED);
00631   if (!error_code)
00632     {
00633       input_error (_("Bad pseudo-random numbers generator seed"));
00634       goto exit_on_error;
00635     }
00636
00637   // Opening algorithm
00638   buffer = json_object_get_string_member (object, LABEL_ALGORITHM);
00639   if (!strcmp (buffer, LABEL_MONTE_CARLO))
00640     {
00641       input->algorithm = ALGORITHM_MONTE_CARLO;
00642
```

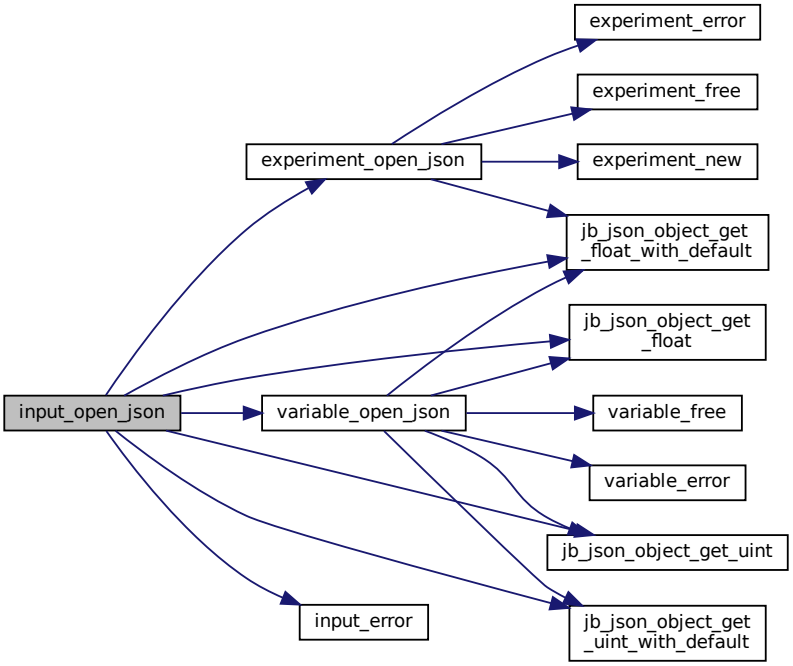
```
00643       // Obtaining simulations number
00644       input->nsimulations
00645         = jb_json_object_get_uint (object, LABEL_NSIMULATIONS, &error_code);
00646       if (!error_code)
00647         {
00648           input_error (_("Bad simulations number"));
00649           goto exit_on_error;
00650         }
00651     }
00652   else if (!strcmp (buffer, LABEL_SWEEP))
00653     input->algorithm = ALGORITHM_SWEEP;
00654   else if (!strcmp (buffer, LABEL_ORTHOGONAL))
00655     input->algorithm = ALGORITHM_ORTHOGONAL;
00656   else if (!strcmp (buffer, LABEL_GENETIC))
00657     {
00658       input->algorithm = ALGORITHM_GENETIC;
00659
00660       // Obtaining population
00661       if (json_object_get_member (object, LABEL_NPOPULATION))
00662         {
00663           input->nsimulations
00664             = jb_json_object_get_uint (object, LABEL_NPOPULATION, &error_code);
00665           if (!error_code || input->nsimulations < 3)
00666             {
00667               input_error (_("Invalid population number"));
00668               goto exit_on_error;
00669             }
00670         }
00671       else
00672         {
00673           input_error (_("No population number"));
00674           goto exit_on_error;
00675         }
00676
00677       // Obtaining generations
00678       if (json_object_get_member (object, LABEL_NGENERATIONS))
00679         {
00680           input->niterations
00681             = jb_json_object_get_uint_with_default (object, LABEL_NGENERATIONS,
00682                                                     &error_code, 1);
00683           if (!error_code || !input->niterations)
00684             {
00685               input_error (_("Invalid generations number"));
00686               goto exit_on_error;
00687             }
00688         }
00689       else
00690         {
00691           input_error (_("No generations number"));
00692           goto exit_on_error;
00693         }
00694
00695       // Obtaining mutation probability
00696       if (json_object_get_member (object, LABEL_MUTATION))
00697         {
00698           input->mutation_ratio
00699             = jb_json_object_get_float (object, LABEL_MUTATION, &error_code);
00700           if (!error_code || input->mutation_ratio < 0.
00701               || input->mutation_ratio >= 1.)
00702             {
00703               input_error (_("Invalid mutation probability"));
00704               goto exit_on_error;
00705             }
00706         }
00707       else
00708         {
00709           input_error (_("No mutation probability"));
00710           goto exit_on_error;
00711         }
00712
00713       // Obtaining reproduction probability
00714       if (json_object_get_member (object, LABEL_REPRODUCTION))
00715         {
00716           input->reproduction_ratio
00717             = jb_json_object_get_float (object, LABEL_REPRODUCTION,
00718                                         &error_code);
00719           if (!error_code || input->reproduction_ratio < 0.
00720               || input->reproduction_ratio >= 1.0)
00721             {
00722               input_error (_("Invalid reproduction probability"));
00723               goto exit_on_error;
00724             }
00725         }
00726       else
00727         {
00728           input_error (_("No reproduction probability"));
00729           goto exit_on_error;
```

```
00730         }
00731
00732       // Obtaining adaptation probability
00733       if (json_object_get_member (object, LABEL_ADAPTATION))
00734         {
00735           input->adaptation_ratio
00736             = jb_json_object_get_float (object, LABEL_ADAPTATION, &error_code);
00737           if (!error_code || input->adaptation_ratio < 0.
00738               || input->adaptation_ratio >= 1.)
00739             {
00740               input_error (_("Invalid adaptation probability"));
00741               goto exit_on_error;
00742             }
00743         }
00744       else
00745         {
00746           input_error (_("No adaptation probability"));
00747           goto exit_on_error;
00748         }
00749
00750       // Checking survivals
00751       i = input->mutation_ratio * input->nsimulations;
00752       i += input->reproduction_ratio * input->nsimulations;
00753       i += input->adaptation_ratio * input->nsimulations;
00754       if (i > input->nsimulations - 2)
00755         {
00756           input_error
00757             (_("No enough survival entities to reproduce the population"));
00758           goto exit_on_error;
00759         }
00760     }
00761   else
00762     {
00763       input_error (_("Unknown algorithm"));
00764       goto exit_on_error;
00765     }
00766
00767   if (input->algorithm == ALGORITHM_MONTE_CARLO
00768       || input->algorithm == ALGORITHM_SWEEP
00769       || input->algorithm == ALGORITHM_ORTHOGONAL)
00770     {
00771
00772       // Obtaining iterations number
00773       input->niterations
00774         = jb_json_object_get_uint (object, LABEL_NITERATIONS, &error_code);
00775       if (!error_code || !input->niterations)
00776         {
00777           input_error (_("Bad iterations number"));
00778           goto exit_on_error;
00779         }
00780
00781       // Obtaining best number
00782       input->nbest
00783         = jb_json_object_get_uint_with_default (object, LABEL_NBEST,
00784                                                 &error_code, 1);
00785       if (!error_code || !input->nbest)
00786         {
00787           input_error (_("Invalid best number"));
00788           goto exit_on_error;
00789         }
00790
00791       // Obtaining tolerance
00792       input->tolerance
00793         = jb_json_object_get_float_with_default (object, LABEL_TOLERANCE,
00794                                                  &error_code, 0.);
00795       if (!error_code || input->tolerance < 0.)
00796         {
00797           input_error (_("Invalid tolerance"));
00798           goto exit_on_error;
00799         }
00800
00801       // Getting hill climbing method parameters
00802       if (json_object_get_member (object, LABEL_NSTEPS))
00803         {
00804           input->nsteps
00805             = jb_json_object_get_uint (object, LABEL_NSTEPS, &error_code);
00806           if (!error_code)
00807             {
00808               input_error (_("Invalid steps number"));
00809               goto exit_on_error;
00810             }
00811           buffer = json_object_get_string_member (object, LABEL_CLIMBING);
00812           if (!strcmp (buffer, LABEL_COORDINATES))
00813             input->climbing = CLIMBING_METHOD_COORDINATES;
00814           else if (!strcmp (buffer, LABEL_RANDOM))
00815             {
00816               input->climbing = CLIMBING_METHOD_RANDOM;
```

```
00817               input->nestimates
00818                 = jb_json_object_get_uint (object, LABEL_NESTIMATES,
00819                                            &error_code);
00820               if (!error_code || !input->nestimates)
00821                 {
00822                   input_error (_("Invalid estimates number"));
00823                   goto exit_on_error;
00824                 }
00825             }
00826           else
00827             {
00828               input_error (_("Unknown method to estimate the hill climbing"));
00829               goto exit_on_error;
00830             }
00831           input->relaxation
00832             = jb_json_object_get_float_with_default (object, LABEL_RELAXATION,
00833                                                      &error_code,
00834                                                      DEFAULT_RELAXATION);
00835           if (!error_code || input->relaxation < 0.  || input->relaxation > 2.)
00836             {
00837               input_error (_("Invalid relaxation parameter"));
00838               goto exit_on_error;
00839             }
00840         }
00841       else
00842         input->nsteps = 0;
00843     }
00844   // Obtaining the threshold
00845   input->threshold
00846     = jb_json_object_get_float_with_default (object, LABEL_THRESHOLD,
00847                                              &error_code, 0.);
00848
00849   if (!error_code)
00850     {
00851       input_error (_("Invalid threshold"));
00852       goto exit_on_error;
00853     }
00854
00855   // Reading the experimental data
00856   array = json_object_get_array_member (object, LABEL_EXPERIMENTS);
00857   n = json_array_get_length (array);
00858   input->experiment = (Experiment *) g_malloc (n * sizeof (Experiment));
00859   for (i = 0; i < n; ++i)
00860     {
00861 #if DEBUG_INPUT
00862       fprintf (stderr, "input_open_json:  nexperiments=%u\n",
00863                input->nexperiments);
00864 #endif
00865       child = json_array_get_element (array, i);
00866       if (!input->nexperiments)
00867         {
00868           if (!experiment_open_json (input->experiment, child, 0))
00869             goto exit_on_error;
00870         }
00871       else
00872         {
00873           if (!experiment_open_json (input->experiment + input->nexperiments,
00874                                      child, input->experiment->ninputs))
00875             goto exit_on_error;
00876         }
00877       ++input->nexperiments;
00878 #if DEBUG_INPUT
00879       fprintf (stderr, "input_open_json:  nexperiments=%u\n",
00880                input->nexperiments);
00881 #endif
00882     }
00883   if (!input->nexperiments)
00884     {
00885       input_error (_("No optimization experiments"));
00886       goto exit_on_error;
00887     }
00888
00889   // Reading the variables data
00890   array = json_object_get_array_member (object, LABEL_VARIABLES);
00891   n = json_array_get_length (array);
00892   input->variable = (Variable *) g_malloc (n * sizeof (Variable));
00893   for (i = 0; i < n; ++i)
00894     {
00895 #if DEBUG_INPUT
00896       fprintf (stderr, "input_open_json:  nvariables=%u\n", input->nvariables);
00897 #endif
00898       child = json_array_get_element (array, i);
00899       if (!variable_open_json (input->variable + input->nvariables, child,
00900                                input->algorithm, input->nsteps))
00901         goto exit_on_error;
00902       ++input->nvariables;
00903     }
```

```
00904   if (!input->nvariables)
00905     {
00906       input_error (_("No optimization variables"));
00907       goto exit_on_error;
00908     }
00909
00910   // Obtaining the error norm
00911   if (json_object_get_member (object, LABEL_NORM))
00912     {
00913       buffer = json_object_get_string_member (object, LABEL_NORM);
00914       if (!strcmp (buffer, LABEL_EUCLIDIAN))
00915         input->norm = ERROR_NORM_EUCLIDIAN;
00916       else if (!strcmp (buffer, LABEL_MAXIMUM))
00917         input->norm = ERROR_NORM_MAXIMUM;
00918       else if (!strcmp (buffer, LABEL_P))
00919         {
00920           input->norm = ERROR_NORM_P;
00921           input->p = jb_json_object_get_float (object, LABEL_P, &error_code);
00922           if (!error_code)
00923             {
00924               input_error (_("Bad P parameter"));
00925               goto exit_on_error;
00926             }
00927         }
00928       else if (!strcmp (buffer, LABEL_TAXICAB))
00929         input->norm = ERROR_NORM_TAXICAB;
00930       else
00931         {
00932           input_error (_("Unknown error norm"));
00933           goto exit_on_error;
00934         }
00935     }
00936   else
00937     input->norm = ERROR_NORM_EUCLIDIAN;
00938
00939   // Closing the JSON document
00940   g_object_unref (parser);
00941
00942 #if DEBUG_INPUT
00943   fprintf (stderr, "input_open_json:  end\n");
00944 #endif
00945   return 1;
00946
00947 exit_on_error:
00948   g_object_unref (parser);
00949 #if DEBUG_INPUT
00950   fprintf (stderr, "input_open_json:  end\n");
00951 #endif
00952   return 0;
00953 }
```

Here is the call graph for this function:



5.7.3.6 input_open_xml()

```
static int input_open_xml (
             xmlDoc * doc )  [inline], [static]
```

Function to open the input file in XML format.

Returns

1_on_success, 0_on_error.

Parameters

doc	xmlDoc struct.

Definition at line 133 of file input.c.

```
00134 {
00135   char buffer2[64];
00136   xmlNode *node, *child;
00137   xmlChar *buffer;
00138   int error_code;
00139   unsigned int i;
00140
00141 #if DEBUG_INPUT
00142   fprintf (stderr, "input_open_xml:  start\n");
```

```
00143 #endif
00144
00145   // Resetting input data
00146   buffer = NULL;
00147   input->type = INPUT_TYPE_XML;
00148
00149   // Getting the root node
00150 #if DEBUG_INPUT
00151   fprintf (stderr, "input_open_xml:  getting the root node\n");
00152 #endif
00153   node = xmlDocGetRootElement (doc);
00154   if (xmlStrcmp (node->name, (const xmlChar *) LABEL_OPTIMIZE))
00155     {
00156       input_error (_("Bad root XML node"));
00157       goto exit_on_error;
00158     }
00159
00160   // Getting result and variables file names
00161   if (!input->result)
00162     {
00163       input->result =
00164         (char *) xmlGetProp (node, (const xmlChar *) LABEL_RESULT_FILE);
00165       if (!input->result)
00166         input->result = (char *) xmlStrdup ((const xmlChar *) result_name);
00167     }
00168 #if DEBUG_INPUT
00169   fprintf (stderr, "input_open_xml:  result file=%s\n", input->result);
00170 #endif
00171   if (!input->variables)
00172     {
00173       input->variables =
00174         (char *) xmlGetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE);
00175       if (!input->variables)
00176         input->variables =
00177           (char *) xmlStrdup ((const xmlChar *) variables_name);
00178     }
00179 #if DEBUG_INPUT
00180   fprintf (stderr, "input_open_xml:  variables file=%s\n", input->variables);
00181 #endif
00182
00183   // Opening simulator program name
00184   input->simulator =
00185     (char *) xmlGetProp (node, (const xmlChar *) LABEL_SIMULATOR);
00186   if (!input->simulator)
00187     {
00188       input_error (_("Bad simulator program"));
00189       goto exit_on_error;
00190     }
00191
00192   // Opening evaluator program name
00193   input->evaluator =
00194     (char *) xmlGetProp (node, (const xmlChar *) LABEL_EVALUATOR);
00195
00196   // Obtaining pseudo-random numbers generator seed
00197   input->seed
00198     = jb_xml_node_get_uint_with_default (node, (const xmlChar *) LABEL_SEED,
00199                                          &error_code, DEFAULT_RANDOM_SEED);
00200   if (!error_code)
00201     {
00202       input_error (_("Bad pseudo-random numbers generator seed"));
00203       goto exit_on_error;
00204     }
00205
00206   // Opening algorithm
00207   buffer = xmlGetProp (node, (const xmlChar *) LABEL_ALGORITHM);
00208   if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MONTE_CARLO))
00209     {
00210       input->algorithm = ALGORITHM_MONTE_CARLO;
00211
00212       // Obtaining simulations number
00213       input->nsimulations
00214         = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NSIMULATIONS,
00215                                 &error_code);
00216       if (!error_code)
00217         {
00218           input_error (_("Bad simulations number"));
00219           goto exit_on_error;
00220         }
00221     }
00222   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_SWEEP))
00223     input->algorithm = ALGORITHM_SWEEP;
00224   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_ORTHOGONAL))
00225     input->algorithm = ALGORITHM_ORTHOGONAL;
00226   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_GENETIC))
00227     {
00228       input->algorithm = ALGORITHM_GENETIC;
00229
```

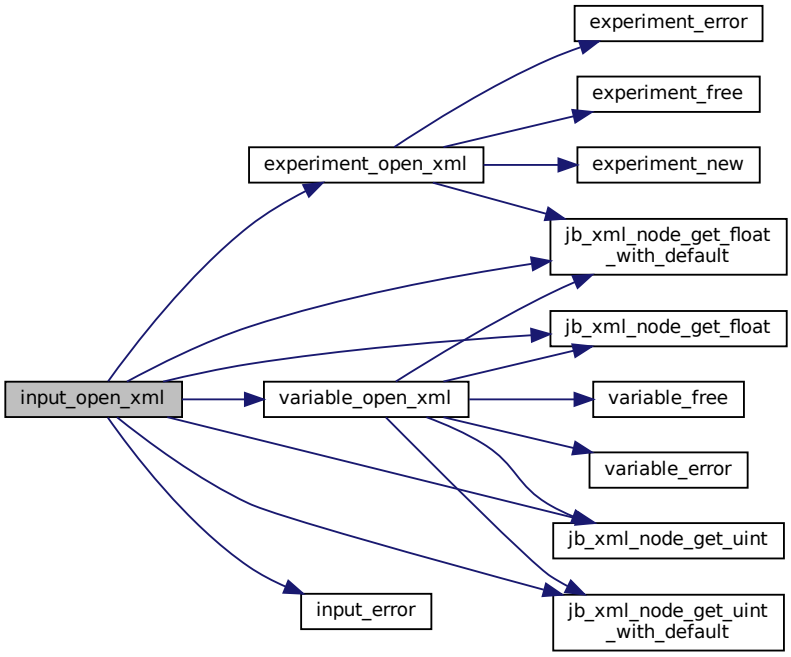
```
00230       // Obtaining population
00231       if (xmlHasProp (node, (const xmlChar *) LABEL_NPOPULATION))
00232         {
00233           input->nsimulations
00234             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NPOPULATION,
00235                                     &error_code);
00236           if (!error_code || input->nsimulations < 3)
00237             {
00238               input_error (_("Invalid population number"));
00239               goto exit_on_error;
00240             }
00241         }
00242       else
00243         {
00244           input_error (_("No population number"));
00245           goto exit_on_error;
00246         }
00247
00248       // Obtaining generations
00249       if (xmlHasProp (node, (const xmlChar *) LABEL_NGENERATIONS))
00250         {
00251           input->niterations
00252             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NGENERATIONS,
00253                                     &error_code);
00254           if (!error_code || !input->niterations)
00255             {
00256               input_error (_("Invalid generations number"));
00257               goto exit_on_error;
00258             }
00259         }
00260       else
00261         {
00262           input_error (_("No generations number"));
00263           goto exit_on_error;
00264         }
00265
00266       // Obtaining mutation probability
00267       if (xmlHasProp (node, (const xmlChar *) LABEL_MUTATION))
00268         {
00269           input->mutation_ratio
00270             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MUTATION,
00271                                      &error_code);
00272           if (!error_code || input->mutation_ratio < 0.
00273               || input->mutation_ratio >= 1.)
00274             {
00275               input_error (_("Invalid mutation probability"));
00276               goto exit_on_error;
00277             }
00278         }
00279       else
00280         {
00281           input_error (_("No mutation probability"));
00282           goto exit_on_error;
00283         }
00284
00285       // Obtaining reproduction probability
00286       if (xmlHasProp (node, (const xmlChar *) LABEL_REPRODUCTION))
00287         {
00288           input->reproduction_ratio
00289             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_REPRODUCTION,
00290                                      &error_code);
00291           if (!error_code || input->reproduction_ratio < 0.
00292               || input->reproduction_ratio >= 1.0)
00293             {
00294               input_error (_("Invalid reproduction probability"));
00295               goto exit_on_error;
00296             }
00297         }
00298       else
00299         {
00300           input_error (_("No reproduction probability"));
00301           goto exit_on_error;
00302         }
00303
00304       // Obtaining adaptation probability
00305       if (xmlHasProp (node, (const xmlChar *) LABEL_ADAPTATION))
00306         {
00307           input->adaptation_ratio
00308             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_ADAPTATION,
00309                                      &error_code);
00310           if (!error_code || input->adaptation_ratio < 0.
00311               || input->adaptation_ratio >= 1.)
00312             {
00313               input_error (_("Invalid adaptation probability"));
00314               goto exit_on_error;
00315             }
00316         }
```

```
00317       else
00318         {
00319           input_error (_("No adaptation probability"));
00320           goto exit_on_error;
00321         }
00322
00323       // Checking survivals
00324       i = input->mutation_ratio * input->nsimulations;
00325       i += input->reproduction_ratio * input->nsimulations;
00326       i += input->adaptation_ratio * input->nsimulations;
00327       if (i > input->nsimulations - 2)
00328         {
00329           input_error
00330             (_("No enough survival entities to reproduce the population"));
00331           goto exit_on_error;
00332         }
00333     }
00334   else
00335     {
00336       input_error (_("Unknown algorithm"));
00337       goto exit_on_error;
00338     }
00339   xmlFree (buffer);
00340   buffer = NULL;
00341
00342   if (input->algorithm == ALGORITHM_MONTE_CARLO
00343       || input->algorithm == ALGORITHM_SWEEP
00344       || input->algorithm == ALGORITHM_ORTHOGONAL)
00345     {
00346
00347       // Obtaining iterations number
00348       input->niterations = jb_xml_node_get_uint_with_default
00349         (node, (const xmlChar *) LABEL_NITERATIONS, &error_code, 1);
00350       if (!error_code || !input->niterations)
00351         {
00352           input_error (_("Bad iterations number"));
00353           goto exit_on_error;
00354         }
00355
00356       // Obtaining best number
00357       input->nbest
00358         = jb_xml_node_get_uint_with_default (node,
00359                                              (const xmlChar *) LABEL_NBEST,
00360                                              &error_code, 1);
00361       if (!error_code || !input->nbest)
00362         {
00363           input_error (_("Invalid best number"));
00364           goto exit_on_error;
00365         }
00366
00367       // Obtaining tolerance
00368       input->tolerance
00369         = jb_xml_node_get_float_with_default (node,
00370                                               (const xmlChar *) LABEL_TOLERANCE,
00371                                               &error_code, 0.);
00372       if (!error_code || input->tolerance < 0.)
00373         {
00374           input_error (_("Invalid tolerance"));
00375           goto exit_on_error;
00376         }
00377
00378       // Getting hill climbing method parameters
00379       if (xmlHasProp (node, (const xmlChar *) LABEL_NSTEPS))
00380         {
00381           input->nsteps =
00382             jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NSTEPS,
00383                                   &error_code);
00384           if (!error_code)
00385             {
00386               input_error (_("Invalid steps number"));
00387               goto exit_on_error;
00388             }
00389 #if DEBUG_INPUT
00390           fprintf (stderr, "input_open_xml:  nsteps=%u\n", input->nsteps);
00391 #endif
00392           buffer = xmlGetProp (node, (const xmlChar *) LABEL_CLIMBING);
00393           if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_COORDINATES))
00394             input->climbing = CLIMBING_METHOD_COORDINATES;
00395           else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_RANDOM))
00396             {
00397               input->climbing = CLIMBING_METHOD_RANDOM;
00398               input->nestimates
00399                 = jb_xml_node_get_uint (node,
00400                                         (const xmlChar *) LABEL_NESTIMATES,
00401                                         &error_code);
00402               if (!error_code || !input->nestimates)
00403                 {
```

```
00404                   input_error (_("Invalid estimates number"));
00405                   goto exit_on_error;
00406                 }
00407             }
00408           else
00409             {
00410               input_error (_("Unknown method to estimate the hill climbing"));
00411               goto exit_on_error;
00412             }
00413           xmlFree (buffer);
00414           buffer = NULL;
00415           input->relaxation
00416             = jb_xml_node_get_float_with_default (node,
00417                                                   (const xmlChar *)
00418                                                   LABEL_RELAXATION,
00419                                                   &error_code,
00420                                                   DEFAULT_RELAXATION);
00421           if (!error_code || input->relaxation < 0.  || input->relaxation > 2.)
00422             {
00423               input_error (_("Invalid relaxation parameter"));
00424               goto exit_on_error;
00425             }
00426         }
00427       else
00428         input->nsteps = 0;
00429     }
00430   // Obtaining the threshold
00431   input->threshold =
00432     jb_xml_node_get_float_with_default (node, (const xmlChar *) LABEL_THRESHOLD,
00433                                         &error_code, 0.);
00434   if (!error_code)
00435     {
00436       input_error (_("Invalid threshold"));
00437       goto exit_on_error;
00438     }
00439
00440   // Reading the experimental data
00441   for (child = node->children; child; child = child->next)
00442     {
00443       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_EXPERIMENT))
00444         break;
00445 #if DEBUG_INPUT
00446       fprintf (stderr, "input_open_xml:  nexperiments=%u\n",
00447                input->nexperiments);
00448 #endif
00449       input->experiment = (Experiment *)
00450         g_realloc (input->experiment,
00451                    (1 + input->nexperiments) * sizeof (Experiment));
00452       if (!input->nexperiments)
00453         {
00454           if (!experiment_open_xml (input->experiment, child, 0))
00455             goto exit_on_error;
00456         }
00457       else
00458         {
00459           if (!experiment_open_xml (input->experiment + input->nexperiments,
00460                                     child, input->experiment->ninputs))
00461             goto exit_on_error;
00462         }
00463       ++input->nexperiments;
00464 #if DEBUG_INPUT
00465       fprintf (stderr, "input_open_xml:  nexperiments=%u\n",
00466                input->nexperiments);
00467 #endif
00468     }
00469   if (!input->nexperiments)
00470     {
00471       input_error (_("No optimization experiments"));
00472       goto exit_on_error;
00473     }
00474   buffer = NULL;
00475
00476   // Reading the variables data
00477   if (input->algorithm == ALGORITHM_SWEEP
00478       || input->algorithm == ALGORITHM_ORTHOGONAL)
00479     input->nsimulations = 1;
00480   for (; child; child = child->next)
00481     {
00482 #if DEBUG_INPUT
00483       fprintf (stderr, "input_open_xml:  nvariables=%u\n", input->nvariables);
00484 #endif
00485       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_VARIABLE))
00486         {
00487           snprintf (buffer2, 64, "%s %u:  %s",
00488                     _("Variable"), input->nvariables + 1, _("bad XML node"));
00489           input_error (buffer2);
00490           goto exit_on_error;
```

```
00491         }
00492       input->variable = (Variable *)
00493         g_realloc (input->variable,
00494                    (1 + input->nvariables) * sizeof (Variable));
00495       if (!variable_open_xml (input->variable + input->nvariables, child,
00496                               input->algorithm, input->nsteps))
00497         goto exit_on_error;
00498       if (input->algorithm == ALGORITHM_SWEEP
00499           || input->algorithm == ALGORITHM_ORTHOGONAL)
00500         input->nsimulations *= input->variable[input->nvariables].nsweeps;
00501       ++input->nvariables;
00502     }
00503   if (!input->nvariables)
00504     {
00505       input_error (_("No optimization variables"));
00506       goto exit_on_error;
00507     }
00508   if (input->nbest > input->nsimulations)
00509     {
00510       input_error (_("Best number higher than simulations number"));
00511       goto exit_on_error;
00512     }
00513   buffer = NULL;
00514
00515   // Obtaining the error norm
00516   if (xmlHasProp (node, (const xmlChar *) LABEL_NORM))
00517     {
00518       buffer = xmlGetProp (node, (const xmlChar *) LABEL_NORM);
00519       if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_EUCLIDIAN))
00520         input->norm = ERROR_NORM_EUCLIDIAN;
00521       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MAXIMUM))
00522         input->norm = ERROR_NORM_MAXIMUM;
00523       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_P))
00524         {
00525           input->norm = ERROR_NORM_P;
00526           input->p
00527             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_P,
00528                                      &error_code);
00529           if (!error_code)
00530             {
00531               input_error (_("Bad P parameter"));
00532               goto exit_on_error;
00533             }
00534         }
00535       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_TAXICAB))
00536         input->norm = ERROR_NORM_TAXICAB;
00537       else
00538         {
00539           input_error (_("Unknown error norm"));
00540           goto exit_on_error;
00541         }
00542       xmlFree (buffer);
00543     }
00544   else
00545     input->norm = ERROR_NORM_EUCLIDIAN;
00546
00547   // Closing the XML document
00548   xmlFreeDoc (doc);
00549
00550 #if DEBUG_INPUT
00551   fprintf (stderr, "input_open_xml:  end\n");
00552 #endif
00553   return 1;
00554
00555 exit_on_error:
00556   xmlFree (buffer);
00557   xmlFreeDoc (doc);
00558 #if DEBUG_INPUT
00559   fprintf (stderr, "input_open_xml:  end\n");
00560 #endif
00561   return 0;
00562 }
```

Here is the call graph for this function:



5.7.4 Variable Documentation

5.7.4.1 input

```
Input input[1]
```

Global Input struct to set the input data.

Definition at line 57 of file input.c.

5.7.4.2 result_name

```
const char* result_name = "result"
```

Name of the result file.

Definition at line 59 of file input.c.

5.7.4.3 variables_name

```
const char* variables_name = "variables"
```

Name of the variables file.

Definition at line 60 of file input.c.

5.8 input.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
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00011 are permitted provided that the following conditions are met:
00012
00013 1.  Redistributions of source code must retain the above copyright notice,
00014 this list of conditions and the following disclaimer.
00015
00016 2.  Redistributions in binary form must reproduce the above copyright notice,
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00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <string.h>
00042 #include <libxml/parser.h>
00043 #include <libintl.h>
00044 #include <glib.h>
00045 #include <glib/gstdio.h>
00046 #include <json-glib/json-glib.h>
00047 #include "jb/src/jb_xml.h"
00048 #include "jb/src/jb_json.h"
00049 #include "jb/src/jb_win.h"
00050 #include "tools.h"
00051 #include "experiment.h"
00052 #include "variable.h"
00053 #include "input.h"
00054
00055 #define DEBUG_INPUT 0
00056
00057 Input input[1];
00058
00059 const char *result_name = "result";
00060 const char *variables_name = "variables";
00061
00065 void
00066 input_new ()
00067 {
00068 #if DEBUG_INPUT
00069   fprintf (stderr, "input_new:  start\n");
00070 #endif
00071   input->nvariables = input->nexperiments = input->nsteps = 0;
00072   input->simulator = input->evaluator = input->directory = input->name = NULL;
00073   input->experiment = NULL;
00074   input->variable = NULL;
00075 #if DEBUG_INPUT
```

```
00076   fprintf (stderr, "input_new:  end\n");
00077 #endif
00078 }
00079
00083 void
00084 input_free ()
00085 {
00086   unsigned int i;
00087 #if DEBUG_INPUT
00088   fprintf (stderr, "input_free:  start\n");
00089 #endif
00090   g_free (input->name);
00091   g_free (input->directory);
00092   for (i = 0; i < input->nexperiments; ++i)
00093     experiment_free (input->experiment + i, input->type);
00094   for (i = 0; i < input->nvariables; ++i)
00095     variable_free (input->variable + i, input->type);
00096   g_free (input->experiment);
00097   g_free (input->variable);
00098   if (input->type == INPUT_TYPE_XML)
00099     {
00100       xmlFree (input->evaluator);
00101       xmlFree (input->simulator);
00102       xmlFree (input->result);
00103       xmlFree (input->variables);
00104     }
00105   else
00106     {
00107       g_free (input->evaluator);
00108       g_free (input->simulator);
00109       g_free (input->result);
00110       g_free (input->variables);
00111     }
00112   input->nexperiments = input->nvariables = input->nsteps = 0;
00113 #if DEBUG_INPUT
00114   fprintf (stderr, "input_free:  end\n");
00115 #endif
00116 }
00117
00121 static void
00122 input_error (char *message)
00123 {
00124   error_message = g_strconcat (_("Input"), ":  ", message, "\n", NULL);
00125 }
00126
00132 static inline int
00133 input_open_xml (xmlDoc * doc)
00134 {
00135   char buffer2[64];
00136   xmlNode *node, *child;
00137   xmlChar *buffer;
00138   int error_code;
00139   unsigned int i;
00140
00141 #if DEBUG_INPUT
00142   fprintf (stderr, "input_open_xml:  start\n");
00143 #endif
00144
00145   // Resetting input data
00146   buffer = NULL;
00147   input->type = INPUT_TYPE_XML;
00148
00149   // Getting the root node
00150 #if DEBUG_INPUT
00151   fprintf (stderr, "input_open_xml:  getting the root node\n");
00152 #endif
00153   node = xmlDocGetRootElement (doc);
00154   if (xmlStrcmp (node->name, (const xmlChar *) LABEL_OPTIMIZE))
00155     {
00156       input_error (_("Bad root XML node"));
00157       goto exit_on_error;
00158     }
00159
00160   // Getting result and variables file names
00161   if (!input->result)
00162     {
00163       input->result =
00164         (char *) xmlGetProp (node, (const xmlChar *) LABEL_RESULT_FILE);
00165       if (!input->result)
00166         input->result = (char *) xmlStrdup ((const xmlChar *) result_name);
00167     }
00168 #if DEBUG_INPUT
00169   fprintf (stderr, "input_open_xml:  result file=%s\n", input->result);
00170 #endif
00171   if (!input->variables)
00172     {
00173       input->variables =
```

```
00174         (char *) xmlGetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE);
00175       if (!input->variables)
00176         input->variables =
00177           (char *) xmlStrdup ((const xmlChar *) variables_name);
00178     }
00179 #if DEBUG_INPUT
00180   fprintf (stderr, "input_open_xml:  variables file=%s\n", input->variables);
00181 #endif
00182
00183   // Opening simulator program name
00184   input->simulator =
00185     (char *) xmlGetProp (node, (const xmlChar *) LABEL_SIMULATOR);
00186   if (!input->simulator)
00187     {
00188       input_error (_("Bad simulator program"));
00189       goto exit_on_error;
00190     }
00191
00192   // Opening evaluator program name
00193   input->evaluator =
00194     (char *) xmlGetProp (node, (const xmlChar *) LABEL_EVALUATOR);
00195
00196   // Obtaining pseudo-random numbers generator seed
00197   input->seed
00198     = jb_xml_node_get_uint_with_default (node, (const xmlChar *) LABEL_SEED,
00199                                          &error_code, DEFAULT_RANDOM_SEED);
00200   if (!error_code)
00201     {
00202       input_error (_("Bad pseudo-random numbers generator seed"));
00203       goto exit_on_error;
00204     }
00205
00206   // Opening algorithm
00207   buffer = xmlGetProp (node, (const xmlChar *) LABEL_ALGORITHM);
00208   if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MONTE_CARLO))
00209     {
00210       input->algorithm = ALGORITHM_MONTE_CARLO;
00211
00212       // Obtaining simulations number
00213       input->nsimulations
00214         = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NSIMULATIONS,
00215                                 &error_code);
00216       if (!error_code)
00217         {
00218           input_error (_("Bad simulations number"));
00219           goto exit_on_error;
00220         }
00221     }
00222   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_SWEEP))
00223     input->algorithm = ALGORITHM_SWEEP;
00224   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_ORTHOGONAL))
00225     input->algorithm = ALGORITHM_ORTHOGONAL;
00226   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_GENETIC))
00227     {
00228       input->algorithm = ALGORITHM_GENETIC;
00229
00230       // Obtaining population
00231       if (xmlHasProp (node, (const xmlChar *) LABEL_NPOPULATION))
00232         {
00233           input->nsimulations
00234             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NPOPULATION,
00235                                     &error_code);
00236           if (!error_code || input->nsimulations < 3)
00237             {
00238               input_error (_("Invalid population number"));
00239               goto exit_on_error;
00240             }
00241         }
00242       else
00243         {
00244           input_error (_("No population number"));
00245           goto exit_on_error;
00246         }
00247
00248       // Obtaining generations
00249       if (xmlHasProp (node, (const xmlChar *) LABEL_NGENERATIONS))
00250         {
00251           input->niterations
00252             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NGENERATIONS,
00253                                     &error_code);
00254           if (!error_code || !input->niterations)
00255             {
00256               input_error (_("Invalid generations number"));
00257               goto exit_on_error;
00258             }
00259         }
00260       else
```

```
00261         {
00262           input_error (_("No generations number"));
00263           goto exit_on_error;
00264         }
00265
00266       // Obtaining mutation probability
00267       if (xmlHasProp (node, (const xmlChar *) LABEL_MUTATION))
00268         {
00269           input->mutation_ratio
00270             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MUTATION,
00271                                      &error_code);
00272           if (!error_code || input->mutation_ratio < 0.
00273               || input->mutation_ratio >= 1.)
00274             {
00275               input_error (_("Invalid mutation probability"));
00276               goto exit_on_error;
00277             }
00278         }
00279       else
00280         {
00281           input_error (_("No mutation probability"));
00282           goto exit_on_error;
00283         }
00284
00285       // Obtaining reproduction probability
00286       if (xmlHasProp (node, (const xmlChar *) LABEL_REPRODUCTION))
00287         {
00288           input->reproduction_ratio
00289             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_REPRODUCTION,
00290                                      &error_code);
00291           if (!error_code || input->reproduction_ratio < 0.
00292               || input->reproduction_ratio >= 1.0)
00293             {
00294               input_error (_("Invalid reproduction probability"));
00295               goto exit_on_error;
00296             }
00297         }
00298       else
00299         {
00300           input_error (_("No reproduction probability"));
00301           goto exit_on_error;
00302         }
00303
00304       // Obtaining adaptation probability
00305       if (xmlHasProp (node, (const xmlChar *) LABEL_ADAPTATION))
00306         {
00307           input->adaptation_ratio
00308             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_ADAPTATION,
00309                                      &error_code);
00310           if (!error_code || input->adaptation_ratio < 0.
00311               || input->adaptation_ratio >= 1.)
00312             {
00313               input_error (_("Invalid adaptation probability"));
00314               goto exit_on_error;
00315             }
00316         }
00317       else
00318         {
00319           input_error (_("No adaptation probability"));
00320           goto exit_on_error;
00321         }
00322
00323       // Checking survivals
00324       i = input->mutation_ratio * input->nsimulations;
00325       i += input->reproduction_ratio * input->nsimulations;
00326       i += input->adaptation_ratio * input->nsimulations;
00327       if (i > input->nsimulations - 2)
00328         {
00329           input_error
00330             (_("No enough survival entities to reproduce the population"));
00331           goto exit_on_error;
00332         }
00333     }
00334   else
00335     {
00336       input_error (_("Unknown algorithm"));
00337       goto exit_on_error;
00338     }
00339   xmlFree (buffer);
00340   buffer = NULL;
00341
00342   if (input->algorithm == ALGORITHM_MONTE_CARLO
00343       || input->algorithm == ALGORITHM_SWEEP
00344       || input->algorithm == ALGORITHM_ORTHOGONAL)
00345     {
00346
00347       // Obtaining iterations number
```

```
00348       input->niterations = jb_xml_node_get_uint_with_default
00349         (node, (const xmlChar *) LABEL_NITERATIONS, &error_code, 1);
00350       if (!error_code || !input->niterations)
00351         {
00352           input_error (_("Bad iterations number"));
00353           goto exit_on_error;
00354         }
00355
00356       // Obtaining best number
00357       input->nbest
00358         = jb_xml_node_get_uint_with_default (node,
00359                                              (const xmlChar *) LABEL_NBEST,
00360                                              &error_code, 1);
00361       if (!error_code || !input->nbest)
00362         {
00363           input_error (_("Invalid best number"));
00364           goto exit_on_error;
00365         }
00366
00367       // Obtaining tolerance
00368       input->tolerance
00369         = jb_xml_node_get_float_with_default (node,
00370                                               (const xmlChar *) LABEL_TOLERANCE,
00371                                               &error_code, 0.);
00372       if (!error_code || input->tolerance < 0.)
00373         {
00374           input_error (_("Invalid tolerance"));
00375           goto exit_on_error;
00376         }
00377
00378       // Getting hill climbing method parameters
00379       if (xmlHasProp (node, (const xmlChar *) LABEL_NSTEPS))
00380         {
00381           input->nsteps =
00382             jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NSTEPS,
00383                                   &error_code);
00384           if (!error_code)
00385             {
00386               input_error (_("Invalid steps number"));
00387               goto exit_on_error;
00388             }
00389 #if DEBUG_INPUT
00390           fprintf (stderr, "input_open_xml:  nsteps=%u\n", input->nsteps);
00391 #endif
00392           buffer = xmlGetProp (node, (const xmlChar *) LABEL_CLIMBING);
00393           if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_COORDINATES))
00394             input->climbing = CLIMBING_METHOD_COORDINATES;
00395           else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_RANDOM))
00396             {
00397               input->climbing = CLIMBING_METHOD_RANDOM;
00398               input->nestimates
00399                 = jb_xml_node_get_uint (node,
00400                                         (const xmlChar *) LABEL_NESTIMATES,
00401                                         &error_code);
00402               if (!error_code || !input->nestimates)
00403                 {
00404                   input_error (_("Invalid estimates number"));
00405                   goto exit_on_error;
00406                 }
00407             }
00408           else
00409             {
00410               input_error (_("Unknown method to estimate the hill climbing"));
00411               goto exit_on_error;
00412             }
00413           xmlFree (buffer);
00414           buffer = NULL;
00415           input->relaxation
00416             = jb_xml_node_get_float_with_default (node,
00417                                                   (const xmlChar *)
00418                                                   LABEL_RELAXATION,
00419                                                   &error_code,
00420                                                   DEFAULT_RELAXATION);
00421           if (!error_code || input->relaxation < 0.  || input->relaxation > 2.)
00422             {
00423               input_error (_("Invalid relaxation parameter"));
00424               goto exit_on_error;
00425             }
00426         }
00427       else
00428         input->nsteps = 0;
00429     }
00430   // Obtaining the threshold
00431   input->threshold =
00432     jb_xml_node_get_float_with_default (node, (const xmlChar *) LABEL_THRESHOLD,
00433                                         &error_code, 0.);
00434   if (!error_code)
```

```
00435     {
00436       input_error (_("Invalid threshold"));
00437       goto exit_on_error;
00438     }
00439
00440   // Reading the experimental data
00441   for (child = node->children; child; child = child->next)
00442     {
00443       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_EXPERIMENT))
00444         break;
00445 #if DEBUG_INPUT
00446       fprintf (stderr, "input_open_xml:  nexperiments=%u\n",
00447                input->nexperiments);
00448 #endif
00449       input->experiment = (Experiment *)
00450         g_realloc (input->experiment,
00451                    (1 + input->nexperiments) * sizeof (Experiment));
00452       if (!input->nexperiments)
00453         {
00454           if (!experiment_open_xml (input->experiment, child, 0))
00455             goto exit_on_error;
00456         }
00457       else
00458         {
00459           if (!experiment_open_xml (input->experiment + input->nexperiments,
00460                                     child, input->experiment->ninputs))
00461             goto exit_on_error;
00462         }
00463       ++input->nexperiments;
00464 #if DEBUG_INPUT
00465       fprintf (stderr, "input_open_xml:  nexperiments=%u\n",
00466                input->nexperiments);
00467 #endif
00468     }
00469   if (!input->nexperiments)
00470     {
00471       input_error (_("No optimization experiments"));
00472       goto exit_on_error;
00473     }
00474   buffer = NULL;
00475
00476   // Reading the variables data
00477   if (input->algorithm == ALGORITHM_SWEEP
00478       || input->algorithm == ALGORITHM_ORTHOGONAL)
00479     input->nsimulations = 1;
00480   for (; child; child = child->next)
00481     {
00482 #if DEBUG_INPUT
00483       fprintf (stderr, "input_open_xml:  nvariables=%u\n", input->nvariables);
00484 #endif
00485       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_VARIABLE))
00486         {
00487           snprintf (buffer2, 64, "%s %u:  %s",
00488                     _("Variable"), input->nvariables + 1, _("bad XML node"));
00489           input_error (buffer2);
00490           goto exit_on_error;
00491         }
00492       input->variable = (Variable *)
00493         g_realloc (input->variable,
00494                    (1 + input->nvariables) * sizeof (Variable));
00495       if (!variable_open_xml (input->variable + input->nvariables, child,
00496                               input->algorithm, input->nsteps))
00497         goto exit_on_error;
00498       if (input->algorithm == ALGORITHM_SWEEP
00499           || input->algorithm == ALGORITHM_ORTHOGONAL)
00500         input->nsimulations *= input->variable[input->nvariables].nsweeps;
00501       ++input->nvariables;
00502     }
00503   if (!input->nvariables)
00504     {
00505       input_error (_("No optimization variables"));
00506       goto exit_on_error;
00507     }
00508   if (input->nbest > input->nsimulations)
00509     {
00510       input_error (_("Best number higher than simulations number"));
00511       goto exit_on_error;
00512     }
00513   buffer = NULL;
00514
00515   // Obtaining the error norm
00516   if (xmlHasProp (node, (const xmlChar *) LABEL_NORM))
00517     {
00518       buffer = xmlGetProp (node, (const xmlChar *) LABEL_NORM);
00519       if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_EUCLIDIAN))
00520         input->norm = ERROR_NORM_EUCLIDIAN;
00521       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MAXIMUM))
```

```
00522         input->norm = ERROR_NORM_MAXIMUM;
00523       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_P))
00524         {
00525           input->norm = ERROR_NORM_P;
00526           input->p
00527             = jb_xml_node_get_float (node, (const xmlChar *) LABEL_P,
00528                                      &error_code);
00529           if (!error_code)
00530             {
00531               input_error (_("Bad P parameter"));
00532               goto exit_on_error;
00533             }
00534         }
00535       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_TAXICAB))
00536         input->norm = ERROR_NORM_TAXICAB;
00537       else
00538         {
00539           input_error (_("Unknown error norm"));
00540           goto exit_on_error;
00541         }
00542       xmlFree (buffer);
00543     }
00544   else
00545     input->norm = ERROR_NORM_EUCLIDIAN;
00546
00547   // Closing the XML document
00548   xmlFreeDoc (doc);
00549
00550 #if DEBUG_INPUT
00551   fprintf (stderr, "input_open_xml:  end\n");
00552 #endif
00553   return 1;
00554
00555 exit_on_error:
00556   xmlFree (buffer);
00557   xmlFreeDoc (doc);
00558 #if DEBUG_INPUT
00559   fprintf (stderr, "input_open_xml:  end\n");
00560 #endif
00561   return 0;
00562 }
00563
00569 static inline int
00570 input_open_json (JsonParser * parser)
00571 {
00572   JsonNode *node, *child;
00573   JsonObject *object;
00574   JsonArray *array;
00575   const char *buffer;
00576   int error_code;
00577   unsigned int i, n;
00578
00579 #if DEBUG_INPUT
00580   fprintf (stderr, "input_open_json:  start\n");
00581 #endif
00582
00583   // Resetting input data
00584   input->type = INPUT_TYPE_JSON;
00585
00586   // Getting the root node
00587 #if DEBUG_INPUT
00588   fprintf (stderr, "input_open_json:  getting the root node\n");
00589 #endif
00590   node = json_parser_get_root (parser);
00591   object = json_node_get_object (node);
00592
00593   // Getting result and variables file names
00594   if (!input->result)
00595     {
00596       buffer = json_object_get_string_member (object, LABEL_RESULT_FILE);
00597       if (!buffer)
00598         buffer = result_name;
00599       input->result = g_strdup (buffer);
00600     }
00601   else
00602     input->result = g_strdup (result_name);
00603   if (!input->variables)
00604     {
00605       buffer = json_object_get_string_member (object, LABEL_VARIABLES_FILE);
00606       if (!buffer)
00607         buffer = variables_name;
00608       input->variables = g_strdup (buffer);
00609     }
00610   else
00611     input->variables = g_strdup (variables_name);
00612
00613   // Opening simulator program name
```

```
00614   buffer = json_object_get_string_member (object, LABEL_SIMULATOR);
00615   if (!buffer)
00616     {
00617       input_error (_("Bad simulator program"));
00618       goto exit_on_error;
00619     }
00620   input->simulator = g_strdup (buffer);
00621
00622   // Opening evaluator program name
00623   buffer = json_object_get_string_member (object, LABEL_EVALUATOR);
00624   if (buffer)
00625     input->evaluator = g_strdup (buffer);
00626
00627   // Obtaining pseudo-random numbers generator seed
00628   input->seed
00629     = jb_json_object_get_uint_with_default (object, LABEL_SEED,
00630                                             &error_code, DEFAULT_RANDOM_SEED);
00631   if (!error_code)
00632     {
00633       input_error (_("Bad pseudo-random numbers generator seed"));
00634       goto exit_on_error;
00635     }
00636
00637   // Opening algorithm
00638   buffer = json_object_get_string_member (object, LABEL_ALGORITHM);
00639   if (!strcmp (buffer, LABEL_MONTE_CARLO))
00640     {
00641       input->algorithm = ALGORITHM_MONTE_CARLO;
00642
00643       // Obtaining simulations number
00644       input->nsimulations
00645         = jb_json_object_get_uint (object, LABEL_NSIMULATIONS, &error_code);
00646       if (!error_code)
00647         {
00648           input_error (_("Bad simulations number"));
00649           goto exit_on_error;
00650         }
00651     }
00652   else if (!strcmp (buffer, LABEL_SWEEP))
00653     input->algorithm = ALGORITHM_SWEEP;
00654   else if (!strcmp (buffer, LABEL_ORTHOGONAL))
00655     input->algorithm = ALGORITHM_ORTHOGONAL;
00656   else if (!strcmp (buffer, LABEL_GENETIC))
00657     {
00658       input->algorithm = ALGORITHM_GENETIC;
00659
00660       // Obtaining population
00661       if (json_object_get_member (object, LABEL_NPOPULATION))
00662         {
00663           input->nsimulations
00664             = jb_json_object_get_uint (object, LABEL_NPOPULATION, &error_code);
00665           if (!error_code || input->nsimulations < 3)
00666             {
00667               input_error (_("Invalid population number"));
00668               goto exit_on_error;
00669             }
00670         }
00671       else
00672         {
00673           input_error (_("No population number"));
00674           goto exit_on_error;
00675         }
00676
00677       // Obtaining generations
00678       if (json_object_get_member (object, LABEL_NGENERATIONS))
00679         {
00680           input->niterations
00681             = jb_json_object_get_uint_with_default (object, LABEL_NGENERATIONS,
00682                                                     &error_code, 1);
00683           if (!error_code || !input->niterations)
00684             {
00685               input_error (_("Invalid generations number"));
00686               goto exit_on_error;
00687             }
00688         }
00689       else
00690         {
00691           input_error (_("No generations number"));
00692           goto exit_on_error;
00693         }
00694
00695       // Obtaining mutation probability
00696       if (json_object_get_member (object, LABEL_MUTATION))
00697         {
00698           input->mutation_ratio
00699             = jb_json_object_get_float (object, LABEL_MUTATION, &error_code);
00700           if (!error_code || input->mutation_ratio < 0.
```

```
00701               || input->mutation_ratio >= 1.)
00702             {
00703               input_error (_("Invalid mutation probability"));
00704               goto exit_on_error;
00705             }
00706         }
00707       else
00708         {
00709           input_error (_("No mutation probability"));
00710           goto exit_on_error;
00711         }
00712
00713       // Obtaining reproduction probability
00714       if (json_object_get_member (object, LABEL_REPRODUCTION))
00715         {
00716           input->reproduction_ratio
00717             = jb_json_object_get_float (object, LABEL_REPRODUCTION,
00718                                         &error_code);
00719           if (!error_code || input->reproduction_ratio < 0.
00720               || input->reproduction_ratio >= 1.0)
00721             {
00722               input_error (_("Invalid reproduction probability"));
00723               goto exit_on_error;
00724             }
00725         }
00726       else
00727         {
00728           input_error (_("No reproduction probability"));
00729           goto exit_on_error;
00730         }
00731
00732       // Obtaining adaptation probability
00733       if (json_object_get_member (object, LABEL_ADAPTATION))
00734         {
00735           input->adaptation_ratio
00736             = jb_json_object_get_float (object, LABEL_ADAPTATION, &error_code);
00737           if (!error_code || input->adaptation_ratio < 0.
00738               || input->adaptation_ratio >= 1.)
00739             {
00740               input_error (_("Invalid adaptation probability"));
00741               goto exit_on_error;
00742             }
00743         }
00744       else
00745         {
00746           input_error (_("No adaptation probability"));
00747           goto exit_on_error;
00748         }
00749
00750       // Checking survivals
00751       i = input->mutation_ratio * input->nsimulations;
00752       i += input->reproduction_ratio * input->nsimulations;
00753       i += input->adaptation_ratio * input->nsimulations;
00754       if (i > input->nsimulations - 2)
00755         {
00756           input_error
00757             (_("No enough survival entities to reproduce the population"));
00758           goto exit_on_error;
00759         }
00760     }
00761   else
00762     {
00763       input_error (_("Unknown algorithm"));
00764       goto exit_on_error;
00765     }
00766
00767   if (input->algorithm == ALGORITHM_MONTE_CARLO
00768       || input->algorithm == ALGORITHM_SWEEP
00769       || input->algorithm == ALGORITHM_ORTHOGONAL)
00770     {
00771
00772       // Obtaining iterations number
00773       input->niterations
00774         = jb_json_object_get_uint (object, LABEL_NITERATIONS, &error_code);
00775       if (!error_code || !input->niterations)
00776         {
00777           input_error (_("Bad iterations number"));
00778           goto exit_on_error;
00779         }
00780
00781       // Obtaining best number
00782       input->nbest
00783         = jb_json_object_get_uint_with_default (object, LABEL_NBEST,
00784                                                 &error_code, 1);
00785       if (!error_code || !input->nbest)
00786         {
00787           input_error (_("Invalid best number"));
```

```
00788           goto exit_on_error;
00789         }
00790
00791       // Obtaining tolerance
00792       input->tolerance
00793         = jb_json_object_get_float_with_default (object, LABEL_TOLERANCE,
00794                                                  &error_code, 0.);
00795       if (!error_code || input->tolerance < 0.)
00796         {
00797           input_error (_("Invalid tolerance"));
00798           goto exit_on_error;
00799         }
00800
00801       // Getting hill climbing method parameters
00802       if (json_object_get_member (object, LABEL_NSTEPS))
00803         {
00804           input->nsteps
00805             = jb_json_object_get_uint (object, LABEL_NSTEPS, &error_code);
00806           if (!error_code)
00807             {
00808               input_error (_("Invalid steps number"));
00809               goto exit_on_error;
00810             }
00811           buffer = json_object_get_string_member (object, LABEL_CLIMBING);
00812           if (!strcmp (buffer, LABEL_COORDINATES))
00813             input->climbing = CLIMBING_METHOD_COORDINATES;
00814           else if (!strcmp (buffer, LABEL_RANDOM))
00815             {
00816               input->climbing = CLIMBING_METHOD_RANDOM;
00817               input->nestimates
00818                 = jb_json_object_get_uint (object, LABEL_NESTIMATES,
00819                                            &error_code);
00820               if (!error_code || !input->nestimates)
00821                 {
00822                   input_error (_("Invalid estimates number"));
00823                   goto exit_on_error;
00824                 }
00825             }
00826           else
00827             {
00828               input_error (_("Unknown method to estimate the hill climbing"));
00829               goto exit_on_error;
00830             }
00831           input->relaxation
00832             = jb_json_object_get_float_with_default (object, LABEL_RELAXATION,
00833                                                      &error_code,
00834                                                      DEFAULT_RELAXATION);
00835           if (!error_code || input->relaxation < 0.  || input->relaxation > 2.)
00836             {
00837               input_error (_("Invalid relaxation parameter"));
00838               goto exit_on_error;
00839             }
00840         }
00841       else
00842         input->nsteps = 0;
00843     }
00844   // Obtaining the threshold
00845   input->threshold
00846     = jb_json_object_get_float_with_default (object, LABEL_THRESHOLD,
00847                                              &error_code, 0.);
00848
00849   if (!error_code)
00850     {
00851       input_error (_("Invalid threshold"));
00852       goto exit_on_error;
00853     }
00854
00855   // Reading the experimental data
00856   array = json_object_get_array_member (object, LABEL_EXPERIMENTS);
00857   n = json_array_get_length (array);
00858   input->experiment = (Experiment *) g_malloc (n * sizeof (Experiment));
00859   for (i = 0; i < n; ++i)
00860     {
00861 #if DEBUG_INPUT
00862       fprintf (stderr, "input_open_json:  nexperiments=%u\n",
00863                input->nexperiments);
00864 #endif
00865       child = json_array_get_element (array, i);
00866       if (!input->nexperiments)
00867         {
00868           if (!experiment_open_json (input->experiment, child, 0))
00869             goto exit_on_error;
00870         }
00871       else
00872         {
00873           if (!experiment_open_json (input->experiment + input->nexperiments,
00874                                      child, input->experiment->ninputs))
```

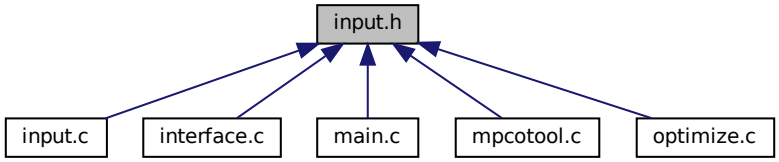
```
00875             goto exit_on_error;
00876         }
00877       ++input->nexperiments;
00878 #if DEBUG_INPUT
00879       fprintf (stderr, "input_open_json:  nexperiments=%u\n",
00880                input->nexperiments);
00881 #endif
00882     }
00883   if (!input->nexperiments)
00884     {
00885       input_error (_("No optimization experiments"));
00886       goto exit_on_error;
00887     }
00888
00889   // Reading the variables data
00890   array = json_object_get_array_member (object, LABEL_VARIABLES);
00891   n = json_array_get_length (array);
00892   input->variable = (Variable *) g_malloc (n * sizeof (Variable));
00893   for (i = 0; i < n; ++i)
00894     {
00895 #if DEBUG_INPUT
00896       fprintf (stderr, "input_open_json:  nvariables=%u\n", input->nvariables);
00897 #endif
00898       child = json_array_get_element (array, i);
00899       if (!variable_open_json (input->variable + input->nvariables, child,
00900                                input->algorithm, input->nsteps))
00901         goto exit_on_error;
00902       ++input->nvariables;
00903     }
00904   if (!input->nvariables)
00905     {
00906       input_error (_("No optimization variables"));
00907       goto exit_on_error;
00908     }
00909
00910   // Obtaining the error norm
00911   if (json_object_get_member (object, LABEL_NORM))
00912     {
00913       buffer = json_object_get_string_member (object, LABEL_NORM);
00914       if (!strcmp (buffer, LABEL_EUCLIDIAN))
00915         input->norm = ERROR_NORM_EUCLIDIAN;
00916       else if (!strcmp (buffer, LABEL_MAXIMUM))
00917         input->norm = ERROR_NORM_MAXIMUM;
00918       else if (!strcmp (buffer, LABEL_P))
00919         {
00920           input->norm = ERROR_NORM_P;
00921           input->p = jb_json_object_get_float (object, LABEL_P, &error_code);
00922           if (!error_code)
00923             {
00924               input_error (_("Bad P parameter"));
00925               goto exit_on_error;
00926             }
00927         }
00928       else if (!strcmp (buffer, LABEL_TAXICAB))
00929         input->norm = ERROR_NORM_TAXICAB;
00930       else
00931         {
00932           input_error (_("Unknown error norm"));
00933           goto exit_on_error;
00934         }
00935     }
00936   else
00937     input->norm = ERROR_NORM_EUCLIDIAN;
00938
00939   // Closing the JSON document
00940   g_object_unref (parser);
00941
00942 #if DEBUG_INPUT
00943   fprintf (stderr, "input_open_json:  end\n");
00944 #endif
00945   return 1;
00946
00947 exit_on_error:
00948   g_object_unref (parser);
00949 #if DEBUG_INPUT
00950   fprintf (stderr, "input_open_json:  end\n");
00951 #endif
00952   return 0;
00953 }
00954
00960 int
00961 input_open (char *filename)
00962 {
00963   xmlDoc *doc;
00964   JsonParser *parser;
00965
00966 #if DEBUG_INPUT
```

```
00967   fprintf (stderr, "input_open:  start\n");
00968 #endif
00969
00970   // Resetting input data
00971   input_new ();
00972
00973   // Opening input file
00974 #if DEBUG_INPUT
00975   fprintf (stderr, "input_open:  opening the input file %s\n", filename);
00976   fprintf (stderr, "input_open:  trying XML format\n");
00977 #endif
00978   doc = xmlParseFile (filename);
00979   if (!doc)
00980     {
00981 #if DEBUG_INPUT
00982       fprintf (stderr, "input_open:  trying JSON format\n");
00983 #endif
00984       parser = json_parser_new ();
00985       if (!json_parser_load_from_file (parser, filename, NULL))
00986         {
00987           input_error (_("Unable to parse the input file"));
00988           goto exit_on_error;
00989         }
00990       if (!input_open_json (parser))
00991         goto exit_on_error;
00992     }
00993   else if (!input_open_xml (doc))
00994     goto exit_on_error;
00995
00996   // Getting the working directory
00997   input->directory = g_path_get_dirname (filename);
00998   input->name = g_path_get_basename (filename);
00999
01000 #if DEBUG_INPUT
01001   fprintf (stderr, "input_open:  end\n");
01002 #endif
01003   return 1;
01004
01005 exit_on_error:
01006   jbw_show_error (error_message);
01007   g_free (error_message);
01008   input_free ();
01009 #if DEBUG_INPUT
01010   fprintf (stderr, "input_open:  end\n");
01011 #endif
01012   return 0;
01013 }
```

5.9 input.h File Reference

Header file to define the input functions.

This graph shows which files directly or indirectly include this file:



Data Structures

- struct Input

  Struct to define the optimization input file.

Enumerations

- enum ClimbingMethod { CLIMBING_METHOD_COORDINATES = 0 , CLIMBING_METHOD_RANDOM = 1 }

  Enum to define the methods to estimate the hill climbing.
- enum ErrorNorm { ERROR_NORM_EUCLIDIAN = 0 , ERROR_NORM_MAXIMUM = 1 , ERROR_NORM_P = 2 , ERROR_NORM_TAXICAB = 3 }

  Enum to define the error norm.

Functions

- void input_new ()
- void input_free ()
- int input_open (char *filename)

Variables

- Input input [1]

  Global Input struct to set the input data.
- const char * result_name

  Name of the result file.
- const char * variables_name

  Name of the variables file.

5.9.1 Detailed Description

Header file to define the input functions.

Authors

Javier Burguete.

Copyright

Definition in file input.h.

5.9.2 Enumeration Type Documentation

5.9.2.1 ClimbingMethod

```
enum ClimbingMethod
```

Enum to define the methods to estimate the hill climbing.

Enumerator

CLIMBING_METHOD_COORDINATES	Coordinates hill climbing method.
CLIMBING_METHOD_RANDOM	Random hill climbing method.

Definition at line 42 of file input.h.

```
00043 {
00044   CLIMBING_METHOD_COORDINATES = 0,
00045   CLIMBING_METHOD_RANDOM = 1,
00046 };
```

5.9.2.2 ErrorNorm

```
enum ErrorNorm
```

Enum to define the error norm.

Enumerator

ERROR_NORM_EUCLIDIAN	Euclidian norm: $\sqrt{\sum_i (w_i\,x_i)^2}$.
ERROR_NORM_MAXIMUM	Maximum norm: $\max_i \lvert w_i\,x_i\rvert$.
ERROR_NORM_P	P-norm $\sqrt[p]{\sum_i \lvert w_i\,x_i\rvert^p}$.
ERROR_NORM_TAXICAB	Taxicab norm $\sum_i \lvert w_i\,x_i\rvert$.

Definition at line 49 of file input.h.

```
00050 {
00051   ERROR_NORM_EUCLIDIAN = 0,
00053   ERROR_NORM_MAXIMUM = 1,
00055   ERROR_NORM_P = 2,
00057   ERROR_NORM_TAXICAB = 3
00059 };
```

5.9.3 Function Documentation

5.9.3.1 input_free()

```
void input_free ( )
```

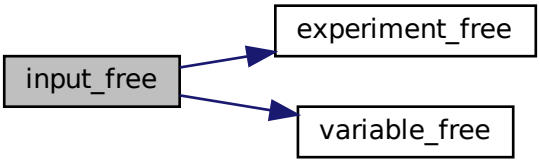
Function to free the memory of the input file data.

Definition at line 84 of file input.c.

```
00085 {
00086   unsigned int i;
00087 #if DEBUG_INPUT
00088   fprintf (stderr, "input_free:  start\n");
00089 #endif
00090   g_free (input->name);
00091   g_free (input->directory);
```

```
00092   for (i = 0; i < input->nexperiments; ++i)
00093     experiment_free (input->experiment + i, input->type);
00094   for (i = 0; i < input->nvariables; ++i)
00095     variable_free (input->variable + i, input->type);
00096   g_free (input->experiment);
00097   g_free (input->variable);
00098   if (input->type == INPUT_TYPE_XML)
00099     {
00100       xmlFree (input->evaluator);
00101       xmlFree (input->simulator);
00102       xmlFree (input->result);
00103       xmlFree (input->variables);
00104     }
00105   else
00106     {
00107       g_free (input->evaluator);
00108       g_free (input->simulator);
00109       g_free (input->result);
00110       g_free (input->variables);
00111     }
00112   input->nexperiments = input->nvariables = input->nsteps = 0;
00113 #if DEBUG_INPUT
00114   fprintf (stderr, "input_free:  end\n");
00115 #endif
00116 }
```

Here is the call graph for this function:



5.9.3.2 input_new()

```
void input_new ( )
```

Function to create a new Input struct.

Definition at line 66 of file input.c.

```
00067 {
00068 #if DEBUG_INPUT
00069   fprintf (stderr, "input_new:  start\n");
00070 #endif
00071   input->nvariables = input->nexperiments = input->nsteps = 0;
00072   input->simulator = input->evaluator = input->directory = input->name = NULL;
00073   input->experiment = NULL;
00074   input->variable = NULL;
00075 #if DEBUG_INPUT
00076   fprintf (stderr, "input_new:  end\n");
00077 #endif
00078 }
```

5.9.3.3 input_open()

```
int input_open (
              char * filename )
```

Function to open the input file.

Returns

1_on_success, 0_on_error.

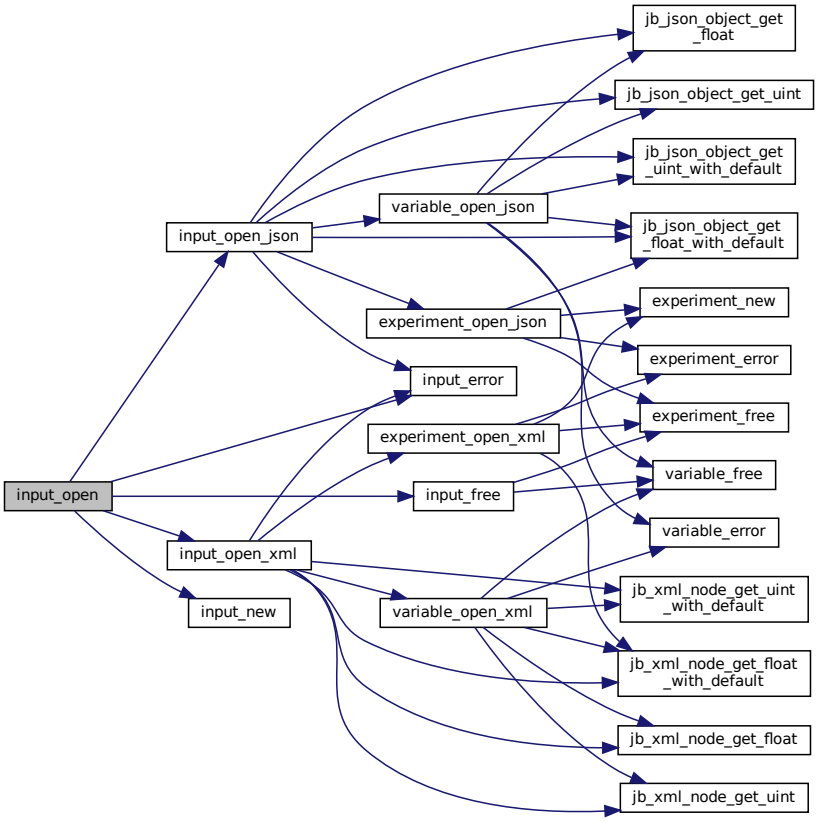
Parameters

filename	Input data file name.

Definition at line 961 of file input.c.

```
00962 {
00963   xmlDoc *doc;
00964   JsonParser *parser;
00965
00966 #if DEBUG_INPUT
00967   fprintf (stderr, "input_open:  start\n");
00968 #endif
00969
00970   // Resetting input data
00971   input_new ();
00972
00973   // Opening input file
00974 #if DEBUG_INPUT
00975   fprintf (stderr, "input_open:  opening the input file %s\n", filename);
00976   fprintf (stderr, "input_open:  trying XML format\n");
00977 #endif
00978   doc = xmlParseFile (filename);
00979   if (!doc)
00980     {
00981 #if DEBUG_INPUT
00982       fprintf (stderr, "input_open:  trying JSON format\n");
00983 #endif
00984       parser = json_parser_new ();
00985       if (!json_parser_load_from_file (parser, filename, NULL))
00986         {
00987           input_error (_("Unable to parse the input file"));
00988           goto exit_on_error;
00989         }
00990       if (!input_open_json (parser))
00991         goto exit_on_error;
00992     }
00993   else if (!input_open_xml (doc))
00994     goto exit_on_error;
00995
00996   // Getting the working directory
00997   input->directory = g_path_get_dirname (filename);
00998   input->name = g_path_get_basename (filename);
00999
01000 #if DEBUG_INPUT
01001   fprintf (stderr, "input_open:  end\n");
01002 #endif
01003   return 1;
01004
01005 exit_on_error:
01006   jbw_show_error (error_message);
01007   g_free (error_message);
01008   input_free ();
01009 #if DEBUG_INPUT
01010   fprintf (stderr, "input_open:  end\n");
01011 #endif
01012   return 0;
01013 }
```

Here is the call graph for this function:



5.9.4 Variable Documentation

5.9.4.1 input

```
Input input[1]  [extern]
```

Global Input struct to set the input data.

Definition at line 57 of file input.c.

5.9.4.2 result_name

```
const char* result_name  [extern]
```

Name of the result file.

Definition at line 59 of file input.c.

5.9.4.3 variables_name

```
const char* variables_name  [extern]
```

Name of the variables file.

Definition at line 60 of file input.c.

5.10 input.h

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
00012
00013 1.  Redistributions of source code must retain the above copyright notice,
00014 this list of conditions and the following disclaimer.
00015
00016 2.  Redistributions in binary form must reproduce the above copyright notice,
00017 this list of conditions and the following disclaimer in the
00018 documentation and/or other materials provided with the distribution.
00019
00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #ifndef INPUT__H
00039 #define INPUT__H 1
00040
00042 enum ClimbingMethod
00043 {
00044   CLIMBING_METHOD_COORDINATES = 0,
00045   CLIMBING_METHOD_RANDOM = 1,
00046 };
00047
00049 enum ErrorNorm
00050 {
00051   ERROR_NORM_EUCLIDIAN = 0,
00053   ERROR_NORM_MAXIMUM = 1,
00055   ERROR_NORM_P = 2,
00057   ERROR_NORM_TAXICAB = 3
00059 };
00060
00065 typedef struct
00066 {
00067   Experiment *experiment;
00068   Variable *variable;
00069   char *result;
00070   char *variables;
00071   char *simulator;
00072   char *evaluator;
00074   char *directory;
00075   char *name;
00076   double tolerance;
00077   double mutation_ratio;
00078   double reproduction_ratio;
00079   double adaptation_ratio;
00080   double relaxation;
00081   double p;
00082   double threshold;
00083   unsigned long int seed;
```

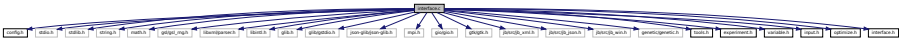
```
00085   unsigned int nvariables;
00086   unsigned int nexperiments;
00087   unsigned int nsimulations;
00088   unsigned int algorithm;
00089   unsigned int nsteps;
00091   unsigned int climbing;
00092   unsigned int nestimates;
00094   unsigned int niterations;
00095   unsigned int nbest;
00096   unsigned int norm;
00097   unsigned int type;
00098 } Input;
00099
00100 extern Input input[1];
00101 extern const char *result_name;
00102 extern const char *variables_name;
00103
00104 // Public functions
00105 void input_new ();
00106 void input_free ();
00107 int input_open (char *filename);
00108
00109 #endif
```

5.11 interface.c File Reference

Source file to define the graphical interface functions.

```
#include "config.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#include <gsl/gsl_rng.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <glib/gstdio.h>
#include <json-glib/json-glib.h>
#include <mpi.h>
#include <gio/gio.h>
#include <gtk/gtk.h>
#include "jb/src/jb_xml.h"
#include "jb/src/jb_json.h"
#include "jb/src/jb_win.h"
#include "genetic/genetic.h"
#include "tools.h"
#include "experiment.h"
#include "variable.h"
#include "input.h"
#include "optimize.h"
#include "interface.h"
```

Include dependency graph for interface.c:



Macros

- #define DEBUG_INTERFACE 1

  Macro to debug interface functions.

- #define INPUT_FILE "test-ga.xml"

  Macro to define the initial input file.

Functions

- static void input_save_climbing_xml (xmlNode *node)
- static void input_save_climbing_json (JsonNode *node)
- static void input_save_xml (xmlDoc *doc)
- static void input_save_json (JsonGenerator *generator)
- static void input_save (char *filename)
- static void dialog_options_close (GtkDialog *dlg, int response_id)
- static void options_new ()
- static void running_new ()
- static unsigned int window_get_algorithm ()
- static unsigned int window_get_climbing ()
- static unsigned int window_get_norm ()
- static void window_save_climbing ()
- static void dialog_save_close (GtkFileChooserDialog *dlg, int response_id)
- static void window_save ()
- static void window_run ()
- static void window_help ()
- static void window_about ()
- static void window_update_climbing ()
- static void window_update ()
- static void window_set_algorithm ()
- static void window_set_experiment ()
- static void window_remove_experiment ()
- static void window_add_experiment ()
- static void dialog_name_experiment_close (GtkFileChooserDialog *dlg, int response_id, void *data)
- static void window_name_experiment ()
- static void window_weight_experiment ()
- static void window_inputs_experiment ()
- static void window_template_experiment_close (GtkFileChooserDialog *dlg, int response_id, void *data)
- static void window_template_experiment (void *data)
- static void window_set_variable ()
- static void window_remove_variable ()
- static void window_add_variable ()
- static void window_label_variable ()
- static void window_precision_variable ()
- static void window_rangemin_variable ()
- static void window_rangemax_variable ()
- static void window_rangeminabs_variable ()
- static void window_rangemaxabs_variable ()
- static void window_step_variable ()
- static void window_update_variable ()
- static int window_read (char *filename)
- static void dialog_open_close (GtkFileChooserDialog *dlg, int response_id)
- static void window_open ()
- static void dialog_simulator_close (GtkFileChooserDialog *dlg, int response_id)
- static void dialog_simulator ()
- static void dialog_evaluator_close (GtkFileChooserDialog *dlg, int response_id)
- static void dialog_evaluator ()
- void window_new (GtkApplication *application)

Variables

- Window window [1]

  Window struct to define the main interface window.
- static const char * logo [ ]

  Logo pixmap.
- static Options options [1]

  Options struct to define the options dialog.
- static Running running [1]

  Running struct to define the running dialog.

5.11.1 Detailed Description

Source file to define the graphical interface functions.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file interface.c.

5.11.2 Macro Definition Documentation

5.11.2.1 DEBUG_INTERFACE

```
#define DEBUG_INTERFACE 1
```

Macro to debug interface functions.

Definition at line 69 of file interface.c.

5.11.2.2 INPUT_FILE

```
#define INPUT_FILE "test-ga.xml"
```

Macro to define the initial input file.

Definition at line 78 of file interface.c.

5.11.3 Function Documentation

5.11.3.1 dialog_evaluator()

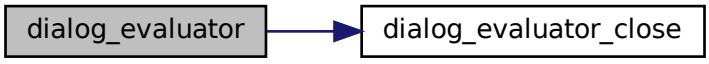
```
static void dialog_evaluator ( )  [static]
```

Function to open a dialog to save the evaluator file.

Definition at line 2251 of file interface.c.

```
02252 {
02253   GtkFileChooserDialog *dlg;
02254 #if DEBUG_INTERFACE
02255   fprintf (stderr, "dialog_evaluator:  start\n");
02256 #endif
02257   dlg = (GtkFileChooserDialog *)
02258     gtk_file_chooser_dialog_new (_("Open evaluator file"),
02259                                  window->window,
02260                                  GTK_FILE_CHOOSER_ACTION_OPEN,
02261                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02262                                  _("_Open"), GTK_RESPONSE_ACCEPT, NULL);
02263   g_signal_connect (dlg, "response", G_CALLBACK (dialog_evaluator_close), NULL);
02264   gtk_window_present (GTK_WINDOW (dlg));
02265 #if DEBUG_INTERFACE
02266   fprintf (stderr, "dialog_evaluator:  end\n");
02267 #endif
02268 }
```

Here is the call graph for this function:



5.11.3.2 dialog_evaluator_close()

```
static void dialog_evaluator_close (
             GtkFileChooserDialog * dlg,
             int response_id )  [static]
```

Function to save the close the evaluator file dialog.

Parameters

dlg	GtkFileChooserDialog dialog.
response_id	Response identifier.

Definition at line 2220 of file interface.c.

```
02223 {
02224   GFile *file1, *file2;
02225   char *buffer1, *buffer2;
02226 #if DEBUG_INTERFACE
02227   fprintf (stderr, "dialog_evaluator_close:  start\n");
02228 #endif
02229   if (response_id == GTK_RESPONSE_OK)
02230     {
02231       buffer1 = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
02232       file1 = g_file_new_for_path (buffer1);
02233       file2 = g_file_new_for_path (input->directory);
02234       buffer2 = g_file_get_relative_path (file2, file1);
02235       input->evaluator = g_strdup (buffer2);
02236       g_free (buffer2);
02237       g_object_unref (file2);
02238       g_object_unref (file1);
02239       g_free (buffer1);
02240     }
02241   gtk_window_destroy (GTK_WINDOW (dlg));
02242 #if DEBUG_INTERFACE
02243   fprintf (stderr, "dialog_evaluator_close:  end\n");
02244 #endif
02245 }
```

5.11.3.3 dialog_name_experiment_close()

```
static void dialog_name_experiment_close (
             GtkFileChooserDialog * dlg,
             int response_id,
             void * data )  [static]
```

Function to close the experiment name dialog.

Parameters

dlg	GtkFileChooserDialog struct.
response_id	Response identifier.
data	Function data.

Definition at line 1459 of file interface.c.

```
01463 {
01464   char *buffer;
01465   unsigned int i;
01466 #if DEBUG_INTERFACE
01467   fprintf (stderr, "window_name_experiment_close:  start\n");
01468 #endif
01469   i = (size_t) data;
01470   if (response_id == GTK_RESPONSE_OK)
01471     {
01472       buffer = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
01473       g_signal_handler_block (window->combo_experiment, window->id_experiment);
01474       gtk_combo_box_text_remove (window->combo_experiment, i);
01475       gtk_combo_box_text_insert_text (window->combo_experiment, i, buffer);
01476       gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01477       g_signal_handler_unblock (window->combo_experiment,
01478                                 window->id_experiment);
01479       g_free (buffer);
01480     }
01481 #if DEBUG_INTERFACE
01482   fprintf (stderr, "window_name_experiment_close:  end\n");
01483 #endif
01484 }
```

5.11.3.4 dialog_open_close()

```
static void dialog_open_close (
             GtkFileChooserDialog * dlg,
             int response_id )  [static]
```

Function to close the input data dialog.

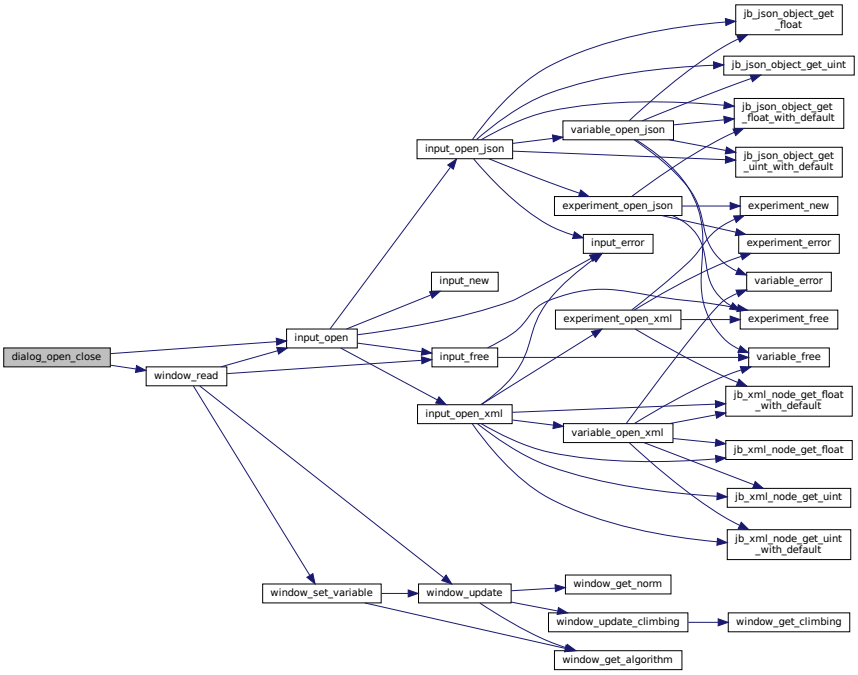
Parameters

dlg	GtkFileChooserDialog dialog.
response_id	Response identifier.

Definition at line 2054 of file interface.c.

```
02057 {
02058   char *buffer, *directory, *name;
02059   GFile *file;
02060
02061 #if DEBUG_INTERFACE
02062   fprintf (stderr, "dialog_open_close:  start\n");
02063 #endif
02064
02065   // Saving a backup of the current input file
02066   directory = g_strdup (input->directory);
02067   name = g_strdup (input->name);
02068
02069   // If OK saving
02070   if (response_id == GTK_RESPONSE_OK)
02071     {
02072
02073       // Traying to open the input file
02074       file = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (dlg));
02075       buffer = g_file_get_path (file);
02076 #if DEBUG_INTERFACE
02077       fprintf (stderr, "dialog_open_close:  file name=%s\n", buffer);
02078 #endif
02079       if (!window_read (buffer))
02080         {
02081 #if DEBUG_INTERFACE
02082           fprintf (stderr, "dialog_open_close:  error reading input file\n");
02083 #endif
02084           g_free (buffer);
02085
02086           // Reading backup file on error
02087           buffer = g_build_filename (directory, name, NULL);
02088           input->result = input->variables = NULL;
02089           if (!input_open (buffer))
02090             {
02091
02092               // Closing on backup file reading error
02093 #if DEBUG_INTERFACE
02094               fprintf (stderr,
02095                        "dialog_open_close:  error reading backup file\n");
02096 #endif
02097             }
02098         }
02099       g_free (buffer);
02100       g_object_unref (file);
02101     }
02102
02103   // Freeing and closing
02104   g_free (name);
02105   g_free (directory);
02106   gtk_window_destroy (GTK_WINDOW (dlg));
02107
02108 #if DEBUG_INTERFACE
02109   fprintf (stderr, "dialog_open_close:  end\n");
02110 #endif
02111
02112 }
```

Here is the call graph for this function:



5.11.3.5 dialog_options_close()

```
static void dialog_options_close (
            GtkDialog * dlg,
            int response_id )  [static]
```

Function to close the options dialog.

Parameters

dlg	GtkDialog options dialog.
response_id	Response identifier.

Definition at line 638 of file interface.c.

```
00640 {
00641 #if DEBUG_INTERFACE
00642   fprintf (stderr, "dialog_options_close:  start\n");
00643 #endif
00644   if (response_id == GTK_RESPONSE_OK)
00645     {
00646       input->seed
00647         = (unsigned long int) gtk_spin_button_get_value (options->spin_seed);
00648       nthreads = gtk_spin_button_get_value_as_int (options->spin_threads);
00649       nthreads_climbing
00650         = gtk_spin_button_get_value_as_int (options->spin_climbing);
00651     }
00652   gtk_window_destroy (GTK_WINDOW (dlg));
00653 #if DEBUG_INTERFACE
```

```
00654   fprintf (stderr, "dialog_options_close:  end\n");
00655 #endif
00656 }
```

5.11.3.6 dialog_save_close()

```
static void dialog_save_close (
             GtkFileChooserDialog * dlg,
             int response_id )  [static]
```

Function to close the save dialog.

Parameters

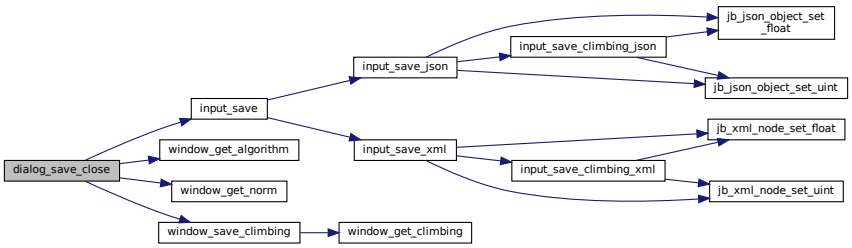
dlg	GtkFileChooserDialog dialog.
response_id	Response identifier.

Definition at line 852 of file interface.c.

```
00855 {
00856   GtkFileFilter *filter1;
00857   char *buffer;
00858 #if DEBUG_INTERFACE
00859   fprintf (stderr, "dialog_save_close:  start\n");
00860 #endif
00861   // If OK response then saving
00862   if (response_id == GTK_RESPONSE_OK)
00863     {
00864       // Setting input file type
00865       filter1 = gtk_file_chooser_get_filter (GTK_FILE_CHOOSER (dlg));
00866       buffer = (char *) gtk_file_filter_get_name (filter1);
00867       if (!strcmp (buffer, "XML"))
00868         input->type = INPUT_TYPE_XML;
00869       else
00870         input->type = INPUT_TYPE_JSON;
00871
00872       // Adding properties to the root XML node
00873       input->simulator
00874         = g_strdup (gtk_button_get_label (window->button_simulator));
00875       if (gtk_check_button_get_active (window->check_evaluator))
00876         input->evaluator
00877           = g_strdup (gtk_button_get_label (window->button_evaluator));
00878       else
00879         input->evaluator = NULL;
00880       if (input->type == INPUT_TYPE_XML)
00881         {
00882           input->result
00883             = (char *) xmlStrdup ((const xmlChar *)
00884                                   gtk_entry_get_text (window->entry_result));
00885           input->variables
00886             = (char *) xmlStrdup ((const xmlChar *)
00887                                   gtk_entry_get_text (window->entry_variables));
00888         }
00889       else
00890         {
00891           input->result = g_strdup (gtk_entry_get_text (window->entry_result));
00892           input->variables =
00893             g_strdup (gtk_entry_get_text (window->entry_variables));
00894         }
00895
00896       // Setting the algorithm
00897       switch (window_get_algorithm ())
00898         {
00899         case ALGORITHM_MONTE_CARLO:
00900           input->algorithm = ALGORITHM_MONTE_CARLO;
00901           input->nsimulations
00902             = gtk_spin_button_get_value_as_int (window->spin_simulations);
00903           input->niterations
00904             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00905           input->tolerance = gtk_spin_button_get_value (window->spin_tolerance);
00906           input->nbest = gtk_spin_button_get_value_as_int (window->spin_bests);
```

```
00907           window_save_climbing ();
00908           break;
00909         case ALGORITHM_SWEEP:
00910           input->algorithm = ALGORITHM_SWEEP;
00911           input->niterations
00912             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00913           input->tolerance = gtk_spin_button_get_value (window->spin_tolerance);
00914           input->nbest = gtk_spin_button_get_value_as_int (window->spin_bests);
00915           window_save_climbing ();
00916           break;
00917         case ALGORITHM_ORTHOGONAL:
00918           input->algorithm = ALGORITHM_ORTHOGONAL;
00919           input->niterations
00920             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00921           input->tolerance = gtk_spin_button_get_value (window->spin_tolerance);
00922           input->nbest = gtk_spin_button_get_value_as_int (window->spin_bests);
00923           window_save_climbing ();
00924           break;
00925         default:
00926           input->algorithm = ALGORITHM_GENETIC;
00927           input->nsimulations
00928             = gtk_spin_button_get_value_as_int (window->spin_population);
00929           input->niterations
00930             = gtk_spin_button_get_value_as_int (window->spin_generations);
00931           input->mutation_ratio
00932             = gtk_spin_button_get_value (window->spin_mutation);
00933           input->reproduction_ratio
00934             = gtk_spin_button_get_value (window->spin_reproduction);
00935           input->adaptation_ratio
00936             = gtk_spin_button_get_value (window->spin_adaptation);
00937         }
00938       input->norm = window_get_norm ();
00939       input->p = gtk_spin_button_get_value (window->spin_p);
00940       input->threshold = gtk_spin_button_get_value (window->spin_threshold);
00941
00942       // Saving the XML file
00943       buffer = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
00944       input_save (buffer);
00945
00946       // Closing and freeing memory
00947       g_free (buffer);
00948     }
00949   gtk_window_destroy (GTK_WINDOW (dlg));
00950 #if DEBUG_INTERFACE
00951   fprintf (stderr, "dialog_save_close:  end\n");
00952 #endif
00953 }
```

Here is the call graph for this function:



5.11.3.7 dialog_simulator()

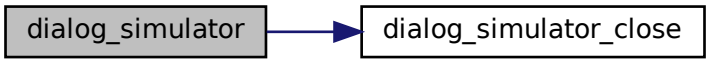
```
static void dialog_simulator ( )  [static]
```

Function to open a dialog to save the simulator file.

Definition at line 2197 of file interface.c.

```
02198 {
02199   GtkFileChooserDialog *dlg;
02200 #if DEBUG_INTERFACE
02201   fprintf (stderr, "dialog_simulator:  start\n");
02202 #endif
02203   dlg = (GtkFileChooserDialog *)
02204     gtk_file_chooser_dialog_new (_("Open simulator file"),
02205                                  window->window,
02206                                  GTK_FILE_CHOOSER_ACTION_OPEN,
02207                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02208                                  _("_Open"), GTK_RESPONSE_ACCEPT, NULL);
02209   g_signal_connect (dlg, "response", G_CALLBACK (dialog_simulator_close), NULL);
02210   gtk_window_present (GTK_WINDOW (dlg));
02211 #if DEBUG_INTERFACE
02212   fprintf (stderr, "dialog_simulator:  end\n");
02213 #endif
02214 }
```

Here is the call graph for this function:



5.11.3.8 dialog_simulator_close()

```
static void dialog_simulator_close (
             GtkFileChooserDialog * dlg,
             int response_id )  [static]
```

Function to save the close the simulator file dialog.

Parameters

dlg	GtkFileChooserDialog dialog.
response_id	Response identifier.

Definition at line 2166 of file interface.c.

```
02169 {
02170   GFile *file1, *file2;
02171   char *buffer1, *buffer2;
02172 #if DEBUG_INTERFACE
02173   fprintf (stderr, "dialog_simulator_close:  start\n");
02174 #endif
02175   if (response_id == GTK_RESPONSE_OK)
02176     {
02177       buffer1 = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
02178       file1 = g_file_new_for_path (buffer1);
02179       file2 = g_file_new_for_path (input->directory);
02180       buffer2 = g_file_get_relative_path (file2, file1);
02181       input->simulator = g_strdup (buffer2);
02182       g_free (buffer2);
02183       g_object_unref (file2);
02184       g_object_unref (file1);
02185       g_free (buffer1);
02186     }
```

```
02187   gtk_window_destroy (GTK_WINDOW (dlg));
02188 #if DEBUG_INTERFACE
02189   fprintf (stderr, "dialog_simulator_close:  end\n");
02190 #endif
02191 }
```

5.11.3.9 input_save()

```
static void input_save (
             char * filename )  [inline], [static]
```

Function to save the input file.

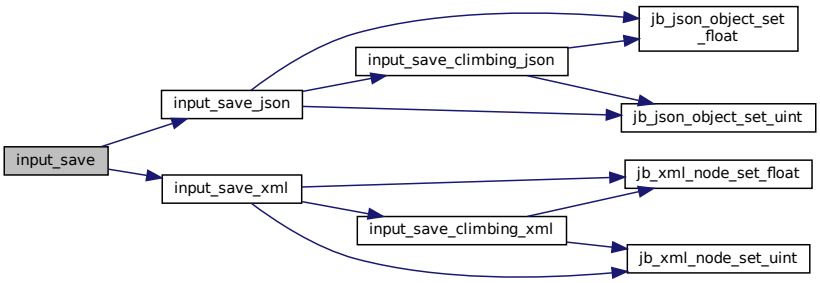
Parameters

filename	Input file name.

Definition at line 590 of file interface.c.

```
00591 {
00592   xmlDoc *doc;
00593   JsonGenerator *generator;
00594
00595 #if DEBUG_INTERFACE
00596   fprintf (stderr, "input_save:  start\n");
00597 #endif
00598
00599   // Getting the input file directory
00600   input->name = g_path_get_basename (filename);
00601   input->directory = g_path_get_dirname (filename);
00602
00603   if (input->type == INPUT_TYPE_XML)
00604     {
00605       // Opening the input file
00606       doc = xmlNewDoc ((const xmlChar *) "1.0");
00607       input_save_xml (doc);
00608
00609       // Saving the XML file
00610       xmlSaveFormatFile (filename, doc, 1);
00611
00612       // Freeing memory
00613       xmlFreeDoc (doc);
00614     }
00615   else
00616     {
00617       // Opening the input file
00618       generator = json_generator_new ();
00619       json_generator_set_pretty (generator, TRUE);
00620       input_save_json (generator);
00621
00622       // Saving the JSON file
00623       json_generator_to_file (generator, filename, NULL);
00624
00625       // Freeing memory
00626       g_object_unref (generator);
00627     }
00628
00629 #if DEBUG_INTERFACE
00630   fprintf (stderr, "input_save:  end\n");
00631 #endif
00632 }
```

Here is the call graph for this function:



5.11.3.10 input_save_climbing_json()

```
static void input_save_climbing_json (
             JsonNode * node )  [static]
```

Function to save the hill climbing method data in a JSON node.

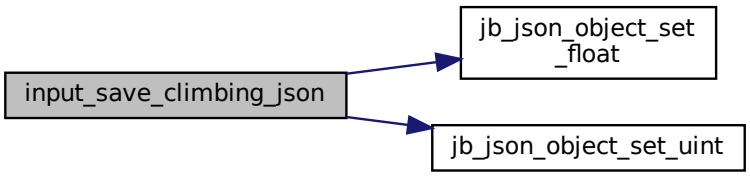
Parameters

node	JSON node.

Definition at line 206 of file interface.c.

```
00207 {
00208   JsonObject *object;
00209 #if DEBUG_INTERFACE
00210   fprintf (stderr, "input_save_climbing_json:  start\n");
00211 #endif
00212   object = json_node_get_object (node);
00213   if (input->nsteps)
00214     {
00215       jb_json_object_set_uint (object, LABEL_NSTEPS, input->nsteps);
00216       if (input->relaxation != DEFAULT_RELAXATION)
00217         jb_json_object_set_float (object, LABEL_RELAXATION, input->relaxation);
00218       switch (input->climbing)
00219         {
00220         case CLIMBING_METHOD_COORDINATES:
00221           json_object_set_string_member (object, LABEL_CLIMBING,
00222                                          LABEL_COORDINATES);
00223           break;
00224         default:
00225           json_object_set_string_member (object, LABEL_CLIMBING, LABEL_RANDOM);
00226           jb_json_object_set_uint (object, LABEL_NESTIMATES, input->nestimates);
00227         }
00228     }
00229 #if DEBUG_INTERFACE
00230   fprintf (stderr, "input_save_climbing_json:  end\n");
00231 #endif
00232 }
```

Here is the call graph for this function:



5.11.3.11 input_save_climbing_xml()

```
static void input_save_climbing_xml (
             xmlNode * node )  [static]
```

Function to save the hill climbing method data in a XML node.

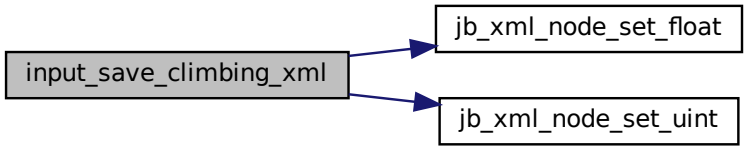
Parameters

node	XML node.

Definition at line 172 of file interface.c.

```
00173 {
00174 #if DEBUG_INTERFACE
00175   fprintf (stderr, "input_save_climbing_xml:  start\n");
00176 #endif
00177   if (input->nsteps)
00178     {
00179       jb_xml_node_set_uint (node, (const xmlChar *) LABEL_NSTEPS,
00180                             input->nsteps);
00181       if (input->relaxation != DEFAULT_RELAXATION)
00182         jb_xml_node_set_float (node, (const xmlChar *) LABEL_RELAXATION,
00183                                input->relaxation);
00184       switch (input->climbing)
00185         {
00186         case CLIMBING_METHOD_COORDINATES:
00187           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00188                       (const xmlChar *) LABEL_COORDINATES);
00189           break;
00190         default:
00191           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00192                       (const xmlChar *) LABEL_RANDOM);
00193           jb_xml_node_set_uint (node, (const xmlChar *) LABEL_NESTIMATES,
00194                                 input->nestimates);
00195         }
00196     }
00197 #if DEBUG_INTERFACE
00198   fprintf (stderr, "input_save_climbing_xml:  end\n");
00199 #endif
00200 }
```

Here is the call graph for this function:



5.11.3.12 input_save_json()

```
static void input_save_json (
             JsonGenerator * generator )  [inline], [static]
```

Function to save the input file in JSON format.

Parameters

generator	JsonGenerator struct.

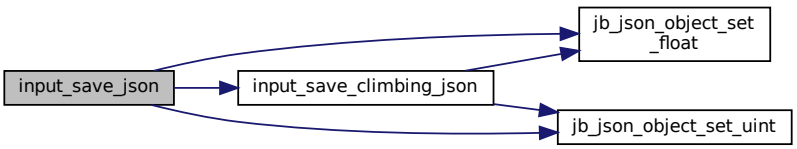
Definition at line 418 of file interface.c.

```
00419 {
00420   unsigned int i, j;
00421   char *buffer;
00422   JsonNode *node, *child;
00423   JsonObject *object;
00424   JsonArray *array;
00425   GFile *file, *file2;
00426
00427 #if DEBUG_INTERFACE
00428   fprintf (stderr, "input_save_json:  start\n");
00429 #endif
00430
00431   // Setting root JSON node
00432   object = json_object_new ();
00433   node = json_node_new (JSON_NODE_OBJECT);
00434   json_node_set_object (node, object);
00435   json_generator_set_root (generator, node);
00436
00437   // Adding properties to the root JSON node
00438   if (strcmp (input->result, result_name))
00439     json_object_set_string_member (object, LABEL_RESULT_FILE, input->result);
00440   if (strcmp (input->variables, variables_name))
00441     json_object_set_string_member (object, LABEL_VARIABLES_FILE,
00442                                    input->variables);
00443   file = g_file_new_for_path (input->directory);
00444   file2 = g_file_new_for_path (input->simulator);
00445   buffer = g_file_get_relative_path (file, file2);
00446   g_object_unref (file2);
00447   json_object_set_string_member (object, LABEL_SIMULATOR, buffer);
00448   g_free (buffer);
00449   if (input->evaluator)
00450     {
00451       file2 = g_file_new_for_path (input->evaluator);
00452       buffer = g_file_get_relative_path (file, file2);
00453       g_object_unref (file2);
00454       if (strlen (buffer))
00455         json_object_set_string_member (object, LABEL_EVALUATOR, buffer);
00456       g_free (buffer);
```

```
00457     }
00458   if (input->seed != DEFAULT_RANDOM_SEED)
00459     jb_json_object_set_uint (object, LABEL_SEED, input->seed);
00460
00461   // Setting the algorithm
00462   buffer = (char *) g_slice_alloc (64);
00463   switch (input->algorithm)
00464     {
00465     case ALGORITHM_MONTE_CARLO:
00466       json_object_set_string_member (object, LABEL_ALGORITHM,
00467                                      LABEL_MONTE_CARLO);
00468       snprintf (buffer, 64, "%u", input->nsimulations);
00469       json_object_set_string_member (object, LABEL_NSIMULATIONS, buffer);
00470       snprintf (buffer, 64, "%u", input->niterations);
00471       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00472       snprintf (buffer, 64, "%.3lg", input->tolerance);
00473       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00474       snprintf (buffer, 64, "%u", input->nbest);
00475       json_object_set_string_member (object, LABEL_NBEST, buffer);
00476       input_save_climbing_json (node);
00477       break;
00478     case ALGORITHM_SWEEP:
00479       json_object_set_string_member (object, LABEL_ALGORITHM, LABEL_SWEEP);
00480       snprintf (buffer, 64, "%u", input->niterations);
00481       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00482       snprintf (buffer, 64, "%.3lg", input->tolerance);
00483       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00484       snprintf (buffer, 64, "%u", input->nbest);
00485       json_object_set_string_member (object, LABEL_NBEST, buffer);
00486       input_save_climbing_json (node);
00487       break;
00488     case ALGORITHM_ORTHOGONAL:
00489       json_object_set_string_member (object, LABEL_ALGORITHM, LABEL_ORTHOGONAL);
00490       snprintf (buffer, 64, "%u", input->niterations);
00491       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00492       snprintf (buffer, 64, "%.3lg", input->tolerance);
00493       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00494       snprintf (buffer, 64, "%u", input->nbest);
00495       json_object_set_string_member (object, LABEL_NBEST, buffer);
00496       input_save_climbing_json (node);
00497       break;
00498     default:
00499       json_object_set_string_member (object, LABEL_ALGORITHM, LABEL_GENETIC);
00500       snprintf (buffer, 64, "%u", input->nsimulations);
00501       json_object_set_string_member (object, LABEL_NPOPULATION, buffer);
00502       snprintf (buffer, 64, "%u", input->niterations);
00503       json_object_set_string_member (object, LABEL_NGENERATIONS, buffer);
00504       snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00505       json_object_set_string_member (object, LABEL_MUTATION, buffer);
00506       snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00507       json_object_set_string_member (object, LABEL_REPRODUCTION, buffer);
00508       snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00509       json_object_set_string_member (object, LABEL_ADAPTATION, buffer);
00510       break;
00511     }
00512   g_slice_free1 (64, buffer);
00513   if (input->threshold != 0.)
00514     jb_json_object_set_float (object, LABEL_THRESHOLD, input->threshold);
00515
00516   // Setting the experimental data
00517   array = json_array_new ();
00518   for (i = 0; i < input->nexperiments; ++i)
00519     {
00520       child = json_node_new (JSON_NODE_OBJECT);
00521       object = json_node_get_object (child);
00522       json_object_set_string_member (object, LABEL_NAME,
00523                                      input->experiment[i].name);
00524       if (input->experiment[i].weight != 1.)
00525         jb_json_object_set_float (object, LABEL_WEIGHT,
00526                                   input->experiment[i].weight);
00527       for (j = 0; j < input->experiment->ninputs; ++j)
00528         json_object_set_string_member (object, stencil[j],
00529                                        input->experiment[i].stencil[j]);
00530       json_array_add_element (array, child);
00531     }
00532   json_object_set_array_member (object, LABEL_EXPERIMENTS, array);
00533
00534   // Setting the variables data
00535   array = json_array_new ();
00536   for (i = 0; i < input->nvariables; ++i)
00537     {
00538       child = json_node_new (JSON_NODE_OBJECT);
00539       object = json_node_get_object (child);
00540       json_object_set_string_member (object, LABEL_NAME,
00541                                      input->variable[i].name);
00542       jb_json_object_set_float (object, LABEL_MINIMUM,
00543                                 input->variable[i].rangemin);
```

```
00544       if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00545         jb_json_object_set_float (object, LABEL_ABSOLUTE_MINIMUM,
00546                                   input->variable[i].rangeminabs);
00547       jb_json_object_set_float (object, LABEL_MAXIMUM,
00548                                 input->variable[i].rangemax);
00549       if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00550         jb_json_object_set_float (object, LABEL_ABSOLUTE_MAXIMUM,
00551                                   input->variable[i].rangemaxabs);
00552       if (input->variable[i].precision != DEFAULT_PRECISION)
00553         jb_json_object_set_uint (object, LABEL_PRECISION,
00554                                  input->variable[i].precision);
00555       if (input->algorithm == ALGORITHM_SWEEP
00556           || input->algorithm == ALGORITHM_ORTHOGONAL)
00557         jb_json_object_set_uint (object, LABEL_NSWEEPS,
00558                                  input->variable[i].nsweeps);
00559       else if (input->algorithm == ALGORITHM_GENETIC)
00560         jb_json_object_set_uint (object, LABEL_NBITS, input->variable[i].nbits);
00561       if (input->nsteps)
00562         jb_json_object_set_float (object, LABEL_STEP, input->variable[i].step);
00563       json_array_add_element (array, child);
00564     }
00565   json_object_set_array_member (object, LABEL_VARIABLES, array);
00566
00567   // Saving the error norm
00568   switch (input->norm)
00569     {
00570     case ERROR_NORM_MAXIMUM:
00571       json_object_set_string_member (object, LABEL_NORM, LABEL_MAXIMUM);
00572       break;
00573     case ERROR_NORM_P:
00574       json_object_set_string_member (object, LABEL_NORM, LABEL_P);
00575       jb_json_object_set_float (object, LABEL_P, input->p);
00576       break;
00577     case ERROR_NORM_TAXICAB:
00578       json_object_set_string_member (object, LABEL_NORM, LABEL_TAXICAB);
00579     }
00580
00581 #if DEBUG_INTERFACE
00582   fprintf (stderr, "input_save_json:  end\n");
00583 #endif
00584 }
```

Here is the call graph for this function:



5.11.3.13 input_save_xml()

```
static void input_save_xml (
             xmlDoc * doc )  [inline], [static]
```

Function to save the input file in XML format.

Parameters

doc	xmlDoc struct.

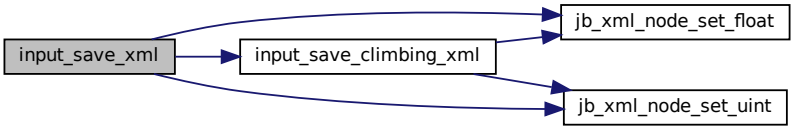
Definition at line 238 of file interface.c.

```
00239 {
00240   unsigned int i, j;
00241   char *buffer;
00242   xmlNode *node, *child;
00243   GFile *file, *file2;
00244
00245 #if DEBUG_INTERFACE
00246   fprintf (stderr, "input_save_xml:  start\n");
00247 #endif
00248
00249   // Setting root XML node
00250   node = xmlNewDocNode (doc, 0, (const xmlChar *) LABEL_OPTIMIZE, 0);
00251   xmlDocSetRootElement (doc, node);
00252
00253   // Adding properties to the root XML node
00254   if (xmlStrcmp
00255       ((const xmlChar *) input->result, (const xmlChar *) result_name))
00256     xmlSetProp (node, (const xmlChar *) LABEL_RESULT_FILE,
00257                 (xmlChar *) input->result);
00258   if (xmlStrcmp
00259       ((const xmlChar *) input->variables, (const xmlChar *) variables_name))
00260     xmlSetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE,
00261                 (xmlChar *) input->variables);
00262   file = g_file_new_for_path (input->directory);
00263   file2 = g_file_new_for_path (input->simulator);
00264   buffer = g_file_get_relative_path (file, file2);
00265   g_object_unref (file2);
00266   xmlSetProp (node, (const xmlChar *) LABEL_SIMULATOR, (xmlChar *) buffer);
00267   g_free (buffer);
00268   if (input->evaluator)
00269     {
00270       file2 = g_file_new_for_path (input->evaluator);
00271       buffer = g_file_get_relative_path (file, file2);
00272       g_object_unref (file2);
00273       if (xmlStrlen ((xmlChar *) buffer))
00274         xmlSetProp (node, (const xmlChar *) LABEL_EVALUATOR,
00275                     (xmlChar *) buffer);
00276       g_free (buffer);
00277     }
00278   if (input->seed != DEFAULT_RANDOM_SEED)
00279     jb_xml_node_set_uint (node, (const xmlChar *) LABEL_SEED, input->seed);
00280
00281   // Setting the algorithm
00282   buffer = (char *) g_slice_alloc (64);
00283   switch (input->algorithm)
00284     {
00285     case ALGORITHM_MONTE_CARLO:
00286       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00287                   (const xmlChar *) LABEL_MONTE_CARLO);
00288       snprintf (buffer, 64, "%u", input->nsimulations);
00289       xmlSetProp (node, (const xmlChar *) LABEL_NSIMULATIONS,
00290                   (xmlChar *) buffer);
00291       snprintf (buffer, 64, "%u", input->niterations);
00292       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00293                   (xmlChar *) buffer);
00294       snprintf (buffer, 64, "%.31g", input->tolerance);
00295       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00296       snprintf (buffer, 64, "%u", input->nbest);
00297       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00298       input_save_climbing_xml (node);
00299       break;
00300     case ALGORITHM_SWEEP:
00301       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00302                   (const xmlChar *) LABEL_SWEEP);
00303       snprintf (buffer, 64, "%u", input->niterations);
00304       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00305                   (xmlChar *) buffer);
00306       snprintf (buffer, 64, "%.31g", input->tolerance);
00307       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00308       snprintf (buffer, 64, "%u", input->nbest);
00309       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00310       input_save_climbing_xml (node);
00311       break;
00312     case ALGORITHM_ORTHOGONAL:
00313       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00314                   (const xmlChar *) LABEL_ORTHOGONAL);
00315       snprintf (buffer, 64, "%u", input->niterations);
00316       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00317                   (xmlChar *) buffer);
00318       snprintf (buffer, 64, "%.31g", input->tolerance);
00319       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00320       snprintf (buffer, 64, "%u", input->nbest);
00321       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00322       input_save_climbing_xml (node);
00323       break;
00324     default:
```

```
00325       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00326                   (const xmlChar *) LABEL_GENETIC);
00327       snprintf (buffer, 64, "%u", input->nsimulations);
00328       xmlSetProp (node, (const xmlChar *) LABEL_NPOPULATION,
00329                   (xmlChar *) buffer);
00330       snprintf (buffer, 64, "%u", input->niterations);
00331       xmlSetProp (node, (const xmlChar *) LABEL_NGENERATIONS,
00332                   (xmlChar *) buffer);
00333       snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00334       xmlSetProp (node, (const xmlChar *) LABEL_MUTATION, (xmlChar *) buffer);
00335       snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00336       xmlSetProp (node, (const xmlChar *) LABEL_REPRODUCTION,
00337                   (xmlChar *) buffer);
00338       snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00339       xmlSetProp (node, (const xmlChar *) LABEL_ADAPTATION, (xmlChar *) buffer);
00340       break;
00341     }
00342   g_slice_free1 (64, buffer);
00343   if (input->threshold != 0.)
00344     jb_xml_node_set_float (node, (const xmlChar *) LABEL_THRESHOLD,
00345                            input->threshold);
00346
00347   // Setting the experimental data
00348   for (i = 0; i < input->nexperiments; ++i)
00349     {
00350       child = xmlNewChild (node, 0, (const xmlChar *) LABEL_EXPERIMENT, 0);
00351       xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00352                   (xmlChar *) input->experiment[i].name);
00353       if (input->experiment[i].weight != 1.)
00354         jb_xml_node_set_float (child, (const xmlChar *) LABEL_WEIGHT,
00355                                input->experiment[i].weight);
00356       for (j = 0; j < input->experiment->ninputs; ++j)
00357         xmlSetProp (child, (const xmlChar *) stencil[j],
00358                     (xmlChar *) input->experiment[i].stencil[j]);
00359     }
00360
00361   // Setting the variables data
00362   for (i = 0; i < input->nvariables; ++i)
00363     {
00364       child = xmlNewChild (node, 0, (const xmlChar *) LABEL_VARIABLE, 0);
00365       xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00366                   (xmlChar *) input->variable[i].name);
00367       jb_xml_node_set_float (child, (const xmlChar *) LABEL_MINIMUM,
00368                              input->variable[i].rangemin);
00369       if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00370         jb_xml_node_set_float (child, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM,
00371                                input->variable[i].rangeminabs);
00372       jb_xml_node_set_float (child, (const xmlChar *) LABEL_MAXIMUM,
00373                              input->variable[i].rangemax);
00374       if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00375         jb_xml_node_set_float (child, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM,
00376                                input->variable[i].rangemaxabs);
00377       if (input->variable[i].precision != DEFAULT_PRECISION)
00378         jb_xml_node_set_uint (child, (const xmlChar *) LABEL_PRECISION,
00379                               input->variable[i].precision);
00380       if (input->algorithm == ALGORITHM_SWEEP
00381           || input->algorithm == ALGORITHM_ORTHOGONAL)
00382         jb_xml_node_set_uint (child, (const xmlChar *) LABEL_NSWEEPS,
00383                               input->variable[i].nsweeps);
00384       else if (input->algorithm == ALGORITHM_GENETIC)
00385         jb_xml_node_set_uint (child, (const xmlChar *) LABEL_NBITS,
00386                               input->variable[i].nbits);
00387       if (input->nsteps)
00388         jb_xml_node_set_float (child, (const xmlChar *) LABEL_STEP,
00389                                input->variable[i].step);
00390     }
00391
00392   // Saving the error norm
00393   switch (input->norm)
00394     {
00395     case ERROR_NORM_MAXIMUM:
00396       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00397                   (const xmlChar *) LABEL_MAXIMUM);
00398       break;
00399     case ERROR_NORM_P:
00400       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00401                   (const xmlChar *) LABEL_P);
00402       jb_xml_node_set_float (node, (const xmlChar *) LABEL_P, input->p);
00403       break;
00404     case ERROR_NORM_TAXICAB:
00405       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00406                   (const xmlChar *) LABEL_TAXICAB);
00407     }
00408
00409 #if DEBUG_INTERFACE
00410   fprintf (stderr, "input_save:  end\n");
00411 #endif
```

```
00412 }
```

Here is the call graph for this function:



5.11.3.14 options_new()

```
static void options_new ( )  [static]
```

Function to open the options dialog.

Definition at line 662 of file interface.c.

```
00663 {
00664 #if DEBUG_INTERFACE
00665   fprintf (stderr, "options_new:  start\n");
00666 #endif
00667   options->label_seed = (GtkLabel *)
00668     gtk_label_new (_("Pseudo-random numbers generator seed"));
00669   options->spin_seed = (GtkSpinButton *)
00670     gtk_spin_button_new_with_range (0., (gdouble) G_MAXULONG, 1.);
00671   gtk_widget_set_tooltip_text
00672     (GTK_WIDGET (options->spin_seed),
00673      _("Seed to init the pseudo-random numbers generator"));
00674   gtk_spin_button_set_value (options->spin_seed, (gdouble) input->seed);
00675   options->label_threads = (GtkLabel *)
00676     gtk_label_new (_("Threads number for the stochastic algorithm"));
00677   options->spin_threads
00678     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00679   gtk_widget_set_tooltip_text
00680     (GTK_WIDGET (options->spin_threads),
00681      _("Number of threads to perform the calibration/optimization for "
00682        "the stochastic algorithm"));
00683   gtk_spin_button_set_value (options->spin_threads, (gdouble) nthreads);
00684   options->label_climbing = (GtkLabel *)
00685     gtk_label_new (_("Threads number for the hill climbing method"));
00686   options->spin_climbing =
00687     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00688   gtk_widget_set_tooltip_text
00689     (GTK_WIDGET (options->spin_climbing),
00690      _("Number of threads to perform the calibration/optimization for the "
00691        "hill climbing method"));
00692   gtk_spin_button_set_value (options->spin_climbing,
00693                              (gdouble) nthreads_climbing);
00694   options->grid = (GtkGrid *) gtk_grid_new ();
00695   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_seed), 0, 0, 1, 1);
00696   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_seed), 1, 0, 1, 1);
00697   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_threads),
00698                    0, 1, 1, 1);
00699   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_threads),
00700                    1, 1, 1, 1);
00701   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_climbing), 0, 2, 1,
00702                    1);
00703   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_climbing), 1, 2, 1,
00704                    1);
00705 #if !GTK4
00706   gtk_widget_show_all (GTK_WIDGET (options->grid));
00707 #else
00708   gtk_widget_show (GTK_WIDGET (options->grid));
00709 #endif
00710   options->dialog = (GtkDialog *)
00711     gtk_dialog_new_with_buttons (_("Options"),
```

```
00712                                 window->window,
00713                                 GTK_DIALOG_MODAL,
00714                                 _("_OK"), GTK_RESPONSE_OK,
00715                                 _("_Cancel"), GTK_RESPONSE_CANCEL, NULL);
00716   gtk_box_append (GTK_BOX (gtk_dialog_get_content_area (options->dialog)),
00717                   GTK_WIDGET (options->grid));
00718   g_signal_connect (options->dialog, "response",
00719                     G_CALLBACK (dialog_options_close), NULL);
00720   gtk_window_present (GTK_WINDOW (options->dialog));
00721 #if DEBUG_INTERFACE
00722   fprintf (stderr, "options_new:  end\n");
00723 #endif
00724 }
```

5.11.3.15 running_new()

```
static void running_new ( )  [inline], [static]
```

Function to open the running dialog.

Definition at line 730 of file interface.c.

```
00731 {
00732 #if DEBUG_INTERFACE
00733   fprintf (stderr, "running_new:  start\n");
00734 #endif
00735   running->label = (GtkLabel *) gtk_label_new (_("Calculating ..."));
00736   running->spinner = (GtkSpinner *) gtk_spinner_new ();
00737   running->grid = (GtkGrid *) gtk_grid_new ();
00738   gtk_grid_attach (running->grid, GTK_WIDGET (running->label), 0, 0, 1, 1);
00739   gtk_grid_attach (running->grid, GTK_WIDGET (running->spinner), 0, 1, 1, 1);
00740   running->dialog = (GtkDialog *)
00741     gtk_dialog_new_with_buttons (_("Calculating"),
00742                                  window->window, GTK_DIALOG_MODAL, NULL, NULL);
00743   gtk_window_set_child (GTK_WINDOW
00744                         (gtk_dialog_get_content_area (running->dialog)),
00745                         GTK_WIDGET (running->grid));
00746   gtk_spinner_start (running->spinner);
00747 #if !GTK4
00748   gtk_widget_show_all (GTK_WIDGET (running->dialog));
00749 #else
00750   gtk_widget_show (GTK_WIDGET (running->dialog));
00751 #endif
00752 #if DEBUG_INTERFACE
00753   fprintf (stderr, "running_new:  end\n");
00754 #endif
00755 }
```

5.11.3.16 window_about()

```
static void window_about ( )  [static]
```

Function to show an about dialog.

Definition at line 1095 of file interface.c.

```
01096 {
01097   static const gchar *authors[] = {
01098     "Javier Burguete Tolosa <jburguete@eead.csic.es>",
01099     "Borja Latorre Garcés <borja.latorre@csic.es>",
01100     NULL
01101   };
01102 #if DEBUG_INTERFACE
01103   fprintf (stderr, "window_about:  start\n");
01104 #endif
01105   gtk_show_about_dialog
01106     (window->window,
01107      "program_name", "MPCOTool",
01108      "comments",
01109      _("The Multi-Purposes Calibration and Optimization Tool.\n"
```

```
01110       "A software to perform calibrations or optimizations of empirical "
01111       "parameters"),
01112     "authors", authors,
01113     "translator-credits",
01114     "Javier Burguete Tolosa <jburguete@eead.csic.es> "
01115     "(english, french and spanish)\n"
01116     "Uğur Çayoğlu (german)",
01117     "version", "4.4.6",
01118     "copyright", "Copyright 2012-2023 Javier Burguete Tolosa",
01119     "logo", window->logo,
01120     "website", "https://github.com/jburguete/mpcotool",
01121     "license-type", GTK_LICENSE_BSD, NULL);
01122 #if DEBUG_INTERFACE
01123   fprintf (stderr, "window_about:  end\n");
01124 #endif
01125 }
```

5.11.3.17 window_add_experiment()

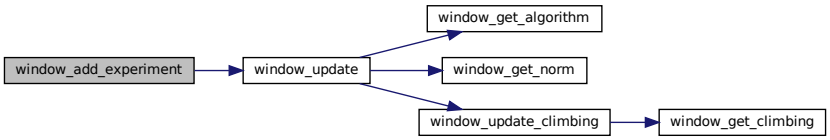
```
static void window_add_experiment ( )  [static]
```

Function to add an experiment in the main window.

Definition at line 1410 of file interface.c.

```
01411 {
01412   unsigned int i, j;
01413 #if DEBUG_INTERFACE
01414   fprintf (stderr, "window_add_experiment:  start\n");
01415 #endif
01416   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01417   g_signal_handler_block (window->combo_experiment, window->id_experiment);
01418   gtk_combo_box_text_insert_text
01419     (window->combo_experiment, i, input->experiment[i].name);
01420   g_signal_handler_unblock (window->combo_experiment, window->id_experiment);
01421   input->experiment = (Experiment *) g_realloc
01422     (input->experiment, (input->nexperiments + 1) * sizeof (Experiment));
01423   for (j = input->nexperiments - 1; j > i; --j)
01424     memcpy (input->experiment + j + 1, input->experiment + j,
01425             sizeof (Experiment));
01426   input->experiment[j + 1].weight = input->experiment[j].weight;
01427   input->experiment[j + 1].ninputs = input->experiment[j].ninputs;
01428   if (input->type == INPUT_TYPE_XML)
01429     {
01430       input->experiment[j + 1].name
01431         = (char *) xmlStrdup ((xmlChar *) input->experiment[j].name);
01432       for (j = 0; j < input->experiment->ninputs; ++j)
01433         input->experiment[i + 1].stencil[j]
01434           = (char *) xmlStrdup ((xmlChar *) input->experiment[i].stencil[j]);
01435     }
01436   else
01437     {
01438       input->experiment[j + 1].name = g_strdup (input->experiment[j].name);
01439       for (j = 0; j < input->experiment->ninputs; ++j)
01440         input->experiment[i + 1].stencil[j]
01441           = g_strdup (input->experiment[i].stencil[j]);
01442     }
01443   ++input->nexperiments;
01444   for (j = 0; j < input->experiment->ninputs; ++j)
01445     g_signal_handler_block (window->button_template[j], window->id_input[j]);
01446   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i + 1);
01447   for (j = 0; j < input->experiment->ninputs; ++j)
01448     g_signal_handler_unblock (window->button_template[j], window->id_input[j]);
01449   window_update ();
01450 #if DEBUG_INTERFACE
01451   fprintf (stderr, "window_add_experiment:  end\n");
01452 #endif
01453 }
```

Here is the call graph for this function:



5.11.3.18 window_add_variable()

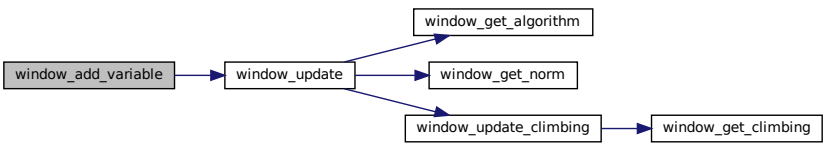
```
static void window_add_variable ( )  [static]
```

Function to add a variable in the main window.

Definition at line 1745 of file interface.c.

```
01746 {
01747   unsigned int i, j;
01748 #if DEBUG_INTERFACE
01749   fprintf (stderr, "window_add_variable:  start\n");
01750 #endif
01751   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01752   g_signal_handler_block (window->combo_variable, window->id_variable);
01753   gtk_combo_box_text_insert_text (window->combo_variable, i,
01754                                   input->variable[i].name);
01755   g_signal_handler_unblock (window->combo_variable, window->id_variable);
01756   input->variable = (Variable *) g_realloc
01757     (input->variable, (input->nvariables + 1) * sizeof (Variable));
01758   for (j = input->nvariables - 1; j > i; --j)
01759     memcpy (input->variable + j + 1, input->variable + j, sizeof (Variable));
01760   memcpy (input->variable + j + 1, input->variable + j, sizeof (Variable));
01761   if (input->type == INPUT_TYPE_XML)
01762     input->variable[j + 1].name
01763       = (char *) xmlStrdup ((xmlChar *) input->variable[j].name);
01764   else
01765     input->variable[j + 1].name = g_strdup (input->variable[j].name);
01766   ++input->nvariables;
01767   g_signal_handler_block (window->entry_variable, window->id_variable_label);
01768   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i + 1);
01769   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
01770   window_update ();
01771 #if DEBUG_INTERFACE
01772   fprintf (stderr, "window_add_variable:  end\n");
01773 #endif
01774 }
```

Here is the call graph for this function:



5.11.3.19 window_get_algorithm()

```
static unsigned int window_get_algorithm ( )  [static]
```

Function to get the stochastic algorithm number.

Returns

Stochastic algorithm number.

Definition at line 763 of file interface.c.

```
00764 {
00765   unsigned int i;
00766 #if DEBUG_INTERFACE
00767   fprintf (stderr, "window_get_algorithm:  start\n");
00768 #endif
00769   i = jbw_array_buttons_get_active (window->button_algorithm, NALGORITHMS);
00770 #if DEBUG_INTERFACE
00771   fprintf (stderr, "window_get_algorithm:  %u\n", i);
00772   fprintf (stderr, "window_get_algorithm:  end\n");
00773 #endif
00774   return i;
00775 }
```

5.11.3.20 window_get_climbing()

```
static unsigned int window_get_climbing ( )  [static]
```

Function to get the hill climbing method number.

Returns

Hill climbing method number.

Definition at line 783 of file interface.c.

```
00784 {
00785   unsigned int i;
00786 #if DEBUG_INTERFACE
00787   fprintf (stderr, "window_get_climbing:  start\n");
00788 #endif
00789   i = jbw_array_buttons_get_active (window->button_climbing, NCLIMBINGS);
00790 #if DEBUG_INTERFACE
00791   fprintf (stderr, "window_get_climbing:  %u\n", i);
00792   fprintf (stderr, "window_get_climbing:  end\n");
00793 #endif
00794   return i;
00795 }
```

5.11.3.21 window_get_norm()

```
static unsigned int window_get_norm ( )  [static]
```

Function to get the norm method number.

Returns

Norm method number.

Definition at line 803 of file interface.c.

```
00804 {
00805   unsigned int i;
00806 #if DEBUG_INTERFACE
00807   fprintf (stderr, "window_get_norm:  start\n");
00808 #endif
00809   i = jbw_array_buttons_get_active (window->button_norm, NNORMS);
00810 #if DEBUG_INTERFACE
00811   fprintf (stderr, "window_get_norm:  %u\n", i);
00812   fprintf (stderr, "window_get_norm:  end\n");
00813 #endif
00814   return i;
00815 }
```

5.11.3.22 window_help()

```
static void window_help ( )  [static]
```

Function to show a help dialog.

Definition at line 1067 of file interface.c.

```
01068 {
01069   char *buffer, *buffer2;
01070 #if DEBUG_INTERFACE
01071   fprintf (stderr, "window_help:  start\n");
01072 #endif
01073   buffer2 = g_build_filename (window->application_directory, "..", "manuals",
01074                               _("user-manual.pdf"), NULL);
01075   buffer = g_filename_to_uri (buffer2, NULL, NULL);
01076   g_free (buffer2);
01077 #if GTK4
01078   gtk_show_uri (window->window, buffer, GDK_CURRENT_TIME);
01079 #else
01080   gtk_show_uri_on_window (window->window, buffer, GDK_CURRENT_TIME, NULL);
01081 #endif
01082 #if DEBUG_INTERFACE
01083   fprintf (stderr, "window_help:  uri=%s\n", buffer);
01084 #endif
01085   g_free (buffer);
01086 #if DEBUG_INTERFACE
01087   fprintf (stderr, "window_help:  end\n");
01088 #endif
01089 }
```

5.11.3.23 window_inputs_experiment()

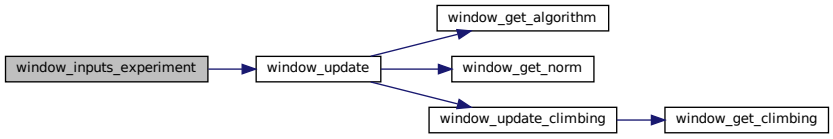
```
static void window_inputs_experiment ( )  [static]
```

Function to update the experiment input templates number in the main window.

Definition at line 1543 of file interface.c.

```
01544 {
01545   unsigned int j;
01546 #if DEBUG_INTERFACE
01547   fprintf (stderr, "window_inputs_experiment:  start\n");
01548 #endif
01549   j = input->experiment->ninputs - 1;
01550   if (j && !gtk_check_button_get_active (window->check_template[j]))
01551     --input->experiment->ninputs;
01552   if (input->experiment->ninputs < MAX_NINPUTS
01553       && gtk_check_button_get_active (window->check_template[j]))
01554     ++input->experiment->ninputs;
01555   window_update ();
01556 #if DEBUG_INTERFACE
01557   fprintf (stderr, "window_inputs_experiment:  end\n");
01558 #endif
01559 }
```

Here is the call graph for this function:



5.11.3.24 window_label_variable()

```
static void window_label_variable ( )  [static]
```

Function to set the variable label in the main window.

Definition at line 1780 of file interface.c.

```
01781 {
01782   unsigned int i;
01783   const char *buffer;
01784 #if DEBUG_INTERFACE
01785   fprintf (stderr, "window_label_variable:  start\n");
01786 #endif
01787   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01788   buffer = gtk_entry_get_text (window->entry_variable);
01789   g_signal_handler_block (window->combo_variable, window->id_variable);
01790   gtk_combo_box_text_remove (window->combo_variable, i);
01791   gtk_combo_box_text_insert_text (window->combo_variable, i, buffer);
01792   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01793   g_signal_handler_unblock (window->combo_variable, window->id_variable);
01794 #if DEBUG_INTERFACE
01795   fprintf (stderr, "window_label_variable:  end\n");
01796 #endif
01797 }
```

5.11.3.25 window_name_experiment()

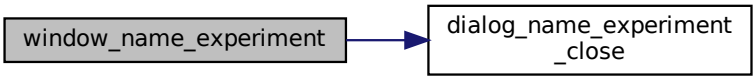
```
static void window_name_experiment ( )  [static]
```

Function to set the experiment name in the main window.

Definition at line 1490 of file interface.c.

```
01491 {
01492   GtkFileChooserDialog *dlg;
01493   GMainLoop *loop;
01494   const char *buffer;
01495   unsigned int i;
01496 #if DEBUG_INTERFACE
01497   fprintf (stderr, "window_name_experiment:  start\n");
01498 #endif
01499   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01500   buffer = gtk_button_get_label (window->button_experiment);
01501   dlg = (GtkFileChooserDialog *)
01502     gtk_file_chooser_dialog_new (_("Open experiment file"),
01503                                  window->window,
01504                                  GTK_FILE_CHOOSER_ACTION_OPEN,
01505                                  _("_Cancel"),
01506                                  GTK_RESPONSE_CANCEL,
01507                                  _("_Open"), GTK_RESPONSE_OK, NULL);
01508   gtk_file_chooser_set_current_name (GTK_FILE_CHOOSER (dlg), buffer);
01509   g_signal_connect (dlg, "response", G_CALLBACK (dialog_name_experiment_close),
01510                     (void *) (size_t) i);
01511   gtk_window_present (GTK_WINDOW (dlg));
01512   loop = g_main_loop_new (NULL, 0);
01513   g_signal_connect_swapped (dlg, "destroy", G_CALLBACK (g_main_loop_quit),
01514                             loop);
01515   g_main_loop_run (loop);
01516   g_main_loop_unref (loop);
01517 #if DEBUG_INTERFACE
01518   fprintf (stderr, "window_name_experiment:  end\n");
01519 #endif
01520 }
```

Here is the call graph for this function:



5.11.3.26 window_new()

```
void window_new (
             GtkApplication * application )
```

Function to open the main window.

Parameters

application	GtkApplication struct.

Definition at line 2274 of file interface.c.

```
02275 {
02276   unsigned int i;
02277   char *buffer, *buffer2, buffer3[64];
02278   const char *label_algorithm[NALGORITHMS] = {
02279     "_Monte-Carlo", _("_Sweep"), _("_Genetic"), _("_Orthogonal")
02280   };
02281   const char *tip_algorithm[NALGORITHMS] = {
02282     _("Monte-Carlo brute force algorithm"),
02283     _("Sweep brute force algorithm"),
02284     _("Genetic algorithm"),
02285     _("Orthogonal sampling brute force algorithm"),
02286   };
02287   const char *label_climbing[NCLIMBINGS] = {
02288     _("_Coordinates climbing"), _("_Random climbing")
02289   };
02290   const char *tip_climbing[NCLIMBINGS] = {
02291     _("Coordinates climbing estimate method"),
02292     _("Random climbing estimate method")
02293   };
02294   const char *label_norm[NNORMS] = { "L2", "L", "Lp", "L1" };
02295   const char *tip_norm[NNORMS] = {
02296     _("Euclidean error norm (L2)"),
02297     _("Maximum error norm (L)"),
02298     _("P error norm (Lp)"),
02299     _("Taxicab error norm (L1)")
02300   };
02301 #if !GTK4
02302   const char *close = "delete-event";
02303 #else
02304   const char *close = "close-request";
02305 #endif
02306
02307 #if DEBUG_INTERFACE
02308   fprintf (stderr, "window_new:  start\n");
02309 #endif
02310
02311   // Creating the window
02312   window->window = window_parent = main_window
02313     = (GtkWindow *) gtk_application_window_new (application);
02314
02315   // Finish when closing the window
02316   g_signal_connect_swapped (window->window, close,
02317                             G_CALLBACK (g_application_quit),
02318                             G_APPLICATION (application));
02319
02320   // Setting the window title
02321   gtk_window_set_title (window->window, "MPCOTool");
02322
02323   // Creating the open button
02324   window->button_open = (GtkButton *)
02325 #if !GTK4
02326     gtk_button_new_from_icon_name ("document-open", GTK_ICON_SIZE_BUTTON);
02327 #else
02328     gtk_button_new_from_icon_name ("document-open");
02329 #endif
02330   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_open),
02331                                _("Open a case"));
02332   g_signal_connect (window->button_open, "clicked", window_open, NULL);
02333
02334   // Creating the save button
02335   window->button_save = (GtkButton *)
02336 #if !GTK4
```

```
02337     gtk_button_new_from_icon_name ("document-save", GTK_ICON_SIZE_BUTTON);
02338 #else
02339     gtk_button_new_from_icon_name ("document-save");
02340 #endif
02341   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_save),
02342                                _("Save the case"));
02343   g_signal_connect (window->button_save, "clicked", (GCallback) window_save,
02344                     NULL);
02345
02346   // Creating the run button
02347   window->button_run = (GtkButton *)
02348 #if !GTK4
02349     gtk_button_new_from_icon_name ("system-run", GTK_ICON_SIZE_BUTTON);
02350 #else
02351     gtk_button_new_from_icon_name ("system-run");
02352 #endif
02353   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_run),
02354                                _("Run the optimization"));
02355   g_signal_connect (window->button_run, "clicked", window_run, NULL);
02356
02357   // Creating the options button
02358   window->button_options = (GtkButton *)
02359 #if !GTK4
02360     gtk_button_new_from_icon_name ("preferences-system", GTK_ICON_SIZE_BUTTON);
02361 #else
02362     gtk_button_new_from_icon_name ("preferences-system");
02363 #endif
02364   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_options),
02365                                _("Edit the case"));
02366   g_signal_connect (window->button_options, "clicked", options_new, NULL);
02367
02368   // Creating the help button
02369   window->button_help = (GtkButton *)
02370 #if !GTK4
02371     gtk_button_new_from_icon_name ("help-browser", GTK_ICON_SIZE_BUTTON);
02372 #else
02373     gtk_button_new_from_icon_name ("help-browser");
02374 #endif
02375   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_help), _("Help"));
02376   g_signal_connect (window->button_help, "clicked", window_help, NULL);
02377
02378   // Creating the about button
02379   window->button_about = (GtkButton *)
02380 #if !GTK4
02381     gtk_button_new_from_icon_name ("help-about", GTK_ICON_SIZE_BUTTON);
02382 #else
02383     gtk_button_new_from_icon_name ("help-about");
02384 #endif
02385   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_about), _("About"));
02386   g_signal_connect (window->button_about, "clicked", window_about, NULL);
02387
02388   // Creating the exit button
02389   window->button_exit = (GtkButton *)
02390 #if !GTK4
02391     gtk_button_new_from_icon_name ("application-exit", GTK_ICON_SIZE_BUTTON);
02392 #else
02393     gtk_button_new_from_icon_name ("application-exit");
02394 #endif
02395   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_exit), _("Exit"));
02396   g_signal_connect_swapped (window->button_exit, "clicked",
02397                             G_CALLBACK (g_application_quit),
02398                             G_APPLICATION (application));
02399
02400   // Creating the buttons bar
02401   window->box_buttons = (GtkBox *) gtk_box_new (GTK_ORIENTATION_HORIZONTAL, 0);
02402   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_open));
02403   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_save));
02404   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_run));
02405   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_options));
02406   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_help));
02407   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_about));
02408   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_exit));
02409
02410   // Creating the simulator program label and entry
02411   window->label_simulator = (GtkLabel *) gtk_label_new (_("Simulator program"));
02412   window->button_simulator = (GtkButton *)
02413     gtk_button_new_with_mnemonic (_("Simulator program"));
02414   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_simulator),
02415                                _("Simulator program executable file"));
02416   gtk_widget_set_hexpand (GTK_WIDGET (window->button_simulator), TRUE);
02417   g_signal_connect (window->button_simulator, "clicked",
02418                     G_CALLBACK (dialog_simulator), NULL);
02419
02420   // Creating the evaluator program label and entry
02421   window->check_evaluator = (GtkCheckButton *)
02422     gtk_check_button_new_with_mnemonic (_("_Evaluator program"));
02423   g_signal_connect (window->check_evaluator, "toggled", window_update, NULL);
```

```
02424   window->button_evaluator = (GtkButton *)
02425     gtk_button_new_with_mnemonic (_("Evaluator program"));
02426   gtk_widget_set_tooltip_text
02427     (GTK_WIDGET (window->button_evaluator),
02428      _("Optional evaluator program executable file"));
02429   g_signal_connect (window->button_evaluator, "clicked",
02430                     G_CALLBACK (dialog_evaluator), NULL);
02431
02432   // Creating the results files labels and entries
02433   window->label_result = (GtkLabel *) gtk_label_new (_("Result file"));
02434   window->entry_result = (GtkEntry *) gtk_entry_new ();
02435   gtk_widget_set_tooltip_text
02436     (GTK_WIDGET (window->entry_result), _("Best results file"));
02437   window->label_variables = (GtkLabel *) gtk_label_new (_("Variables file"));
02438   window->entry_variables = (GtkEntry *) gtk_entry_new ();
02439   gtk_widget_set_tooltip_text
02440     (GTK_WIDGET (window->entry_variables), _("All simulated results file"));
02441
02442   // Creating the files grid and attaching widgets
02443   window->grid_files = (GtkGrid *) gtk_grid_new ();
02444   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_simulator),
02445                    0, 0, 1, 1);
02446   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->button_simulator),
02447                    1, 0, 1, 1);
02448   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->check_evaluator),
02449                    0, 1, 1, 1);
02450   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->button_evaluator),
02451                    1, 1, 1, 1);
02452   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_result),
02453                    0, 2, 1, 1);
02454   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->entry_result),
02455                    1, 2, 1, 1);
02456   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_variables),
02457                    0, 3, 1, 1);
02458   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->entry_variables),
02459                    1, 3, 1, 1);
02460
02461   // Creating the algorithm properties
02462   window->label_simulations = (GtkLabel *) gtk_label_new
02463     (_("Simulations number"));
02464   window->spin_simulations
02465     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02466   gtk_widget_set_tooltip_text
02467     (GTK_WIDGET (window->spin_simulations),
02468      _("Number of simulations to perform for each iteration"));
02469   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_simulations), TRUE);
02470   window->label_iterations = (GtkLabel *)
02471     gtk_label_new (_("Iterations number"));
02472   window->spin_iterations
02473     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02474   gtk_widget_set_tooltip_text
02475     (GTK_WIDGET (window->spin_iterations), _("Number of iterations"));
02476   g_signal_connect
02477     (window->spin_iterations, "value-changed", window_update, NULL);
02478   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_iterations), TRUE);
02479   window->label_tolerance = (GtkLabel *) gtk_label_new (_("Tolerance"));
02480   window->spin_tolerance =
02481     (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02482   gtk_widget_set_tooltip_text
02483     (GTK_WIDGET (window->spin_tolerance),
02484      _("Tolerance to set the variable interval on the next iteration"));
02485   window->label_bests = (GtkLabel *) gtk_label_new (_("Bests number"));
02486   window->spin_bests
02487     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02488   gtk_widget_set_tooltip_text
02489     (GTK_WIDGET (window->spin_bests),
02490      _("Number of best simulations used to set the variable interval "
02491        "on the next iteration"));
02492   window->label_population
02493     = (GtkLabel *) gtk_label_new (_("Population number"));
02494   window->spin_population
02495     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02496   gtk_widget_set_tooltip_text
02497     (GTK_WIDGET (window->spin_population),
02498      _("Number of population for the genetic algorithm"));
02499   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_population), TRUE);
02500   window->label_generations
02501     = (GtkLabel *) gtk_label_new (_("Generations number"));
02502   window->spin_generations
02503     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02504   gtk_widget_set_tooltip_text
02505     (GTK_WIDGET (window->spin_generations),
02506      _("Number of generations for the genetic algorithm"));
02507   window->label_mutation = (GtkLabel *) gtk_label_new (_("Mutation ratio"));
02508   window->spin_mutation
02509     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02510   gtk_widget_set_tooltip_text
```

```
02511     (GTK_WIDGET (window->spin_mutation),
02512      _("Ratio of mutation for the genetic algorithm"));
02513   window->label_reproduction
02514     = (GtkLabel *) gtk_label_new (_("Reproduction ratio"));
02515   window->spin_reproduction
02516     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02517   gtk_widget_set_tooltip_text
02518     (GTK_WIDGET (window->spin_reproduction),
02519      _("Ratio of reproduction for the genetic algorithm"));
02520   window->label_adaptation = (GtkLabel *) gtk_label_new (_("Adaptation ratio"));
02521   window->spin_adaptation
02522     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02523   gtk_widget_set_tooltip_text
02524     (GTK_WIDGET (window->spin_adaptation),
02525      _("Ratio of adaptation for the genetic algorithm"));
02526   window->label_threshold = (GtkLabel *) gtk_label_new (_("Threshold"));
02527   window->spin_threshold = (GtkSpinButton *)
02528     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE,
02529                                     precision[DEFAULT_PRECISION]);
02530   gtk_widget_set_tooltip_text
02531     (GTK_WIDGET (window->spin_threshold),
02532      _("Threshold in the objective function to finish the simulations"));
02533   window->scrolled_threshold = (GtkScrolledWindow *)
02534 #if !GTK4
02535     gtk_scrolled_window_new (NULL, NULL);
02536 #else
02537     gtk_scrolled_window_new ();
02538 #endif
02539   gtk_scrolled_window_set_child (window->scrolled_threshold,
02540                                  GTK_WIDGET (window->spin_threshold));
02541 //  gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_threshold), TRUE);
02542 //  gtk_widget_set_halign (GTK_WIDGET (window->scrolled_threshold),
02543 //                         GTK_ALIGN_FILL);
02544
02545   // Creating the hill climbing method properties
02546   window->check_climbing = (GtkCheckButton *)
02547     gtk_check_button_new_with_mnemonic (_("_Hill climbing method"));
02548   g_signal_connect (window->check_climbing, "toggled", window_update, NULL);
02549   window->grid_climbing = (GtkGrid *) gtk_grid_new ();
02550 #if !GTK4
02551   window->button_climbing[0] = (GtkRadioButton *)
02552     gtk_radio_button_new_with_mnemonic (NULL, label_climbing[0]);
02553 #else
02554   window->button_climbing[0] = (GtkCheckButton *)
02555     gtk_check_button_new_with_mnemonic (label_climbing[0]);
02556 #endif
02557   gtk_grid_attach (window->grid_climbing,
02558                    GTK_WIDGET (window->button_climbing[0]), 0, 0, 1, 1);
02559   g_signal_connect (window->button_climbing[0], "toggled", window_update, NULL);
02560   for (i = 0; ++i < NCLIMBINGS;)
02561     {
02562 #if !GTK4
02563       window->button_climbing[i] = (GtkRadioButton *)
02564         gtk_radio_button_new_with_mnemonic
02565         (gtk_radio_button_get_group (window->button_climbing[0]),
02566          label_climbing[i]);
02567 #else
02568       window->button_climbing[i] = (GtkCheckButton *)
02569         gtk_check_button_new_with_mnemonic (label_climbing[i]);
02570       gtk_check_button_set_group (window->button_climbing[i],
02571                                   window->button_climbing[0]);
02572 #endif
02573       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_climbing[i]),
02574                                    tip_climbing[i]);
02575       gtk_grid_attach (window->grid_climbing,
02576                        GTK_WIDGET (window->button_climbing[i]), 0, i, 1, 1);
02577       g_signal_connect (window->button_climbing[i], "toggled", window_update,
02578                         NULL);
02579     }
02580   window->label_steps = (GtkLabel *) gtk_label_new (_("Steps number"));
02581   window->spin_steps = (GtkSpinButton *)
02582     gtk_spin_button_new_with_range (1., 1.e12, 1.);
02583   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_steps), TRUE);
02584   window->label_estimates
02585     = (GtkLabel *) gtk_label_new (_("Climbing estimates number"));
02586   window->spin_estimates = (GtkSpinButton *)
02587     gtk_spin_button_new_with_range (1., 1.e3, 1.);
02588   window->label_relaxation
02589     = (GtkLabel *) gtk_label_new (_("Relaxation parameter"));
02590   window->spin_relaxation = (GtkSpinButton *)
02591     gtk_spin_button_new_with_range (0., 2., 0.001);
02592   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_steps),
02593                    0, NCLIMBINGS, 1, 1);
02594   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_steps),
02595                    1, NCLIMBINGS, 1, 1);
02596   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_estimates),
02597                    0, NCLIMBINGS + 1, 1, 1);
```

```
02598   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_estimates),
02599                    1, NCLIMBINGS + 1, 1, 1);
02600   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_relaxation),
02601                    0, NCLIMBINGS + 2, 1, 1);
02602   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_relaxation),
02603                    1, NCLIMBINGS + 2, 1, 1);
02604
02605   // Creating the array of algorithms
02606   window->grid_algorithm = (GtkGrid *) gtk_grid_new ();
02607 #if !GTK4
02608   window->button_algorithm[0] = (GtkRadioButton *)
02609     gtk_radio_button_new_with_mnemonic (NULL, label_algorithm[0]);
02610 #else
02611   window->button_algorithm[0] = (GtkCheckButton *)
02612     gtk_check_button_new_with_mnemonic (label_algorithm[0]);
02613 #endif
02614   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[0]),
02615                                tip_algorithm[0]);
02616   gtk_grid_attach (window->grid_algorithm,
02617                    GTK_WIDGET (window->button_algorithm[0]), 0, 0, 1, 1);
02618   g_signal_connect (window->button_algorithm[0], "toggled",
02619                     window_set_algorithm, NULL);
02620   for (i = 0; ++i < NALGORITHMS;)
02621     {
02622 #if !GTK4
02623       window->button_algorithm[i] = (GtkRadioButton *)
02624         gtk_radio_button_new_with_mnemonic
02625         (gtk_radio_button_get_group (window->button_algorithm[0]),
02626          label_algorithm[i]);
02627 #else
02628       window->button_algorithm[i] = (GtkCheckButton *)
02629         gtk_check_button_new_with_mnemonic (label_algorithm[i]);
02630       gtk_check_button_set_group (window->button_algorithm[i],
02631                                   window->button_algorithm[0]),
02632 #endif
02633         gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[i]),
02634                                      tip_algorithm[i]);
02635       gtk_grid_attach (window->grid_algorithm,
02636                        GTK_WIDGET (window->button_algorithm[i]), 0, i, 1, 1);
02637       g_signal_connect (window->button_algorithm[i], "toggled",
02638                         window_set_algorithm, NULL);
02639     }
02640   gtk_grid_attach (window->grid_algorithm,
02641                    GTK_WIDGET (window->label_simulations),
02642                    0, NALGORITHMS, 1, 1);
02643   gtk_grid_attach (window->grid_algorithm,
02644                    GTK_WIDGET (window->spin_simulations), 1, NALGORITHMS, 1, 1);
02645   gtk_grid_attach (window->grid_algorithm,
02646                    GTK_WIDGET (window->label_iterations),
02647                    0, NALGORITHMS + 1, 1, 1);
02648   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_iterations),
02649                    1, NALGORITHMS + 1, 1, 1);
02650   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_tolerance),
02651                    0, NALGORITHMS + 2, 1, 1);
02652   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_tolerance),
02653                    1, NALGORITHMS + 2, 1, 1);
02654   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_bests),
02655                    0, NALGORITHMS + 3, 1, 1);
02656   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_bests),
02657                    1, NALGORITHMS + 3, 1, 1);
02658   gtk_grid_attach (window->grid_algorithm,
02659                    GTK_WIDGET (window->label_population),
02660                    0, NALGORITHMS + 4, 1, 1);
02661   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_population),
02662                    1, NALGORITHMS + 4, 1, 1);
02663   gtk_grid_attach (window->grid_algorithm,
02664                    GTK_WIDGET (window->label_generations),
02665                    0, NALGORITHMS + 5, 1, 1);
02666   gtk_grid_attach (window->grid_algorithm,
02667                    GTK_WIDGET (window->spin_generations),
02668                    1, NALGORITHMS + 5, 1, 1);
02669   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_mutation),
02670                    0, NALGORITHMS + 6, 1, 1);
02671   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_mutation),
02672                    1, NALGORITHMS + 6, 1, 1);
02673   gtk_grid_attach (window->grid_algorithm,
02674                    GTK_WIDGET (window->label_reproduction),
02675                    0, NALGORITHMS + 7, 1, 1);
02676   gtk_grid_attach (window->grid_algorithm,
02677                    GTK_WIDGET (window->spin_reproduction),
02678                    1, NALGORITHMS + 7, 1, 1);
02679   gtk_grid_attach (window->grid_algorithm,
02680                    GTK_WIDGET (window->label_adaptation),
02681                    0, NALGORITHMS + 8, 1, 1);
02682   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_adaptation),
02683                    1, NALGORITHMS + 8, 1, 1);
02684   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->check_climbing),
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02685                    0, NALGORITHMS + 9, 2, 1);
02686   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->grid_climbing),
02687                    0, NALGORITHMS + 10, 2, 1);
02688   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_threshold),
02689                    0, NALGORITHMS + 11, 1, 1);
02690   gtk_grid_attach (window->grid_algorithm,
02691                    GTK_WIDGET (window->scrolled_threshold),
02692                    1, NALGORITHMS + 11, 1, 1);
02693   window->frame_algorithm = (GtkFrame *) gtk_frame_new (_("Algorithm"));
02694   gtk_frame_set_child (window->frame_algorithm,
02695                        GTK_WIDGET (window->grid_algorithm));
02696
02697   // Creating the variable widgets
02698   window->combo_variable = (GtkComboBoxText *) gtk_combo_box_text_new ();
02699   gtk_widget_set_tooltip_text
02700     (GTK_WIDGET (window->combo_variable), _("Variables selector"));
02701   window->id_variable = g_signal_connect
02702     (window->combo_variable, "changed", window_set_variable, NULL);
02703 #if !GTK4
02704   window->button_add_variable = (GtkButton *)
02705     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02706 #else
02707   window->button_add_variable = (GtkButton *)
02708     gtk_button_new_from_icon_name ("list-add");
02709 #endif
02710   g_signal_connect (window->button_add_variable, "clicked", window_add_variable,
02711                     NULL);
02712   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_variable),
02713                                _("Add variable"));
02714 #if !GTK4
02715   window->button_remove_variable = (GtkButton *)
02716     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02717 #else
02718   window->button_remove_variable = (GtkButton *)
02719     gtk_button_new_from_icon_name ("list-remove");
02720 #endif
02721   g_signal_connect (window->button_remove_variable, "clicked",
02722                     window_remove_variable, NULL);
02723   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_variable),
02724                                _("Remove variable"));
02725   window->label_variable = (GtkLabel *) gtk_label_new (_("Name"));
02726   window->entry_variable = (GtkEntry *) gtk_entry_new ();
02727   gtk_widget_set_tooltip_text
02728     (GTK_WIDGET (window->entry_variable), _("Variable name"));
02729   gtk_widget_set_hexpand (GTK_WIDGET (window->entry_variable), TRUE);
02730   window->id_variable_label = g_signal_connect
02731     (window->entry_variable, "changed", window_label_variable, NULL);
02732   window->label_min = (GtkLabel *) gtk_label_new (_("Minimum"));
02733   window->spin_min = (GtkSpinButton *) gtk_spin_button_new_with_range
02734     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02735   gtk_widget_set_tooltip_text
02736     (GTK_WIDGET (window->spin_min), _("Minimum initial value of the variable"));
02737   window->scrolled_min = (GtkScrolledWindow *)
02738 #if !GTK4
02739     gtk_scrolled_window_new (NULL, NULL);
02740 #else
02741     gtk_scrolled_window_new ();
02742 #endif
02743   gtk_scrolled_window_set_child (window->scrolled_min,
02744                                  GTK_WIDGET (window->spin_min));
02745   g_signal_connect (window->spin_min, "value-changed",
02746                     window_rangemin_variable, NULL);
02747   window->label_max = (GtkLabel *) gtk_label_new (_("Maximum"));
02748   window->spin_max = (GtkSpinButton *) gtk_spin_button_new_with_range
02749     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02750   gtk_widget_set_tooltip_text
02751     (GTK_WIDGET (window->spin_max), _("Maximum initial value of the variable"));
02752   window->scrolled_max = (GtkScrolledWindow *)
02753 #if !GTK4
02754     gtk_scrolled_window_new (NULL, NULL);
02755 #else
02756     gtk_scrolled_window_new ();
02757 #endif
02758   gtk_scrolled_window_set_child (window->scrolled_max,
02759                                  GTK_WIDGET (window->spin_max));
02760   g_signal_connect (window->spin_max, "value-changed",
02761                     window_rangemax_variable, NULL);
02762   window->check_minabs = (GtkCheckButton *)
02763     gtk_check_button_new_with_mnemonic (_("_Absolute minimum"));
02764   g_signal_connect (window->check_minabs, "toggled", window_update, NULL);
02765   window->spin_minabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02766     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02767   gtk_widget_set_tooltip_text
02768     (GTK_WIDGET (window->spin_minabs),
02769      _("Minimum allowed value of the variable"));
02770   window->scrolled_minabs = (GtkScrolledWindow *)
02771 #if !GTK4
```

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02772     gtk_scrolled_window_new (NULL, NULL);
02773 #else
02774     gtk_scrolled_window_new ();
02775 #endif
02776   gtk_scrolled_window_set_child (window->scrolled_minabs,
02777                                  GTK_WIDGET (window->spin_minabs));
02778   g_signal_connect (window->spin_minabs, "value-changed",
02779                     window_rangeminabs_variable, NULL);
02780   window->check_maxabs = (GtkCheckButton *)
02781     gtk_check_button_new_with_mnemonic (_("_Absolute maximum"));
02782   g_signal_connect (window->check_maxabs, "toggled", window_update, NULL);
02783   window->spin_maxabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02784     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02785   gtk_widget_set_tooltip_text
02786     (GTK_WIDGET (window->spin_maxabs),
02787      _("Maximum allowed value of the variable"));
02788   window->scrolled_maxabs = (GtkScrolledWindow *)
02789 #if !GTK4
02790     gtk_scrolled_window_new (NULL, NULL);
02791 #else
02792     gtk_scrolled_window_new ();
02793 #endif
02794   gtk_scrolled_window_set_child (window->scrolled_maxabs,
02795                                  GTK_WIDGET (window->spin_maxabs));
02796   g_signal_connect (window->spin_maxabs, "value-changed",
02797                     window_rangemaxabs_variable, NULL);
02798   window->label_precision = (GtkLabel *) gtk_label_new (_("Precision digits"));
02799   window->spin_precision = (GtkSpinButton *)
02800     gtk_spin_button_new_with_range (0., (gdouble) DEFAULT_PRECISION, 1.);
02801   gtk_widget_set_tooltip_text
02802     (GTK_WIDGET (window->spin_precision),
02803      _("Number of precision floating point digits\n"
02804        "0 is for integer numbers"));
02805   g_signal_connect (window->spin_precision, "value-changed",
02806                     window_precision_variable, NULL);
02807   window->label_sweeps = (GtkLabel *) gtk_label_new (_("Sweeps number"));
02808   window->spin_sweeps =
02809     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02810   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_sweeps),
02811                                _("Number of steps sweeping the variable"));
02812   g_signal_connect (window->spin_sweeps, "value-changed",
02813                     window_update_variable, NULL);
02814   window->label_bits = (GtkLabel *) gtk_label_new (_("Bits number"));
02815   window->spin_bits
02816     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
02817   gtk_widget_set_tooltip_text
02818     (GTK_WIDGET (window->spin_bits),
02819      _("Number of bits to encode the variable"));
02820   g_signal_connect
02821     (window->spin_bits, "value-changed", window_update_variable, NULL);
02822   window->label_step = (GtkLabel *) gtk_label_new (_("Step size"));
02823   window->spin_step = (GtkSpinButton *) gtk_spin_button_new_with_range
02824     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02825   gtk_widget_set_tooltip_text
02826     (GTK_WIDGET (window->spin_step),
02827      _("Initial step size for the hill climbing method"));
02828   window->scrolled_step = (GtkScrolledWindow *)
02829 #if !GTK4
02830     gtk_scrolled_window_new (NULL, NULL);
02831 #else
02832     gtk_scrolled_window_new ();
02833 #endif
02834   gtk_scrolled_window_set_child (window->scrolled_step,
02835                                  GTK_WIDGET (window->spin_step));
02836   g_signal_connect
02837     (window->spin_step, "value-changed", window_step_variable, NULL);
02838   window->grid_variable = (GtkGrid *) gtk_grid_new ();
02839   gtk_grid_attach (window->grid_variable,
02840                    GTK_WIDGET (window->combo_variable), 0, 0, 2, 1);
02841   gtk_grid_attach (window->grid_variable,
02842                    GTK_WIDGET (window->button_add_variable), 2, 0, 1, 1);
02843   gtk_grid_attach (window->grid_variable,
02844                    GTK_WIDGET (window->button_remove_variable), 3, 0, 1, 1);
02845   gtk_grid_attach (window->grid_variable,
02846                    GTK_WIDGET (window->label_variable), 0, 1, 1, 1);
02847   gtk_grid_attach (window->grid_variable,
02848                    GTK_WIDGET (window->entry_variable), 1, 1, 3, 1);
02849   gtk_grid_attach (window->grid_variable,
02850                    GTK_WIDGET (window->label_min), 0, 2, 1, 1);
02851   gtk_grid_attach (window->grid_variable,
02852                    GTK_WIDGET (window->scrolled_min), 1, 2, 3, 1);
02853   gtk_grid_attach (window->grid_variable,
02854                    GTK_WIDGET (window->label_max), 0, 3, 1, 1);
02855   gtk_grid_attach (window->grid_variable,
02856                    GTK_WIDGET (window->scrolled_max), 1, 3, 3, 1);
02857   gtk_grid_attach (window->grid_variable,
02858                    GTK_WIDGET (window->check_minabs), 0, 4, 1, 1);
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02859   gtk_grid_attach (window->grid_variable,
02860                    GTK_WIDGET (window->scrolled_minabs), 1, 4, 3, 1);
02861   gtk_grid_attach (window->grid_variable,
02862                    GTK_WIDGET (window->check_maxabs), 0, 5, 1, 1);
02863   gtk_grid_attach (window->grid_variable,
02864                    GTK_WIDGET (window->scrolled_maxabs), 1, 5, 3, 1);
02865   gtk_grid_attach (window->grid_variable,
02866                    GTK_WIDGET (window->label_precision), 0, 6, 1, 1);
02867   gtk_grid_attach (window->grid_variable,
02868                    GTK_WIDGET (window->spin_precision), 1, 6, 3, 1);
02869   gtk_grid_attach (window->grid_variable,
02870                    GTK_WIDGET (window->label_sweeps), 0, 7, 1, 1);
02871   gtk_grid_attach (window->grid_variable,
02872                    GTK_WIDGET (window->spin_sweeps), 1, 7, 3, 1);
02873   gtk_grid_attach (window->grid_variable,
02874                    GTK_WIDGET (window->label_bits), 0, 8, 1, 1);
02875   gtk_grid_attach (window->grid_variable,
02876                    GTK_WIDGET (window->spin_bits), 1, 8, 3, 1);
02877   gtk_grid_attach (window->grid_variable,
02878                    GTK_WIDGET (window->label_step), 0, 9, 1, 1);
02879   gtk_grid_attach (window->grid_variable,
02880                    GTK_WIDGET (window->scrolled_step), 1, 9, 3, 1);
02881   window->frame_variable = (GtkFrame *) gtk_frame_new (_("Variable"));
02882   gtk_frame_set_child (window->frame_variable,
02883                        GTK_WIDGET (window->grid_variable));
02884
02885   // Creating the experiment widgets
02886   window->combo_experiment = (GtkComboBoxText *) gtk_combo_box_text_new ();
02887   gtk_widget_set_tooltip_text (GTK_WIDGET (window->combo_experiment),
02888                                _("Experiment selector"));
02889   window->id_experiment = g_signal_connect
02890     (window->combo_experiment, "changed", window_set_experiment, NULL);
02891 #if !GTK4
02892   window->button_add_experiment = (GtkButton *)
02893     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02894 #else
02895   window->button_add_experiment = (GtkButton *)
02896     gtk_button_new_from_icon_name ("list-add");
02897 #endif
02898   g_signal_connect
02899     (window->button_add_experiment, "clicked", window_add_experiment, NULL);
02900   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_experiment),
02901                                _("Add experiment"));
02902 #if !GTK4
02903   window->button_remove_experiment = (GtkButton *)
02904     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02905 #else
02906   window->button_remove_experiment = (GtkButton *)
02907     gtk_button_new_from_icon_name ("list-remove");
02908 #endif
02909   g_signal_connect (window->button_remove_experiment, "clicked",
02910                     window_remove_experiment, NULL);
02911   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_experiment),
02912                                _("Remove experiment"));
02913   window->label_experiment
02914     = (GtkLabel *) gtk_label_new (_("Experimental data file"));
02915   window->button_experiment = (GtkButton *)
02916     gtk_button_new_with_mnemonic (_("Experimental data file"));
02917   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_experiment),
02918                                _("Experimental data file"));
02919   g_signal_connect (window->button_experiment, "clicked",
02920                     window_name_experiment, NULL);
02921   gtk_widget_set_hexpand (GTK_WIDGET (window->button_experiment), TRUE);
02922   window->label_weight = (GtkLabel *) gtk_label_new (_("Weight"));
02923   window->spin_weight
02924     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02925   gtk_widget_set_tooltip_text
02926     (GTK_WIDGET (window->spin_weight),
02927      _("Weight factor to build the objective function"));
02928   g_signal_connect
02929     (window->spin_weight, "value-changed", window_weight_experiment, NULL);
02930   window->grid_experiment = (GtkGrid *) gtk_grid_new ();
02931   gtk_grid_attach (window->grid_experiment,
02932                    GTK_WIDGET (window->combo_experiment), 0, 0, 2, 1);
02933   gtk_grid_attach (window->grid_experiment,
02934                    GTK_WIDGET (window->button_add_experiment), 2, 0, 1, 1);
02935   gtk_grid_attach (window->grid_experiment,
02936                    GTK_WIDGET (window->button_remove_experiment), 3, 0, 1, 1);
02937   gtk_grid_attach (window->grid_experiment,
02938                    GTK_WIDGET (window->label_experiment), 0, 1, 1, 1);
02939   gtk_grid_attach (window->grid_experiment,
02940                    GTK_WIDGET (window->button_experiment), 1, 1, 3, 1);
02941   gtk_grid_attach (window->grid_experiment,
02942                    GTK_WIDGET (window->label_weight), 0, 2, 1, 1);
02943   gtk_grid_attach (window->grid_experiment,
02944                    GTK_WIDGET (window->spin_weight), 1, 2, 3, 1);
02945   for (i = 0; i < MAX_NINPUTS; ++i)
```

```
02946     {
02947       snprintf (buffer3, 64, "%s %u", _("Input template"), i + 1);
02948       window->check_template[i] = (GtkCheckButton *)
02949         gtk_check_button_new_with_label (buffer3);
02950       window->id_template[i]
02951         = g_signal_connect (window->check_template[i], "toggled",
02952                             window_inputs_experiment, NULL);
02953       gtk_grid_attach (window->grid_experiment,
02954                        GTK_WIDGET (window->check_template[i]), 0, 3 + i, 1, 1);
02955       window->button_template[i] = (GtkButton *)
02956         gtk_button_new_with_mnemonic (_("Input template"));
02957
02958       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_template[i]),
02959                                    _("Experimental input template file"));
02960       window->id_input[i] =
02961         g_signal_connect_swapped (window->button_template[i], "clicked",
02962                                   (GCallback) window_template_experiment,
02963                                   (void *) (size_t) i);
02964       gtk_grid_attach (window->grid_experiment,
02965                        GTK_WIDGET (window->button_template[i]), 1, 3 + i, 3, 1);
02966     }
02967   window->frame_experiment = (GtkFrame *) gtk_frame_new (_("Experiment"));
02968   gtk_frame_set_child (window->frame_experiment,
02969                        GTK_WIDGET (window->grid_experiment));
02970
02971   // Creating the error norm widgets
02972   window->frame_norm = (GtkFrame *) gtk_frame_new (_("Error norm"));
02973   window->grid_norm = (GtkGrid *) gtk_grid_new ();
02974   gtk_frame_set_child (window->frame_norm, GTK_WIDGET (window->grid_norm));
02975 #if !GTK4
02976   window->button_norm[0] = (GtkRadioButton *)
02977     gtk_radio_button_new_with_mnemonic (NULL, label_norm[0]);
02978 #else
02979   window->button_norm[0] = (GtkCheckButton *)
02980     gtk_check_button_new_with_mnemonic (label_norm[0]);
02981 #endif
02982   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[0]),
02983                                tip_norm[0]);
02984   gtk_grid_attach (window->grid_norm,
02985                    GTK_WIDGET (window->button_norm[0]), 0, 0, 1, 1);
02986   g_signal_connect (window->button_norm[0], "toggled", window_update, NULL);
02987   for (i = 0; ++i < NNORMS;)
02988     {
02989 #if !GTK4
02990       window->button_norm[i] = (GtkRadioButton *)
02991         gtk_radio_button_new_with_mnemonic
02992         (gtk_radio_button_get_group (window->button_norm[0]), label_norm[i]);
02993 #else
02994       window->button_norm[i] = (GtkCheckButton *)
02995         gtk_check_button_new_with_mnemonic (label_norm[i]);
02996       gtk_check_button_set_group (window->button_norm[i],
02997                                   window->button_norm[0]);
02998 #endif
02999       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[i]),
03000                                    tip_norm[i]);
03001       gtk_grid_attach (window->grid_norm,
03002                        GTK_WIDGET (window->button_norm[i]), 0, i, 1, 1);
03003       g_signal_connect (window->button_norm[i], "toggled", window_update, NULL);
03004     }
03005   window->label_p = (GtkLabel *) gtk_label_new (_("P parameter"));
03006   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->label_p), 1, 1, 1, 1);
03007   window->spin_p = (GtkSpinButton *)
03008     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE, 0.01);
03009   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_p),
03010                                _("P parameter for the P error norm"));
03011   window->scrolled_p = (GtkScrolledWindow *)
03012 #if !GTK4
03013     gtk_scrolled_window_new (NULL, NULL);
03014 #else
03015     gtk_scrolled_window_new ();
03016 #endif
03017   gtk_scrolled_window_set_child (window->scrolled_p,
03018                                  GTK_WIDGET (window->spin_p));
03019   gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_p), TRUE);
03020   gtk_widget_set_halign (GTK_WIDGET (window->scrolled_p), GTK_ALIGN_FILL);
03021   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->scrolled_p),
03022                    1, 2, 1, 2);
03023
03024   // Creating the grid and attaching the widgets to the grid
03025   window->grid = (GtkGrid *) gtk_grid_new ();
03026   gtk_grid_attach (window->grid, GTK_WIDGET (window->box_buttons), 0, 0, 3, 1);
03027   gtk_grid_attach (window->grid, GTK_WIDGET (window->grid_files), 0, 1, 1, 1);
03028   gtk_grid_attach (window->grid,
03029                    GTK_WIDGET (window->frame_algorithm), 0, 2, 1, 1);
03030   gtk_grid_attach (window->grid,
03031                    GTK_WIDGET (window->frame_variable), 1, 2, 1, 1);
03032   gtk_grid_attach (window->grid,
```

```
03033                   GTK_WIDGET (window->frame_experiment), 2, 2, 1, 1);
03034   gtk_grid_attach (window->grid, GTK_WIDGET (window->frame_norm), 1, 1, 2, 1);
03035   gtk_window_set_child (window->window, GTK_WIDGET (window->grid));
03036
03037   // Setting the window logo
03038   window->logo = gdk_pixbuf_new_from_xpm_data (logo);
03039 #if !GTK4
03040   gtk_window_set_icon (window->window, window->logo);
03041 #endif
03042
03043   // Showing the window
03044 #if !GTK4
03045   gtk_widget_show_all (GTK_WIDGET (window->window));
03046 #else
03047   gtk_widget_show (GTK_WIDGET (window->window));
03048 #endif
03049
03050   // In GTK+ 3.16 and 3.18 the default scrolled size is wrong
03051 #if GTK_MINOR_VERSION >= 16
03052   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_min), -1, 40);
03053   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_max), -1, 40);
03054   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_minabs), -1, 40);
03055   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_maxabs), -1, 40);
03056   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_step), -1, 40);
03057   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_p), -1, 40);
03058   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_threshold), -1, 40);
03059 #endif
03060
03061   // Reading initial example
03062   input_new ();
03063   buffer2 = g_get_current_dir ();
03064   buffer = g_build_filename (buffer2, "..", "tests", "test1", INPUT_FILE, NULL);
03065   g_free (buffer2);
03066   window_read (buffer);
03067   g_free (buffer);
03068
03069 #if DEBUG_INTERFACE
03070   fprintf (stderr, "window_new:  start\n");
03071 #endif
03072 }
```

5.11.3.27 window_open()

```
static void window_open ( )  [static]
```

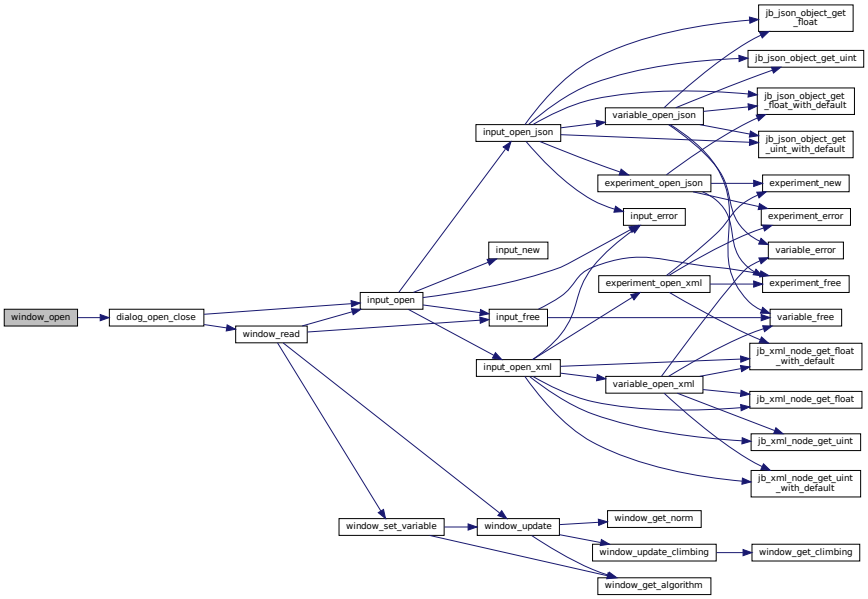
Function to open the input data.

Definition at line 2118 of file interface.c.

```
02119 {
02120   GtkFileChooserDialog *dlg;
02121   GtkFileFilter *filter;
02122
02123 #if DEBUG_INTERFACE
02124   fprintf (stderr, "window_open:  start\n");
02125 #endif
02126
02127   // Opening dialog
02128   dlg = (GtkFileChooserDialog *)
02129     gtk_file_chooser_dialog_new (_("Open input file"),
02130                                  window->window,
02131                                  GTK_FILE_CHOOSER_ACTION_OPEN,
02132                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02133                                  _("_OK"), GTK_RESPONSE_OK, NULL);
02134
02135   // Adding XML filter
02136   filter = (GtkFileFilter *) gtk_file_filter_new ();
02137   gtk_file_filter_set_name (filter, "XML");
02138   gtk_file_filter_add_pattern (filter, "*.xml");
02139   gtk_file_filter_add_pattern (filter, "*.XML");
02140   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02141
02142   // Adding JSON filter
02143   filter = (GtkFileFilter *) gtk_file_filter_new ();
02144   gtk_file_filter_set_name (filter, "JSON");
02145   gtk_file_filter_add_pattern (filter, "*.json");
02146   gtk_file_filter_add_pattern (filter, "*.JSON");
02147   gtk_file_filter_add_pattern (filter, "*.js");
02148   gtk_file_filter_add_pattern (filter, "*.JS");
```

```
02149   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02150
02151   // Connecting the close function
02152   g_signal_connect (dlg, "response", G_CALLBACK (dialog_open_close), NULL);
02153
02154   // Showing modal dialog
02155   gtk_window_present (GTK_WINDOW (dlg));
02156
02157 #if DEBUG_INTERFACE
02158   fprintf (stderr, "window_open:  end\n");
02159 #endif
02160 }
```

Here is the call graph for this function:



5.11.3.28 window_precision_variable()

```
static void window_precision_variable ( )  [static]
```

Function to update the variable precision in the main window.

Definition at line 1803 of file interface.c.

```
01804 {
01805   unsigned int i;
01806 #if DEBUG_INTERFACE
01807   fprintf (stderr, "window_precision_variable:  start\n");
01808 #endif
01809   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01810   input->variable[i].precision
01811     = (unsigned int) gtk_spin_button_get_value_as_int (window->spin_precision);
01812   gtk_spin_button_set_digits (window->spin_min, input->variable[i].precision);
01813   gtk_spin_button_set_digits (window->spin_max, input->variable[i].precision);
01814   gtk_spin_button_set_digits (window->spin_minabs,
01815                               input->variable[i].precision);
01816   gtk_spin_button_set_digits (window->spin_maxabs,
01817                               input->variable[i].precision);
01818 #if DEBUG_INTERFACE
01819   fprintf (stderr, "window_precision_variable:  end\n");
01820 #endif
01821 }
```

5.11.3.29 window_rangemax_variable()

```
static void window_rangemax_variable ( )  [static]
```

Function to update the variable rangemax in the main window.

Definition at line 1844 of file interface.c.

```
01845 {
01846   unsigned int i;
01847 #if DEBUG_INTERFACE
01848   fprintf (stderr, "window_rangemax_variable:  start\n");
01849 #endif
01850   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01851   input->variable[i].rangemax = gtk_spin_button_get_value (window->spin_max);
01852 #if DEBUG_INTERFACE
01853   fprintf (stderr, "window_rangemax_variable:  end\n");
01854 #endif
01855 }
```

5.11.3.30 window_rangemaxabs_variable()

```
static void window_rangemaxabs_variable ( )  [static]
```

Function to update the variable rangemaxabs in the main window.

Definition at line 1879 of file interface.c.

```
01880 {
01881   unsigned int i;
01882 #if DEBUG_INTERFACE
01883   fprintf (stderr, "window_rangemaxabs_variable:  start\n");
01884 #endif
01885   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01886   input->variable[i].rangemaxabs
01887     = gtk_spin_button_get_value (window->spin_maxabs);
01888 #if DEBUG_INTERFACE
01889   fprintf (stderr, "window_rangemaxabs_variable:  end\n");
01890 #endif
01891 }
```

5.11.3.31 window_rangemin_variable()

```
static void window_rangemin_variable ( )  [static]
```

Function to update the variable rangemin in the main window.

Definition at line 1827 of file interface.c.

```
01828 {
01829   unsigned int i;
01830 #if DEBUG_INTERFACE
01831   fprintf (stderr, "window_rangemin_variable:  start\n");
01832 #endif
01833   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01834   input->variable[i].rangemin = gtk_spin_button_get_value (window->spin_min);
01835 #if DEBUG_INTERFACE
01836   fprintf (stderr, "window_rangemin_variable:  end\n");
01837 #endif
01838 }
```

5.11.3.32 window_rangeminabs_variable()

```
static void window_rangeminabs_variable ( )  [static]
```

Function to update the variable rangeminabs in the main window.

Definition at line 1861 of file interface.c.

```
01862 {
01863   unsigned int i;
01864 #if DEBUG_INTERFACE
01865   fprintf (stderr, "window_rangeminabs_variable:  start\n");
01866 #endif
01867   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01868   input->variable[i].rangeminabs
01869     = gtk_spin_button_get_value (window->spin_minabs);
01870 #if DEBUG_INTERFACE
01871   fprintf (stderr, "window_rangeminabs_variable:  end\n");
01872 #endif
01873 }
```

5.11.3.33 window_read()

```
static int window_read (
             char * filename )  [static]
```

Function to read the input data of a file.

Returns

1 on succes, 0 on error.

Parameters

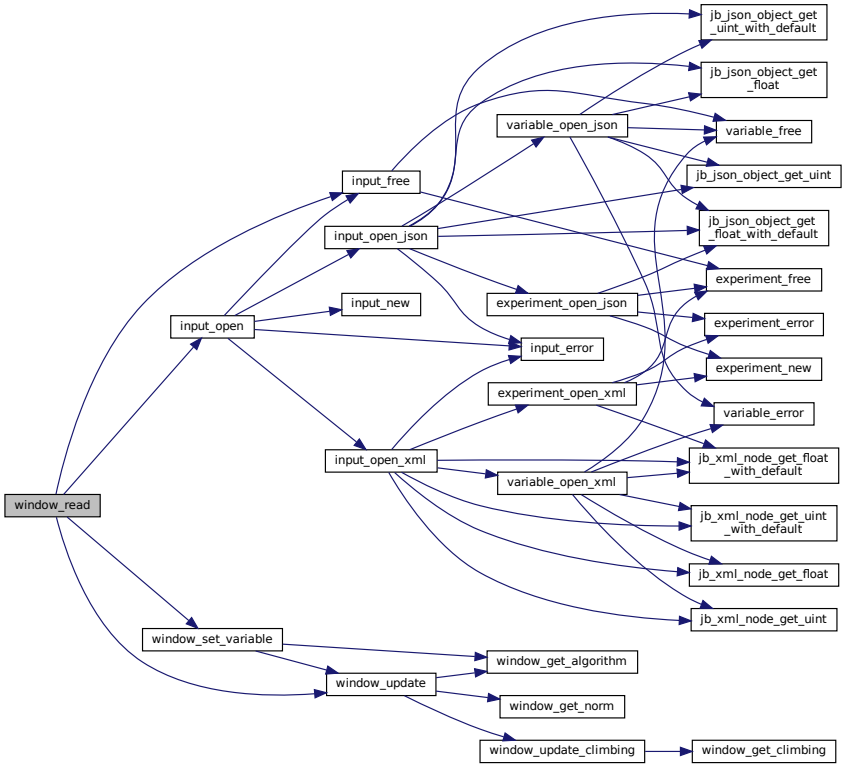
filename	File name.

Definition at line 1953 of file interface.c.

```
01954 {
01955   unsigned int i;
01956 #if DEBUG_INTERFACE
01957   fprintf (stderr, "window_read:  start\n");
01958   fprintf (stderr, "window_read:  file name=%s\n", filename);
01959 #endif
01960
01961   // Reading new input file
01962   input_free ();
01963   input->result = input->variables = NULL;
01964   if (!input_open (filename))
01965     {
01966 #if DEBUG_INTERFACE
01967       fprintf (stderr, "window_read:  end\n");
01968 #endif
01969       return 0;
01970     }
01971
01972   // Setting GTK+ widgets data
01973   gtk_entry_set_text (window->entry_result, input->result);
01974   gtk_entry_set_text (window->entry_variables, input->variables);
01975   gtk_button_set_label (window->button_simulator, input->simulator);
01976   gtk_check_button_set_active (window->check_evaluator,
01977                                (size_t) input->evaluator);
01978   if (input->evaluator)
01979     gtk_button_set_label (window->button_evaluator, input->evaluator);
01980   gtk_check_button_set_active (window->button_algorithm[input->algorithm],
01981                                TRUE);
01982   switch (input->algorithm)
```

```
01983     {
01984     case ALGORITHM_MONTE_CARLO:
01985       gtk_spin_button_set_value (window->spin_simulations,
01986                                  (gdouble) input->nsimulations);
01987       // fallthrough
01988     case ALGORITHM_SWEEP:
01989     case ALGORITHM_ORTHOGONAL:
01990       gtk_spin_button_set_value (window->spin_iterations,
01991                                  (gdouble) input->niterations);
01992       gtk_spin_button_set_value (window->spin_bests, (gdouble) input->nbest);
01993       gtk_spin_button_set_value (window->spin_tolerance, input->tolerance);
01994       gtk_check_button_set_active (window->check_climbing, input->nsteps);
01995       if (input->nsteps)
01996         {
01997           gtk_check_button_set_active
01998             (window->button_climbing[input->climbing], TRUE);
01999           gtk_spin_button_set_value (window->spin_steps,
02000                                      (gdouble) input->nsteps);
02001           gtk_spin_button_set_value (window->spin_relaxation,
02002                                      (gdouble) input->relaxation);
02003           switch (input->climbing)
02004             {
02005             case CLIMBING_METHOD_RANDOM:
02006               gtk_spin_button_set_value (window->spin_estimates,
02007                                          (gdouble) input->nestimates);
02008             }
02009         }
02010       break;
02011     default:
02012       gtk_spin_button_set_value (window->spin_population,
02013                                  (gdouble) input->nsimulations);
02014       gtk_spin_button_set_value (window->spin_generations,
02015                                  (gdouble) input->niterations);
02016       gtk_spin_button_set_value (window->spin_mutation, input->mutation_ratio);
02017       gtk_spin_button_set_value (window->spin_reproduction,
02018                                  input->reproduction_ratio);
02019       gtk_spin_button_set_value (window->spin_adaptation,
02020                                  input->adaptation_ratio);
02021     }
02022   gtk_check_button_set_active (window->button_norm[input->norm], TRUE);
02023   gtk_spin_button_set_value (window->spin_p, input->p);
02024   gtk_spin_button_set_value (window->spin_threshold, input->threshold);
02025   g_signal_handler_block (window->combo_experiment, window->id_experiment);
02026   gtk_combo_box_text_remove_all (window->combo_experiment);
02027   for (i = 0; i < input->nexperiments; ++i)
02028     gtk_combo_box_text_append_text (window->combo_experiment,
02029                                     input->experiment[i].name);
02030   g_signal_handler_unblock (window->combo_experiment, window->id_experiment);
02031   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), 0);
02032   g_signal_handler_block (window->combo_variable, window->id_variable);
02033   g_signal_handler_block (window->entry_variable, window->id_variable_label);
02034   gtk_combo_box_text_remove_all (window->combo_variable);
02035   for (i = 0; i < input->nvariables; ++i)
02036     gtk_combo_box_text_append_text (window->combo_variable,
02037                                     input->variable[i].name);
02038   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
02039   g_signal_handler_unblock (window->combo_variable, window->id_variable);
02040   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), 0);
02041   window_set_variable ();
02042   window_update ();
02043
02044 #if DEBUG_INTERFACE
02045   fprintf (stderr, "window_read:  end\n");
02046 #endif
02047   return 1;
02048 }
```

Here is the call graph for this function:



5.11.3.34 window_remove_experiment()

```
static void window_remove_experiment ( )  [static]
```

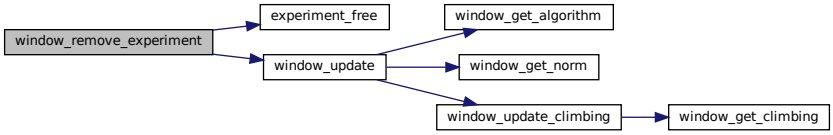
Function to remove an experiment in the main window.

Definition at line 1377 of file interface.c.

```
01378 {
01379   unsigned int i, j;
01380 #if DEBUG_INTERFACE
01381   fprintf (stderr, "window_remove_experiment:  start\n");
01382 #endif
01383   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01384   g_signal_handler_block (window->combo_experiment, window->id_experiment);
01385   gtk_combo_box_text_remove (window->combo_experiment, i);
01386   g_signal_handler_unblock (window->combo_experiment, window->id_experiment);
01387   experiment_free (input->experiment + i, input->type);
01388   --input->nexperiments;
01389   for (j = i; j < input->nexperiments; ++j)
01390     memcpy (input->experiment + j, input->experiment + j + 1,
01391             sizeof (Experiment));
01392   j = input->nexperiments - 1;
01393   if (i > j)
01394     i = j;
01395   for (j = 0; j < input->experiment->ninputs; ++j)
01396     g_signal_handler_block (window->button_template[j], window->id_input[j]);
01397   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01398   for (j = 0; j < input->experiment->ninputs; ++j)
01399     g_signal_handler_unblock (window->button_template[j], window->id_input[j]);
01400   window_update ();
01401 #if DEBUG_INTERFACE
```

```
01402   fprintf (stderr, "window_remove_experiment:  end\n");
01403 #endif
01404 }
```

Here is the call graph for this function:



5.11.3.35 window_remove_variable()

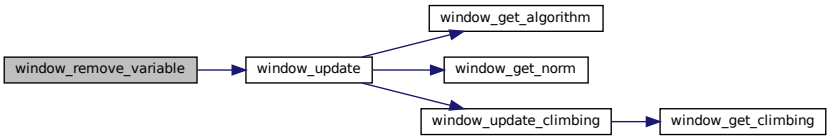
```
static void window_remove_variable ( )  [static]
```

Function to remove a variable in the main window.

Definition at line 1715 of file interface.c.

```
01716 {
01717   unsigned int i, j;
01718 #if DEBUG_INTERFACE
01719   fprintf (stderr, "window_remove_variable:  start\n");
01720 #endif
01721   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01722   g_signal_handler_block (window->combo_variable, window->id_variable);
01723   gtk_combo_box_text_remove (window->combo_variable, i);
01724   g_signal_handler_unblock (window->combo_variable, window->id_variable);
01725   xmlFree (input->variable[i].name);
01726   --input->nvariables;
01727   for (j = i; j < input->nvariables; ++j)
01728     memcpy (input->variable + j, input->variable + j + 1, sizeof (Variable));
01729   j = input->nvariables - 1;
01730   if (i > j)
01731     i = j;
01732   g_signal_handler_block (window->entry_variable, window->id_variable_label);
01733   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01734   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
01735   window_update ();
01736 #if DEBUG_INTERFACE
01737   fprintf (stderr, "window_remove_variable:  end\n");
01738 #endif
01739 }
```

Here is the call graph for this function:



5.11.3.36 window_run()

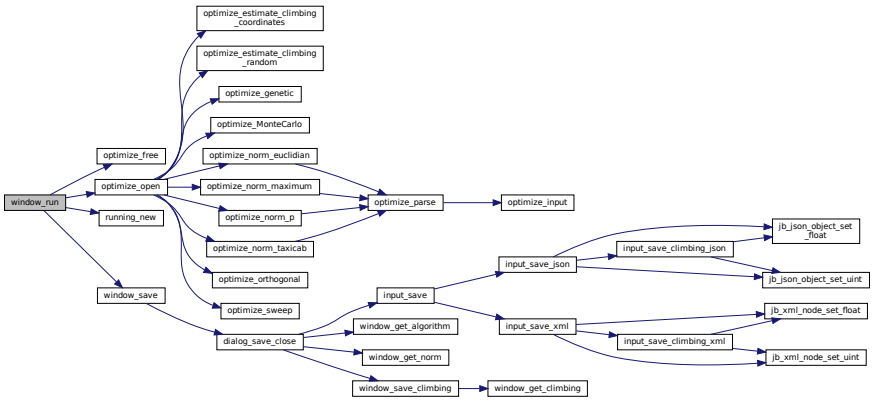
```
static void window_run ( )  [static]
```

Function to run a optimization.

Definition at line 1019 of file interface.c.

```
01020 {
01021   char *msg, *msg2, buffer[64], buffer2[64];
01022   unsigned int i;
01023 #if DEBUG_INTERFACE
01024   fprintf (stderr, "window_run:  start\n");
01025 #endif
01026   window_save ();
01027   running_new ();
01028   jbw_process_pending ();
01029   optimize_open ();
01030 #if DEBUG_INTERFACE
01031   fprintf (stderr, "window_run:  closing running dialog\n");
01032 #endif
01033   gtk_spinner_stop (running->spinner);
01034   gtk_window_destroy (GTK_WINDOW (running->dialog));
01035 #if DEBUG_INTERFACE
01036   fprintf (stderr, "window_run:  displaying results\n");
01037 #endif
01038   snprintf (buffer, 64, "error = %.15le\n", optimize->error_old[0]);
01039   msg2 = g_strdup (buffer);
01040   for (i = 0; i < optimize->nvariables; ++i, msg2 = msg)
01041     {
01042       snprintf (buffer, 64, "%s = %s\n",
01043                 input->variable[i].name, format[input->variable[i].precision]);
01044       snprintf (buffer2, 64, buffer, optimize->value_old[i]);
01045       msg = g_strconcat (msg2, buffer2, NULL);
01046       g_free (msg2);
01047     }
01048   snprintf (buffer, 64, "%s = %.6lg s", _("Calculation time"),
01049             optimize->calculation_time);
01050   msg = g_strconcat (msg2, buffer, NULL);
01051   g_free (msg2);
01052   jbw_show_message_gtk (_("Best result"), msg, INFO_TYPE);
01053   g_free (msg);
01054 #if DEBUG_INTERFACE
01055   fprintf (stderr, "window_run:  freeing memory\n");
01056 #endif
01057   optimize_free ();
01058 #if DEBUG_INTERFACE
01059   fprintf (stderr, "window_run:  end\n");
01060 #endif
01061 }
```

Here is the call graph for this function:



5.11.3.37 window_save()

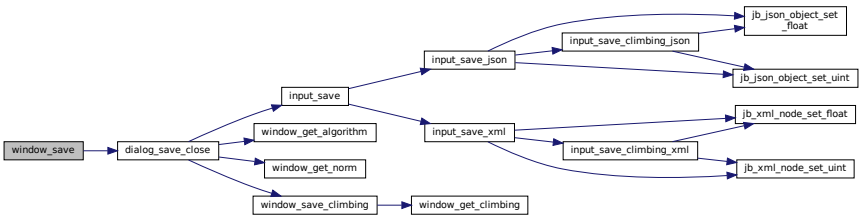
```
static void window_save ( )  [static]
```

Function to save the input file.

Definition at line 959 of file interface.c.

```
00960 {
00961   GtkFileChooserDialog *dlg;
00962   GtkFileFilter *filter1, *filter2;
00963   char *buffer;
00964
00965 #if DEBUG_INTERFACE
00966   fprintf (stderr, "window_save:  start\n");
00967 #endif
00968
00969   // Opening the saving dialog
00970   dlg = (GtkFileChooserDialog *)
00971     gtk_file_chooser_dialog_new (_("Save file"),
00972                                  window->window,
00973                                  GTK_FILE_CHOOSER_ACTION_SAVE,
00974                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
00975                                  _("_OK"), GTK_RESPONSE_OK, NULL);
00976 #if !GTK4
00977   gtk_file_chooser_set_do_overwrite_confirmation (GTK_FILE_CHOOSER (dlg), TRUE);
00978 #endif
00979   buffer = g_build_filename (input->directory, input->name, NULL);
00980   gtk_file_chooser_set_current_name (GTK_FILE_CHOOSER (dlg), buffer);
00981   g_free (buffer);
00982
00983   // Adding XML filter
00984   filter1 = (GtkFileFilter *) gtk_file_filter_new ();
00985   gtk_file_filter_set_name (filter1, "XML");
00986   gtk_file_filter_add_pattern (filter1, "*.xml");
00987   gtk_file_filter_add_pattern (filter1, "*.XML");
00988   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter1);
00989
00990   // Adding JSON filter
00991   filter2 = (GtkFileFilter *) gtk_file_filter_new ();
00992   gtk_file_filter_set_name (filter2, "JSON");
00993   gtk_file_filter_add_pattern (filter2, "*.json");
00994   gtk_file_filter_add_pattern (filter2, "*.JSON");
00995   gtk_file_filter_add_pattern (filter2, "*.js");
00996   gtk_file_filter_add_pattern (filter2, "*.JS");
00997   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter2);
00998
00999   if (input->type == INPUT_TYPE_XML)
01000     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter1);
01001   else
01002     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter2);
01003
01004   // Connecting the close function
01005   g_signal_connect (dlg, "response", G_CALLBACK (dialog_save_close), NULL);
01006
01007   // Showing modal dialog
01008   gtk_window_present (GTK_WINDOW (dlg));
01009
01010 #if DEBUG_INTERFACE
01011   fprintf (stderr, "window_save:  end\n");
01012 #endif
01013 }
```

Here is the call graph for this function:



5.11.3.38 window_save_climbing()

```
static void window_save_climbing ( )  [static]
```

Function to save the hill climbing method data in the input file.

Definition at line 821 of file interface.c.

```
00822 {
00823 #if DEBUG_INTERFACE
00824   fprintf (stderr, "window_save_climbing:  start\n");
00825 #endif
00826   if (gtk_check_button_get_active (window->check_climbing))
00827     {
00828       input->nsteps = gtk_spin_button_get_value_as_int (window->spin_steps);
00829       input->relaxation = gtk_spin_button_get_value (window->spin_relaxation);
00830       switch (window_get_climbing ())
00831         {
00832         case CLIMBING_METHOD_COORDINATES:
00833           input->climbing = CLIMBING_METHOD_COORDINATES;
00834           break;
00835         default:
00836           input->climbing = CLIMBING_METHOD_RANDOM;
00837           input->nestimates
00838             = gtk_spin_button_get_value_as_int (window->spin_estimates);
00839         }
00840     }
00841   else
00842     input->nsteps = 0;
00843 #if DEBUG_INTERFACE
00844   fprintf (stderr, "window_save_climbing:  end\n");
00845 #endif
00846 }
```

Here is the call graph for this function:

5.11.3.39 window_set_algorithm()

```
static void window_set_algorithm ( )  [static]
```

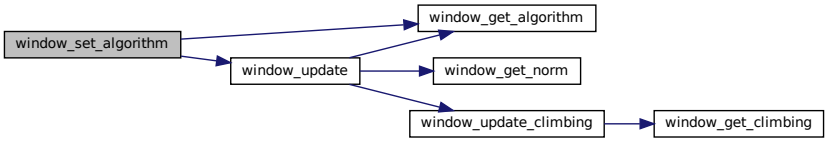
Function to avoid memory errors changing the algorithm.

Definition at line 1314 of file interface.c.

```
01315 {
01316   int i;
01317 #if DEBUG_INTERFACE
01318   fprintf (stderr, "window_set_algorithm:  start\n");
01319 #endif
01320   i = window_get_algorithm ();
01321   switch (i)
01322     {
01323     case ALGORITHM_SWEEP:
01324     case ALGORITHM_ORTHOGONAL:
01325       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01326       if (i < 0)
01327         i = 0;
01328       gtk_spin_button_set_value (window->spin_sweeps,
01329                                  (gdouble) input->variable[i].nsweeps);
```

```
01330       break;
01331     case ALGORITHM_GENETIC:
01332       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01333       if (i < 0)
01334         i = 0;
01335       gtk_spin_button_set_value (window->spin_bits,
01336                                  (gdouble) input->variable[i].nbits);
01337     }
01338   window_update ();
01339 #if DEBUG_INTERFACE
01340   fprintf (stderr, "window_set_algorithm:  end\n");
01341 #endif
01342 }
```

Here is the call graph for this function:



5.11.3.40 window_set_experiment()

```
static void window_set_experiment ( )  [static]
```

Function to set the experiment data in the main window.

Definition at line 1348 of file interface.c.

```
01349 {
01350   unsigned int i, j;
01351   char *buffer1;
01352 #if DEBUG_INTERFACE
01353   fprintf (stderr, "window_set_experiment:  start\n");
01354 #endif
01355   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01356   gtk_spin_button_set_value (window->spin_weight, input->experiment[i].weight);
01357   buffer1 = gtk_combo_box_text_get_active_text (window->combo_experiment);
01358   gtk_button_set_label (window->button_experiment, buffer1);
01359   g_free (buffer1);
01360   for (j = 0; j < input->experiment->ninputs; ++j)
01361     {
01362       g_signal_handler_block (window->button_template[j], window->id_input[j]);
01363       gtk_button_set_label (window->button_template[j],
01364                             input->experiment[i].stencil[j]);
01365       g_signal_handler_unblock
01366         (window->button_template[j], window->id_input[j]);
01367     }
01368 #if DEBUG_INTERFACE
01369   fprintf (stderr, "window_set_experiment:  end\n");
01370 #endif
01371 }
```

5.11.3.41 window_set_variable()

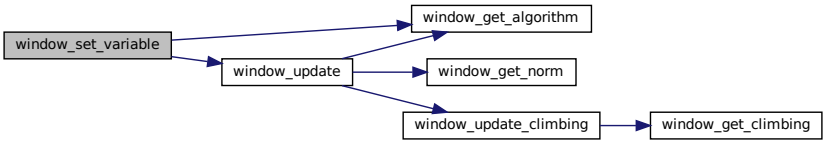
```
static void window_set_variable ( )  [static]
```

Function to set the variable data in the main window.

Definition at line 1642 of file interface.c.

```
01643 {
01644   unsigned int i;
01645 #if DEBUG_INTERFACE
01646   fprintf (stderr, "window_set_variable:  start\n");
01647 #endif
01648   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01649   g_signal_handler_block (window->entry_variable, window->id_variable_label);
01650   gtk_entry_set_text (window->entry_variable, input->variable[i].name);
01651   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
01652   gtk_spin_button_set_value (window->spin_min, input->variable[i].rangemin);
01653   gtk_spin_button_set_value (window->spin_max, input->variable[i].rangemax);
01654   if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
01655     {
01656       gtk_spin_button_set_value (window->spin_minabs,
01657                                  input->variable[i].rangeminabs);
01658       gtk_check_button_set_active (window->check_minabs, 1);
01659     }
01660   else
01661     {
01662       gtk_spin_button_set_value (window->spin_minabs, -G_MAXDOUBLE);
01663       gtk_check_button_set_active (window->check_minabs, 0);
01664     }
01665   if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
01666     {
01667       gtk_spin_button_set_value (window->spin_maxabs,
01668                                  input->variable[i].rangemaxabs);
01669       gtk_check_button_set_active (window->check_maxabs, 1);
01670     }
01671   else
01672     {
01673       gtk_spin_button_set_value (window->spin_maxabs, G_MAXDOUBLE);
01674       gtk_check_button_set_active (window->check_maxabs, 0);
01675     }
01676   gtk_spin_button_set_value (window->spin_precision,
01677                              input->variable[i].precision);
01678   gtk_spin_button_set_value (window->spin_steps, (gdouble) input->nsteps);
01679   if (input->nsteps)
01680     gtk_spin_button_set_value (window->spin_step, input->variable[i].step);
01681 #if DEBUG_INTERFACE
01682   fprintf (stderr, "window_set_variable:  precision[%u]=%u\n", i,
01683            input->variable[i].precision);
01684 #endif
01685   switch (window_get_algorithm ())
01686     {
01687     case ALGORITHM_SWEEP:
01688     case ALGORITHM_ORTHOGONAL:
01689       gtk_spin_button_set_value (window->spin_sweeps,
01690                                  (gdouble) input->variable[i].nsweeps);
01691 #if DEBUG_INTERFACE
01692       fprintf (stderr, "window_set_variable:  nsweeps[%u]=%u\n", i,
01693                input->variable[i].nsweeps);
01694 #endif
01695       break;
01696     case ALGORITHM_GENETIC:
01697       gtk_spin_button_set_value (window->spin_bits,
01698                                  (gdouble) input->variable[i].nbits);
01699 #if DEBUG_INTERFACE
01700       fprintf (stderr, "window_set_variable:  nbits[%u]=%u\n", i,
01701                input->variable[i].nbits);
01702 #endif
01703       break;
01704     }
01705   window_update ();
01706 #if DEBUG_INTERFACE
01707   fprintf (stderr, "window_set_variable:  end\n");
01708 #endif
01709 }
```

Here is the call graph for this function:



5.11.3.42 window_step_variable()

```
static void window_step_variable ( )  [static]
```

Function to update the variable step in the main window.

Definition at line 1897 of file interface.c.

```
01898 {
01899   unsigned int i;
01900 #if DEBUG_INTERFACE
01901   fprintf (stderr, "window_step_variable:  start\n");
01902 #endif
01903   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01904   input->variable[i].step = gtk_spin_button_get_value (window->spin_step);
01905 #if DEBUG_INTERFACE
01906   fprintf (stderr, "window_step_variable:  end\n");
01907 #endif
01908 }
```

5.11.3.43 window_template_experiment()

```
static void window_template_experiment (
             void * data )  [static]
```

Function to update the experiment i-th input template in the main window.

Parameters

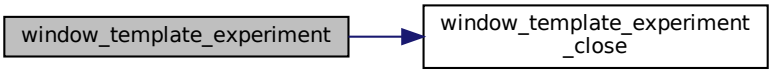
data	Callback data (i-th input template).

Definition at line 1605 of file interface.c.

```
01607 {
01608   GtkFileChooserDialog *dlg;
01609   GMainLoop *loop;
01610   const char *buffer;
01611   unsigned int i;
01612 #if DEBUG_INTERFACE
01613   fprintf (stderr, "window_template_experiment:  start\n");
01614 #endif
01615   i = (size_t) data;
01616   buffer = gtk_button_get_label (window->button_template[i]);
01617   dlg = (GtkFileChooserDialog *)
01618     gtk_file_chooser_dialog_new (_("Open template file"),
01619                                  window->window,
```

```
01620                                 GTK_FILE_CHOOSER_ACTION_OPEN,
01621                                 _("_Cancel"),
01622                                 GTK_RESPONSE_CANCEL,
01623                                 _("_Open"), GTK_RESPONSE_ACCEPT, NULL);
01624   gtk_file_chooser_set_current_name (GTK_FILE_CHOOSER (dlg), buffer);
01625   g_signal_connect (dlg, "response",
01626                     G_CALLBACK (window_template_experiment_close), data);
01627   gtk_window_present (GTK_WINDOW (dlg));
01628   loop = g_main_loop_new (NULL, 0);
01629   g_signal_connect_swapped (dlg, "destroy", G_CALLBACK (g_main_loop_quit),
01630                             loop);
01631   g_main_loop_run (loop);
01632   g_main_loop_unref (loop);
01633 #if DEBUG_INTERFACE
01634   fprintf (stderr, "window_template_experiment:  end\n");
01635 #endif
01636 }
```

Here is the call graph for this function:



5.11.3.44 window_template_experiment_close()

```
static void window_template_experiment_close (
             GtkFileChooserDialog * dlg,
             int response_id,
             void * data )  [static]
```

Function to close the experiment template dialog.

Parameters

dlg	GtkFileChooserDialg struct.
response_id	Response identifier.
data	Function data.

Definition at line 1565 of file interface.c.

```
01570 {
01571   GFile *file1, *file2;
01572   char *buffer1, *buffer2;
01573   unsigned int i, j;
01574 #if DEBUG_INTERFACE
01575   fprintf (stderr, "window_template_experiment_close:  start\n");
01576 #endif
01577   if (response_id == GTK_RESPONSE_OK)
01578     {
01579       i = (size_t) data;
01580       j = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01581       buffer1 = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
01582       file1 = g_file_new_for_path (buffer1);
01583       file2 = g_file_new_for_path (input->directory);
01584       buffer2 = g_file_get_relative_path (file2, file1);
01585       if (input->type == INPUT_TYPE_XML)
```

```
01586         input->experiment[j].stencil[i]
01587           = (char *) xmlStrdup ((xmlChar *) buffer2);
01588       else
01589         input->experiment[j].stencil[i] = g_strdup (buffer2);
01590       g_free (buffer2);
01591       g_object_unref (file2);
01592       g_object_unref (file1);
01593       g_free (buffer1);
01594     }
01595   gtk_window_destroy (GTK_WINDOW (dlg));
01596 #if DEBUG_INTERFACE
01597   fprintf (stderr, "window_template_experiment_close:  end\n");
01598 #endif
01599 }
```

5.11.3.45 window_update()

```
static void window_update ( )  [static]
```

Function to update the main window view.

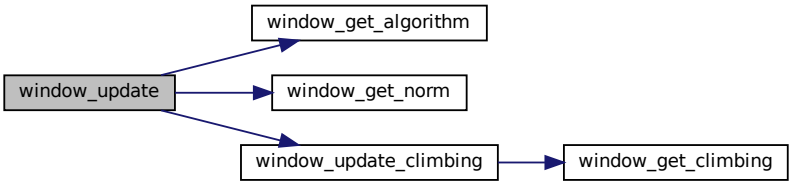
Definition at line 1162 of file interface.c.

```
01163 {
01164   unsigned int i;
01165 #if DEBUG_INTERFACE
01166   fprintf (stderr, "window_update:  start\n");
01167 #endif
01168   gtk_widget_set_sensitive
01169     (GTK_WIDGET (window->button_evaluator),
01170      gtk_check_button_get_active (window->check_evaluator));
01171   gtk_widget_hide (GTK_WIDGET (window->label_simulations));
01172   gtk_widget_hide (GTK_WIDGET (window->spin_simulations));
01173   gtk_widget_hide (GTK_WIDGET (window->label_iterations));
01174   gtk_widget_hide (GTK_WIDGET (window->spin_iterations));
01175   gtk_widget_hide (GTK_WIDGET (window->label_tolerance));
01176   gtk_widget_hide (GTK_WIDGET (window->spin_tolerance));
01177   gtk_widget_hide (GTK_WIDGET (window->label_bests));
01178   gtk_widget_hide (GTK_WIDGET (window->spin_bests));
01179   gtk_widget_hide (GTK_WIDGET (window->label_population));
01180   gtk_widget_hide (GTK_WIDGET (window->spin_population));
01181   gtk_widget_hide (GTK_WIDGET (window->label_generations));
01182   gtk_widget_hide (GTK_WIDGET (window->spin_generations));
01183   gtk_widget_hide (GTK_WIDGET (window->label_mutation));
01184   gtk_widget_hide (GTK_WIDGET (window->spin_mutation));
01185   gtk_widget_hide (GTK_WIDGET (window->label_reproduction));
01186   gtk_widget_hide (GTK_WIDGET (window->spin_reproduction));
01187   gtk_widget_hide (GTK_WIDGET (window->label_adaptation));
01188   gtk_widget_hide (GTK_WIDGET (window->spin_adaptation));
01189   gtk_widget_hide (GTK_WIDGET (window->label_sweeps));
01190   gtk_widget_hide (GTK_WIDGET (window->spin_sweeps));
01191   gtk_widget_hide (GTK_WIDGET (window->label_bits));
01192   gtk_widget_hide (GTK_WIDGET (window->spin_bits));
01193   gtk_widget_hide (GTK_WIDGET (window->check_climbing));
01194   gtk_widget_hide (GTK_WIDGET (window->grid_climbing));
01195   gtk_widget_hide (GTK_WIDGET (window->label_step));
01196   gtk_widget_hide (GTK_WIDGET (window->spin_step));
01197   gtk_widget_hide (GTK_WIDGET (window->label_p));
01198   gtk_widget_hide (GTK_WIDGET (window->spin_p));
01199   i = gtk_spin_button_get_value_as_int (window->spin_iterations);
01200   switch (window_get_algorithm ())
01201     {
01202     case ALGORITHM_MONTE_CARLO:
01203       gtk_widget_show (GTK_WIDGET (window->label_simulations));
01204       gtk_widget_show (GTK_WIDGET (window->spin_simulations));
01205       gtk_widget_show (GTK_WIDGET (window->label_iterations));
01206       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01207       if (i > 1)
01208         {
01209           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01210           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01211           gtk_widget_show (GTK_WIDGET (window->label_bests));
01212           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01213         }
01214       window_update_climbing ();
01215       break;
01216     case ALGORITHM_SWEEP:
01217     case ALGORITHM_ORTHOGONAL:
01218       gtk_widget_show (GTK_WIDGET (window->label_iterations));
```

```
01219       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01220       if (i > 1)
01221         {
01222           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01223           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01224           gtk_widget_show (GTK_WIDGET (window->label_bests));
01225           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01226         }
01227       gtk_widget_show (GTK_WIDGET (window->label_sweeps));
01228       gtk_widget_show (GTK_WIDGET (window->spin_sweeps));
01229       gtk_widget_show (GTK_WIDGET (window->check_climbing));
01230       window_update_climbing ();
01231       break;
01232     default:
01233       gtk_widget_show (GTK_WIDGET (window->label_population));
01234       gtk_widget_show (GTK_WIDGET (window->spin_population));
01235       gtk_widget_show (GTK_WIDGET (window->label_generations));
01236       gtk_widget_show (GTK_WIDGET (window->spin_generations));
01237       gtk_widget_show (GTK_WIDGET (window->label_mutation));
01238       gtk_widget_show (GTK_WIDGET (window->spin_mutation));
01239       gtk_widget_show (GTK_WIDGET (window->label_reproduction));
01240       gtk_widget_show (GTK_WIDGET (window->spin_reproduction));
01241       gtk_widget_show (GTK_WIDGET (window->label_adaptation));
01242       gtk_widget_show (GTK_WIDGET (window->spin_adaptation));
01243       gtk_widget_show (GTK_WIDGET (window->label_bits));
01244       gtk_widget_show (GTK_WIDGET (window->spin_bits));
01245     }
01246   gtk_widget_set_sensitive
01247     (GTK_WIDGET (window->button_remove_experiment), input->nexperiments > 1);
01248   gtk_widget_set_sensitive
01249     (GTK_WIDGET (window->button_remove_variable), input->nvariables > 1);
01250   for (i = 0; i < input->experiment->ninputs; ++i)
01251     {
01252       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01253       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01254       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 0);
01255       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i]), 1);
01256       g_signal_handler_block
01257         (window->check_template[i], window->id_template[i]);
01258       g_signal_handler_block (window->button_template[i], window->id_input[i]);
01259       gtk_check_button_set_active (window->check_template[i], 1);
01260       g_signal_handler_unblock (window->button_template[i],
01261                                 window->id_input[i]);
01262       g_signal_handler_unblock (window->check_template[i],
01263                                 window->id_template[i]);
01264     }
01265   if (i > 0)
01266     {
01267       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i - 1]), 1);
01268       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i - 1]),
01269                                 gtk_check_button_get_active
01270                                 (window->check_template[i - 1]));
01271     }
01272   if (i < MAX_NINPUTS)
01273     {
01274       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01275       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01276       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 1);
01277       gtk_widget_set_sensitive
01278         (GTK_WIDGET (window->button_template[i]),
01279          gtk_check_button_get_active (window->check_template[i]));
01280       g_signal_handler_block
01281         (window->check_template[i], window->id_template[i]);
01282       g_signal_handler_block (window->button_template[i], window->id_input[i]);
01283       gtk_check_button_set_active (window->check_template[i], 0);
01284       g_signal_handler_unblock (window->button_template[i],
01285                                 window->id_input[i]);
01286       g_signal_handler_unblock (window->check_template[i],
01287                                 window->id_template[i]);
01288     }
01289   while (++i < MAX_NINPUTS)
01290     {
01291       gtk_widget_hide (GTK_WIDGET (window->check_template[i]));
01292       gtk_widget_hide (GTK_WIDGET (window->button_template[i]));
01293     }
01294   gtk_widget_set_sensitive
01295     (GTK_WIDGET (window->spin_minabs),
01296      gtk_check_button_get_active (window->check_minabs));
01297   gtk_widget_set_sensitive
01298     (GTK_WIDGET (window->spin_maxabs),
01299      gtk_check_button_get_active (window->check_maxabs));
01300   if (window_get_norm () == ERROR_NORM_P)
01301     {
01302       gtk_widget_show (GTK_WIDGET (window->label_p));
01303       gtk_widget_show (GTK_WIDGET (window->spin_p));
01304     }
01305 #if DEBUG_INTERFACE
```

```
01306   fprintf (stderr, "window_update:  end\n");
01307 #endif
01308 }
```

Here is the call graph for this function:



5.11.3.46 window_update_climbing()

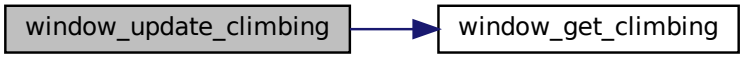
```
static void window_update_climbing ( )  [static]
```

Function to update hill climbing method widgets view in the main window.

Definition at line 1131 of file interface.c.

```
01132 {
01133 #if DEBUG_INTERFACE
01134   fprintf (stderr, "window_update_climbing:  start\n");
01135 #endif
01136   gtk_widget_show (GTK_WIDGET (window->check_climbing));
01137   if (gtk_check_button_get_active (window->check_climbing))
01138     {
01139       gtk_widget_show (GTK_WIDGET (window->grid_climbing));
01140       gtk_widget_show (GTK_WIDGET (window->label_step));
01141       gtk_widget_show (GTK_WIDGET (window->spin_step));
01142     }
01143   switch (window_get_climbing ())
01144     {
01145     case CLIMBING_METHOD_COORDINATES:
01146       gtk_widget_hide (GTK_WIDGET (window->label_estimates));
01147       gtk_widget_hide (GTK_WIDGET (window->spin_estimates));
01148       break;
01149     default:
01150       gtk_widget_show (GTK_WIDGET (window->label_estimates));
01151       gtk_widget_show (GTK_WIDGET (window->spin_estimates));
01152     }
01153 #if DEBUG_INTERFACE
01154   fprintf (stderr, "window_update_climbing:  end\n");
01155 #endif
01156 }
```

Here is the call graph for this function:



5.11.3.47 window_update_variable()

```
static void window_update_variable ( )  [static]
```

Function to update the variable data in the main window.

Definition at line 1914 of file interface.c.

```
01915 {
01916   int i;
01917 #if DEBUG_INTERFACE
01918   fprintf (stderr, "window_update_variable:  start\n");
01919 #endif
01920   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01921   if (i < 0)
01922     i = 0;
01923   switch (window_get_algorithm ())
01924     {
01925     case ALGORITHM_SWEEP:
01926     case ALGORITHM_ORTHOGONAL:
01927       input->variable[i].nsweeps
01928         = gtk_spin_button_get_value_as_int (window->spin_sweeps);
01929 #if DEBUG_INTERFACE
01930       fprintf (stderr, "window_update_variable:  nsweeps[%d]=%u\n", i,
01931                input->variable[i].nsweeps);
01932 #endif
01933       break;
01934     case ALGORITHM_GENETIC:
01935       input->variable[i].nbits
01936         = gtk_spin_button_get_value_as_int (window->spin_bits);
01937 #if DEBUG_INTERFACE
01938       fprintf (stderr, "window_update_variable:  nbits[%d]=%u\n", i,
01939                input->variable[i].nbits);
01940 #endif
01941     }
01942 #if DEBUG_INTERFACE
01943   fprintf (stderr, "window_update_variable:  end\n");
01944 #endif
01945 }
```

Here is the call graph for this function:

5.11.3.48 window_weight_experiment()

```
static void window_weight_experiment ( )  [static]
```

Function to update the experiment weight in the main window.

Definition at line 1526 of file interface.c.

```
01527 {
01528   unsigned int i;
01529 #if DEBUG_INTERFACE
01530   fprintf (stderr, "window_weight_experiment:  start\n");
01531 #endif
01532   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01533   input->experiment[i].weight = gtk_spin_button_get_value (window->spin_weight);
01534 #if DEBUG_INTERFACE
01535   fprintf (stderr, "window_weight_experiment:  end\n");
01536 #endif
01537 }
```

5.11.4 Variable Documentation

5.11.4.1 logo

```
const char* logo[]  [static]
```

Logo pixmap.

Definition at line 84 of file interface.c.

5.11.4.2 options

```
Options options[1]  [static]
```

Options struct to define the options dialog.

Definition at line 163 of file interface.c.

5.11.4.3 running

```
Running running[1]  [static]
```

Running struct to define the running dialog.

Definition at line 165 of file interface.c.

5.11.4.4 window

```
Window window[1]
```

Window struct to define the main interface window.

Definition at line 81 of file interface.c.

5.12 interface.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
00012
00013 1.  Redistributions of source code must retain the above copyright notice,
00014 this list of conditions and the following disclaimer.
00015
00016 2.  Redistributions in binary form must reproduce the above copyright notice,
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00018 documentation and/or other materials provided with the distribution.
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00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <stdlib.h>
00042 #include <string.h>
00043 #include <math.h>
00044 #include <gsl/gsl_rng.h>
00045 #include <libxml/parser.h>
00046 #include <libintl.h>
00047 #include <glib.h>
00048 #include <glib/gstdio.h>
00049 #include <json-glib/json-glib.h>
00050 #ifdef G_OS_WIN32
00051 #include <windows.h>
00052 #endif
00053 #if HAVE_MPI
00054 #include <mpi.h>
00055 #endif
00056 #include <gio/gio.h>
00057 #include <gtk/gtk.h>
00058 #include "jb/src/jb_xml.h"
00059 #include "jb/src/jb_json.h"
00060 #include "jb/src/jb_win.h"
00061 #include "genetic/genetic.h"
00062 #include "tools.h"
00063 #include "experiment.h"
00064 #include "variable.h"
00065 #include "input.h"
00066 #include "optimize.h"
00067 #include "interface.h"
00068
00069 #define DEBUG_INTERFACE 1
00070
00075 #ifdef G_OS_WIN32
00076 #define INPUT_FILE "test-ga-win.xml"
00077 #else
00078 #define INPUT_FILE "test-ga.xml"
00079 #endif
00080
00081 Window window[1];
00083
00084 static const char *logo[] = {
00085   "32 32 3 1",
00086   "     c None",
00087   ".        c #0000FF",
00088   "+    c #FF0000",
00089   "                                ",
00090   "                                ",
00091   "                                ",
00092   "     .          .          .          .          ",
00093   "     .          .          .          .          ",
```

```
00094   "     .             .             .             .          ",
00095   "     .             .             .             .          ",
00096   "     .             .          +++     .          ",
00097   "     .             .        +++++    .          ",
00098   "     .             .        +++++    .          ",
00099   "     .             .        +++++    .          ",
00100   "    +++      .           +++    +++    ",
00101   "   +++++     .             .        +++++   ",
00102   "   +++++     .             .        +++++   ",
00103   "   +++++     .             .        +++++   ",
00104   "    +++      .             .          +++    ",
00105   "     .             .             .             .          ",
00106   "     .           +++      .             .          ",
00107   "     .         +++++    .             .          ",
00108   "     .         +++++    .             .          ",
00109   "     .         +++++    .             .          ",
00110   "     .           +++      .             .          ",
00111   "     .             .             .             .          ",
00112   "     .             .             .             .          ",
00113   "     .             .             .             .          ",
00114   "     .             .             .             .          ",
00115   "     .             .             .             .          ",
00116   "     .             .             .             .          ",
00117   "     .             .             .             .          ",
00118   "                                  ",
00119   "                                  ",
00120   "                                  "
00121 };
00122
00123 /*
00124 const char * logo[] = {
00125 "32 32 3 1",
00126 "     c #FFFFFFFFFFFF",
00127 ".        c #00000000FFFF",
00128 "X    c #FFFF00000000",
00129 "                                  ",
00130 "                                  ",
00131 "                                  ",
00132 "     .             .             .             .          ",
00133 "     .             .             .             .          ",
00134 "     .             .             .             .          ",
00135 "     .             .             .             .          ",
00136 "     .             .          XXX      .      ",
00137 "     .             .        XXXXX    .      ",
00138 "     .             .        XXXXX    .      ",
00139 "     .             .        XXXXX    .      ",
00140 "    XXX      .      XXX     XXX     ",
00141 "   XXXXX     .       .        XXXXX    ",
00142 "   XXXXX     .       .        XXXXX    ",
00143 "   XXXXX     .       .        XXXXX    ",
00144 "    XXX      .       .          XXX     ",
00145 "     .             .             .             .          ",
00146 "     .          XXX      .       .           ",
00147 "     .        XXXXX     .       .           ",
00148 "     .        XXXXX     .       .           ",
00149 "     .        XXXXX     .       .           ",
00150 "     .          XXX      .       .           ",
00151 "     .             .             .             .          ",
00152 "     .             .             .             .          ",
00153 "     .             .             .             .          ",
00154 "     .             .             .             .          ",
00155 "     .             .             .             .          ",
00156 "     .             .             .             .          ",
00157 "     .             .             .             .          ",
00158 "                                  ",
00159 "                                  ",
00160 "                                  "};
00161 */
00162
00163 static Options options[1];
00165 static Running running[1];
00167
00171 static void
00172 input_save_climbing_xml (xmlNode * node)
00173 {
00174 #if DEBUG_INTERFACE
00175   fprintf (stderr, "input_save_climbing_xml:  start\n");
00176 #endif
00177   if (input->nsteps)
00178     {
00179       jb_xml_node_set_uint (node, (const xmlChar *) LABEL_NSTEPS,
00180                             input->nsteps);
00181       if (input->relaxation != DEFAULT_RELAXATION)
00182         jb_xml_node_set_float (node, (const xmlChar *) LABEL_RELAXATION,
00183                                input->relaxation);
00184       switch (input->climbing)
00185         {
```

```
00186         case CLIMBING_METHOD_COORDINATES:
00187           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00188                       (const xmlChar *) LABEL_COORDINATES);
00189           break;
00190         default:
00191           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00192                       (const xmlChar *) LABEL_RANDOM);
00193           jb_xml_node_set_uint (node, (const xmlChar *) LABEL_NESTIMATES,
00194                                 input->nestimates);
00195         }
00196     }
00197 #if DEBUG_INTERFACE
00198   fprintf (stderr, "input_save_climbing_xml:  end\n");
00199 #endif
00200 }
00201
00205 static void
00206 input_save_climbing_json (JsonNode * node)
00207 {
00208   JsonObject *object;
00209 #if DEBUG_INTERFACE
00210   fprintf (stderr, "input_save_climbing_json:  start\n");
00211 #endif
00212   object = json_node_get_object (node);
00213   if (input->nsteps)
00214     {
00215       jb_json_object_set_uint (object, LABEL_NSTEPS, input->nsteps);
00216       if (input->relaxation != DEFAULT_RELAXATION)
00217         jb_json_object_set_float (object, LABEL_RELAXATION, input->relaxation);
00218       switch (input->climbing)
00219         {
00220         case CLIMBING_METHOD_COORDINATES:
00221           json_object_set_string_member (object, LABEL_CLIMBING,
00222                                          LABEL_COORDINATES);
00223           break;
00224         default:
00225           json_object_set_string_member (object, LABEL_CLIMBING, LABEL_RANDOM);
00226           jb_json_object_set_uint (object, LABEL_NESTIMATES, input->nestimates);
00227         }
00228     }
00229 #if DEBUG_INTERFACE
00230   fprintf (stderr, "input_save_climbing_json:  end\n");
00231 #endif
00232 }
00233
00237 static inline void
00238 input_save_xml (xmlDoc * doc)
00239 {
00240   unsigned int i, j;
00241   char *buffer;
00242   xmlNode *node, *child;
00243   GFile *file, *file2;
00244
00245 #if DEBUG_INTERFACE
00246   fprintf (stderr, "input_save_xml:  start\n");
00247 #endif
00248
00249   // Setting root XML node
00250   node = xmlNewDocNode (doc, 0, (const xmlChar *) LABEL_OPTIMIZE, 0);
00251   xmlDocSetRootElement (doc, node);
00252
00253   // Adding properties to the root XML node
00254   if (xmlStrcmp
00255       ((const xmlChar *) input->result, (const xmlChar *) result_name))
00256     xmlSetProp (node, (const xmlChar *) LABEL_RESULT_FILE,
00257                 (xmlChar *) input->result);
00258   if (xmlStrcmp
00259       ((const xmlChar *) input->variables, (const xmlChar *) variables_name))
00260     xmlSetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE,
00261                 (xmlChar *) input->variables);
00262   file = g_file_new_for_path (input->directory);
00263   file2 = g_file_new_for_path (input->simulator);
00264   buffer = g_file_get_relative_path (file, file2);
00265   g_object_unref (file2);
00266   xmlSetProp (node, (const xmlChar *) LABEL_SIMULATOR, (xmlChar *) buffer);
00267   g_free (buffer);
00268   if (input->evaluator)
00269     {
00270       file2 = g_file_new_for_path (input->evaluator);
00271       buffer = g_file_get_relative_path (file, file2);
00272       g_object_unref (file2);
00273       if (xmlStrlen ((xmlChar *) buffer))
00274         xmlSetProp (node, (const xmlChar *) LABEL_EVALUATOR,
00275                     (xmlChar *) buffer);
00276       g_free (buffer);
00277     }
00278   if (input->seed != DEFAULT_RANDOM_SEED)
```

```
00279     jb_xml_node_set_uint (node, (const xmlChar *) LABEL_SEED, input->seed);
00280
00281   // Setting the algorithm
00282   buffer = (char *) g_slice_alloc (64);
00283   switch (input->algorithm)
00284     {
00285     case ALGORITHM_MONTE_CARLO:
00286       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00287                   (const xmlChar *) LABEL_MONTE_CARLO);
00288       snprintf (buffer, 64, "%u", input->nsimulations);
00289       xmlSetProp (node, (const xmlChar *) LABEL_NSIMULATIONS,
00290                   (xmlChar *) buffer);
00291       snprintf (buffer, 64, "%u", input->niterations);
00292       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00293                   (xmlChar *) buffer);
00294       snprintf (buffer, 64, "%.3lg", input->tolerance);
00295       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00296       snprintf (buffer, 64, "%u", input->nbest);
00297       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00298       input_save_climbing_xml (node);
00299       break;
00300     case ALGORITHM_SWEEP:
00301       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00302                   (const xmlChar *) LABEL_SWEEP);
00303       snprintf (buffer, 64, "%u", input->niterations);
00304       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00305                   (xmlChar *) buffer);
00306       snprintf (buffer, 64, "%.3lg", input->tolerance);
00307       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00308       snprintf (buffer, 64, "%u", input->nbest);
00309       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00310       input_save_climbing_xml (node);
00311       break;
00312     case ALGORITHM_ORTHOGONAL:
00313       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00314                   (const xmlChar *) LABEL_ORTHOGONAL);
00315       snprintf (buffer, 64, "%u", input->niterations);
00316       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00317                   (xmlChar *) buffer);
00318       snprintf (buffer, 64, "%.3lg", input->tolerance);
00319       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00320       snprintf (buffer, 64, "%u", input->nbest);
00321       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00322       input_save_climbing_xml (node);
00323       break;
00324     default:
00325       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00326                   (const xmlChar *) LABEL_GENETIC);
00327       snprintf (buffer, 64, "%u", input->nsimulations);
00328       xmlSetProp (node, (const xmlChar *) LABEL_NPOPULATION,
00329                   (xmlChar *) buffer);
00330       snprintf (buffer, 64, "%u", input->niterations);
00331       xmlSetProp (node, (const xmlChar *) LABEL_NGENERATIONS,
00332                   (xmlChar *) buffer);
00333       snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00334       xmlSetProp (node, (const xmlChar *) LABEL_MUTATION, (xmlChar *) buffer);
00335       snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00336       xmlSetProp (node, (const xmlChar *) LABEL_REPRODUCTION,
00337                   (xmlChar *) buffer);
00338       snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00339       xmlSetProp (node, (const xmlChar *) LABEL_ADAPTATION, (xmlChar *) buffer);
00340       break;
00341     }
00342   g_slice_free1 (64, buffer);
00343   if (input->threshold != 0.)
00344     jb_xml_node_set_float (node, (const xmlChar *) LABEL_THRESHOLD,
00345                            input->threshold);
00346
00347   // Setting the experimental data
00348   for (i = 0; i < input->nexperiments; ++i)
00349     {
00350       child = xmlNewChild (node, 0, (const xmlChar *) LABEL_EXPERIMENT, 0);
00351       xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00352                   (xmlChar *) input->experiment[i].name);
00353       if (input->experiment[i].weight != 1.)
00354         jb_xml_node_set_float (child, (const xmlChar *) LABEL_WEIGHT,
00355                                input->experiment[i].weight);
00356       for (j = 0; j < input->experiment->ninputs; ++j)
00357         xmlSetProp (child, (const xmlChar *) stencil[j],
00358                     (xmlChar *) input->experiment[i].stencil[j]);
00359     }
00360
00361   // Setting the variables data
00362   for (i = 0; i < input->nvariables; ++i)
00363     {
00364       child = xmlNewChild (node, 0, (const xmlChar *) LABEL_VARIABLE, 0);
00365       xmlSetProp (child, (const xmlChar *) LABEL_NAME,
```

```
00366                   (xmlChar *) input->variable[i].name);
00367       jb_xml_node_set_float (child, (const xmlChar *) LABEL_MINIMUM,
00368                              input->variable[i].rangemin);
00369       if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00370         jb_xml_node_set_float (child, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM,
00371                                input->variable[i].rangeminabs);
00372       jb_xml_node_set_float (child, (const xmlChar *) LABEL_MAXIMUM,
00373                              input->variable[i].rangemax);
00374       if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00375         jb_xml_node_set_float (child, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM,
00376                                input->variable[i].rangemaxabs);
00377       if (input->variable[i].precision != DEFAULT_PRECISION)
00378         jb_xml_node_set_uint (child, (const xmlChar *) LABEL_PRECISION,
00379                               input->variable[i].precision);
00380       if (input->algorithm == ALGORITHM_SWEEP
00381           || input->algorithm == ALGORITHM_ORTHOGONAL)
00382         jb_xml_node_set_uint (child, (const xmlChar *) LABEL_NSWEEPS,
00383                               input->variable[i].nsweeps);
00384       else if (input->algorithm == ALGORITHM_GENETIC)
00385         jb_xml_node_set_uint (child, (const xmlChar *) LABEL_NBITS,
00386                               input->variable[i].nbits);
00387       if (input->nsteps)
00388         jb_xml_node_set_float (child, (const xmlChar *) LABEL_STEP,
00389                                input->variable[i].step);
00390     }
00391
00392   // Saving the error norm
00393   switch (input->norm)
00394     {
00395     case ERROR_NORM_MAXIMUM:
00396       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00397                   (const xmlChar *) LABEL_MAXIMUM);
00398       break;
00399     case ERROR_NORM_P:
00400       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00401                   (const xmlChar *) LABEL_P);
00402       jb_xml_node_set_float (node, (const xmlChar *) LABEL_P, input->p);
00403       break;
00404     case ERROR_NORM_TAXICAB:
00405       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00406                   (const xmlChar *) LABEL_TAXICAB);
00407     }
00408
00409 #if DEBUG_INTERFACE
00410   fprintf (stderr, "input_save:  end\n");
00411 #endif
00412 }
00413
00417 static inline void
00418 input_save_json (JsonGenerator * generator)
00419 {
00420   unsigned int i, j;
00421   char *buffer;
00422   JsonNode *node, *child;
00423   JsonObject *object;
00424   JsonArray *array;
00425   GFile *file, *file2;
00426
00427 #if DEBUG_INTERFACE
00428   fprintf (stderr, "input_save_json:  start\n");
00429 #endif
00430
00431   // Setting root JSON node
00432   object = json_object_new ();
00433   node = json_node_new (JSON_NODE_OBJECT);
00434   json_node_set_object (node, object);
00435   json_generator_set_root (generator, node);
00436
00437   // Adding properties to the root JSON node
00438   if (strcmp (input->result, result_name))
00439     json_object_set_string_member (object, LABEL_RESULT_FILE, input->result);
00440   if (strcmp (input->variables, variables_name))
00441     json_object_set_string_member (object, LABEL_VARIABLES_FILE,
00442                                    input->variables);
00443   file = g_file_new_for_path (input->directory);
00444   file2 = g_file_new_for_path (input->simulator);
00445   buffer = g_file_get_relative_path (file, file2);
00446   g_object_unref (file2);
00447   json_object_set_string_member (object, LABEL_SIMULATOR, buffer);
00448   g_free (buffer);
00449   if (input->evaluator)
00450     {
00451       file2 = g_file_new_for_path (input->evaluator);
00452       buffer = g_file_get_relative_path (file, file2);
00453       g_object_unref (file2);
00454       if (strlen (buffer))
00455         json_object_set_string_member (object, LABEL_EVALUATOR, buffer);
```

```
00456       g_free (buffer);
00457     }
00458   if (input->seed != DEFAULT_RANDOM_SEED)
00459     jb_json_object_set_uint (object, LABEL_SEED, input->seed);
00460
00461   // Setting the algorithm
00462   buffer = (char *) g_slice_alloc (64);
00463   switch (input->algorithm)
00464     {
00465     case ALGORITHM_MONTE_CARLO:
00466       json_object_set_string_member (object, LABEL_ALGORITHM,
00467                                      LABEL_MONTE_CARLO);
00468       snprintf (buffer, 64, "%u", input->nsimulations);
00469       json_object_set_string_member (object, LABEL_NSIMULATIONS, buffer);
00470       snprintf (buffer, 64, "%u", input->niterations);
00471       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00472       snprintf (buffer, 64, "%.3lg", input->tolerance);
00473       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00474       snprintf (buffer, 64, "%u", input->nbest);
00475       json_object_set_string_member (object, LABEL_NBEST, buffer);
00476       input_save_climbing_json (node);
00477       break;
00478     case ALGORITHM_SWEEP:
00479       json_object_set_string_member (object, LABEL_ALGORITHM, LABEL_SWEEP);
00480       snprintf (buffer, 64, "%u", input->niterations);
00481       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00482       snprintf (buffer, 64, "%.3lg", input->tolerance);
00483       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00484       snprintf (buffer, 64, "%u", input->nbest);
00485       json_object_set_string_member (object, LABEL_NBEST, buffer);
00486       input_save_climbing_json (node);
00487       break;
00488     case ALGORITHM_ORTHOGONAL:
00489       json_object_set_string_member (object, LABEL_ALGORITHM, LABEL_ORTHOGONAL);
00490       snprintf (buffer, 64, "%u", input->niterations);
00491       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00492       snprintf (buffer, 64, "%.3lg", input->tolerance);
00493       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00494       snprintf (buffer, 64, "%u", input->nbest);
00495       json_object_set_string_member (object, LABEL_NBEST, buffer);
00496       input_save_climbing_json (node);
00497       break;
00498     default:
00499       json_object_set_string_member (object, LABEL_ALGORITHM, LABEL_GENETIC);
00500       snprintf (buffer, 64, "%u", input->nsimulations);
00501       json_object_set_string_member (object, LABEL_NPOPULATION, buffer);
00502       snprintf (buffer, 64, "%u", input->niterations);
00503       json_object_set_string_member (object, LABEL_NGENERATIONS, buffer);
00504       snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00505       json_object_set_string_member (object, LABEL_MUTATION, buffer);
00506       snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00507       json_object_set_string_member (object, LABEL_REPRODUCTION, buffer);
00508       snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00509       json_object_set_string_member (object, LABEL_ADAPTATION, buffer);
00510       break;
00511     }
00512   g_slice_free1 (64, buffer);
00513   if (input->threshold != 0.)
00514     jb_json_object_set_float (object, LABEL_THRESHOLD, input->threshold);
00515
00516   // Setting the experimental data
00517   array = json_array_new ();
00518   for (i = 0; i < input->nexperiments; ++i)
00519     {
00520       child = json_node_new (JSON_NODE_OBJECT);
00521       object = json_node_get_object (child);
00522       json_object_set_string_member (object, LABEL_NAME,
00523                                      input->experiment[i].name);
00524       if (input->experiment[i].weight != 1.)
00525         jb_json_object_set_float (object, LABEL_WEIGHT,
00526                                   input->experiment[i].weight);
00527       for (j = 0; j < input->experiment->ninputs; ++j)
00528         json_object_set_string_member (object, stencil[j],
00529                                        input->experiment[i].stencil[j]);
00530       json_array_add_element (array, child);
00531     }
00532   json_object_set_array_member (object, LABEL_EXPERIMENTS, array);
00533
00534   // Setting the variables data
00535   array = json_array_new ();
00536   for (i = 0; i < input->nvariables; ++i)
00537     {
00538       child = json_node_new (JSON_NODE_OBJECT);
00539       object = json_node_get_object (child);
00540       json_object_set_string_member (object, LABEL_NAME,
00541                                      input->variable[i].name);
00542       jb_json_object_set_float (object, LABEL_MINIMUM,
```

```
00543                                 input->variable[i].rangemin);
00544       if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00545         jb_json_object_set_float (object, LABEL_ABSOLUTE_MINIMUM,
00546                                   input->variable[i].rangeminabs);
00547       jb_json_object_set_float (object, LABEL_MAXIMUM,
00548                                 input->variable[i].rangemax);
00549       if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00550         jb_json_object_set_float (object, LABEL_ABSOLUTE_MAXIMUM,
00551                                   input->variable[i].rangemaxabs);
00552       if (input->variable[i].precision != DEFAULT_PRECISION)
00553         jb_json_object_set_uint (object, LABEL_PRECISION,
00554                                  input->variable[i].precision);
00555       if (input->algorithm == ALGORITHM_SWEEP
00556           || input->algorithm == ALGORITHM_ORTHOGONAL)
00557         jb_json_object_set_uint (object, LABEL_NSWEEPS,
00558                                  input->variable[i].nsweeps);
00559       else if (input->algorithm == ALGORITHM_GENETIC)
00560         jb_json_object_set_uint (object, LABEL_NBITS, input->variable[i].nbits);
00561       if (input->nsteps)
00562         jb_json_object_set_float (object, LABEL_STEP, input->variable[i].step);
00563       json_array_add_element (array, child);
00564     }
00565   json_object_set_array_member (object, LABEL_VARIABLES, array);
00566
00567   // Saving the error norm
00568   switch (input->norm)
00569     {
00570     case ERROR_NORM_MAXIMUM:
00571       json_object_set_string_member (object, LABEL_NORM, LABEL_MAXIMUM);
00572       break;
00573     case ERROR_NORM_P:
00574       json_object_set_string_member (object, LABEL_NORM, LABEL_P);
00575       jb_json_object_set_float (object, LABEL_P, input->p);
00576       break;
00577     case ERROR_NORM_TAXICAB:
00578       json_object_set_string_member (object, LABEL_NORM, LABEL_TAXICAB);
00579     }
00580
00581 #if DEBUG_INTERFACE
00582   fprintf (stderr, "input_save_json:  end\n");
00583 #endif
00584 }
00585
00589 static inline void
00590 input_save (char *filename)
00591 {
00592   xmlDoc *doc;
00593   JsonGenerator *generator;
00594
00595 #if DEBUG_INTERFACE
00596   fprintf (stderr, "input_save:  start\n");
00597 #endif
00598
00599   // Getting the input file directory
00600   input->name = g_path_get_basename (filename);
00601   input->directory = g_path_get_dirname (filename);
00602
00603   if (input->type == INPUT_TYPE_XML)
00604     {
00605       // Opening the input file
00606       doc = xmlNewDoc ((const xmlChar *) "1.0");
00607       input_save_xml (doc);
00608
00609       // Saving the XML file
00610       xmlSaveFormatFile (filename, doc, 1);
00611
00612       // Freeing memory
00613       xmlFreeDoc (doc);
00614     }
00615   else
00616     {
00617       // Opening the input file
00618       generator = json_generator_new ();
00619       json_generator_set_pretty (generator, TRUE);
00620       input_save_json (generator);
00621
00622       // Saving the JSON file
00623       json_generator_to_file (generator, filename, NULL);
00624
00625       // Freeing memory
00626       g_object_unref (generator);
00627     }
00628
00629 #if DEBUG_INTERFACE
00630   fprintf (stderr, "input_save:  end\n");
00631 #endif
00632 }
```

```
00633
00637 static void
00638 dialog_options_close (GtkDialog * dlg,
00639                       int response_id)
00640 {
00641 #if DEBUG_INTERFACE
00642   fprintf (stderr, "dialog_options_close:  start\n");
00643 #endif
00644   if (response_id == GTK_RESPONSE_OK)
00645     {
00646       input->seed
00647         = (unsigned long int) gtk_spin_button_get_value (options->spin_seed);
00648       nthreads = gtk_spin_button_get_value_as_int (options->spin_threads);
00649       nthreads_climbing
00650         = gtk_spin_button_get_value_as_int (options->spin_climbing);
00651     }
00652   gtk_window_destroy (GTK_WINDOW (dlg));
00653 #if DEBUG_INTERFACE
00654   fprintf (stderr, "dialog_options_close:  end\n");
00655 #endif
00656 }
00657
00661 static void
00662 options_new ()
00663 {
00664 #if DEBUG_INTERFACE
00665   fprintf (stderr, "options_new:  start\n");
00666 #endif
00667   options->label_seed = (GtkLabel *)
00668     gtk_label_new (_("Pseudo-random numbers generator seed"));
00669   options->spin_seed = (GtkSpinButton *)
00670     gtk_spin_button_new_with_range (0., (gdouble) G_MAXULONG, 1.);
00671   gtk_widget_set_tooltip_text
00672     (GTK_WIDGET (options->spin_seed),
00673      _("Seed to init the pseudo-random numbers generator"));
00674   gtk_spin_button_set_value (options->spin_seed, (gdouble) input->seed);
00675   options->label_threads = (GtkLabel *)
00676     gtk_label_new (_("Threads number for the stochastic algorithm"));
00677   options->spin_threads
00678     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00679   gtk_widget_set_tooltip_text
00680     (GTK_WIDGET (options->spin_threads),
00681      _("Number of threads to perform the calibration/optimization for "
00682        "the stochastic algorithm"));
00683   gtk_spin_button_set_value (options->spin_threads, (gdouble) nthreads);
00684   options->label_climbing = (GtkLabel *)
00685     gtk_label_new (_("Threads number for the hill climbing method"));
00686   options->spin_climbing =
00687     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00688   gtk_widget_set_tooltip_text
00689     (GTK_WIDGET (options->spin_climbing),
00690      _("Number of threads to perform the calibration/optimization for the "
00691        "hill climbing method"));
00692   gtk_spin_button_set_value (options->spin_climbing,
00693                              (gdouble) nthreads_climbing);
00694   options->grid = (GtkGrid *) gtk_grid_new ();
00695   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_seed), 0, 0, 1, 1);
00696   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_seed), 1, 0, 1, 1);
00697   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_threads),
00698                    0, 1, 1, 1);
00699   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_threads),
00700                    1, 1, 1, 1);
00701   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_climbing), 0, 2, 1,
00702                    1);
00703   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_climbing), 1, 2, 1,
00704                    1);
00705 #if !GTK4
00706   gtk_widget_show_all (GTK_WIDGET (options->grid));
00707 #else
00708   gtk_widget_show (GTK_WIDGET (options->grid));
00709 #endif
00710   options->dialog = (GtkDialog *)
00711     gtk_dialog_new_with_buttons (_("Options"),
00712                                  window->window,
00713                                  GTK_DIALOG_MODAL,
00714                                  _("_OK"), GTK_RESPONSE_OK,
00715                                  _("_Cancel"), GTK_RESPONSE_CANCEL, NULL);
00716   gtk_box_append (GTK_BOX (gtk_dialog_get_content_area (options->dialog)),
00717                   GTK_WIDGET (options->grid));
00718   g_signal_connect (options->dialog, "response",
00719                     G_CALLBACK (dialog_options_close), NULL);
00720   gtk_window_present (GTK_WINDOW (options->dialog));
00721 #if DEBUG_INTERFACE
00722   fprintf (stderr, "options_new:  end\n");
00723 #endif
00724 }
00725
```

```
00729 static inline void
00730 running_new ()
00731 {
00732 #if DEBUG_INTERFACE
00733   fprintf (stderr, "running_new:  start\n");
00734 #endif
00735   running->label = (GtkLabel *) gtk_label_new (_("Calculating ..."));
00736   running->spinner = (GtkSpinner *) gtk_spinner_new ();
00737   running->grid = (GtkGrid *) gtk_grid_new ();
00738   gtk_grid_attach (running->grid, GTK_WIDGET (running->label), 0, 0, 1, 1);
00739   gtk_grid_attach (running->grid, GTK_WIDGET (running->spinner), 0, 1, 1, 1);
00740   running->dialog = (GtkDialog *)
00741     gtk_dialog_new_with_buttons (_("Calculating"),
00742                                  window->window, GTK_DIALOG_MODAL, NULL, NULL);
00743   gtk_window_set_child (GTK_WINDOW
00744                         (gtk_dialog_get_content_area (running->dialog)),
00745                         GTK_WIDGET (running->grid));
00746   gtk_spinner_start (running->spinner);
00747 #if !GTK4
00748   gtk_widget_show_all (GTK_WIDGET (running->dialog));
00749 #else
00750   gtk_widget_show (GTK_WIDGET (running->dialog));
00751 #endif
00752 #if DEBUG_INTERFACE
00753   fprintf (stderr, "running_new:  end\n");
00754 #endif
00755 }
00756
00762 static unsigned int
00763 window_get_algorithm ()
00764 {
00765   unsigned int i;
00766 #if DEBUG_INTERFACE
00767   fprintf (stderr, "window_get_algorithm:  start\n");
00768 #endif
00769   i = jbw_array_buttons_get_active (window->button_algorithm, NALGORITHMS);
00770 #if DEBUG_INTERFACE
00771   fprintf (stderr, "window_get_algorithm:  %u\n", i);
00772   fprintf (stderr, "window_get_algorithm:  end\n");
00773 #endif
00774   return i;
00775 }
00776
00782 static unsigned int
00783 window_get_climbing ()
00784 {
00785   unsigned int i;
00786 #if DEBUG_INTERFACE
00787   fprintf (stderr, "window_get_climbing:  start\n");
00788 #endif
00789   i = jbw_array_buttons_get_active (window->button_climbing, NCLIMBINGS);
00790 #if DEBUG_INTERFACE
00791   fprintf (stderr, "window_get_climbing:  %u\n", i);
00792   fprintf (stderr, "window_get_climbing:  end\n");
00793 #endif
00794   return i;
00795 }
00796
00802 static unsigned int
00803 window_get_norm ()
00804 {
00805   unsigned int i;
00806 #if DEBUG_INTERFACE
00807   fprintf (stderr, "window_get_norm:  start\n");
00808 #endif
00809   i = jbw_array_buttons_get_active (window->button_norm, NNORMS);
00810 #if DEBUG_INTERFACE
00811   fprintf (stderr, "window_get_norm:  %u\n", i);
00812   fprintf (stderr, "window_get_norm:  end\n");
00813 #endif
00814   return i;
00815 }
00816
00820 static void
00821 window_save_climbing ()
00822 {
00823 #if DEBUG_INTERFACE
00824   fprintf (stderr, "window_save_climbing:  start\n");
00825 #endif
00826   if (gtk_check_button_get_active (window->check_climbing))
00827     {
00828       input->nsteps = gtk_spin_button_get_value_as_int (window->spin_steps);
00829       input->relaxation = gtk_spin_button_get_value (window->spin_relaxation);
00830       switch (window_get_climbing ())
00831         {
00832         case CLIMBING_METHOD_COORDINATES:
00833           input->climbing = CLIMBING_METHOD_COORDINATES;
```

```
00834           break;
00835         default:
00836           input->climbing = CLIMBING_METHOD_RANDOM;
00837           input->nestimates
00838             = gtk_spin_button_get_value_as_int (window->spin_estimates);
00839         }
00840     }
00841   else
00842     input->nsteps = 0;
00843 #if DEBUG_INTERFACE
00844   fprintf (stderr, "window_save_climbing:  end\n");
00845 #endif
00846 }
00847
00851 static void
00852 dialog_save_close (GtkFileChooserDialog * dlg,
00854                    int response_id)
00855 {
00856   GtkFileFilter *filter1;
00857   char *buffer;
00858 #if DEBUG_INTERFACE
00859   fprintf (stderr, "dialog_save_close:  start\n");
00860 #endif
00861   // If OK response then saving
00862   if (response_id == GTK_RESPONSE_OK)
00863     {
00864       // Setting input file type
00865       filter1 = gtk_file_chooser_get_filter (GTK_FILE_CHOOSER (dlg));
00866       buffer = (char *) gtk_file_filter_get_name (filter1);
00867       if (!strcmp (buffer, "XML"))
00868         input->type = INPUT_TYPE_XML;
00869       else
00870         input->type = INPUT_TYPE_JSON;
00871
00872       // Adding properties to the root XML node
00873       input->simulator
00874         = g_strdup (gtk_button_get_label (window->button_simulator));
00875       if (gtk_check_button_get_active (window->check_evaluator))
00876         input->evaluator
00877           = g_strdup (gtk_button_get_label (window->button_evaluator));
00878       else
00879         input->evaluator = NULL;
00880       if (input->type == INPUT_TYPE_XML)
00881         {
00882           input->result
00883             = (char *) xmlStrdup ((const xmlChar *)
00884                                   gtk_entry_get_text (window->entry_result));
00885           input->variables
00886             = (char *) xmlStrdup ((const xmlChar *)
00887                                   gtk_entry_get_text (window->entry_variables));
00888         }
00889       else
00890         {
00891           input->result = g_strdup (gtk_entry_get_text (window->entry_result));
00892           input->variables =
00893             g_strdup (gtk_entry_get_text (window->entry_variables));
00894         }
00895
00896       // Setting the algorithm
00897       switch (window_get_algorithm ())
00898         {
00899         case ALGORITHM_MONTE_CARLO:
00900           input->algorithm = ALGORITHM_MONTE_CARLO;
00901           input->nsimulations
00902             = gtk_spin_button_get_value_as_int (window->spin_simulations);
00903           input->niterations
00904             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00905           input->tolerance = gtk_spin_button_get_value (window->spin_tolerance);
00906           input->nbest = gtk_spin_button_get_value_as_int (window->spin_bests);
00907           window_save_climbing ();
00908           break;
00909         case ALGORITHM_SWEEP:
00910           input->algorithm = ALGORITHM_SWEEP;
00911           input->niterations
00912             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00913           input->tolerance = gtk_spin_button_get_value (window->spin_tolerance);
00914           input->nbest = gtk_spin_button_get_value_as_int (window->spin_bests);
00915           window_save_climbing ();
00916           break;
00917         case ALGORITHM_ORTHOGONAL:
00918           input->algorithm = ALGORITHM_ORTHOGONAL;
00919           input->niterations
00920             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00921           input->tolerance = gtk_spin_button_get_value (window->spin_tolerance);
00922           input->nbest = gtk_spin_button_get_value_as_int (window->spin_bests);
00923           window_save_climbing ();
00924           break;
```

```
00925         default:
00926           input->algorithm = ALGORITHM_GENETIC;
00927           input->nsimulations
00928             = gtk_spin_button_get_value_as_int (window->spin_population);
00929           input->niterations
00930             = gtk_spin_button_get_value_as_int (window->spin_generations);
00931           input->mutation_ratio
00932             = gtk_spin_button_get_value (window->spin_mutation);
00933           input->reproduction_ratio
00934             = gtk_spin_button_get_value (window->spin_reproduction);
00935           input->adaptation_ratio
00936             = gtk_spin_button_get_value (window->spin_adaptation);
00937         }
00938       input->norm = window_get_norm ();
00939       input->p = gtk_spin_button_get_value (window->spin_p);
00940       input->threshold = gtk_spin_button_get_value (window->spin_threshold);
00941
00942       // Saving the XML file
00943       buffer = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
00944       input_save (buffer);
00945
00946       // Closing and freeing memory
00947       g_free (buffer);
00948     }
00949   gtk_window_destroy (GTK_WINDOW (dlg));
00950 #if DEBUG_INTERFACE
00951   fprintf (stderr, "dialog_save_close:  end\n");
00952 #endif
00953 }
00954
00958 static void
00959 window_save ()
00960 {
00961   GtkFileChooserDialog *dlg;
00962   GtkFileFilter *filter1, *filter2;
00963   char *buffer;
00964
00965 #if DEBUG_INTERFACE
00966   fprintf (stderr, "window_save:  start\n");
00967 #endif
00968
00969   // Opening the saving dialog
00970   dlg = (GtkFileChooserDialog *)
00971     gtk_file_chooser_dialog_new (_("Save file"),
00972                                  window->window,
00973                                  GTK_FILE_CHOOSER_ACTION_SAVE,
00974                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
00975                                  _("_OK"), GTK_RESPONSE_OK, NULL);
00976 #if !GTK4
00977   gtk_file_chooser_set_do_overwrite_confirmation (GTK_FILE_CHOOSER (dlg), TRUE);
00978 #endif
00979   buffer = g_build_filename (input->directory, input->name, NULL);
00980   gtk_file_chooser_set_current_name (GTK_FILE_CHOOSER (dlg), buffer);
00981   g_free (buffer);
00982
00983   // Adding XML filter
00984   filter1 = (GtkFileFilter *) gtk_file_filter_new ();
00985   gtk_file_filter_set_name (filter1, "XML");
00986   gtk_file_filter_add_pattern (filter1, "*.xml");
00987   gtk_file_filter_add_pattern (filter1, "*.XML");
00988   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter1);
00989
00990   // Adding JSON filter
00991   filter2 = (GtkFileFilter *) gtk_file_filter_new ();
00992   gtk_file_filter_set_name (filter2, "JSON");
00993   gtk_file_filter_add_pattern (filter2, "*.json");
00994   gtk_file_filter_add_pattern (filter2, "*.JSON");
00995   gtk_file_filter_add_pattern (filter2, "*.js");
00996   gtk_file_filter_add_pattern (filter2, "*.JS");
00997   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter2);
00998
00999   if (input->type == INPUT_TYPE_XML)
01000     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter1);
01001   else
01002     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter2);
01003
01004   // Connecting the close function
01005   g_signal_connect (dlg, "response", G_CALLBACK (dialog_save_close), NULL);
01006
01007   // Showing modal dialog
01008   gtk_window_present (GTK_WINDOW (dlg));
01009
01010 #if DEBUG_INTERFACE
01011   fprintf (stderr, "window_save:  end\n");
01012 #endif
01013 }
01014
```

```
01018 static void
01019 window_run ()
01020 {
01021   char *msg, *msg2, buffer[64], buffer2[64];
01022   unsigned int i;
01023 #if DEBUG_INTERFACE
01024   fprintf (stderr, "window_run:  start\n");
01025 #endif
01026   window_save ();
01027   running_new ();
01028   jbw_process_pending ();
01029   optimize_open ();
01030 #if DEBUG_INTERFACE
01031   fprintf (stderr, "window_run:  closing running dialog\n");
01032 #endif
01033   gtk_spinner_stop (running->spinner);
01034   gtk_window_destroy (GTK_WINDOW (running->dialog));
01035 #if DEBUG_INTERFACE
01036   fprintf (stderr, "window_run:  displaying results\n");
01037 #endif
01038   snprintf (buffer, 64, "error = %.15le\n", optimize->error_old[0]);
01039   msg2 = g_strdup (buffer);
01040   for (i = 0; i < optimize->nvariables; ++i, msg2 = msg)
01041     {
01042       snprintf (buffer, 64, "%s = %s\n",
01043                 input->variable[i].name, format[input->variable[i].precision]);
01044       snprintf (buffer2, 64, buffer, optimize->value_old[i]);
01045       msg = g_strconcat (msg2, buffer2, NULL);
01046       g_free (msg2);
01047     }
01048   snprintf (buffer, 64, "%s = %.6lg s", _("Calculation time"),
01049             optimize->calculation_time);
01050   msg = g_strconcat (msg2, buffer, NULL);
01051   g_free (msg2);
01052   jbw_show_message_gtk (_("Best result"), msg, INFO_TYPE);
01053   g_free (msg);
01054 #if DEBUG_INTERFACE
01055   fprintf (stderr, "window_run:  freeing memory\n");
01056 #endif
01057   optimize_free ();
01058 #if DEBUG_INTERFACE
01059   fprintf (stderr, "window_run:  end\n");
01060 #endif
01061 }
01062
01066 static void
01067 window_help ()
01068 {
01069   char *buffer, *buffer2;
01070 #if DEBUG_INTERFACE
01071   fprintf (stderr, "window_help:  start\n");
01072 #endif
01073   buffer2 = g_build_filename (window->application_directory, "..", "manuals",
01074                               _("user-manual.pdf"), NULL);
01075   buffer = g_filename_to_uri (buffer2, NULL, NULL);
01076   g_free (buffer2);
01077 #if GTK4
01078   gtk_show_uri (window->window, buffer, GDK_CURRENT_TIME);
01079 #else
01080   gtk_show_uri_on_window (window->window, buffer, GDK_CURRENT_TIME, NULL);
01081 #endif
01082 #if DEBUG_INTERFACE
01083   fprintf (stderr, "window_help:  uri=%s\n", buffer);
01084 #endif
01085   g_free (buffer);
01086 #if DEBUG_INTERFACE
01087   fprintf (stderr, "window_help:  end\n");
01088 #endif
01089 }
01090
01094 static void
01095 window_about ()
01096 {
01097   static const gchar *authors[] = {
01098     "Javier Burguete Tolosa <jburguete@eead.csic.es>",
01099     "Borja Latorre Garcés <borja.latorre@csic.es>",
01100     NULL
01101   };
01102 #if DEBUG_INTERFACE
01103   fprintf (stderr, "window_about:  start\n");
01104 #endif
01105   gtk_show_about_dialog
01106     (window->window,
01107      "program_name", "MPCOTool",
01108      "comments",
01109      _("The Multi-Purposes Calibration and Optimization Tool.\n"
01110        "A software to perform calibrations or optimizations of empirical "
```

```
01111         "parameters"),
01112       "authors", authors,
01113       "translator-credits",
01114       "Javier Burguete Tolosa <jburguete@eead.csic.es> "
01115       "(english, french and spanish)\n"
01116       "Uğur Çayoğlu (german)",
01117       "version", "4.4.6",
01118       "copyright", "Copyright 2012-2023 Javier Burguete Tolosa",
01119       "logo", window->logo,
01120       "website", "https://github.com/jburguete/mpcotool",
01121       "license-type", GTK_LICENSE_BSD, NULL);
01122 #if DEBUG_INTERFACE
01123   fprintf (stderr, "window_about:  end\n");
01124 #endif
01125 }
01126
01130 static void
01131 window_update_climbing ()
01132 {
01133 #if DEBUG_INTERFACE
01134   fprintf (stderr, "window_update_climbing:  start\n");
01135 #endif
01136   gtk_widget_show (GTK_WIDGET (window->check_climbing));
01137   if (gtk_check_button_get_active (window->check_climbing))
01138     {
01139       gtk_widget_show (GTK_WIDGET (window->grid_climbing));
01140       gtk_widget_show (GTK_WIDGET (window->label_step));
01141       gtk_widget_show (GTK_WIDGET (window->spin_step));
01142     }
01143   switch (window_get_climbing ())
01144     {
01145     case CLIMBING_METHOD_COORDINATES:
01146       gtk_widget_hide (GTK_WIDGET (window->label_estimates));
01147       gtk_widget_hide (GTK_WIDGET (window->spin_estimates));
01148       break;
01149     default:
01150       gtk_widget_show (GTK_WIDGET (window->label_estimates));
01151       gtk_widget_show (GTK_WIDGET (window->spin_estimates));
01152     }
01153 #if DEBUG_INTERFACE
01154   fprintf (stderr, "window_update_climbing:  end\n");
01155 #endif
01156 }
01157
01161 static void
01162 window_update ()
01163 {
01164   unsigned int i;
01165 #if DEBUG_INTERFACE
01166   fprintf (stderr, "window_update:  start\n");
01167 #endif
01168   gtk_widget_set_sensitive
01169     (GTK_WIDGET (window->button_evaluator),
01170      gtk_check_button_get_active (window->check_evaluator));
01171   gtk_widget_hide (GTK_WIDGET (window->label_simulations));
01172   gtk_widget_hide (GTK_WIDGET (window->spin_simulations));
01173   gtk_widget_hide (GTK_WIDGET (window->label_iterations));
01174   gtk_widget_hide (GTK_WIDGET (window->spin_iterations));
01175   gtk_widget_hide (GTK_WIDGET (window->label_tolerance));
01176   gtk_widget_hide (GTK_WIDGET (window->spin_tolerance));
01177   gtk_widget_hide (GTK_WIDGET (window->label_bests));
01178   gtk_widget_hide (GTK_WIDGET (window->spin_bests));
01179   gtk_widget_hide (GTK_WIDGET (window->label_population));
01180   gtk_widget_hide (GTK_WIDGET (window->spin_population));
01181   gtk_widget_hide (GTK_WIDGET (window->label_generations));
01182   gtk_widget_hide (GTK_WIDGET (window->spin_generations));
01183   gtk_widget_hide (GTK_WIDGET (window->label_mutation));
01184   gtk_widget_hide (GTK_WIDGET (window->spin_mutation));
01185   gtk_widget_hide (GTK_WIDGET (window->label_reproduction));
01186   gtk_widget_hide (GTK_WIDGET (window->spin_reproduction));
01187   gtk_widget_hide (GTK_WIDGET (window->label_adaptation));
01188   gtk_widget_hide (GTK_WIDGET (window->spin_adaptation));
01189   gtk_widget_hide (GTK_WIDGET (window->label_sweeps));
01190   gtk_widget_hide (GTK_WIDGET (window->spin_sweeps));
01191   gtk_widget_hide (GTK_WIDGET (window->label_bits));
01192   gtk_widget_hide (GTK_WIDGET (window->spin_bits));
01193   gtk_widget_hide (GTK_WIDGET (window->check_climbing));
01194   gtk_widget_hide (GTK_WIDGET (window->grid_climbing));
01195   gtk_widget_hide (GTK_WIDGET (window->label_step));
01196   gtk_widget_hide (GTK_WIDGET (window->spin_step));
01197   gtk_widget_hide (GTK_WIDGET (window->label_p));
01198   gtk_widget_hide (GTK_WIDGET (window->spin_p));
01199   i = gtk_spin_button_get_value_as_int (window->spin_iterations);
01200   switch (window_get_algorithm ())
01201     {
01202     case ALGORITHM_MONTE_CARLO:
01203       gtk_widget_show (GTK_WIDGET (window->label_simulations));
```

```
01204       gtk_widget_show (GTK_WIDGET (window->spin_simulations));
01205       gtk_widget_show (GTK_WIDGET (window->label_iterations));
01206       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01207       if (i > 1)
01208         {
01209           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01210           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01211           gtk_widget_show (GTK_WIDGET (window->label_bests));
01212           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01213         }
01214       window_update_climbing ();
01215       break;
01216     case ALGORITHM_SWEEP:
01217     case ALGORITHM_ORTHOGONAL:
01218       gtk_widget_show (GTK_WIDGET (window->label_iterations));
01219       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01220       if (i > 1)
01221         {
01222           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01223           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01224           gtk_widget_show (GTK_WIDGET (window->label_bests));
01225           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01226         }
01227       gtk_widget_show (GTK_WIDGET (window->label_sweeps));
01228       gtk_widget_show (GTK_WIDGET (window->spin_sweeps));
01229       gtk_widget_show (GTK_WIDGET (window->check_climbing));
01230       window_update_climbing ();
01231       break;
01232     default:
01233       gtk_widget_show (GTK_WIDGET (window->label_population));
01234       gtk_widget_show (GTK_WIDGET (window->spin_population));
01235       gtk_widget_show (GTK_WIDGET (window->label_generations));
01236       gtk_widget_show (GTK_WIDGET (window->spin_generations));
01237       gtk_widget_show (GTK_WIDGET (window->label_mutation));
01238       gtk_widget_show (GTK_WIDGET (window->spin_mutation));
01239       gtk_widget_show (GTK_WIDGET (window->label_reproduction));
01240       gtk_widget_show (GTK_WIDGET (window->spin_reproduction));
01241       gtk_widget_show (GTK_WIDGET (window->label_adaptation));
01242       gtk_widget_show (GTK_WIDGET (window->spin_adaptation));
01243       gtk_widget_show (GTK_WIDGET (window->label_bits));
01244       gtk_widget_show (GTK_WIDGET (window->spin_bits));
01245     }
01246   gtk_widget_set_sensitive
01247     (GTK_WIDGET (window->button_remove_experiment), input->nexperiments > 1);
01248   gtk_widget_set_sensitive
01249     (GTK_WIDGET (window->button_remove_variable), input->nvariables > 1);
01250   for (i = 0; i < input->experiment->ninputs; ++i)
01251     {
01252       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01253       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01254       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 0);
01255       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i]), 1);
01256       g_signal_handler_block
01257         (window->check_template[i], window->id_template[i]);
01258       g_signal_handler_block (window->button_template[i], window->id_input[i]);
01259       gtk_check_button_set_active (window->check_template[i], 1);
01260       g_signal_handler_unblock (window->button_template[i],
01261                                 window->id_input[i]);
01262       g_signal_handler_unblock (window->check_template[i],
01263                                 window->id_template[i]);
01264     }
01265   if (i > 0)
01266     {
01267       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i - 1]), 1);
01268       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i - 1]),
01269                                 gtk_check_button_get_active
01270                                 (window->check_template[i - 1]));
01271     }
01272   if (i < MAX_NINPUTS)
01273     {
01274       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01275       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01276       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 1);
01277       gtk_widget_set_sensitive
01278         (GTK_WIDGET (window->button_template[i]),
01279          gtk_check_button_get_active (window->check_template[i]));
01280       g_signal_handler_block
01281         (window->check_template[i], window->id_template[i]);
01282       g_signal_handler_block (window->button_template[i], window->id_input[i]);
01283       gtk_check_button_set_active (window->check_template[i], 0);
01284       g_signal_handler_unblock (window->button_template[i],
01285                                 window->id_input[i]);
01286       g_signal_handler_unblock (window->check_template[i],
01287                                 window->id_template[i]);
01288     }
01289   while (++i < MAX_NINPUTS)
01290     {
```

```
01291       gtk_widget_hide (GTK_WIDGET (window->check_template[i]));
01292       gtk_widget_hide (GTK_WIDGET (window->button_template[i]));
01293     }
01294   gtk_widget_set_sensitive
01295     (GTK_WIDGET (window->spin_minabs),
01296      gtk_check_button_get_active (window->check_minabs));
01297   gtk_widget_set_sensitive
01298     (GTK_WIDGET (window->spin_maxabs),
01299      gtk_check_button_get_active (window->check_maxabs));
01300   if (window_get_norm () == ERROR_NORM_P)
01301     {
01302       gtk_widget_show (GTK_WIDGET (window->label_p));
01303       gtk_widget_show (GTK_WIDGET (window->spin_p));
01304     }
01305 #if DEBUG_INTERFACE
01306   fprintf (stderr, "window_update:  end\n");
01307 #endif
01308 }
01309
01313 static void
01314 window_set_algorithm ()
01315 {
01316   int i;
01317 #if DEBUG_INTERFACE
01318   fprintf (stderr, "window_set_algorithm:  start\n");
01319 #endif
01320   i = window_get_algorithm ();
01321   switch (i)
01322     {
01323     case ALGORITHM_SWEEP:
01324     case ALGORITHM_ORTHOGONAL:
01325       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01326       if (i < 0)
01327         i = 0;
01328       gtk_spin_button_set_value (window->spin_sweeps,
01329                                  (gdouble) input->variable[i].nsweeps);
01330       break;
01331     case ALGORITHM_GENETIC:
01332       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01333       if (i < 0)
01334         i = 0;
01335       gtk_spin_button_set_value (window->spin_bits,
01336                                  (gdouble) input->variable[i].nbits);
01337     }
01338   window_update ();
01339 #if DEBUG_INTERFACE
01340   fprintf (stderr, "window_set_algorithm:  end\n");
01341 #endif
01342 }
01343
01347 static void
01348 window_set_experiment ()
01349 {
01350   unsigned int i, j;
01351   char *buffer1;
01352 #if DEBUG_INTERFACE
01353   fprintf (stderr, "window_set_experiment:  start\n");
01354 #endif
01355   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01356   gtk_spin_button_set_value (window->spin_weight, input->experiment[i].weight);
01357   buffer1 = gtk_combo_box_text_get_active_text (window->combo_experiment);
01358   gtk_button_set_label (window->button_experiment, buffer1);
01359   g_free (buffer1);
01360   for (j = 0; j < input->experiment->ninputs; ++j)
01361     {
01362       g_signal_handler_block (window->button_template[j], window->id_input[j]);
01363       gtk_button_set_label (window->button_template[j],
01364                             input->experiment[i].stencil[j]);
01365       g_signal_handler_unblock
01366         (window->button_template[j], window->id_input[j]);
01367     }
01368 #if DEBUG_INTERFACE
01369   fprintf (stderr, "window_set_experiment:  end\n");
01370 #endif
01371 }
01372
01376 static void
01377 window_remove_experiment ()
01378 {
01379   unsigned int i, j;
01380 #if DEBUG_INTERFACE
01381   fprintf (stderr, "window_remove_experiment:  start\n");
01382 #endif
01383   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01384   g_signal_handler_block (window->combo_experiment, window->id_experiment);
01385   gtk_combo_box_text_remove (window->combo_experiment, i);
01386   g_signal_handler_unblock (window->combo_experiment, window->id_experiment);
```

```
01387   experiment_free (input->experiment + i, input->type);
01388   --input->nexperiments;
01389   for (j = i; j < input->nexperiments; ++j)
01390     memcpy (input->experiment + j, input->experiment + j + 1,
01391             sizeof (Experiment));
01392   j = input->nexperiments - 1;
01393   if (i > j)
01394     i = j;
01395   for (j = 0; j < input->experiment->ninputs; ++j)
01396     g_signal_handler_block (window->button_template[j], window->id_input[j]);
01397   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01398   for (j = 0; j < input->experiment->ninputs; ++j)
01399     g_signal_handler_unblock (window->button_template[j], window->id_input[j]);
01400   window_update ();
01401 #if DEBUG_INTERFACE
01402   fprintf (stderr, "window_remove_experiment:  end\n");
01403 #endif
01404 }
01405
01409 static void
01410 window_add_experiment ()
01411 {
01412   unsigned int i, j;
01413 #if DEBUG_INTERFACE
01414   fprintf (stderr, "window_add_experiment:  start\n");
01415 #endif
01416   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01417   g_signal_handler_block (window->combo_experiment, window->id_experiment);
01418   gtk_combo_box_text_insert_text
01419     (window->combo_experiment, i, input->experiment[i].name);
01420   g_signal_handler_unblock (window->combo_experiment, window->id_experiment);
01421   input->experiment = (Experiment *) g_realloc
01422     (input->experiment, (input->nexperiments + 1) * sizeof (Experiment));
01423   for (j = input->nexperiments - 1; j > i; --j)
01424     memcpy (input->experiment + j + 1, input->experiment + j,
01425             sizeof (Experiment));
01426   input->experiment[j + 1].weight = input->experiment[j].weight;
01427   input->experiment[j + 1].ninputs = input->experiment[j].ninputs;
01428   if (input->type == INPUT_TYPE_XML)
01429     {
01430       input->experiment[j + 1].name
01431         = (char *) xmlStrdup ((xmlChar *) input->experiment[j].name);
01432       for (j = 0; j < input->experiment->ninputs; ++j)
01433         input->experiment[i + 1].stencil[j]
01434           = (char *) xmlStrdup ((xmlChar *) input->experiment[i].stencil[j]);
01435     }
01436   else
01437     {
01438       input->experiment[j + 1].name = g_strdup (input->experiment[j].name);
01439       for (j = 0; j < input->experiment->ninputs; ++j)
01440         input->experiment[i + 1].stencil[j]
01441           = g_strdup (input->experiment[i].stencil[j]);
01442     }
01443   ++input->nexperiments;
01444   for (j = 0; j < input->experiment->ninputs; ++j)
01445     g_signal_handler_block (window->button_template[j], window->id_input[j]);
01446   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i + 1);
01447   for (j = 0; j < input->experiment->ninputs; ++j)
01448     g_signal_handler_unblock (window->button_template[j], window->id_input[j]);
01449   window_update ();
01450 #if DEBUG_INTERFACE
01451   fprintf (stderr, "window_add_experiment:  end\n");
01452 #endif
01453 }
01454
01458 static void
01459 dialog_name_experiment_close (GtkFileChooserDialog * dlg,
01461                               int response_id,
01462                               void *data)
01463 {
01464   char *buffer;
01465   unsigned int i;
01466 #if DEBUG_INTERFACE
01467   fprintf (stderr, "window_name_experiment_close:  start\n");
01468 #endif
01469   i = (size_t) data;
01470   if (response_id == GTK_RESPONSE_OK)
01471     {
01472       buffer = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
01473       g_signal_handler_block (window->combo_experiment, window->id_experiment);
01474       gtk_combo_box_text_remove (window->combo_experiment, i);
01475       gtk_combo_box_text_insert_text (window->combo_experiment, i, buffer);
01476       gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01477       g_signal_handler_unblock (window->combo_experiment,
01478                                 window->id_experiment);
01479       g_free (buffer);
01480     }
```

```
01481 #if DEBUG_INTERFACE
01482   fprintf (stderr, "window_name_experiment_close:  end\n");
01483 #endif
01484 }
01485
01489 static void
01490 window_name_experiment ()
01491 {
01492   GtkFileChooserDialog *dlg;
01493   GMainLoop *loop;
01494   const char *buffer;
01495   unsigned int i;
01496 #if DEBUG_INTERFACE
01497   fprintf (stderr, "window_name_experiment:  start\n");
01498 #endif
01499   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01500   buffer = gtk_button_get_label (window->button_experiment);
01501   dlg = (GtkFileChooserDialog *)
01502     gtk_file_chooser_dialog_new (_("Open experiment file"),
01503                                  window->window,
01504                                  GTK_FILE_CHOOSER_ACTION_OPEN,
01505                                  _("_Cancel"),
01506                                  GTK_RESPONSE_CANCEL,
01507                                  _("_Open"), GTK_RESPONSE_OK, NULL);
01508   gtk_file_chooser_set_current_name (GTK_FILE_CHOOSER (dlg), buffer);
01509   g_signal_connect (dlg, "response", G_CALLBACK (dialog_name_experiment_close),
01510                     (void *) (size_t) i);
01511   gtk_window_present (GTK_WINDOW (dlg));
01512   loop = g_main_loop_new (NULL, 0);
01513   g_signal_connect_swapped (dlg, "destroy", G_CALLBACK (g_main_loop_quit),
01514                             loop);
01515   g_main_loop_run (loop);
01516   g_main_loop_unref (loop);
01517 #if DEBUG_INTERFACE
01518   fprintf (stderr, "window_name_experiment:  end\n");
01519 #endif
01520 }
01521
01525 static void
01526 window_weight_experiment ()
01527 {
01528   unsigned int i;
01529 #if DEBUG_INTERFACE
01530   fprintf (stderr, "window_weight_experiment:  start\n");
01531 #endif
01532   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01533   input->experiment[i].weight = gtk_spin_button_get_value (window->spin_weight);
01534 #if DEBUG_INTERFACE
01535   fprintf (stderr, "window_weight_experiment:  end\n");
01536 #endif
01537 }
01538
01542 static void
01543 window_inputs_experiment ()
01544 {
01545   unsigned int j;
01546 #if DEBUG_INTERFACE
01547   fprintf (stderr, "window_inputs_experiment:  start\n");
01548 #endif
01549   j = input->experiment->ninputs - 1;
01550   if (j && !gtk_check_button_get_active (window->check_template[j]))
01551     --input->experiment->ninputs;
01552   if (input->experiment->ninputs < MAX_NINPUTS
01553       && gtk_check_button_get_active (window->check_template[j]))
01554     ++input->experiment->ninputs;
01555   window_update ();
01556 #if DEBUG_INTERFACE
01557   fprintf (stderr, "window_inputs_experiment:  end\n");
01558 #endif
01559 }
01560
01564 static void
01565 window_template_experiment_close (GtkFileChooserDialog * dlg,
01567                                   int response_id,
01569                                   void *data)
01570 {
01571   GFile *file1, *file2;
01572   char *buffer1, *buffer2;
01573   unsigned int i, j;
01574 #if DEBUG_INTERFACE
01575   fprintf (stderr, "window_template_experiment_close:  start\n");
01576 #endif
01577   if (response_id == GTK_RESPONSE_OK)
01578     {
01579       i = (size_t) data;
01580       j = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01581       buffer1 = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
```

```
01582       file1 = g_file_new_for_path (buffer1);
01583       file2 = g_file_new_for_path (input->directory);
01584       buffer2 = g_file_get_relative_path (file2, file1);
01585       if (input->type == INPUT_TYPE_XML)
01586         input->experiment[j].stencil[i]
01587           = (char *) xmlStrdup ((xmlChar *) buffer2);
01588       else
01589         input->experiment[j].stencil[i] = g_strdup (buffer2);
01590       g_free (buffer2);
01591       g_object_unref (file2);
01592       g_object_unref (file1);
01593       g_free (buffer1);
01594     }
01595   gtk_window_destroy (GTK_WINDOW (dlg));
01596 #if DEBUG_INTERFACE
01597   fprintf (stderr, "window_template_experiment_close:  end\n");
01598 #endif
01599 }
01600
01604 static void
01605 window_template_experiment (void *data)
01607 {
01608   GtkFileChooserDialog *dlg;
01609   GMainLoop *loop;
01610   const char *buffer;
01611   unsigned int i;
01612 #if DEBUG_INTERFACE
01613   fprintf (stderr, "window_template_experiment:  start\n");
01614 #endif
01615   i = (size_t) data;
01616   buffer = gtk_button_get_label (window->button_template[i]);
01617   dlg = (GtkFileChooserDialog *)
01618     gtk_file_chooser_dialog_new (_("Open template file"),
01619                                  window->window,
01620                                  GTK_FILE_CHOOSER_ACTION_OPEN,
01621                                  _("_Cancel"),
01622                                  GTK_RESPONSE_CANCEL,
01623                                  _("_Open"), GTK_RESPONSE_ACCEPT, NULL);
01624   gtk_file_chooser_set_current_name (GTK_FILE_CHOOSER (dlg), buffer);
01625   g_signal_connect (dlg, "response",
01626                     G_CALLBACK (window_template_experiment_close), data);
01627   gtk_window_present (GTK_WINDOW (dlg));
01628   loop = g_main_loop_new (NULL, 0);
01629   g_signal_connect_swapped (dlg, "destroy", G_CALLBACK (g_main_loop_quit),
01630                             loop);
01631   g_main_loop_run (loop);
01632   g_main_loop_unref (loop);
01633 #if DEBUG_INTERFACE
01634   fprintf (stderr, "window_template_experiment:  end\n");
01635 #endif
01636 }
01637
01641 static void
01642 window_set_variable ()
01643 {
01644   unsigned int i;
01645 #if DEBUG_INTERFACE
01646   fprintf (stderr, "window_set_variable:  start\n");
01647 #endif
01648   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01649   g_signal_handler_block (window->entry_variable, window->id_variable_label);
01650   gtk_entry_set_text (window->entry_variable, input->variable[i].name);
01651   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
01652   gtk_spin_button_set_value (window->spin_min, input->variable[i].rangemin);
01653   gtk_spin_button_set_value (window->spin_max, input->variable[i].rangemax);
01654   if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
01655     {
01656       gtk_spin_button_set_value (window->spin_minabs,
01657                                  input->variable[i].rangeminabs);
01658       gtk_check_button_set_active (window->check_minabs, 1);
01659     }
01660   else
01661     {
01662       gtk_spin_button_set_value (window->spin_minabs, -G_MAXDOUBLE);
01663       gtk_check_button_set_active (window->check_minabs, 0);
01664     }
01665   if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
01666     {
01667       gtk_spin_button_set_value (window->spin_maxabs,
01668                                  input->variable[i].rangemaxabs);
01669       gtk_check_button_set_active (window->check_maxabs, 1);
01670     }
01671   else
01672     {
01673       gtk_spin_button_set_value (window->spin_maxabs, G_MAXDOUBLE);
01674       gtk_check_button_set_active (window->check_maxabs, 0);
01675     }
```

```
01676   gtk_spin_button_set_value (window->spin_precision,
01677                              input->variable[i].precision);
01678   gtk_spin_button_set_value (window->spin_steps, (gdouble) input->nsteps);
01679   if (input->nsteps)
01680     gtk_spin_button_set_value (window->spin_step, input->variable[i].step);
01681 #if DEBUG_INTERFACE
01682   fprintf (stderr, "window_set_variable:  precision[%u]=%u\n", i,
01683            input->variable[i].precision);
01684 #endif
01685   switch (window_get_algorithm ())
01686     {
01687     case ALGORITHM_SWEEP:
01688     case ALGORITHM_ORTHOGONAL:
01689       gtk_spin_button_set_value (window->spin_sweeps,
01690                                  (gdouble) input->variable[i].nsweeps);
01691 #if DEBUG_INTERFACE
01692       fprintf (stderr, "window_set_variable:  nsweeps[%u]=%u\n", i,
01693                input->variable[i].nsweeps);
01694 #endif
01695       break;
01696     case ALGORITHM_GENETIC:
01697       gtk_spin_button_set_value (window->spin_bits,
01698                                  (gdouble) input->variable[i].nbits);
01699 #if DEBUG_INTERFACE
01700       fprintf (stderr, "window_set_variable:  nbits[%u]=%u\n", i,
01701                input->variable[i].nbits);
01702 #endif
01703       break;
01704     }
01705   window_update ();
01706 #if DEBUG_INTERFACE
01707   fprintf (stderr, "window_set_variable:  end\n");
01708 #endif
01709 }
01710
01714 static void
01715 window_remove_variable ()
01716 {
01717   unsigned int i, j;
01718 #if DEBUG_INTERFACE
01719   fprintf (stderr, "window_remove_variable:  start\n");
01720 #endif
01721   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01722   g_signal_handler_block (window->combo_variable, window->id_variable);
01723   gtk_combo_box_text_remove (window->combo_variable, i);
01724   g_signal_handler_unblock (window->combo_variable, window->id_variable);
01725   xmlFree (input->variable[i].name);
01726   --input->nvariables;
01727   for (j = i; j < input->nvariables; ++j)
01728     memcpy (input->variable + j, input->variable + j + 1, sizeof (Variable));
01729   j = input->nvariables - 1;
01730   if (i > j)
01731     i = j;
01732   g_signal_handler_block (window->entry_variable, window->id_variable_label);
01733   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01734   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
01735   window_update ();
01736 #if DEBUG_INTERFACE
01737   fprintf (stderr, "window_remove_variable:  end\n");
01738 #endif
01739 }
01740
01744 static void
01745 window_add_variable ()
01746 {
01747   unsigned int i, j;
01748 #if DEBUG_INTERFACE
01749   fprintf (stderr, "window_add_variable:  start\n");
01750 #endif
01751   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01752   g_signal_handler_block (window->combo_variable, window->id_variable);
01753   gtk_combo_box_text_insert_text (window->combo_variable, i,
01754                                   input->variable[i].name);
01755   g_signal_handler_unblock (window->combo_variable, window->id_variable);
01756   input->variable = (Variable *) g_realloc
01757     (input->variable, (input->nvariables + 1) * sizeof (Variable));
01758   for (j = input->nvariables - 1; j > i; --j)
01759     memcpy (input->variable + j + 1, input->variable + j, sizeof (Variable));
01760   memcpy (input->variable + j + 1, input->variable + j, sizeof (Variable));
01761   if (input->type == INPUT_TYPE_XML)
01762     input->variable[j + 1].name
01763       = (char *) xmlStrdup ((xmlChar *) input->variable[j].name);
01764   else
01765     input->variable[j + 1].name = g_strdup (input->variable[j].name);
01766   ++input->nvariables;
01767   g_signal_handler_block (window->entry_variable, window->id_variable_label);
01768   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i + 1);
```

```
01769   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
01770   window_update ();
01771 #if DEBUG_INTERFACE
01772   fprintf (stderr, "window_add_variable:  end\n");
01773 #endif
01774 }
01775
01779 static void
01780 window_label_variable ()
01781 {
01782   unsigned int i;
01783   const char *buffer;
01784 #if DEBUG_INTERFACE
01785   fprintf (stderr, "window_label_variable:  start\n");
01786 #endif
01787   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01788   buffer = gtk_entry_get_text (window->entry_variable);
01789   g_signal_handler_block (window->combo_variable, window->id_variable);
01790   gtk_combo_box_text_remove (window->combo_variable, i);
01791   gtk_combo_box_text_insert_text (window->combo_variable, i, buffer);
01792   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01793   g_signal_handler_unblock (window->combo_variable, window->id_variable);
01794 #if DEBUG_INTERFACE
01795   fprintf (stderr, "window_label_variable:  end\n");
01796 #endif
01797 }
01798
01802 static void
01803 window_precision_variable ()
01804 {
01805   unsigned int i;
01806 #if DEBUG_INTERFACE
01807   fprintf (stderr, "window_precision_variable:  start\n");
01808 #endif
01809   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01810   input->variable[i].precision
01811     = (unsigned int) gtk_spin_button_get_value_as_int (window->spin_precision);
01812   gtk_spin_button_set_digits (window->spin_min, input->variable[i].precision);
01813   gtk_spin_button_set_digits (window->spin_max, input->variable[i].precision);
01814   gtk_spin_button_set_digits (window->spin_minabs,
01815                               input->variable[i].precision);
01816   gtk_spin_button_set_digits (window->spin_maxabs,
01817                               input->variable[i].precision);
01818 #if DEBUG_INTERFACE
01819   fprintf (stderr, "window_precision_variable:  end\n");
01820 #endif
01821 }
01822
01826 static void
01827 window_rangemin_variable ()
01828 {
01829   unsigned int i;
01830 #if DEBUG_INTERFACE
01831   fprintf (stderr, "window_rangemin_variable:  start\n");
01832 #endif
01833   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01834   input->variable[i].rangemin = gtk_spin_button_get_value (window->spin_min);
01835 #if DEBUG_INTERFACE
01836   fprintf (stderr, "window_rangemin_variable:  end\n");
01837 #endif
01838 }
01839
01843 static void
01844 window_rangemax_variable ()
01845 {
01846   unsigned int i;
01847 #if DEBUG_INTERFACE
01848   fprintf (stderr, "window_rangemax_variable:  start\n");
01849 #endif
01850   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01851   input->variable[i].rangemax = gtk_spin_button_get_value (window->spin_max);
01852 #if DEBUG_INTERFACE
01853   fprintf (stderr, "window_rangemax_variable:  end\n");
01854 #endif
01855 }
01856
01860 static void
01861 window_rangeminabs_variable ()
01862 {
01863   unsigned int i;
01864 #if DEBUG_INTERFACE
01865   fprintf (stderr, "window_rangeminabs_variable:  start\n");
01866 #endif
01867   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01868   input->variable[i].rangeminabs
01869     = gtk_spin_button_get_value (window->spin_minabs);
01870 #if DEBUG_INTERFACE
```

```
01871   fprintf (stderr, "window_rangeminabs_variable:  end\n");
01872 #endif
01873 }
01874
01878 static void
01879 window_rangemaxabs_variable ()
01880 {
01881   unsigned int i;
01882 #if DEBUG_INTERFACE
01883   fprintf (stderr, "window_rangemaxabs_variable:  start\n");
01884 #endif
01885   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01886   input->variable[i].rangemaxabs
01887     = gtk_spin_button_get_value (window->spin_maxabs);
01888 #if DEBUG_INTERFACE
01889   fprintf (stderr, "window_rangemaxabs_variable:  end\n");
01890 #endif
01891 }
01892
01896 static void
01897 window_step_variable ()
01898 {
01899   unsigned int i;
01900 #if DEBUG_INTERFACE
01901   fprintf (stderr, "window_step_variable:  start\n");
01902 #endif
01903   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01904   input->variable[i].step = gtk_spin_button_get_value (window->spin_step);
01905 #if DEBUG_INTERFACE
01906   fprintf (stderr, "window_step_variable:  end\n");
01907 #endif
01908 }
01909
01913 static void
01914 window_update_variable ()
01915 {
01916   int i;
01917 #if DEBUG_INTERFACE
01918   fprintf (stderr, "window_update_variable:  start\n");
01919 #endif
01920   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01921   if (i < 0)
01922     i = 0;
01923   switch (window_get_algorithm ())
01924     {
01925     case ALGORITHM_SWEEP:
01926     case ALGORITHM_ORTHOGONAL:
01927       input->variable[i].nsweeps
01928         = gtk_spin_button_get_value_as_int (window->spin_sweeps);
01929 #if DEBUG_INTERFACE
01930       fprintf (stderr, "window_update_variable:  nsweeps[%d]=%u\n", i,
01931                input->variable[i].nsweeps);
01932 #endif
01933       break;
01934     case ALGORITHM_GENETIC:
01935       input->variable[i].nbits
01936         = gtk_spin_button_get_value_as_int (window->spin_bits);
01937 #if DEBUG_INTERFACE
01938       fprintf (stderr, "window_update_variable:  nbits[%d]=%u\n", i,
01939                input->variable[i].nbits);
01940 #endif
01941     }
01942 #if DEBUG_INTERFACE
01943   fprintf (stderr, "window_update_variable:  end\n");
01944 #endif
01945 }
01946
01952 static int
01953 window_read (char *filename)
01954 {
01955   unsigned int i;
01956 #if DEBUG_INTERFACE
01957   fprintf (stderr, "window_read:  start\n");
01958   fprintf (stderr, "window_read:  file name=%s\n", filename);
01959 #endif
01960
01961   // Reading new input file
01962   input_free ();
01963   input->result = input->variables = NULL;
01964   if (!input_open (filename))
01965     {
01966 #if DEBUG_INTERFACE
01967       fprintf (stderr, "window_read:  end\n");
01968 #endif
01969       return 0;
01970     }
01971
```

```
01972   // Setting GTK+ widgets data
01973   gtk_entry_set_text (window->entry_result, input->result);
01974   gtk_entry_set_text (window->entry_variables, input->variables);
01975   gtk_button_set_label (window->button_simulator, input->simulator);
01976   gtk_check_button_set_active (window->check_evaluator,
01977                                (size_t) input->evaluator);
01978   if (input->evaluator)
01979     gtk_button_set_label (window->button_evaluator, input->evaluator);
01980   gtk_check_button_set_active (window->button_algorithm[input->algorithm],
01981                                TRUE);
01982   switch (input->algorithm)
01983     {
01984     case ALGORITHM_MONTE_CARLO:
01985       gtk_spin_button_set_value (window->spin_simulations,
01986                                  (gdouble) input->nsimulations);
01987       // fallthrough
01988     case ALGORITHM_SWEEP:
01989     case ALGORITHM_ORTHOGONAL:
01990       gtk_spin_button_set_value (window->spin_iterations,
01991                                  (gdouble) input->niterations);
01992       gtk_spin_button_set_value (window->spin_bests, (gdouble) input->nbest);
01993       gtk_spin_button_set_value (window->spin_tolerance, input->tolerance);
01994       gtk_check_button_set_active (window->check_climbing, input->nsteps);
01995       if (input->nsteps)
01996         {
01997           gtk_check_button_set_active
01998             (window->button_climbing[input->climbing], TRUE);
01999           gtk_spin_button_set_value (window->spin_steps,
02000                                      (gdouble) input->nsteps);
02001           gtk_spin_button_set_value (window->spin_relaxation,
02002                                      (gdouble) input->relaxation);
02003           switch (input->climbing)
02004             {
02005             case CLIMBING_METHOD_RANDOM:
02006               gtk_spin_button_set_value (window->spin_estimates,
02007                                          (gdouble) input->nestimates);
02008             }
02009         }
02010       break;
02011     default:
02012       gtk_spin_button_set_value (window->spin_population,
02013                                  (gdouble) input->nsimulations);
02014       gtk_spin_button_set_value (window->spin_generations,
02015                                  (gdouble) input->niterations);
02016       gtk_spin_button_set_value (window->spin_mutation, input->mutation_ratio);
02017       gtk_spin_button_set_value (window->spin_reproduction,
02018                                  input->reproduction_ratio);
02019       gtk_spin_button_set_value (window->spin_adaptation,
02020                                  input->adaptation_ratio);
02021     }
02022   gtk_check_button_set_active (window->button_norm[input->norm], TRUE);
02023   gtk_spin_button_set_value (window->spin_p, input->p);
02024   gtk_spin_button_set_value (window->spin_threshold, input->threshold);
02025   g_signal_handler_block (window->combo_experiment, window->id_experiment);
02026   gtk_combo_box_text_remove_all (window->combo_experiment);
02027   for (i = 0; i < input->nexperiments; ++i)
02028     gtk_combo_box_text_append_text (window->combo_experiment,
02029                                     input->experiment[i].name);
02030   g_signal_handler_unblock (window->combo_experiment, window->id_experiment);
02031   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), 0);
02032   g_signal_handler_block (window->combo_variable, window->id_variable);
02033   g_signal_handler_block (window->entry_variable, window->id_variable_label);
02034   gtk_combo_box_text_remove_all (window->combo_variable);
02035   for (i = 0; i < input->nvariables; ++i)
02036     gtk_combo_box_text_append_text (window->combo_variable,
02037                                     input->variable[i].name);
02038   g_signal_handler_unblock (window->entry_variable, window->id_variable_label);
02039   g_signal_handler_unblock (window->combo_variable, window->id_variable);
02040   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), 0);
02041   window_set_variable ();
02042   window_update ();
02043
02044 #if DEBUG_INTERFACE
02045   fprintf (stderr, "window_read:  end\n");
02046 #endif
02047   return 1;
02048 }
02049
02053 static void
02054 dialog_open_close (GtkFileChooserDialog * dlg,
02056                    int response_id)
02057 {
02058   char *buffer, *directory, *name;
02059   GFile *file;
02060
02061 #if DEBUG_INTERFACE
02062   fprintf (stderr, "dialog_open_close:  start\n");
```

```
02063 #endif
02064
02065   // Saving a backup of the current input file
02066   directory = g_strdup (input->directory);
02067   name = g_strdup (input->name);
02068
02069   // If OK saving
02070   if (response_id == GTK_RESPONSE_OK)
02071     {
02072
02073       // Traying to open the input file
02074       file = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (dlg));
02075       buffer = g_file_get_path (file);
02076 #if DEBUG_INTERFACE
02077       fprintf (stderr, "dialog_open_close:  file name=%s\n", buffer);
02078 #endif
02079       if (!window_read (buffer))
02080         {
02081 #if DEBUG_INTERFACE
02082           fprintf (stderr, "dialog_open_close:  error reading input file\n");
02083 #endif
02084           g_free (buffer);
02085
02086           // Reading backup file on error
02087           buffer = g_build_filename (directory, name, NULL);
02088           input->result = input->variables = NULL;
02089           if (!input_open (buffer))
02090             {
02091
02092               // Closing on backup file reading error
02093 #if DEBUG_INTERFACE
02094               fprintf (stderr,
02095                        "dialog_open_close:  error reading backup file\n");
02096 #endif
02097             }
02098         }
02099       g_free (buffer);
02100       g_object_unref (file);
02101     }
02102
02103   // Freeing and closing
02104   g_free (name);
02105   g_free (directory);
02106   gtk_window_destroy (GTK_WINDOW (dlg));
02107
02108 #if DEBUG_INTERFACE
02109   fprintf (stderr, "dialog_open_close:  end\n");
02110 #endif
02111
02112 }
02113
02117 static void
02118 window_open ()
02119 {
02120   GtkFileChooserDialog *dlg;
02121   GtkFileFilter *filter;
02122
02123 #if DEBUG_INTERFACE
02124   fprintf (stderr, "window_open:  start\n");
02125 #endif
02126
02127   // Opening dialog
02128   dlg = (GtkFileChooserDialog *)
02129     gtk_file_chooser_dialog_new (_("Open input file"),
02130                                  window->window,
02131                                  GTK_FILE_CHOOSER_ACTION_OPEN,
02132                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02133                                  _("_OK"), GTK_RESPONSE_OK, NULL);
02134
02135   // Adding XML filter
02136   filter = (GtkFileFilter *) gtk_file_filter_new ();
02137   gtk_file_filter_set_name (filter, "XML");
02138   gtk_file_filter_add_pattern (filter, "*.xml");
02139   gtk_file_filter_add_pattern (filter, "*.XML");
02140   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02141
02142   // Adding JSON filter
02143   filter = (GtkFileFilter *) gtk_file_filter_new ();
02144   gtk_file_filter_set_name (filter, "JSON");
02145   gtk_file_filter_add_pattern (filter, "*.json");
02146   gtk_file_filter_add_pattern (filter, "*.JSON");
02147   gtk_file_filter_add_pattern (filter, "*.js");
02148   gtk_file_filter_add_pattern (filter, "*.JS");
02149   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02150
02151   // Connecting the close function
02152   g_signal_connect (dlg, "response", G_CALLBACK (dialog_open_close), NULL);
```

```
02153
02154   // Showing modal dialog
02155   gtk_window_present (GTK_WINDOW (dlg));
02156
02157 #if DEBUG_INTERFACE
02158   fprintf (stderr, "window_open:  end\n");
02159 #endif
02160 }
02161
02165 static void
02166 dialog_simulator_close (GtkFileChooserDialog * dlg,
02168                         int response_id)
02169 {
02170   GFile *file1, *file2;
02171   char *buffer1, *buffer2;
02172 #if DEBUG_INTERFACE
02173   fprintf (stderr, "dialog_simulator_close:  start\n");
02174 #endif
02175   if (response_id == GTK_RESPONSE_OK)
02176     {
02177       buffer1 = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
02178       file1 = g_file_new_for_path (buffer1);
02179       file2 = g_file_new_for_path (input->directory);
02180       buffer2 = g_file_get_relative_path (file2, file1);
02181       input->simulator = g_strdup (buffer2);
02182       g_free (buffer2);
02183       g_object_unref (file2);
02184       g_object_unref (file1);
02185       g_free (buffer1);
02186     }
02187   gtk_window_destroy (GTK_WINDOW (dlg));
02188 #if DEBUG_INTERFACE
02189   fprintf (stderr, "dialog_simulator_close:  end\n");
02190 #endif
02191 }
02192
02196 static void
02197 dialog_simulator ()
02198 {
02199   GtkFileChooserDialog *dlg;
02200 #if DEBUG_INTERFACE
02201   fprintf (stderr, "dialog_simulator:  start\n");
02202 #endif
02203   dlg = (GtkFileChooserDialog *)
02204     gtk_file_chooser_dialog_new (_("Open simulator file"),
02205                                  window->window,
02206                                  GTK_FILE_CHOOSER_ACTION_OPEN,
02207                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02208                                  _("_Open"), GTK_RESPONSE_ACCEPT, NULL);
02209   g_signal_connect (dlg, "response", G_CALLBACK (dialog_simulator_close), NULL);
02210   gtk_window_present (GTK_WINDOW (dlg));
02211 #if DEBUG_INTERFACE
02212   fprintf (stderr, "dialog_simulator:  end\n");
02213 #endif
02214 }
02215
02219 static void
02220 dialog_evaluator_close (GtkFileChooserDialog * dlg,
02222                         int response_id)
02223 {
02224   GFile *file1, *file2;
02225   char *buffer1, *buffer2;
02226 #if DEBUG_INTERFACE
02227   fprintf (stderr, "dialog_evaluator_close:  start\n");
02228 #endif
02229   if (response_id == GTK_RESPONSE_OK)
02230     {
02231       buffer1 = gtk_file_chooser_get_current_name (GTK_FILE_CHOOSER (dlg));
02232       file1 = g_file_new_for_path (buffer1);
02233       file2 = g_file_new_for_path (input->directory);
02234       buffer2 = g_file_get_relative_path (file2, file1);
02235       input->evaluator = g_strdup (buffer2);
02236       g_free (buffer2);
02237       g_object_unref (file2);
02238       g_object_unref (file1);
02239       g_free (buffer1);
02240     }
02241   gtk_window_destroy (GTK_WINDOW (dlg));
02242 #if DEBUG_INTERFACE
02243   fprintf (stderr, "dialog_evaluator_close:  end\n");
02244 #endif
02245 }
02246
02250 static void
02251 dialog_evaluator ()
02252 {
02253   GtkFileChooserDialog *dlg;
```

```
02254 #if DEBUG_INTERFACE
02255   fprintf (stderr, "dialog_evaluator:  start\n");
02256 #endif
02257   dlg = (GtkFileChooserDialog *)
02258     gtk_file_chooser_dialog_new (_("Open evaluator file"),
02259                                  window->window,
02260                                  GTK_FILE_CHOOSER_ACTION_OPEN,
02261                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02262                                  _("_Open"), GTK_RESPONSE_ACCEPT, NULL);
02263   g_signal_connect (dlg, "response", G_CALLBACK (dialog_evaluator_close), NULL);
02264   gtk_window_present (GTK_WINDOW (dlg));
02265 #if DEBUG_INTERFACE
02266   fprintf (stderr, "dialog_evaluator:  end\n");
02267 #endif
02268 }
02269
02273 void
02274 window_new (GtkApplication * application)
02275 {
02276   unsigned int i;
02277   char *buffer, *buffer2, buffer3[64];
02278   const char *label_algorithm[NALGORITHMS] = {
02279     "_Monte-Carlo", _("_Sweep"), _("_Genetic"), _("_Orthogonal")
02280   };
02281   const char *tip_algorithm[NALGORITHMS] = {
02282     _("Monte-Carlo brute force algorithm"),
02283     _("Sweep brute force algorithm"),
02284     _("Genetic algorithm"),
02285     _("Orthogonal sampling brute force algorithm"),
02286   };
02287   const char *label_climbing[NCLIMBINGS] = {
02288     _("_Coordinates climbing"), _("_Random climbing")
02289   };
02290   const char *tip_climbing[NCLIMBINGS] = {
02291     _("Coordinates climbing estimate method"),
02292     _("Random climbing estimate method")
02293   };
02294   const char *label_norm[NNORMS] = { "L2", "L", "Lp", "L1" };
02295   const char *tip_norm[NNORMS] = {
02296     _("Euclidean error norm (L2)"),
02297     _("Maximum error norm (L)"),
02298     _("P error norm (Lp)"),
02299     _("Taxicab error norm (L1)")
02300   };
02301 #if !GTK4
02302   const char *close = "delete-event";
02303 #else
02304   const char *close = "close-request";
02305 #endif
02306
02307 #if DEBUG_INTERFACE
02308   fprintf (stderr, "window_new:  start\n");
02309 #endif
02310
02311   // Creating the window
02312   window->window = window_parent = main_window
02313     = (GtkWindow *) gtk_application_window_new (application);
02314
02315   // Finish when closing the window
02316   g_signal_connect_swapped (window->window, close,
02317                             G_CALLBACK (g_application_quit),
02318                             G_APPLICATION (application));
02319
02320   // Setting the window title
02321   gtk_window_set_title (window->window, "MPCOTool");
02322
02323   // Creating the open button
02324   window->button_open = (GtkButton *)
02325 #if !GTK4
02326     gtk_button_new_from_icon_name ("document-open", GTK_ICON_SIZE_BUTTON);
02327 #else
02328     gtk_button_new_from_icon_name ("document-open");
02329 #endif
02330   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_open),
02331                                _("Open a case"));
02332   g_signal_connect (window->button_open, "clicked", window_open, NULL);
02333
02334   // Creating the save button
02335   window->button_save = (GtkButton *)
02336 #if !GTK4
02337     gtk_button_new_from_icon_name ("document-save", GTK_ICON_SIZE_BUTTON);
02338 #else
02339     gtk_button_new_from_icon_name ("document-save");
02340 #endif
02341   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_save),
02342                                _("Save the case"));
02343   g_signal_connect (window->button_save, "clicked", (GCallback) window_save,
```

```
02344                     NULL);
02345
02346   // Creating the run button
02347   window->button_run = (GtkButton *)
02348 #if !GTK4
02349     gtk_button_new_from_icon_name ("system-run", GTK_ICON_SIZE_BUTTON);
02350 #else
02351     gtk_button_new_from_icon_name ("system-run");
02352 #endif
02353   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_run),
02354                                _("Run the optimization"));
02355   g_signal_connect (window->button_run, "clicked", window_run, NULL);
02356
02357   // Creating the options button
02358   window->button_options = (GtkButton *)
02359 #if !GTK4
02360     gtk_button_new_from_icon_name ("preferences-system", GTK_ICON_SIZE_BUTTON);
02361 #else
02362     gtk_button_new_from_icon_name ("preferences-system");
02363 #endif
02364   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_options),
02365                                _("Edit the case"));
02366   g_signal_connect (window->button_options, "clicked", options_new, NULL);
02367
02368   // Creating the help button
02369   window->button_help = (GtkButton *)
02370 #if !GTK4
02371     gtk_button_new_from_icon_name ("help-browser", GTK_ICON_SIZE_BUTTON);
02372 #else
02373     gtk_button_new_from_icon_name ("help-browser");
02374 #endif
02375   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_help), _("Help"));
02376   g_signal_connect (window->button_help, "clicked", window_help, NULL);
02377
02378   // Creating the about button
02379   window->button_about = (GtkButton *)
02380 #if !GTK4
02381     gtk_button_new_from_icon_name ("help-about", GTK_ICON_SIZE_BUTTON);
02382 #else
02383     gtk_button_new_from_icon_name ("help-about");
02384 #endif
02385   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_about), _("About"));
02386   g_signal_connect (window->button_about, "clicked", window_about, NULL);
02387
02388   // Creating the exit button
02389   window->button_exit = (GtkButton *)
02390 #if !GTK4
02391     gtk_button_new_from_icon_name ("application-exit", GTK_ICON_SIZE_BUTTON);
02392 #else
02393     gtk_button_new_from_icon_name ("application-exit");
02394 #endif
02395   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_exit), _("Exit"));
02396   g_signal_connect_swapped (window->button_exit, "clicked",
02397                             G_CALLBACK (g_application_quit),
02398                             G_APPLICATION (application));
02399
02400   // Creating the buttons bar
02401   window->box_buttons = (GtkBox *) gtk_box_new (GTK_ORIENTATION_HORIZONTAL, 0);
02402   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_open));
02403   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_save));
02404   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_run));
02405   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_options));
02406   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_help));
02407   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_about));
02408   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_exit));
02409
02410   // Creating the simulator program label and entry
02411   window->label_simulator = (GtkLabel *) gtk_label_new (_("Simulator program"));
02412   window->button_simulator = (GtkButton *)
02413     gtk_button_new_with_mnemonic (_("Simulator program"));
02414   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_simulator),
02415                                _("Simulator program executable file"));
02416   gtk_widget_set_hexpand (GTK_WIDGET (window->button_simulator), TRUE);
02417   g_signal_connect (window->button_simulator, "clicked",
02418                     G_CALLBACK (dialog_simulator), NULL);
02419
02420   // Creating the evaluator program label and entry
02421   window->check_evaluator = (GtkCheckButton *)
02422     gtk_check_button_new_with_mnemonic (_("_Evaluator program"));
02423   g_signal_connect (window->check_evaluator, "toggled", window_update, NULL);
02424   window->button_evaluator = (GtkButton *)
02425     gtk_button_new_with_mnemonic (_("Evaluator program"));
02426   gtk_widget_set_tooltip_text
02427     (GTK_WIDGET (window->button_evaluator),
02428      _("Optional evaluator program executable file"));
02429   g_signal_connect (window->button_evaluator, "clicked",
02430                     G_CALLBACK (dialog_evaluator), NULL);
```

```
02431
02432   // Creating the results files labels and entries
02433   window->label_result = (GtkLabel *) gtk_label_new (_("Result file"));
02434   window->entry_result = (GtkEntry *) gtk_entry_new ();
02435   gtk_widget_set_tooltip_text
02436     (GTK_WIDGET (window->entry_result), _("Best results file"));
02437   window->label_variables = (GtkLabel *) gtk_label_new (_("Variables file"));
02438   window->entry_variables = (GtkEntry *) gtk_entry_new ();
02439   gtk_widget_set_tooltip_text
02440     (GTK_WIDGET (window->entry_variables), _("All simulated results file"));
02441
02442   // Creating the files grid and attaching widgets
02443   window->grid_files = (GtkGrid *) gtk_grid_new ();
02444   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_simulator),
02445                    0, 0, 1, 1);
02446   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->button_simulator),
02447                    1, 0, 1, 1);
02448   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->check_evaluator),
02449                    0, 1, 1, 1);
02450   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->button_evaluator),
02451                    1, 1, 1, 1);
02452   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_result),
02453                    0, 2, 1, 1);
02454   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->entry_result),
02455                    1, 2, 1, 1);
02456   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_variables),
02457                    0, 3, 1, 1);
02458   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->entry_variables),
02459                    1, 3, 1, 1);
02460
02461   // Creating the algorithm properties
02462   window->label_simulations = (GtkLabel *) gtk_label_new
02463     (_("Simulations number"));
02464   window->spin_simulations
02465     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02466   gtk_widget_set_tooltip_text
02467     (GTK_WIDGET (window->spin_simulations),
02468      _("Number of simulations to perform for each iteration"));
02469   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_simulations), TRUE);
02470   window->label_iterations = (GtkLabel *)
02471     gtk_label_new (_("Iterations number"));
02472   window->spin_iterations
02473     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02474   gtk_widget_set_tooltip_text
02475     (GTK_WIDGET (window->spin_iterations), _("Number of iterations"));
02476   g_signal_connect
02477     (window->spin_iterations, "value-changed", window_update, NULL);
02478   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_iterations), TRUE);
02479   window->label_tolerance = (GtkLabel *) gtk_label_new (_("Tolerance"));
02480   window->spin_tolerance =
02481     (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02482   gtk_widget_set_tooltip_text
02483     (GTK_WIDGET (window->spin_tolerance),
02484      _("Tolerance to set the variable interval on the next iteration"));
02485   window->label_bests = (GtkLabel *) gtk_label_new (_("Bests number"));
02486   window->spin_bests
02487     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02488   gtk_widget_set_tooltip_text
02489     (GTK_WIDGET (window->spin_bests),
02490      _("Number of best simulations used to set the variable interval "
02491        "on the next iteration"));
02492   window->label_population
02493     = (GtkLabel *) gtk_label_new (_("Population number"));
02494   window->spin_population
02495     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02496   gtk_widget_set_tooltip_text
02497     (GTK_WIDGET (window->spin_population),
02498      _("Number of population for the genetic algorithm"));
02499   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_population), TRUE);
02500   window->label_generations
02501     = (GtkLabel *) gtk_label_new (_("Generations number"));
02502   window->spin_generations
02503     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02504   gtk_widget_set_tooltip_text
02505     (GTK_WIDGET (window->spin_generations),
02506      _("Number of generations for the genetic algorithm"));
02507   window->label_mutation = (GtkLabel *) gtk_label_new (_("Mutation ratio"));
02508   window->spin_mutation
02509     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02510   gtk_widget_set_tooltip_text
02511     (GTK_WIDGET (window->spin_mutation),
02512      _("Ratio of mutation for the genetic algorithm"));
02513   window->label_reproduction
02514     = (GtkLabel *) gtk_label_new (_("Reproduction ratio"));
02515   window->spin_reproduction
02516     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02517   gtk_widget_set_tooltip_text
```

```
02518     (GTK_WIDGET (window->spin_reproduction),
02519      _("Ratio of reproduction for the genetic algorithm"));
02520   window->label_adaptation = (GtkLabel *) gtk_label_new (_("Adaptation ratio"));
02521   window->spin_adaptation
02522     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02523   gtk_widget_set_tooltip_text
02524     (GTK_WIDGET (window->spin_adaptation),
02525      _("Ratio of adaptation for the genetic algorithm"));
02526   window->label_threshold = (GtkLabel *) gtk_label_new (_("Threshold"));
02527   window->spin_threshold = (GtkSpinButton *)
02528     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE,
02529                                     precision[DEFAULT_PRECISION]);
02530   gtk_widget_set_tooltip_text
02531     (GTK_WIDGET (window->spin_threshold),
02532      _("Threshold in the objective function to finish the simulations"));
02533   window->scrolled_threshold = (GtkScrolledWindow *)
02534 #if !GTK4
02535     gtk_scrolled_window_new (NULL, NULL);
02536 #else
02537     gtk_scrolled_window_new ();
02538 #endif
02539   gtk_scrolled_window_set_child (window->scrolled_threshold,
02540                                  GTK_WIDGET (window->spin_threshold));
02541 //  gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_threshold), TRUE);
02542 //  gtk_widget_set_halign (GTK_WIDGET (window->scrolled_threshold),
02543 //                         GTK_ALIGN_FILL);
02544
02545   // Creating the hill climbing method properties
02546   window->check_climbing = (GtkCheckButton *)
02547     gtk_check_button_new_with_mnemonic (_("_Hill climbing method"));
02548   g_signal_connect (window->check_climbing, "toggled", window_update, NULL);
02549   window->grid_climbing = (GtkGrid *) gtk_grid_new ();
02550 #if !GTK4
02551   window->button_climbing[0] = (GtkRadioButton *)
02552     gtk_radio_button_new_with_mnemonic (NULL, label_climbing[0]);
02553 #else
02554   window->button_climbing[0] = (GtkCheckButton *)
02555     gtk_check_button_new_with_mnemonic (label_climbing[0]);
02556 #endif
02557   gtk_grid_attach (window->grid_climbing,
02558                    GTK_WIDGET (window->button_climbing[0]), 0, 0, 1, 1);
02559   g_signal_connect (window->button_climbing[0], "toggled", window_update, NULL);
02560   for (i = 0; ++i < NCLIMBINGS;)
02561     {
02562 #if !GTK4
02563       window->button_climbing[i] = (GtkRadioButton *)
02564         gtk_radio_button_new_with_mnemonic
02565         (gtk_radio_button_get_group (window->button_climbing[0]),
02566          label_climbing[i]);
02567 #else
02568       window->button_climbing[i] = (GtkCheckButton *)
02569         gtk_check_button_new_with_mnemonic (label_climbing[i]);
02570       gtk_check_button_set_group (window->button_climbing[i],
02571                                   window->button_climbing[0]);
02572 #endif
02573       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_climbing[i]),
02574                                    tip_climbing[i]);
02575       gtk_grid_attach (window->grid_climbing,
02576                        GTK_WIDGET (window->button_climbing[i]), 0, i, 1, 1);
02577       g_signal_connect (window->button_climbing[i], "toggled", window_update,
02578                         NULL);
02579     }
02580   window->label_steps = (GtkLabel *) gtk_label_new (_("Steps number"));
02581   window->spin_steps = (GtkSpinButton *)
02582     gtk_spin_button_new_with_range (1., 1.e12, 1.);
02583   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_steps), TRUE);
02584   window->label_estimates
02585     = (GtkLabel *) gtk_label_new (_("Climbing estimates number"));
02586   window->spin_estimates = (GtkSpinButton *)
02587     gtk_spin_button_new_with_range (1., 1.e3, 1.);
02588   window->label_relaxation
02589     = (GtkLabel *) gtk_label_new (_("Relaxation parameter"));
02590   window->spin_relaxation = (GtkSpinButton *)
02591     gtk_spin_button_new_with_range (0., 2., 0.001);
02592   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_steps),
02593                    0, NCLIMBINGS, 1, 1);
02594   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_steps),
02595                    1, NCLIMBINGS, 1, 1);
02596   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_estimates),
02597                    0, NCLIMBINGS + 1, 1, 1);
02598   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_estimates),
02599                    1, NCLIMBINGS + 1, 1, 1);
02600   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_relaxation),
02601                    0, NCLIMBINGS + 2, 1, 1);
02602   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_relaxation),
02603                    1, NCLIMBINGS + 2, 1, 1);
02604
```

```
02605   // Creating the array of algorithms
02606   window->grid_algorithm = (GtkGrid *) gtk_grid_new ();
02607 #if !GTK4
02608   window->button_algorithm[0] = (GtkRadioButton *)
02609     gtk_radio_button_new_with_mnemonic (NULL, label_algorithm[0]);
02610 #else
02611   window->button_algorithm[0] = (GtkCheckButton *)
02612     gtk_check_button_new_with_mnemonic (label_algorithm[0]);
02613 #endif
02614   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[0]),
02615                                tip_algorithm[0]);
02616   gtk_grid_attach (window->grid_algorithm,
02617                    GTK_WIDGET (window->button_algorithm[0]), 0, 0, 1, 1);
02618   g_signal_connect (window->button_algorithm[0], "toggled",
02619                     window_set_algorithm, NULL);
02620   for (i = 0; ++i < NALGORITHMS;)
02621     {
02622 #if !GTK4
02623       window->button_algorithm[i] = (GtkRadioButton *)
02624         gtk_radio_button_new_with_mnemonic
02625         (gtk_radio_button_get_group (window->button_algorithm[0]),
02626          label_algorithm[i]);
02627 #else
02628       window->button_algorithm[i] = (GtkCheckButton *)
02629         gtk_check_button_new_with_mnemonic (label_algorithm[i]);
02630       gtk_check_button_set_group (window->button_algorithm[i],
02631                                   window->button_algorithm[0]),
02632 #endif
02633         gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[i]),
02634                                      tip_algorithm[i]);
02635       gtk_grid_attach (window->grid_algorithm,
02636                        GTK_WIDGET (window->button_algorithm[i]), 0, i, 1, 1);
02637       g_signal_connect (window->button_algorithm[i], "toggled",
02638                         window_set_algorithm, NULL);
02639     }
02640   gtk_grid_attach (window->grid_algorithm,
02641                    GTK_WIDGET (window->label_simulations),
02642                    0, NALGORITHMS, 1, 1);
02643   gtk_grid_attach (window->grid_algorithm,
02644                    GTK_WIDGET (window->spin_simulations), 1, NALGORITHMS, 1, 1);
02645   gtk_grid_attach (window->grid_algorithm,
02646                    GTK_WIDGET (window->label_iterations),
02647                    0, NALGORITHMS + 1, 1, 1);
02648   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_iterations),
02649                    1, NALGORITHMS + 1, 1, 1);
02650   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_tolerance),
02651                    0, NALGORITHMS + 2, 1, 1);
02652   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_tolerance),
02653                    1, NALGORITHMS + 2, 1, 1);
02654   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_bests),
02655                    0, NALGORITHMS + 3, 1, 1);
02656   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_bests),
02657                    1, NALGORITHMS + 3, 1, 1);
02658   gtk_grid_attach (window->grid_algorithm,
02659                    GTK_WIDGET (window->label_population),
02660                    0, NALGORITHMS + 4, 1, 1);
02661   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_population),
02662                    1, NALGORITHMS + 4, 1, 1);
02663   gtk_grid_attach (window->grid_algorithm,
02664                    GTK_WIDGET (window->label_generations),
02665                    0, NALGORITHMS + 5, 1, 1);
02666   gtk_grid_attach (window->grid_algorithm,
02667                    GTK_WIDGET (window->spin_generations),
02668                    1, NALGORITHMS + 5, 1, 1);
02669   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_mutation),
02670                    0, NALGORITHMS + 6, 1, 1);
02671   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_mutation),
02672                    1, NALGORITHMS + 6, 1, 1);
02673   gtk_grid_attach (window->grid_algorithm,
02674                    GTK_WIDGET (window->label_reproduction),
02675                    0, NALGORITHMS + 7, 1, 1);
02676   gtk_grid_attach (window->grid_algorithm,
02677                    GTK_WIDGET (window->spin_reproduction),
02678                    1, NALGORITHMS + 7, 1, 1);
02679   gtk_grid_attach (window->grid_algorithm,
02680                    GTK_WIDGET (window->label_adaptation),
02681                    0, NALGORITHMS + 8, 1, 1);
02682   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_adaptation),
02683                    1, NALGORITHMS + 8, 1, 1);
02684   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->check_climbing),
02685                    0, NALGORITHMS + 9, 2, 1);
02686   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->grid_climbing),
02687                    0, NALGORITHMS + 10, 2, 1);
02688   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_threshold),
02689                    0, NALGORITHMS + 11, 1, 1);
02690   gtk_grid_attach (window->grid_algorithm,
02691                    GTK_WIDGET (window->scrolled_threshold),
```

```
02692                   1, NALGORITHMS + 11, 1, 1);
02693   window->frame_algorithm = (GtkFrame *) gtk_frame_new (_("Algorithm"));
02694   gtk_frame_set_child (window->frame_algorithm,
02695                        GTK_WIDGET (window->grid_algorithm));
02696
02697   // Creating the variable widgets
02698   window->combo_variable = (GtkComboBoxText *) gtk_combo_box_text_new ();
02699   gtk_widget_set_tooltip_text
02700     (GTK_WIDGET (window->combo_variable), _("Variables selector"));
02701   window->id_variable = g_signal_connect
02702     (window->combo_variable, "changed", window_set_variable, NULL);
02703 #if !GTK4
02704   window->button_add_variable = (GtkButton *)
02705     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02706 #else
02707   window->button_add_variable = (GtkButton *)
02708     gtk_button_new_from_icon_name ("list-add");
02709 #endif
02710   g_signal_connect (window->button_add_variable, "clicked", window_add_variable,
02711                     NULL);
02712   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_variable),
02713                                _("Add variable"));
02714 #if !GTK4
02715   window->button_remove_variable = (GtkButton *)
02716     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02717 #else
02718   window->button_remove_variable = (GtkButton *)
02719     gtk_button_new_from_icon_name ("list-remove");
02720 #endif
02721   g_signal_connect (window->button_remove_variable, "clicked",
02722                     window_remove_variable, NULL);
02723   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_variable),
02724                                _("Remove variable"));
02725   window->label_variable = (GtkLabel *) gtk_label_new (_("Name"));
02726   window->entry_variable = (GtkEntry *) gtk_entry_new ();
02727   gtk_widget_set_tooltip_text
02728     (GTK_WIDGET (window->entry_variable), _("Variable name"));
02729   gtk_widget_set_hexpand (GTK_WIDGET (window->entry_variable), TRUE);
02730   window->id_variable_label = g_signal_connect
02731     (window->entry_variable, "changed", window_label_variable, NULL);
02732   window->label_min = (GtkLabel *) gtk_label_new (_("Minimum"));
02733   window->spin_min = (GtkSpinButton *) gtk_spin_button_new_with_range
02734     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02735   gtk_widget_set_tooltip_text
02736     (GTK_WIDGET (window->spin_min), _("Minimum initial value of the variable"));
02737   window->scrolled_min = (GtkScrolledWindow *)
02738 #if !GTK4
02739     gtk_scrolled_window_new (NULL, NULL);
02740 #else
02741     gtk_scrolled_window_new ();
02742 #endif
02743   gtk_scrolled_window_set_child (window->scrolled_min,
02744                                  GTK_WIDGET (window->spin_min));
02745   g_signal_connect (window->spin_min, "value-changed",
02746                     window_rangemin_variable, NULL);
02747   window->label_max = (GtkLabel *) gtk_label_new (_("Maximum"));
02748   window->spin_max = (GtkSpinButton *) gtk_spin_button_new_with_range
02749     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02750   gtk_widget_set_tooltip_text
02751     (GTK_WIDGET (window->spin_max), _("Maximum initial value of the variable"));
02752   window->scrolled_max = (GtkScrolledWindow *)
02753 #if !GTK4
02754     gtk_scrolled_window_new (NULL, NULL);
02755 #else
02756     gtk_scrolled_window_new ();
02757 #endif
02758   gtk_scrolled_window_set_child (window->scrolled_max,
02759                                  GTK_WIDGET (window->spin_max));
02760   g_signal_connect (window->spin_max, "value-changed",
02761                     window_rangemax_variable, NULL);
02762   window->check_minabs = (GtkCheckButton *)
02763     gtk_check_button_new_with_mnemonic (_("_Absolute minimum"));
02764   g_signal_connect (window->check_minabs, "toggled", window_update, NULL);
02765   window->spin_minabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02766     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02767   gtk_widget_set_tooltip_text
02768     (GTK_WIDGET (window->spin_minabs),
02769      _("Minimum allowed value of the variable"));
02770   window->scrolled_minabs = (GtkScrolledWindow *)
02771 #if !GTK4
02772     gtk_scrolled_window_new (NULL, NULL);
02773 #else
02774     gtk_scrolled_window_new ();
02775 #endif
02776   gtk_scrolled_window_set_child (window->scrolled_minabs,
02777                                  GTK_WIDGET (window->spin_minabs));
02778   g_signal_connect (window->spin_minabs, "value-changed",
```

```
02779                     window_rangeminabs_variable, NULL);
02780   window->check_maxabs = (GtkCheckButton *)
02781     gtk_check_button_new_with_mnemonic (_("_Absolute maximum"));
02782   g_signal_connect (window->check_maxabs, "toggled", window_update, NULL);
02783   window->spin_maxabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02784     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02785   gtk_widget_set_tooltip_text
02786     (GTK_WIDGET (window->spin_maxabs),
02787      _("Maximum allowed value of the variable"));
02788   window->scrolled_maxabs = (GtkScrolledWindow *)
02789 #if !GTK4
02790     gtk_scrolled_window_new (NULL, NULL);
02791 #else
02792     gtk_scrolled_window_new ();
02793 #endif
02794   gtk_scrolled_window_set_child (window->scrolled_maxabs,
02795                                  GTK_WIDGET (window->spin_maxabs));
02796   g_signal_connect (window->spin_maxabs, "value-changed",
02797                     window_rangemaxabs_variable, NULL);
02798   window->label_precision = (GtkLabel *) gtk_label_new (_("Precision digits"));
02799   window->spin_precision = (GtkSpinButton *)
02800     gtk_spin_button_new_with_range (0., (gdouble) DEFAULT_PRECISION, 1.);
02801   gtk_widget_set_tooltip_text
02802     (GTK_WIDGET (window->spin_precision),
02803      _("Number of precision floating point digits\n"
02804        "0 is for integer numbers"));
02805   g_signal_connect (window->spin_precision, "value-changed",
02806                     window_precision_variable, NULL);
02807   window->label_sweeps = (GtkLabel *) gtk_label_new (_("Sweeps number"));
02808   window->spin_sweeps =
02809     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02810   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_sweeps),
02811                                _("Number of steps sweeping the variable"));
02812   g_signal_connect (window->spin_sweeps, "value-changed",
02813                     window_update_variable, NULL);
02814   window->label_bits = (GtkLabel *) gtk_label_new (_("Bits number"));
02815   window->spin_bits
02816     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
02817   gtk_widget_set_tooltip_text
02818     (GTK_WIDGET (window->spin_bits),
02819      _("Number of bits to encode the variable"));
02820   g_signal_connect
02821     (window->spin_bits, "value-changed", window_update_variable, NULL);
02822   window->label_step = (GtkLabel *) gtk_label_new (_("Step size"));
02823   window->spin_step = (GtkSpinButton *) gtk_spin_button_new_with_range
02824     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02825   gtk_widget_set_tooltip_text
02826     (GTK_WIDGET (window->spin_step),
02827      _("Initial step size for the hill climbing method"));
02828   window->scrolled_step = (GtkScrolledWindow *)
02829 #if !GTK4
02830     gtk_scrolled_window_new (NULL, NULL);
02831 #else
02832     gtk_scrolled_window_new ();
02833 #endif
02834   gtk_scrolled_window_set_child (window->scrolled_step,
02835                                  GTK_WIDGET (window->spin_step));
02836   g_signal_connect
02837     (window->spin_step, "value-changed", window_step_variable, NULL);
02838   window->grid_variable = (GtkGrid *) gtk_grid_new ();
02839   gtk_grid_attach (window->grid_variable,
02840                    GTK_WIDGET (window->combo_variable), 0, 0, 2, 1);
02841   gtk_grid_attach (window->grid_variable,
02842                    GTK_WIDGET (window->button_add_variable), 2, 0, 1, 1);
02843   gtk_grid_attach (window->grid_variable,
02844                    GTK_WIDGET (window->button_remove_variable), 3, 0, 1, 1);
02845   gtk_grid_attach (window->grid_variable,
02846                    GTK_WIDGET (window->label_variable), 0, 1, 1, 1);
02847   gtk_grid_attach (window->grid_variable,
02848                    GTK_WIDGET (window->entry_variable), 1, 1, 3, 1);
02849   gtk_grid_attach (window->grid_variable,
02850                    GTK_WIDGET (window->label_min), 0, 2, 1, 1);
02851   gtk_grid_attach (window->grid_variable,
02852                    GTK_WIDGET (window->scrolled_min), 1, 2, 3, 1);
02853   gtk_grid_attach (window->grid_variable,
02854                    GTK_WIDGET (window->label_max), 0, 3, 1, 1);
02855   gtk_grid_attach (window->grid_variable,
02856                    GTK_WIDGET (window->scrolled_max), 1, 3, 3, 1);
02857   gtk_grid_attach (window->grid_variable,
02858                    GTK_WIDGET (window->check_minabs), 0, 4, 1, 1);
02859   gtk_grid_attach (window->grid_variable,
02860                    GTK_WIDGET (window->scrolled_minabs), 1, 4, 3, 1);
02861   gtk_grid_attach (window->grid_variable,
02862                    GTK_WIDGET (window->check_maxabs), 0, 5, 1, 1);
02863   gtk_grid_attach (window->grid_variable,
02864                    GTK_WIDGET (window->scrolled_maxabs), 1, 5, 3, 1);
02865   gtk_grid_attach (window->grid_variable,
```

```
02866                   GTK_WIDGET (window->label_precision), 0, 6, 1, 1);
02867   gtk_grid_attach (window->grid_variable,
02868                   GTK_WIDGET (window->spin_precision), 1, 6, 3, 1);
02869   gtk_grid_attach (window->grid_variable,
02870                   GTK_WIDGET (window->label_sweeps), 0, 7, 1, 1);
02871   gtk_grid_attach (window->grid_variable,
02872                   GTK_WIDGET (window->spin_sweeps), 1, 7, 3, 1);
02873   gtk_grid_attach (window->grid_variable,
02874                   GTK_WIDGET (window->label_bits), 0, 8, 1, 1);
02875   gtk_grid_attach (window->grid_variable,
02876                   GTK_WIDGET (window->spin_bits), 1, 8, 3, 1);
02877   gtk_grid_attach (window->grid_variable,
02878                   GTK_WIDGET (window->label_step), 0, 9, 1, 1);
02879   gtk_grid_attach (window->grid_variable,
02880                   GTK_WIDGET (window->scrolled_step), 1, 9, 3, 1);
02881   window->frame_variable = (GtkFrame *) gtk_frame_new (_("Variable"));
02882   gtk_frame_set_child (window->frame_variable,
02883                        GTK_WIDGET (window->grid_variable));
02884
02885   // Creating the experiment widgets
02886   window->combo_experiment = (GtkComboBoxText *) gtk_combo_box_text_new ();
02887   gtk_widget_set_tooltip_text (GTK_WIDGET (window->combo_experiment),
02888                                _("Experiment selector"));
02889   window->id_experiment = g_signal_connect
02890     (window->combo_experiment, "changed", window_set_experiment, NULL);
02891 #if !GTK4
02892   window->button_add_experiment = (GtkButton *)
02893     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02894 #else
02895   window->button_add_experiment = (GtkButton *)
02896     gtk_button_new_from_icon_name ("list-add");
02897 #endif
02898   g_signal_connect
02899     (window->button_add_experiment, "clicked", window_add_experiment, NULL);
02900   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_experiment),
02901                                _("Add experiment"));
02902 #if !GTK4
02903   window->button_remove_experiment = (GtkButton *)
02904     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02905 #else
02906   window->button_remove_experiment = (GtkButton *)
02907     gtk_button_new_from_icon_name ("list-remove");
02908 #endif
02909   g_signal_connect (window->button_remove_experiment, "clicked",
02910                     window_remove_experiment, NULL);
02911   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_experiment),
02912                                _("Remove experiment"));
02913   window->label_experiment
02914     = (GtkLabel *) gtk_label_new (_("Experimental data file"));
02915   window->button_experiment = (GtkButton *)
02916     gtk_button_new_with_mnemonic (_("Experimental data file"));
02917   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_experiment),
02918                                _("Experimental data file"));
02919   g_signal_connect (window->button_experiment, "clicked",
02920                     window_name_experiment, NULL);
02921   gtk_widget_set_hexpand (GTK_WIDGET (window->button_experiment), TRUE);
02922   window->label_weight = (GtkLabel *) gtk_label_new (_("Weight"));
02923   window->spin_weight
02924     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02925   gtk_widget_set_tooltip_text
02926     (GTK_WIDGET (window->spin_weight),
02927      _("Weight factor to build the objective function"));
02928   g_signal_connect
02929     (window->spin_weight, "value-changed", window_weight_experiment, NULL);
02930   window->grid_experiment = (GtkGrid *) gtk_grid_new ();
02931   gtk_grid_attach (window->grid_experiment,
02932                    GTK_WIDGET (window->combo_experiment), 0, 0, 2, 1);
02933   gtk_grid_attach (window->grid_experiment,
02934                    GTK_WIDGET (window->button_add_experiment), 2, 0, 1, 1);
02935   gtk_grid_attach (window->grid_experiment,
02936                    GTK_WIDGET (window->button_remove_experiment), 3, 0, 1, 1);
02937   gtk_grid_attach (window->grid_experiment,
02938                    GTK_WIDGET (window->label_experiment), 0, 1, 1, 1);
02939   gtk_grid_attach (window->grid_experiment,
02940                    GTK_WIDGET (window->button_experiment), 1, 1, 3, 1);
02941   gtk_grid_attach (window->grid_experiment,
02942                    GTK_WIDGET (window->label_weight), 0, 2, 1, 1);
02943   gtk_grid_attach (window->grid_experiment,
02944                    GTK_WIDGET (window->spin_weight), 1, 2, 3, 1);
02945   for (i = 0; i < MAX_NINPUTS; ++i)
02946     {
02947       snprintf (buffer3, 64, "%s %u", _("Input template"), i + 1);
02948       window->check_template[i] = (GtkCheckButton *)
02949         gtk_check_button_new_with_label (buffer3);
02950       window->id_template[i]
02951         = g_signal_connect (window->check_template[i], "toggled",
02952                             window_inputs_experiment, NULL);
```

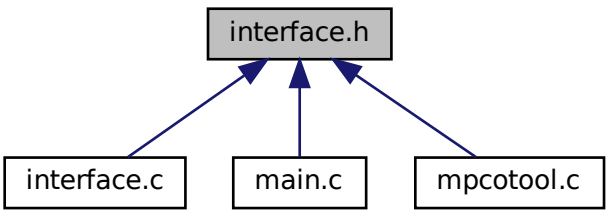
```
02953       gtk_grid_attach (window->grid_experiment,
02954                        GTK_WIDGET (window->check_template[i]), 0, 3 + i, 1, 1);
02955       window->button_template[i] = (GtkButton *)
02956         gtk_button_new_with_mnemonic (_("Input template"));
02957
02958       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_template[i]),
02959                                    _("Experimental input template file"));
02960       window->id_input[i] =
02961         g_signal_connect_swapped (window->button_template[i], "clicked",
02962                                   (GCallback) window_template_experiment,
02963                                   (void *) (size_t) i);
02964       gtk_grid_attach (window->grid_experiment,
02965                        GTK_WIDGET (window->button_template[i]), 1, 3 + i, 3, 1);
02966     }
02967   window->frame_experiment = (GtkFrame *) gtk_frame_new (_("Experiment"));
02968   gtk_frame_set_child (window->frame_experiment,
02969                        GTK_WIDGET (window->grid_experiment));
02970
02971   // Creating the error norm widgets
02972   window->frame_norm = (GtkFrame *) gtk_frame_new (_("Error norm"));
02973   window->grid_norm = (GtkGrid *) gtk_grid_new ();
02974   gtk_frame_set_child (window->frame_norm, GTK_WIDGET (window->grid_norm));
02975 #if !GTK4
02976   window->button_norm[0] = (GtkRadioButton *)
02977     gtk_radio_button_new_with_mnemonic (NULL, label_norm[0]);
02978 #else
02979   window->button_norm[0] = (GtkCheckButton *)
02980     gtk_check_button_new_with_mnemonic (label_norm[0]);
02981 #endif
02982   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[0]),
02983                                tip_norm[0]);
02984   gtk_grid_attach (window->grid_norm,
02985                    GTK_WIDGET (window->button_norm[0]), 0, 0, 1, 1);
02986   g_signal_connect (window->button_norm[0], "toggled", window_update, NULL);
02987   for (i = 0; ++i < NNORMS;)
02988     {
02989 #if !GTK4
02990       window->button_norm[i] = (GtkRadioButton *)
02991         gtk_radio_button_new_with_mnemonic
02992         (gtk_radio_button_get_group (window->button_norm[0]), label_norm[i]);
02993 #else
02994       window->button_norm[i] = (GtkCheckButton *)
02995         gtk_check_button_new_with_mnemonic (label_norm[i]);
02996       gtk_check_button_set_group (window->button_norm[i],
02997                                   window->button_norm[0]);
02998 #endif
02999       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[i]),
03000                                    tip_norm[i]);
03001       gtk_grid_attach (window->grid_norm,
03002                        GTK_WIDGET (window->button_norm[i]), 0, i, 1, 1);
03003       g_signal_connect (window->button_norm[i], "toggled", window_update, NULL);
03004     }
03005   window->label_p = (GtkLabel *) gtk_label_new (_("P parameter"));
03006   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->label_p), 1, 1, 1, 1);
03007   window->spin_p = (GtkSpinButton *)
03008     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE, 0.01);
03009   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_p),
03010                                _("P parameter for the P error norm"));
03011   window->scrolled_p = (GtkScrolledWindow *)
03012 #if !GTK4
03013     gtk_scrolled_window_new (NULL, NULL);
03014 #else
03015     gtk_scrolled_window_new ();
03016 #endif
03017   gtk_scrolled_window_set_child (window->scrolled_p,
03018                                  GTK_WIDGET (window->spin_p));
03019   gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_p), TRUE);
03020   gtk_widget_set_halign (GTK_WIDGET (window->scrolled_p), GTK_ALIGN_FILL);
03021   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->scrolled_p),
03022                    1, 2, 1, 2);
03023
03024   // Creating the grid and attaching the widgets to the grid
03025   window->grid = (GtkGrid *) gtk_grid_new ();
03026   gtk_grid_attach (window->grid, GTK_WIDGET (window->box_buttons), 0, 0, 3, 1);
03027   gtk_grid_attach (window->grid, GTK_WIDGET (window->grid_files), 0, 1, 1, 1);
03028   gtk_grid_attach (window->grid,
03029                    GTK_WIDGET (window->frame_algorithm), 0, 2, 1, 1);
03030   gtk_grid_attach (window->grid,
03031                    GTK_WIDGET (window->frame_variable), 1, 2, 1, 1);
03032   gtk_grid_attach (window->grid,
03033                    GTK_WIDGET (window->frame_experiment), 2, 2, 1, 1);
03034   gtk_grid_attach (window->grid, GTK_WIDGET (window->frame_norm), 1, 1, 2, 1);
03035   gtk_window_set_child (window->window, GTK_WIDGET (window->grid));
03036
03037   // Setting the window logo
03038   window->logo = gdk_pixbuf_new_from_xpm_data (logo);
03039 #if !GTK4
```

```
03040   gtk_window_set_icon (window->window, window->logo);
03041 #endif
03042
03043   // Showing the window
03044 #if !GTK4
03045   gtk_widget_show_all (GTK_WIDGET (window->window));
03046 #else
03047   gtk_widget_show (GTK_WIDGET (window->window));
03048 #endif
03049
03050   // In GTK+ 3.16 and 3.18 the default scrolled size is wrong
03051 #if GTK_MINOR_VERSION >= 16
03052   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_min), -1, 40);
03053   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_max), -1, 40);
03054   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_minabs), -1, 40);
03055   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_maxabs), -1, 40);
03056   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_step), -1, 40);
03057   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_p), -1, 40);
03058   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_threshold), -1, 40);
03059 #endif
03060
03061   // Reading initial example
03062   input_new ();
03063   buffer2 = g_get_current_dir ();
03064   buffer = g_build_filename (buffer2, "..", "tests", "test1", INPUT_FILE, NULL);
03065   g_free (buffer2);
03066   window_read (buffer);
03067   g_free (buffer);
03068
03069 #if DEBUG_INTERFACE
03070   fprintf (stderr, "window_new:  start\n");
03071 #endif
03072 }
```

5.13 interface.h File Reference

Header file to define the graphical interface functions.

This graph shows which files directly or indirectly include this file:



Data Structures

- struct Options

  Struct to define the options dialog.
- struct Running

  Struct to define the running dialog.
- struct Window

  Struct to define the main window.

Macros

- #define MAX_LENGTH (DEFAULT_PRECISION + 8)
  Max length of texts allowed in GtkSpinButtons.

Functions

- void window_new (GtkApplication *application)

Variables

- Window window [1]
  Window struct to define the main interface window.

5.13.1 Detailed Description

Header file to define the graphical interface functions.

Authors

Javier Burguete.

Copyright

Definition in file interface.h.

5.13.2 Macro Definition Documentation

5.13.2.1 MAX_LENGTH

```
#define MAX_LENGTH (DEFAULT_PRECISION + 8)
```

Max length of texts allowed in GtkSpinButtons.

Definition at line 42 of file interface.h.

5.13.3 Function Documentation

5.13.3.1 window_new()

```
void window_new (
            GtkApplication * application )
```

Function to open the main window.

Parameters

application	GtkApplication struct.

Definition at line 2274 of file interface.c.

```
02275 {
02276   unsigned int i;
02277   char *buffer, *buffer2, buffer3[64];
02278   const char *label_algorithm[NALGORITHMS] = {
02279     "_Monte-Carlo", _("_Sweep"), _("_Genetic"), _("_Orthogonal")
02280   };
02281   const char *tip_algorithm[NALGORITHMS] = {
02282     _("Monte-Carlo brute force algorithm"),
02283     _("Sweep brute force algorithm"),
02284     _("Genetic algorithm"),
02285     _("Orthogonal sampling brute force algorithm"),
02286   };
02287   const char *label_climbing[NCLIMBINGS] = {
02288     _("_Coordinates climbing"), _("_Random climbing")
02289   };
02290   const char *tip_climbing[NCLIMBINGS] = {
02291     _("Coordinates climbing estimate method"),
02292     _("Random climbing estimate method")
02293   };
02294   const char *label_norm[NNORMS] = { "L2", "L", "Lp", "L1" };
02295   const char *tip_norm[NNORMS] = {
02296     _("Euclidean error norm (L2)"),
02297     _("Maximum error norm (L)"),
02298     _("P error norm (Lp)"),
02299     _("Taxicab error norm (L1)")
02300   };
02301 #if !GTK4
02302   const char *close = "delete-event";
02303 #else
02304   const char *close = "close-request";
02305 #endif
02306
02307 #if DEBUG_INTERFACE
02308   fprintf (stderr, "window_new:  start\n");
02309 #endif
02310
02311   // Creating the window
02312   window->window = window_parent = main_window
02313     = (GtkWindow *) gtk_application_window_new (application);
02314
02315   // Finish when closing the window
02316   g_signal_connect_swapped (window->window, close,
02317                             G_CALLBACK (g_application_quit),
02318                             G_APPLICATION (application));
02319
02320   // Setting the window title
02321   gtk_window_set_title (window->window, "MPCOTool");
02322
02323   // Creating the open button
02324   window->button_open = (GtkButton *)
02325 #if !GTK4
02326     gtk_button_new_from_icon_name ("document-open", GTK_ICON_SIZE_BUTTON);
02327 #else
02328     gtk_button_new_from_icon_name ("document-open");
02329 #endif
02330   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_open),
02331                                _("Open a case"));
02332   g_signal_connect (window->button_open, "clicked", window_open, NULL);
02333
02334   // Creating the save button
02335   window->button_save = (GtkButton *)
02336 #if !GTK4
02337     gtk_button_new_from_icon_name ("document-save", GTK_ICON_SIZE_BUTTON);
02338 #else
02339     gtk_button_new_from_icon_name ("document-save");
02340 #endif
02341   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_save),
02342                                _("Save the case"));
02343   g_signal_connect (window->button_save, "clicked", (GCallback) window_save,
02344                     NULL);
02345
02346   // Creating the run button
02347   window->button_run = (GtkButton *)
02348 #if !GTK4
02349     gtk_button_new_from_icon_name ("system-run", GTK_ICON_SIZE_BUTTON);
02350 #else
02351     gtk_button_new_from_icon_name ("system-run");
02352 #endif
```

```
02353   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_run),
02354                                _("Run the optimization"));
02355   g_signal_connect (window->button_run, "clicked", window_run, NULL);
02356
02357   // Creating the options button
02358   window->button_options = (GtkButton *)
02359 #if !GTK4
02360     gtk_button_new_from_icon_name ("preferences-system", GTK_ICON_SIZE_BUTTON);
02361 #else
02362     gtk_button_new_from_icon_name ("preferences-system");
02363 #endif
02364   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_options),
02365                                _("Edit the case"));
02366   g_signal_connect (window->button_options, "clicked", options_new, NULL);
02367
02368   // Creating the help button
02369   window->button_help = (GtkButton *)
02370 #if !GTK4
02371     gtk_button_new_from_icon_name ("help-browser", GTK_ICON_SIZE_BUTTON);
02372 #else
02373     gtk_button_new_from_icon_name ("help-browser");
02374 #endif
02375   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_help), _("Help"));
02376   g_signal_connect (window->button_help, "clicked", window_help, NULL);
02377
02378   // Creating the about button
02379   window->button_about = (GtkButton *)
02380 #if !GTK4
02381     gtk_button_new_from_icon_name ("help-about", GTK_ICON_SIZE_BUTTON);
02382 #else
02383     gtk_button_new_from_icon_name ("help-about");
02384 #endif
02385   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_about), _("About"));
02386   g_signal_connect (window->button_about, "clicked", window_about, NULL);
02387
02388   // Creating the exit button
02389   window->button_exit = (GtkButton *)
02390 #if !GTK4
02391     gtk_button_new_from_icon_name ("application-exit", GTK_ICON_SIZE_BUTTON);
02392 #else
02393     gtk_button_new_from_icon_name ("application-exit");
02394 #endif
02395   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_exit), _("Exit"));
02396   g_signal_connect_swapped (window->button_exit, "clicked",
02397                             G_CALLBACK (g_application_quit),
02398                             G_APPLICATION (application));
02399
02400   // Creating the buttons bar
02401   window->box_buttons = (GtkBox *) gtk_box_new (GTK_ORIENTATION_HORIZONTAL, 0);
02402   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_open));
02403   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_save));
02404   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_run));
02405   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_options));
02406   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_help));
02407   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_about));
02408   gtk_box_append (window->box_buttons, GTK_WIDGET (window->button_exit));
02409
02410   // Creating the simulator program label and entry
02411   window->label_simulator = (GtkLabel *) gtk_label_new (_("Simulator program"));
02412   window->button_simulator = (GtkButton *)
02413     gtk_button_new_with_mnemonic (_("Simulator program"));
02414   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_simulator),
02415                                _("Simulator program executable file"));
02416   gtk_widget_set_hexpand (GTK_WIDGET (window->button_simulator), TRUE);
02417   g_signal_connect (window->button_simulator, "clicked",
02418                     G_CALLBACK (dialog_simulator), NULL);
02419
02420   // Creating the evaluator program label and entry
02421   window->check_evaluator = (GtkCheckButton *)
02422     gtk_check_button_new_with_mnemonic (_("_Evaluator program"));
02423   g_signal_connect (window->check_evaluator, "toggled", window_update, NULL);
02424   window->button_evaluator = (GtkButton *)
02425     gtk_button_new_with_mnemonic (_("Evaluator program"));
02426   gtk_widget_set_tooltip_text
02427     (GTK_WIDGET (window->button_evaluator),
02428      _("Optional evaluator program executable file"));
02429   g_signal_connect (window->button_evaluator, "clicked",
02430                     G_CALLBACK (dialog_evaluator), NULL);
02431
02432   // Creating the results files labels and entries
02433   window->label_result = (GtkLabel *) gtk_label_new (_("Result file"));
02434   window->entry_result = (GtkEntry *) gtk_entry_new ();
02435   gtk_widget_set_tooltip_text
02436     (GTK_WIDGET (window->entry_result), _("Best results file"));
02437   window->label_variables = (GtkLabel *) gtk_label_new (_("Variables file"));
02438   window->entry_variables = (GtkEntry *) gtk_entry_new ();
02439   gtk_widget_set_tooltip_text
```

```
02440     (GTK_WIDGET (window->entry_variables), _("All simulated results file"));
02441
02442   // Creating the files grid and attaching widgets
02443   window->grid_files = (GtkGrid *) gtk_grid_new ();
02444   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_simulator),
02445                    0, 0, 1, 1);
02446   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->button_simulator),
02447                    1, 0, 1, 1);
02448   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->check_evaluator),
02449                    0, 1, 1, 1);
02450   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->button_evaluator),
02451                    1, 1, 1, 1);
02452   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_result),
02453                    0, 2, 1, 1);
02454   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->entry_result),
02455                    1, 2, 1, 1);
02456   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->label_variables),
02457                    0, 3, 1, 1);
02458   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->entry_variables),
02459                    1, 3, 1, 1);
02460
02461   // Creating the algorithm properties
02462   window->label_simulations = (GtkLabel *) gtk_label_new
02463     (_("Simulations number"));
02464   window->spin_simulations
02465     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02466   gtk_widget_set_tooltip_text
02467     (GTK_WIDGET (window->spin_simulations),
02468      _("Number of simulations to perform for each iteration"));
02469   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_simulations), TRUE);
02470   window->label_iterations = (GtkLabel *)
02471     gtk_label_new (_("Iterations number"));
02472   window->spin_iterations
02473     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02474   gtk_widget_set_tooltip_text
02475     (GTK_WIDGET (window->spin_iterations), _("Number of iterations"));
02476   g_signal_connect
02477     (window->spin_iterations, "value-changed", window_update, NULL);
02478   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_iterations), TRUE);
02479   window->label_tolerance = (GtkLabel *) gtk_label_new (_("Tolerance"));
02480   window->spin_tolerance =
02481     (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02482   gtk_widget_set_tooltip_text
02483     (GTK_WIDGET (window->spin_tolerance),
02484      _("Tolerance to set the variable interval on the next iteration"));
02485   window->label_bests = (GtkLabel *) gtk_label_new (_("Bests number"));
02486   window->spin_bests
02487     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02488   gtk_widget_set_tooltip_text
02489     (GTK_WIDGET (window->spin_bests),
02490      _("Number of best simulations used to set the variable interval "
02491        "on the next iteration"));
02492   window->label_population
02493     = (GtkLabel *) gtk_label_new (_("Population number"));
02494   window->spin_population
02495     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02496   gtk_widget_set_tooltip_text
02497     (GTK_WIDGET (window->spin_population),
02498      _("Number of population for the genetic algorithm"));
02499   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_population), TRUE);
02500   window->label_generations
02501     = (GtkLabel *) gtk_label_new (_("Generations number"));
02502   window->spin_generations
02503     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02504   gtk_widget_set_tooltip_text
02505     (GTK_WIDGET (window->spin_generations),
02506      _("Number of generations for the genetic algorithm"));
02507   window->label_mutation = (GtkLabel *) gtk_label_new (_("Mutation ratio"));
02508   window->spin_mutation
02509     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02510   gtk_widget_set_tooltip_text
02511     (GTK_WIDGET (window->spin_mutation),
02512      _("Ratio of mutation for the genetic algorithm"));
02513   window->label_reproduction
02514     = (GtkLabel *) gtk_label_new (_("Reproduction ratio"));
02515   window->spin_reproduction
02516     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02517   gtk_widget_set_tooltip_text
02518     (GTK_WIDGET (window->spin_reproduction),
02519      _("Ratio of reproduction for the genetic algorithm"));
02520   window->label_adaptation = (GtkLabel *) gtk_label_new (_("Adaptation ratio"));
02521   window->spin_adaptation
02522     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02523   gtk_widget_set_tooltip_text
02524     (GTK_WIDGET (window->spin_adaptation),
02525      _("Ratio of adaptation for the genetic algorithm"));
02526   window->label_threshold = (GtkLabel *) gtk_label_new (_("Threshold"));
```

```
02527   window->spin_threshold = (GtkSpinButton *)
02528     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE,
02529                                     precision[DEFAULT_PRECISION]);
02530   gtk_widget_set_tooltip_text
02531     (GTK_WIDGET (window->spin_threshold),
02532      _("Threshold in the objective function to finish the simulations"));
02533   window->scrolled_threshold = (GtkScrolledWindow *)
02534 #if !GTK4
02535     gtk_scrolled_window_new (NULL, NULL);
02536 #else
02537     gtk_scrolled_window_new ();
02538 #endif
02539   gtk_scrolled_window_set_child (window->scrolled_threshold,
02540                                  GTK_WIDGET (window->spin_threshold));
02541 //  gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_threshold), TRUE);
02542 //  gtk_widget_set_halign (GTK_WIDGET (window->scrolled_threshold),
02543 //                         GTK_ALIGN_FILL);
02544
02545   // Creating the hill climbing method properties
02546   window->check_climbing = (GtkCheckButton *)
02547     gtk_check_button_new_with_mnemonic (_("_Hill climbing method"));
02548   g_signal_connect (window->check_climbing, "toggled", window_update, NULL);
02549   window->grid_climbing = (GtkGrid *) gtk_grid_new ();
02550 #if !GTK4
02551   window->button_climbing[0] = (GtkRadioButton *)
02552     gtk_radio_button_new_with_mnemonic (NULL, label_climbing[0]);
02553 #else
02554   window->button_climbing[0] = (GtkCheckButton *)
02555     gtk_check_button_new_with_mnemonic (label_climbing[0]);
02556 #endif
02557   gtk_grid_attach (window->grid_climbing,
02558                    GTK_WIDGET (window->button_climbing[0]), 0, 0, 1, 1);
02559   g_signal_connect (window->button_climbing[0], "toggled", window_update, NULL);
02560   for (i = 0; ++i < NCLIMBINGS;)
02561     {
02562 #if !GTK4
02563       window->button_climbing[i] = (GtkRadioButton *)
02564         gtk_radio_button_new_with_mnemonic
02565         (gtk_radio_button_get_group (window->button_climbing[0]),
02566          label_climbing[i]);
02567 #else
02568       window->button_climbing[i] = (GtkCheckButton *)
02569         gtk_check_button_new_with_mnemonic (label_climbing[i]);
02570       gtk_check_button_set_group (window->button_climbing[i],
02571                                   window->button_climbing[0]);
02572 #endif
02573       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_climbing[i]),
02574                                    tip_climbing[i]);
02575       gtk_grid_attach (window->grid_climbing,
02576                        GTK_WIDGET (window->button_climbing[i]), 0, i, 1, 1);
02577       g_signal_connect (window->button_climbing[i], "toggled", window_update,
02578                         NULL);
02579     }
02580   window->label_steps = (GtkLabel *) gtk_label_new (_("Steps number"));
02581   window->spin_steps = (GtkSpinButton *)
02582     gtk_spin_button_new_with_range (1., 1.e12, 1.);
02583   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_steps), TRUE);
02584   window->label_estimates
02585     = (GtkLabel *) gtk_label_new (_("Climbing estimates number"));
02586   window->spin_estimates = (GtkSpinButton *)
02587     gtk_spin_button_new_with_range (1., 1.e3, 1.);
02588   window->label_relaxation
02589     = (GtkLabel *) gtk_label_new (_("Relaxation parameter"));
02590   window->spin_relaxation = (GtkSpinButton *)
02591     gtk_spin_button_new_with_range (0., 2., 0.001);
02592   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_steps),
02593                    0, NCLIMBINGS, 1, 1);
02594   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_steps),
02595                    1, NCLIMBINGS, 1, 1);
02596   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_estimates),
02597                    0, NCLIMBINGS + 1, 1, 1);
02598   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_estimates),
02599                    1, NCLIMBINGS + 1, 1, 1);
02600   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->label_relaxation),
02601                    0, NCLIMBINGS + 2, 1, 1);
02602   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->spin_relaxation),
02603                    1, NCLIMBINGS + 2, 1, 1);
02604
02605   // Creating the array of algorithms
02606   window->grid_algorithm = (GtkGrid *) gtk_grid_new ();
02607 #if !GTK4
02608   window->button_algorithm[0] = (GtkRadioButton *)
02609     gtk_radio_button_new_with_mnemonic (NULL, label_algorithm[0]);
02610 #else
02611   window->button_algorithm[0] = (GtkCheckButton *)
02612     gtk_check_button_new_with_mnemonic (label_algorithm[0]);
02613 #endif
```

```
02614   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[0]),
02615                                tip_algorithm[0]);
02616   gtk_grid_attach (window->grid_algorithm,
02617                    GTK_WIDGET (window->button_algorithm[0]), 0, 0, 1, 1);
02618   g_signal_connect (window->button_algorithm[0], "toggled",
02619                     window_set_algorithm, NULL);
02620   for (i = 0; ++i < NALGORITHMS;)
02621     {
02622 #if !GTK4
02623       window->button_algorithm[i] = (GtkRadioButton *)
02624         gtk_radio_button_new_with_mnemonic
02625         (gtk_radio_button_get_group (window->button_algorithm[0]),
02626          label_algorithm[i]);
02627 #else
02628       window->button_algorithm[i] = (GtkCheckButton *)
02629         gtk_check_button_new_with_mnemonic (label_algorithm[i]);
02630       gtk_check_button_set_group (window->button_algorithm[i],
02631                                   window->button_algorithm[0]),
02632 #endif
02633         gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[i]),
02634                                      tip_algorithm[i]);
02635       gtk_grid_attach (window->grid_algorithm,
02636                        GTK_WIDGET (window->button_algorithm[i]), 0, i, 1, 1);
02637       g_signal_connect (window->button_algorithm[i], "toggled",
02638                         window_set_algorithm, NULL);
02639     }
02640   gtk_grid_attach (window->grid_algorithm,
02641                    GTK_WIDGET (window->label_simulations),
02642                    0, NALGORITHMS, 1, 1);
02643   gtk_grid_attach (window->grid_algorithm,
02644                    GTK_WIDGET (window->spin_simulations), 1, NALGORITHMS, 1, 1);
02645   gtk_grid_attach (window->grid_algorithm,
02646                    GTK_WIDGET (window->label_iterations),
02647                    0, NALGORITHMS + 1, 1, 1);
02648   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_iterations),
02649                    1, NALGORITHMS + 1, 1, 1);
02650   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_tolerance),
02651                    0, NALGORITHMS + 2, 1, 1);
02652   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_tolerance),
02653                    1, NALGORITHMS + 2, 1, 1);
02654   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_bests),
02655                    0, NALGORITHMS + 3, 1, 1);
02656   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_bests),
02657                    1, NALGORITHMS + 3, 1, 1);
02658   gtk_grid_attach (window->grid_algorithm,
02659                    GTK_WIDGET (window->label_population),
02660                    0, NALGORITHMS + 4, 1, 1);
02661   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_population),
02662                    1, NALGORITHMS + 4, 1, 1);
02663   gtk_grid_attach (window->grid_algorithm,
02664                    GTK_WIDGET (window->label_generations),
02665                    0, NALGORITHMS + 5, 1, 1);
02666   gtk_grid_attach (window->grid_algorithm,
02667                    GTK_WIDGET (window->spin_generations),
02668                    1, NALGORITHMS + 5, 1, 1);
02669   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_mutation),
02670                    0, NALGORITHMS + 6, 1, 1);
02671   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_mutation),
02672                    1, NALGORITHMS + 6, 1, 1);
02673   gtk_grid_attach (window->grid_algorithm,
02674                    GTK_WIDGET (window->label_reproduction),
02675                    0, NALGORITHMS + 7, 1, 1);
02676   gtk_grid_attach (window->grid_algorithm,
02677                    GTK_WIDGET (window->spin_reproduction),
02678                    1, NALGORITHMS + 7, 1, 1);
02679   gtk_grid_attach (window->grid_algorithm,
02680                    GTK_WIDGET (window->label_adaptation),
02681                    0, NALGORITHMS + 8, 1, 1);
02682   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->spin_adaptation),
02683                    1, NALGORITHMS + 8, 1, 1);
02684   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->check_climbing),
02685                    0, NALGORITHMS + 9, 2, 1);
02686   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->grid_climbing),
02687                    0, NALGORITHMS + 10, 2, 1);
02688   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->label_threshold),
02689                    0, NALGORITHMS + 11, 1, 1);
02690   gtk_grid_attach (window->grid_algorithm,
02691                    GTK_WIDGET (window->scrolled_threshold),
02692                    1, NALGORITHMS + 11, 1, 1);
02693   window->frame_algorithm = (GtkFrame *) gtk_frame_new (_("Algorithm"));
02694   gtk_frame_set_child (window->frame_algorithm,
02695                        GTK_WIDGET (window->grid_algorithm));
02696
02697   // Creating the variable widgets
02698   window->combo_variable = (GtkComboBoxText *) gtk_combo_box_text_new ();
02699   gtk_widget_set_tooltip_text
02700     (GTK_WIDGET (window->combo_variable), _("Variables selector"));
```

```
02701   window->id_variable = g_signal_connect
02702     (window->combo_variable, "changed", window_set_variable, NULL);
02703 #if !GTK4
02704   window->button_add_variable = (GtkButton *)
02705     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02706 #else
02707   window->button_add_variable = (GtkButton *)
02708     gtk_button_new_from_icon_name ("list-add");
02709 #endif
02710   g_signal_connect (window->button_add_variable, "clicked", window_add_variable,
02711                     NULL);
02712   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_variable),
02713                                _("Add variable"));
02714 #if !GTK4
02715   window->button_remove_variable = (GtkButton *)
02716     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02717 #else
02718   window->button_remove_variable = (GtkButton *)
02719     gtk_button_new_from_icon_name ("list-remove");
02720 #endif
02721   g_signal_connect (window->button_remove_variable, "clicked",
02722                     window_remove_variable, NULL);
02723   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_variable),
02724                                _("Remove variable"));
02725   window->label_variable = (GtkLabel *) gtk_label_new (_("Name"));
02726   window->entry_variable = (GtkEntry *) gtk_entry_new ();
02727   gtk_widget_set_tooltip_text
02728     (GTK_WIDGET (window->entry_variable), _("Variable name"));
02729   gtk_widget_set_hexpand (GTK_WIDGET (window->entry_variable), TRUE);
02730   window->id_variable_label = g_signal_connect
02731     (window->entry_variable, "changed", window_label_variable, NULL);
02732   window->label_min = (GtkLabel *) gtk_label_new (_("Minimum"));
02733   window->spin_min = (GtkSpinButton *) gtk_spin_button_new_with_range
02734     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02735   gtk_widget_set_tooltip_text
02736     (GTK_WIDGET (window->spin_min), _("Minimum initial value of the variable"));
02737   window->scrolled_min = (GtkScrolledWindow *)
02738 #if !GTK4
02739     gtk_scrolled_window_new (NULL, NULL);
02740 #else
02741     gtk_scrolled_window_new ();
02742 #endif
02743   gtk_scrolled_window_set_child (window->scrolled_min,
02744                                  GTK_WIDGET (window->spin_min));
02745   g_signal_connect (window->spin_min, "value-changed",
02746                     window_rangemin_variable, NULL);
02747   window->label_max = (GtkLabel *) gtk_label_new (_("Maximum"));
02748   window->spin_max = (GtkSpinButton *) gtk_spin_button_new_with_range
02749     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02750   gtk_widget_set_tooltip_text
02751     (GTK_WIDGET (window->spin_max), _("Maximum initial value of the variable"));
02752   window->scrolled_max = (GtkScrolledWindow *)
02753 #if !GTK4
02754     gtk_scrolled_window_new (NULL, NULL);
02755 #else
02756     gtk_scrolled_window_new ();
02757 #endif
02758   gtk_scrolled_window_set_child (window->scrolled_max,
02759                                  GTK_WIDGET (window->spin_max));
02760   g_signal_connect (window->spin_max, "value-changed",
02761                     window_rangemax_variable, NULL);
02762   window->check_minabs = (GtkCheckButton *)
02763     gtk_check_button_new_with_mnemonic (_("_Absolute minimum"));
02764   g_signal_connect (window->check_minabs, "toggled", window_update, NULL);
02765   window->spin_minabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02766     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02767   gtk_widget_set_tooltip_text
02768     (GTK_WIDGET (window->spin_minabs),
02769      _("Minimum allowed value of the variable"));
02770   window->scrolled_minabs = (GtkScrolledWindow *)
02771 #if !GTK4
02772     gtk_scrolled_window_new (NULL, NULL);
02773 #else
02774     gtk_scrolled_window_new ();
02775 #endif
02776   gtk_scrolled_window_set_child (window->scrolled_minabs,
02777                                  GTK_WIDGET (window->spin_minabs));
02778   g_signal_connect (window->spin_minabs, "value-changed",
02779                     window_rangeminabs_variable, NULL);
02780   window->check_maxabs = (GtkCheckButton *)
02781     gtk_check_button_new_with_mnemonic (_("_Absolute maximum"));
02782   g_signal_connect (window->check_maxabs, "toggled", window_update, NULL);
02783   window->spin_maxabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02784     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02785   gtk_widget_set_tooltip_text
02786     (GTK_WIDGET (window->spin_maxabs),
02787      _("Maximum allowed value of the variable"));
```

```
02788   window->scrolled_maxabs = (GtkScrolledWindow *)
02789 #if !GTK4
02790     gtk_scrolled_window_new (NULL, NULL);
02791 #else
02792     gtk_scrolled_window_new ();
02793 #endif
02794   gtk_scrolled_window_set_child (window->scrolled_maxabs,
02795                                  GTK_WIDGET (window->spin_maxabs));
02796   g_signal_connect (window->spin_maxabs, "value-changed",
02797                     window_rangemaxabs_variable, NULL);
02798   window->label_precision = (GtkLabel *) gtk_label_new (_("Precision digits"));
02799   window->spin_precision = (GtkSpinButton *)
02800     gtk_spin_button_new_with_range (0., (gdouble) DEFAULT_PRECISION, 1.);
02801   gtk_widget_set_tooltip_text
02802     (GTK_WIDGET (window->spin_precision),
02803      _("Number of precision floating point digits\n"
02804        "0 is for integer numbers"));
02805   g_signal_connect (window->spin_precision, "value-changed",
02806                     window_precision_variable, NULL);
02807   window->label_sweeps = (GtkLabel *) gtk_label_new (_("Sweeps number"));
02808   window->spin_sweeps =
02809     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02810   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_sweeps),
02811                                _("Number of steps sweeping the variable"));
02812   g_signal_connect (window->spin_sweeps, "value-changed",
02813                     window_update_variable, NULL);
02814   window->label_bits = (GtkLabel *) gtk_label_new (_("Bits number"));
02815   window->spin_bits
02816     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
02817   gtk_widget_set_tooltip_text
02818     (GTK_WIDGET (window->spin_bits),
02819      _("Number of bits to encode the variable"));
02820   g_signal_connect
02821     (window->spin_bits, "value-changed", window_update_variable, NULL);
02822   window->label_step = (GtkLabel *) gtk_label_new (_("Step size"));
02823   window->spin_step = (GtkSpinButton *) gtk_spin_button_new_with_range
02824     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02825   gtk_widget_set_tooltip_text
02826     (GTK_WIDGET (window->spin_step),
02827      _("Initial step size for the hill climbing method"));
02828   window->scrolled_step = (GtkScrolledWindow *)
02829 #if !GTK4
02830     gtk_scrolled_window_new (NULL, NULL);
02831 #else
02832     gtk_scrolled_window_new ();
02833 #endif
02834   gtk_scrolled_window_set_child (window->scrolled_step,
02835                                  GTK_WIDGET (window->spin_step));
02836   g_signal_connect
02837     (window->spin_step, "value-changed", window_step_variable, NULL);
02838   window->grid_variable = (GtkGrid *) gtk_grid_new ();
02839   gtk_grid_attach (window->grid_variable,
02840                    GTK_WIDGET (window->combo_variable), 0, 0, 2, 1);
02841   gtk_grid_attach (window->grid_variable,
02842                    GTK_WIDGET (window->button_add_variable), 2, 0, 1, 1);
02843   gtk_grid_attach (window->grid_variable,
02844                    GTK_WIDGET (window->button_remove_variable), 3, 0, 1, 1);
02845   gtk_grid_attach (window->grid_variable,
02846                    GTK_WIDGET (window->label_variable), 0, 1, 1, 1);
02847   gtk_grid_attach (window->grid_variable,
02848                    GTK_WIDGET (window->entry_variable), 1, 1, 3, 1);
02849   gtk_grid_attach (window->grid_variable,
02850                    GTK_WIDGET (window->label_min), 0, 2, 1, 1);
02851   gtk_grid_attach (window->grid_variable,
02852                    GTK_WIDGET (window->scrolled_min), 1, 2, 3, 1);
02853   gtk_grid_attach (window->grid_variable,
02854                    GTK_WIDGET (window->label_max), 0, 3, 1, 1);
02855   gtk_grid_attach (window->grid_variable,
02856                    GTK_WIDGET (window->scrolled_max), 1, 3, 3, 1);
02857   gtk_grid_attach (window->grid_variable,
02858                    GTK_WIDGET (window->check_minabs), 0, 4, 1, 1);
02859   gtk_grid_attach (window->grid_variable,
02860                    GTK_WIDGET (window->scrolled_minabs), 1, 4, 3, 1);
02861   gtk_grid_attach (window->grid_variable,
02862                    GTK_WIDGET (window->check_maxabs), 0, 5, 1, 1);
02863   gtk_grid_attach (window->grid_variable,
02864                    GTK_WIDGET (window->scrolled_maxabs), 1, 5, 3, 1);
02865   gtk_grid_attach (window->grid_variable,
02866                    GTK_WIDGET (window->label_precision), 0, 6, 1, 1);
02867   gtk_grid_attach (window->grid_variable,
02868                    GTK_WIDGET (window->spin_precision), 1, 6, 3, 1);
02869   gtk_grid_attach (window->grid_variable,
02870                    GTK_WIDGET (window->label_sweeps), 0, 7, 1, 1);
02871   gtk_grid_attach (window->grid_variable,
02872                    GTK_WIDGET (window->spin_sweeps), 1, 7, 3, 1);
02873   gtk_grid_attach (window->grid_variable,
02874                    GTK_WIDGET (window->label_bits), 0, 8, 1, 1);
```

```
02875   gtk_grid_attach (window->grid_variable,
02876                    GTK_WIDGET (window->spin_bits), 1, 8, 3, 1);
02877   gtk_grid_attach (window->grid_variable,
02878                    GTK_WIDGET (window->label_step), 0, 9, 1, 1);
02879   gtk_grid_attach (window->grid_variable,
02880                    GTK_WIDGET (window->scrolled_step), 1, 9, 3, 1);
02881   window->frame_variable = (GtkFrame *) gtk_frame_new (_("Variable"));
02882   gtk_frame_set_child (window->frame_variable,
02883                        GTK_WIDGET (window->grid_variable));
02884
02885   // Creating the experiment widgets
02886   window->combo_experiment = (GtkComboBoxText *) gtk_combo_box_text_new ();
02887   gtk_widget_set_tooltip_text (GTK_WIDGET (window->combo_experiment),
02888                                _("Experiment selector"));
02889   window->id_experiment = g_signal_connect
02890     (window->combo_experiment, "changed", window_set_experiment, NULL);
02891 #if !GTK4
02892   window->button_add_experiment = (GtkButton *)
02893     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02894 #else
02895   window->button_add_experiment = (GtkButton *)
02896     gtk_button_new_from_icon_name ("list-add");
02897 #endif
02898   g_signal_connect
02899     (window->button_add_experiment, "clicked", window_add_experiment, NULL);
02900   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_experiment),
02901                                _("Add experiment"));
02902 #if !GTK4
02903   window->button_remove_experiment = (GtkButton *)
02904     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02905 #else
02906   window->button_remove_experiment = (GtkButton *)
02907     gtk_button_new_from_icon_name ("list-remove");
02908 #endif
02909   g_signal_connect (window->button_remove_experiment, "clicked",
02910                     window_remove_experiment, NULL);
02911   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_experiment),
02912                                _("Remove experiment"));
02913   window->label_experiment
02914     = (GtkLabel *) gtk_label_new (_("Experimental data file"));
02915   window->button_experiment = (GtkButton *)
02916     gtk_button_new_with_mnemonic (_("Experimental data file"));
02917   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_experiment),
02918                                _("Experimental data file"));
02919   g_signal_connect (window->button_experiment, "clicked",
02920                     window_name_experiment, NULL);
02921   gtk_widget_set_hexpand (GTK_WIDGET (window->button_experiment), TRUE);
02922   window->label_weight = (GtkLabel *) gtk_label_new (_("Weight"));
02923   window->spin_weight
02924     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02925   gtk_widget_set_tooltip_text
02926     (GTK_WIDGET (window->spin_weight),
02927      _("Weight factor to build the objective function"));
02928   g_signal_connect
02929     (window->spin_weight, "value-changed", window_weight_experiment, NULL);
02930   window->grid_experiment = (GtkGrid *) gtk_grid_new ();
02931   gtk_grid_attach (window->grid_experiment,
02932                    GTK_WIDGET (window->combo_experiment), 0, 0, 2, 1);
02933   gtk_grid_attach (window->grid_experiment,
02934                    GTK_WIDGET (window->button_add_experiment), 2, 0, 1, 1);
02935   gtk_grid_attach (window->grid_experiment,
02936                    GTK_WIDGET (window->button_remove_experiment), 3, 0, 1, 1);
02937   gtk_grid_attach (window->grid_experiment,
02938                    GTK_WIDGET (window->label_experiment), 0, 1, 1, 1);
02939   gtk_grid_attach (window->grid_experiment,
02940                    GTK_WIDGET (window->button_experiment), 1, 1, 3, 1);
02941   gtk_grid_attach (window->grid_experiment,
02942                    GTK_WIDGET (window->label_weight), 0, 2, 1, 1);
02943   gtk_grid_attach (window->grid_experiment,
02944                    GTK_WIDGET (window->spin_weight), 1, 2, 3, 1);
02945   for (i = 0; i < MAX_NINPUTS; ++i)
02946     {
02947       snprintf (buffer3, 64, "%s %u", _("Input template"), i + 1);
02948       window->check_template[i] = (GtkCheckButton *)
02949         gtk_check_button_new_with_label (buffer3);
02950       window->id_template[i]
02951         = g_signal_connect (window->check_template[i], "toggled",
02952                             window_inputs_experiment, NULL);
02953       gtk_grid_attach (window->grid_experiment,
02954                        GTK_WIDGET (window->check_template[i]), 0, 3 + i, 1, 1);
02955       window->button_template[i] = (GtkButton *)
02956         gtk_button_new_with_mnemonic (_("Input template"));
02957
02958       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_template[i]),
02959                                    _("Experimental input template file"));
02960       window->id_input[i] =
02961         g_signal_connect_swapped (window->button_template[i], "clicked",
```

```
02962                                   (GCallback) window_template_experiment,
02963                                   (void *) (size_t) i);
02964       gtk_grid_attach (window->grid_experiment,
02965                        GTK_WIDGET (window->button_template[i]), 1, 3 + i, 3, 1);
02966     }
02967   window->frame_experiment = (GtkFrame *) gtk_frame_new (_("Experiment"));
02968   gtk_frame_set_child (window->frame_experiment,
02969                        GTK_WIDGET (window->grid_experiment));
02970
02971   // Creating the error norm widgets
02972   window->frame_norm = (GtkFrame *) gtk_frame_new (_("Error norm"));
02973   window->grid_norm = (GtkGrid *) gtk_grid_new ();
02974   gtk_frame_set_child (window->frame_norm, GTK_WIDGET (window->grid_norm));
02975 #if !GTK4
02976   window->button_norm[0] = (GtkRadioButton *)
02977     gtk_radio_button_new_with_mnemonic (NULL, label_norm[0]);
02978 #else
02979   window->button_norm[0] = (GtkCheckButton *)
02980     gtk_check_button_new_with_mnemonic (label_norm[0]);
02981 #endif
02982   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[0]),
02983                                tip_norm[0]);
02984   gtk_grid_attach (window->grid_norm,
02985                    GTK_WIDGET (window->button_norm[0]), 0, 0, 1, 1);
02986   g_signal_connect (window->button_norm[0], "toggled", window_update, NULL);
02987   for (i = 0; ++i < NNORMS;)
02988     {
02989 #if !GTK4
02990       window->button_norm[i] = (GtkRadioButton *)
02991         gtk_radio_button_new_with_mnemonic
02992         (gtk_radio_button_get_group (window->button_norm[0]), label_norm[i]);
02993 #else
02994       window->button_norm[i] = (GtkCheckButton *)
02995         gtk_check_button_new_with_mnemonic (label_norm[i]);
02996       gtk_check_button_set_group (window->button_norm[i],
02997                                   window->button_norm[0]);
02998 #endif
02999       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[i]),
03000                                    tip_norm[i]);
03001       gtk_grid_attach (window->grid_norm,
03002                        GTK_WIDGET (window->button_norm[i]), 0, i, 1, 1);
03003       g_signal_connect (window->button_norm[i], "toggled", window_update, NULL);
03004     }
03005   window->label_p = (GtkLabel *) gtk_label_new (_("P parameter"));
03006   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->label_p), 1, 1, 1, 1);
03007   window->spin_p = (GtkSpinButton *)
03008     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE, 0.01);
03009   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_p),
03010                                _("P parameter for the P error norm"));
03011   window->scrolled_p = (GtkScrolledWindow *)
03012 #if !GTK4
03013     gtk_scrolled_window_new (NULL, NULL);
03014 #else
03015     gtk_scrolled_window_new ();
03016 #endif
03017   gtk_scrolled_window_set_child (window->scrolled_p,
03018                                  GTK_WIDGET (window->spin_p));
03019   gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_p), TRUE);
03020   gtk_widget_set_halign (GTK_WIDGET (window->scrolled_p), GTK_ALIGN_FILL);
03021   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->scrolled_p),
03022                    1, 2, 1, 2);
03023
03024   // Creating the grid and attaching the widgets to the grid
03025   window->grid = (GtkGrid *) gtk_grid_new ();
03026   gtk_grid_attach (window->grid, GTK_WIDGET (window->box_buttons), 0, 0, 3, 1);
03027   gtk_grid_attach (window->grid, GTK_WIDGET (window->grid_files), 0, 1, 1, 1);
03028   gtk_grid_attach (window->grid,
03029                    GTK_WIDGET (window->frame_algorithm), 0, 2, 1, 1);
03030   gtk_grid_attach (window->grid,
03031                    GTK_WIDGET (window->frame_variable), 1, 2, 1, 1);
03032   gtk_grid_attach (window->grid,
03033                    GTK_WIDGET (window->frame_experiment), 2, 2, 1, 1);
03034   gtk_grid_attach (window->grid, GTK_WIDGET (window->frame_norm), 1, 1, 2, 1);
03035   gtk_window_set_child (window->window, GTK_WIDGET (window->grid));
03036
03037   // Setting the window logo
03038   window->logo = gdk_pixbuf_new_from_xpm_data (logo);
03039 #if !GTK4
03040   gtk_window_set_icon (window->window, window->logo);
03041 #endif
03042
03043   // Showing the window
03044 #if !GTK4
03045   gtk_widget_show_all (GTK_WIDGET (window->window));
03046 #else
03047   gtk_widget_show (GTK_WIDGET (window->window));
03048 #endif
```

```
03049
03050   // In GTK+ 3.16 and 3.18 the default scrolled size is wrong
03051 #if GTK_MINOR_VERSION >= 16
03052   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_min), -1, 40);
03053   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_max), -1, 40);
03054   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_minabs), -1, 40);
03055   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_maxabs), -1, 40);
03056   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_step), -1, 40);
03057   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_p), -1, 40);
03058   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_threshold), -1, 40);
03059 #endif
03060
03061   // Reading initial example
03062   input_new ();
03063   buffer2 = g_get_current_dir ();
03064   buffer = g_build_filename (buffer2, "..", "tests", "test1", INPUT_FILE, NULL);
03065   g_free (buffer2);
03066   window_read (buffer);
03067   g_free (buffer);
03068
03069 #if DEBUG_INTERFACE
03070   fprintf (stderr, "window_new:  start\n");
03071 #endif
03072 }
```

5.13.4 Variable Documentation

5.13.4.1 window

```
Window window[1]  [extern]
```

Window struct to define the main interface window.

Definition at line 81 of file interface.c.

5.14 interface.h

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
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00011 are permitted provided that the following conditions are met:
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00013 1.  Redistributions of source code must retain the above copyright notice,
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00015
00016 2.  Redistributions in binary form must reproduce the above copyright notice,
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00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
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00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
```

```
00031
00038 #ifndef INTERFACE__H
00039 #define INTERFACE__H 1
00040
00041 #define MAX_LENGTH (DEFAULT_PRECISION + 8)
00043
00048 typedef struct
00049 {
00050   GtkDialog *dialog;
00051   GtkGrid *grid;
00052   GtkLabel *label_seed;
00054   GtkSpinButton *spin_seed;
00056   GtkLabel *label_threads;
00057   GtkSpinButton *spin_threads;
00058   GtkLabel *label_climbing;
00059   GtkSpinButton *spin_climbing;
00060 } Options;
00061
00066 typedef struct
00067 {
00068   GtkDialog *dialog;
00069   GtkLabel *label;
00070   GtkSpinner *spinner;
00071   GtkGrid *grid;
00072 } Running;
00073
00078 typedef struct
00079 {
00080   GtkWindow *window;
00081   GtkGrid *grid;
00082   GtkBox *box_buttons;
00083   GtkButton *button_open;
00084   GtkButton *button_save;
00085   GtkButton *button_run;
00086   GtkButton *button_options;
00087   GtkButton *button_help;
00088   GtkButton *button_about;
00089   GtkButton *button_exit;
00090   GtkGrid *grid_files;
00091   GtkLabel *label_simulator;
00092   GtkButton *button_simulator;
00093   GtkCheckButton *check_evaluator;
00094   GtkButton *button_evaluator;
00095   GtkLabel *label_result;
00096   GtkEntry *entry_result;
00097   GtkLabel *label_variables;
00098   GtkEntry *entry_variables;
00099   GtkFrame *frame_norm;
00100   GtkGrid *grid_norm;
00101 #if !GTK4
00102   GtkRadioButton *button_norm[NNORMS];
00104 #else
00105   GtkCheckButton *button_norm[NNORMS];
00107 #endif
00108   GtkLabel *label_p;
00109   GtkSpinButton *spin_p;
00110   GtkScrolledWindow *scrolled_p;
00112   GtkFrame *frame_algorithm;
00113   GtkGrid *grid_algorithm;
00114 #if !GTK4
00115   GtkRadioButton *button_algorithm[NALGORITHMS];
00117 #else
00118   GtkCheckButton *button_algorithm[NALGORITHMS];
00120 #endif
00121   GtkLabel *label_simulations;
00122   GtkSpinButton *spin_simulations;
00124   GtkLabel *label_iterations;
00125   GtkSpinButton *spin_iterations;
00127   GtkLabel *label_tolerance;
00128   GtkSpinButton *spin_tolerance;
00129   GtkLabel *label_bests;
00130   GtkSpinButton *spin_bests;
00131   GtkLabel *label_population;
00132   GtkSpinButton *spin_population;
00134   GtkLabel *label_generations;
00135   GtkSpinButton *spin_generations;
00137   GtkLabel *label_mutation;
00138   GtkSpinButton *spin_mutation;
00139   GtkLabel *label_reproduction;
00140   GtkSpinButton *spin_reproduction;
00142   GtkLabel *label_adaptation;
00143   GtkSpinButton *spin_adaptation;
00145   GtkCheckButton *check_climbing;
00147   GtkGrid *grid_climbing;
00149 #if !GTK4
00150   GtkRadioButton *button_climbing[NCLIMBINGS];
00152 #else
```

```
00153   GtkCheckButton *button_climbing[NCLIMBINGS];
00155 #endif
00156   GtkLabel *label_steps;
00157   GtkSpinButton *spin_steps;
00158   GtkLabel *label_estimates;
00159   GtkSpinButton *spin_estimates;
00161   GtkLabel *label_relaxation;
00163   GtkSpinButton *spin_relaxation;
00165   GtkLabel *label_threshold;
00166   GtkSpinButton *spin_threshold;
00167   GtkScrolledWindow *scrolled_threshold;
00169   GtkFrame *frame_variable;
00170   GtkGrid *grid_variable;
00171   GtkComboBoxText *combo_variable;
00173   GtkButton *button_add_variable;
00174   GtkButton *button_remove_variable;
00175   GtkLabel *label_variable;
00176   GtkEntry *entry_variable;
00177   GtkLabel *label_min;
00178   GtkSpinButton *spin_min;
00179   GtkScrolledWindow *scrolled_min;
00180   GtkLabel *label_max;
00181   GtkSpinButton *spin_max;
00182   GtkScrolledWindow *scrolled_max;
00183   GtkCheckButton *check_minabs;
00184   GtkSpinButton *spin_minabs;
00185   GtkScrolledWindow *scrolled_minabs;
00186   GtkCheckButton *check_maxabs;
00187   GtkSpinButton *spin_maxabs;
00188   GtkScrolledWindow *scrolled_maxabs;
00189   GtkLabel *label_precision;
00190   GtkSpinButton *spin_precision;
00191   GtkLabel *label_sweeps;
00192   GtkSpinButton *spin_sweeps;
00193   GtkLabel *label_bits;
00194   GtkSpinButton *spin_bits;
00195   GtkLabel *label_step;
00196   GtkSpinButton *spin_step;
00197   GtkScrolledWindow *scrolled_step;
00198   GtkFrame *frame_experiment;
00199   GtkGrid *grid_experiment;
00200   GtkComboBoxText *combo_experiment;
00201   GtkButton *button_add_experiment;
00202   GtkButton *button_remove_experiment;
00203   GtkLabel *label_experiment;
00204   GtkButton *button_experiment;
00206   GtkLabel *label_weight;
00207   GtkSpinButton *spin_weight;
00208   GtkCheckButton *check_template[MAX_NINPUTS];
00210   GtkButton *button_template[MAX_NINPUTS];
00212   GdkPixbuf *logo;
00213   Experiment *experiment;
00214   Variable *variable;
00215   char *application_directory;
00216   gulong id_experiment;
00217   gulong id_experiment_name;
00218   gulong id_variable;
00219   gulong id_variable_label;
00220   gulong id_template[MAX_NINPUTS];
00222   gulong id_input[MAX_NINPUTS];
00224   unsigned int nexperiments;
00225   unsigned int nvariables;
00226 } Window;
00227
00228 // Global variables
00229 extern Window window[1];
00230
00231 // Public functions
00232 void window_new (GtkApplication * application);
00233
00234 #endif
```

5.15 main.c File Reference

Main source file.

```
#include "config.h"
#include <stdio.h>
#include <stdlib.h>
```

```
#include <string.h>
#include <math.h>
#include <locale.h>
#include <gsl/gsl_rng.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <json-glib/json-glib.h>
#include <mpi.h>
#include <gio/gio.h>
#include <gtk/gtk.h>
#include "jb/src/jb_win.h"
#include "genetic/genetic.h"
#include "tools.h"
#include "experiment.h"
#include "variable.h"
#include "input.h"
#include "optimize.h"
#include "interface.h"
#include "mpcotool.h"
```

Include dependency graph for main.c:

Macros

- #define JBW 2

Functions

- int main (int argn, char **argc)

5.15.1 Detailed Description

Main source file.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file main.c.

5.15.2 Macro Definition Documentation

5.15.2.1 JBW

```
#define JBW 2
```

Definition at line 59 of file main.c.

5.15.3 Function Documentation

5.15.3.1 main()

```
int main (
              int argn,
              char ** argc )
```

Main function

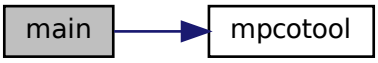
Returns

0 on succes, error code (>0) on error.

Definition at line 81 of file main.c.

```
00082 {
00083 #if HAVE_GTK
00084   show_pending = jbw_process_pending;
00085 #endif
00086   jbw_init (&argn, &argc);
00087   return mpcotool (argn, argc);
00088 }
```

Here is the call graph for this function:



5.16 main.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
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00014 this list of conditions and the following disclaimer.
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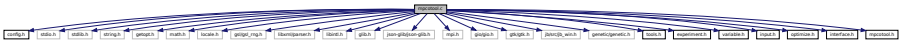
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <stdlib.h>
00042 #include <string.h>
00043 #include <math.h>
00044 #include <locale.h>
00045 #include <gsl/gsl_rng.h>
00046 #include <libxml/parser.h>
00047 #include <libintl.h>
00048 #include <glib.h>
00049 #include <json-glib/json-glib.h>
00050 #ifdef G_OS_WIN32
00051 #include <windows.h>
00052 #endif
00053 #if HAVE_MPI
00054 #include <mpi.h>
00055 #endif
00056 #if HAVE_GTK
00057 #include <gio/gio.h>
00058 #include <gtk/gtk.h>
00059 #define JBW 2
00060 #else
00061 #define JBW 1
00062 #endif
00063 #include "jb/src/jb_win.h"
00064 #include "genetic/genetic.h"
00065 #include "tools.h"
00066 #include "experiment.h"
00067 #include "variable.h"
00068 #include "input.h"
00069 #include "optimize.h"
00070 #if HAVE_GTK
00071 #include "interface.h"
00072 #endif
00073 #include "mpcotool.h"
00074
00080 int
00081 main (int argn, char **argc)
00082 {
00083 #if HAVE_GTK
00084   show_pending = jbw_process_pending;
00085 #endif
00086   jbw_init (&argn, &argc);
00087   return mpcotool (argn, argc);
00088 }
```

5.17 mpcotool.c File Reference

Main function source file.

```
#include "config.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <getopt.h>
#include <math.h>
#include <locale.h>
#include <gsl/gsl_rng.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <json-glib/json-glib.h>
#include <mpi.h>
#include <gio/gio.h>
#include <gtk/gtk.h>
#include "jb/src/jb_win.h"
#include "genetic/genetic.h"
#include "tools.h"
#include "experiment.h"
#include "variable.h"
#include "input.h"
#include "optimize.h"
#include "interface.h"
#include "mpcotool.h"
```

Include dependency graph for mpcotool.c:



Macros

- #define DEBUG_MPCOTOOL 1

  Macro to debug main functions.

Functions

- int mpcotool (int argn, char **argc)

5.17.1 Detailed Description

Main function source file.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file mpcotool.c.

5.17.2 Macro Definition Documentation

5.17.2.1 DEBUG_MPCOTOOL

```
#define DEBUG_MPCOTOOL 1
```

Macro to debug main functions.

Definition at line 73 of file mpcotool.c.

5.17.3 Function Documentation

5.17.3.1 mpcotool()

```
int mpcotool (
              int argn,
              char ** argc )
```

Main function.

Returns

0 on success, >0 on error.

Parameters

argn	Arguments number.
argc	Arguments pointer.

Definition at line 81 of file mpcotool.c.

```
00083 {
00084   const struct option options[] = {
00085     {"seed", required_argument, NULL, 's'},
00086     {"nthreads", required_argument, NULL, 't'},
00087     {NULL, 0, NULL, 0}
00088   };
00089 #if HAVE_GTK
00090   GtkApplication *application;
00091 #endif
00092   int o, option_index;
00093
00094   // Starting pseudo-random numbers generator
00095 #if DEBUG_MPCOTOOL
00096   fprintf (stderr, "mpcotool:  starting pseudo-random numbers generator\n");
00097 #endif
00098   optimize->rng = gsl_rng_alloc (gsl_rng_taus2);
00099
00100   // Allowing spaces in the XML data file
00101 #if DEBUG_MPCOTOOL
00102   fprintf (stderr, "mpcotool:  allowing spaces in the XML data file\n");
00103 #endif
00104   xmlKeepBlanksDefault (0);
00105
```

```
00106   // Starting MPI
00107 #if HAVE_MPI
00108 #if DEBUG_MPCOTOOL
00109   fprintf (stderr, "mpcotool:  starting MPI\n");
00110 #endif
00111   MPI_Init (&argn, &argc);
00112   MPI_Comm_size (MPI_COMM_WORLD, &ntasks);
00113   MPI_Comm_rank (MPI_COMM_WORLD, &optimize->mpi_rank);
00114   printf ("rank=%d tasks=%d\n", optimize->mpi_rank, ntasks);
00115 #else
00116   ntasks = 1;
00117 #endif
00118
00119   // Getting threads number and pseudo-random numbers generator seed
00120   nthreads_climbing = nthreads = jb_get_ncores ();
00121   optimize->seed = DEFAULT_RANDOM_SEED;
00122
00123   // Parsing command line arguments
00124   while (1)
00125     {
00126       o = getopt_long (argn, argc, "s:t:", options, &option_index);
00127       if (o == -1)
00128         break;
00129       switch (o)
00130         {
00131         case 's':
00132           optimize->seed = atol (optarg);
00133           break;
00134         case 't':
00135           nthreads_climbing = nthreads = atoi (optarg);
00136           break;
00137         default:
00138           printf ("%s\n%s\n", _("ERROR!"), _("Unknown option"));
00139           return 1;
00140         }
00141     }
00142   argn -= optind;
00143
00144   // Resetting result and variables file names
00145 #if DEBUG_MPCOTOOL
00146   fprintf (stderr, "mpcotool:  resetting result and variables file names\n");
00147 #endif
00148   input->result = input->variables = NULL;
00149
00150 #if HAVE_GTK
00151
00152   // Setting local language and international floating point numbers notation
00153   jb_set_locales (PROGRAM_INTERFACE, LOCALE_DIR, "", "C");
00154
00155   // Initing GTK+
00156   window->application_directory = g_get_current_dir ();
00157   gtk_disable_setlocale ();
00158   application = gtk_application_new ("es.csic.eead.auladei.sprinkler",
00159                                      G_APPLICATION_DEFAULT_FLAGS);
00160   g_signal_connect (application, "activate", G_CALLBACK (window_new), NULL);
00161
00162   // Opening the main window
00163   g_application_run (G_APPLICATION (application), 0, NULL);
00164
00165   // Freeing memory
00166   input_free ();
00167   gtk_window_destroy (window->window);
00168   g_object_unref (application);
00169   g_free (window->application_directory);
00170
00171 #else
00172
00173   // Checking syntax
00174   if (argn < 1 || argn > 3)
00175     {
00176       printf ("The syntax is:\n"
00177               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00178               "[variables_file]\n");
00179       return 2;
00180     }
00181   if (argn > 1)
00182     input->result = (char *) xmlStrdup ((xmlChar *) argc[optind + 1]);
00183   if (argn == 2)
00184     input->variables = (char *) xmlStrdup ((xmlChar *) argc[optind + 2]);
00185
00186   // Making optimization
00187 #if DEBUG_MPCOTOOL
00188   fprintf (stderr, "mpcotool:  making optimization\n");
00189 #endif
00190   if (input_open (argc[optind]))
00191     optimize_open ();
00192
```

```
00193   // Freeing memory
00194 #if DEBUG_MPCOTOOL
00195   fprintf (stderr, "mpcotool:  freeing memory and closing\n");
00196 #endif
00197   optimize_free ();
00198
00199 #endif
00200
00201   // Closing MPI
00202 #if HAVE_MPI
00203   MPI_Finalize ();
00204 #endif
00205
00206   // Freeing memory
00207   gsl_rng_free (optimize->rng);
00208
00209   // Closing
00210   return 0;
00211 }
```

5.18 mpcotool.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
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00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
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00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <stdlib.h>
00042 #include <string.h>
00043 #include <getopt.h>
00044 #include <math.h>
00045 #include <locale.h>
00046 #include <gsl/gsl_rng.h>
00047 #include <libxml/parser.h>
00048 #include <libintl.h>
00049 #include <glib.h>
00050 #include <json-glib/json-glib.h>
00051 #ifdef G_OS_WIN32
00052 #include <windows.h>
00053 #endif
00054 #if HAVE_MPI
00055 #include <mpi.h>
00056 #endif
00057 #if HAVE_GTK
00058 #include <gio/gio.h>
00059 #include <gtk/gtk.h>
00060 #endif
00061 #include "jb/src/jb_win.h"
00062 #include "genetic/genetic.h"
00063 #include "tools.h"
00064 #include "experiment.h"
```

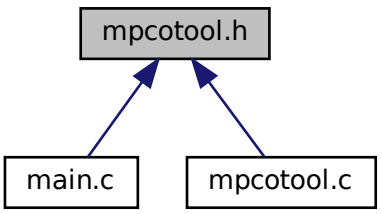
```
00065 #include "variable.h"
00066 #include "input.h"
00067 #include "optimize.h"
00068 #if HAVE_GTK
00069 #include "interface.h"
00070 #endif
00071 #include "mpcotool.h"
00072
00073 #define DEBUG_MPCOTOOL 1
00074
00080 int
00081 mpcotool (int argn,
00082           char **argc)
00083 {
00084   const struct option options[] = {
00085     {"seed", required_argument, NULL, 's'},
00086     {"nthreads", required_argument, NULL, 't'},
00087     {NULL, 0, NULL, 0}
00088   };
00089 #if HAVE_GTK
00090   GtkApplication *application;
00091 #endif
00092   int o, option_index;
00093
00094   // Starting pseudo-random numbers generator
00095 #if DEBUG_MPCOTOOL
00096   fprintf (stderr, "mpcotool:  starting pseudo-random numbers generator\n");
00097 #endif
00098   optimize->rng = gsl_rng_alloc (gsl_rng_taus2);
00099
00100   // Allowing spaces in the XML data file
00101 #if DEBUG_MPCOTOOL
00102   fprintf (stderr, "mpcotool:  allowing spaces in the XML data file\n");
00103 #endif
00104   xmlKeepBlanksDefault (0);
00105
00106   // Starting MPI
00107 #if HAVE_MPI
00108 #if DEBUG_MPCOTOOL
00109   fprintf (stderr, "mpcotool:  starting MPI\n");
00110 #endif
00111   MPI_Init (&argn, &argc);
00112   MPI_Comm_size (MPI_COMM_WORLD, &ntasks);
00113   MPI_Comm_rank (MPI_COMM_WORLD, &optimize->mpi_rank);
00114   printf ("rank=%d tasks=%d\n", optimize->mpi_rank, ntasks);
00115 #else
00116   ntasks = 1;
00117 #endif
00118
00119   // Getting threads number and pseudo-random numbers generator seed
00120   nthreads_climbing = nthreads = jb_get_ncores ();
00121   optimize->seed = DEFAULT_RANDOM_SEED;
00122
00123   // Parsing command line arguments
00124   while (1)
00125     {
00126       o = getopt_long (argn, argc, "s:t:", options, &option_index);
00127       if (o == -1)
00128         break;
00129       switch (o)
00130         {
00131         case 's':
00132           optimize->seed = atol (optarg);
00133           break;
00134         case 't':
00135           nthreads_climbing = nthreads = atoi (optarg);
00136           break;
00137         default:
00138           printf ("%s\n%s\n", _("ERROR!"), _("Unknown option"));
00139           return 1;
00140         }
00141     }
00142   argn -= optind;
00143
00144   // Resetting result and variables file names
00145 #if DEBUG_MPCOTOOL
00146   fprintf (stderr, "mpcotool:  resetting result and variables file names\n");
00147 #endif
00148   input->result = input->variables = NULL;
00149
00150 #if HAVE_GTK
00151
00152   // Setting local language and international floating point numbers notation
00153   jb_set_locales (PROGRAM_INTERFACE, LOCALE_DIR, "", "C");
00154
00155   // Initing GTK+
00156   window->application_directory = g_get_current_dir ();
```

```
00157   gtk_disable_setlocale ();
00158   application = gtk_application_new ("es.csic.eead.auladei.sprinkler",
00159                                      G_APPLICATION_DEFAULT_FLAGS);
00160   g_signal_connect (application, "activate", G_CALLBACK (window_new), NULL);
00161
00162   // Opening the main window
00163   g_application_run (G_APPLICATION (application), 0, NULL);
00164
00165   // Freeing memory
00166   input_free ();
00167   gtk_window_destroy (window->window);
00168   g_object_unref (application);
00169   g_free (window->application_directory);
00170
00171 #else
00172
00173   // Checking syntax
00174   if (argn < 1 || argn > 3)
00175     {
00176       printf ("The syntax is:\n"
00177               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00178               "[variables_file]\n");
00179       return 2;
00180     }
00181   if (argn > 1)
00182     input->result = (char *) xmlStrdup ((xmlChar *) argc[optind + 1]);
00183   if (argn == 2)
00184     input->variables = (char *) xmlStrdup ((xmlChar *) argc[optind + 2]);
00185
00186   // Making optimization
00187 #if DEBUG_MPCOTOOL
00188   fprintf (stderr, "mpcotool:  making optimization\n");
00189 #endif
00190   if (input_open (argc[optind]))
00191     optimize_open ();
00192
00193   // Freeing memory
00194 #if DEBUG_MPCOTOOL
00195   fprintf (stderr, "mpcotool:  freeing memory and closing\n");
00196 #endif
00197   optimize_free ();
00198
00199 #endif
00200
00201   // Closing MPI
00202 #if HAVE_MPI
00203   MPI_Finalize ();
00204 #endif
00205
00206   // Freeing memory
00207   gsl_rng_free (optimize->rng);
00208
00209   // Closing
00210   return 0;
00211 }
```

5.19 mpcotool.h File Reference

Main function header file.

This graph shows which files directly or indirectly include this file:



Functions

- int mpcotool (int argn, char **argc)

5.19.1 Detailed Description

Main function header file.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file mpcotool.h.

5.19.2 Function Documentation

5.19.2.1 mpcotool()

```
int mpcotool (
              int argn,
              char ** argc )
```

Main function.

Returns

0 on success, >0 on error.

Parameters

argn	Arguments number.
argc	Arguments pointer.

Definition at line 81 of file mpcotool.c.

```
00083 {
00084   const struct option options[] = {
00085     {"seed", required_argument, NULL, 's'},
00086     {"nthreads", required_argument, NULL, 't'},
00087     {NULL, 0, NULL, 0}
00088   };
00089 #if HAVE_GTK
00090   GtkApplication *application;
00091 #endif
00092   int o, option_index;
00093
```

```
00094   // Starting pseudo-random numbers generator
00095 #if DEBUG_MPCOTOOL
00096   fprintf (stderr, "mpcotool:  starting pseudo-random numbers generator\n");
00097 #endif
00098   optimize->rng = gsl_rng_alloc (gsl_rng_taus2);
00099
00100   // Allowing spaces in the XML data file
00101 #if DEBUG_MPCOTOOL
00102   fprintf (stderr, "mpcotool:  allowing spaces in the XML data file\n");
00103 #endif
00104   xmlKeepBlanksDefault (0);
00105
00106   // Starting MPI
00107 #if HAVE_MPI
00108 #if DEBUG_MPCOTOOL
00109   fprintf (stderr, "mpcotool:  starting MPI\n");
00110 #endif
00111   MPI_Init (&argn, &argc);
00112   MPI_Comm_size (MPI_COMM_WORLD, &ntasks);
00113   MPI_Comm_rank (MPI_COMM_WORLD, &optimize->mpi_rank);
00114   printf ("rank=%d tasks=%d\n", optimize->mpi_rank, ntasks);
00115 #else
00116   ntasks = 1;
00117 #endif
00118
00119   // Getting threads number and pseudo-random numbers generator seed
00120   nthreads_climbing = nthreads = jb_get_ncores ();
00121   optimize->seed = DEFAULT_RANDOM_SEED;
00122
00123   // Parsing command line arguments
00124   while (1)
00125     {
00126       o = getopt_long (argn, argc, "s:t:", options, &option_index);
00127       if (o == -1)
00128         break;
00129       switch (o)
00130         {
00131         case 's':
00132           optimize->seed = atol (optarg);
00133           break;
00134         case 't':
00135           nthreads_climbing = nthreads = atoi (optarg);
00136           break;
00137         default:
00138           printf ("%s\n%s\n", _("ERROR!"), _("Unknown option"));
00139           return 1;
00140         }
00141     }
00142   argn -= optind;
00143
00144   // Resetting result and variables file names
00145 #if DEBUG_MPCOTOOL
00146   fprintf (stderr, "mpcotool:  resetting result and variables file names\n");
00147 #endif
00148   input->result = input->variables = NULL;
00149
00150 #if HAVE_GTK
00151
00152   // Setting local language and international floating point numbers notation
00153   jb_set_locales (PROGRAM_INTERFACE, LOCALE_DIR, "", "C");
00154
00155   // Initing GTK+
00156   window->application_directory = g_get_current_dir ();
00157   gtk_disable_setlocale ();
00158   application = gtk_application_new ("es.csic.eead.auladei.sprinkler",
00159                                      G_APPLICATION_DEFAULT_FLAGS);
00160   g_signal_connect (application, "activate", G_CALLBACK (window_new), NULL);
00161
00162   // Opening the main window
00163   g_application_run (G_APPLICATION (application), 0, NULL);
00164
00165   // Freeing memory
00166   input_free ();
00167   gtk_window_destroy (window->window);
00168   g_object_unref (application);
00169   g_free (window->application_directory);
00170
00171 #else
00172
00173   // Checking syntax
00174   if (argn < 1 || argn > 3)
00175     {
00176       printf ("The syntax is:\n"
00177               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00178               "[variables_file]\n");
00179       return 2;
00180     }
```

```
00181   if (argn > 1)
00182     input->result = (char *) xmlStrdup ((xmlChar *) argc[optind + 1]);
00183   if (argn == 2)
00184     input->variables = (char *) xmlStrdup ((xmlChar *) argc[optind + 2]);
00185
00186   // Making optimization
00187 #if DEBUG_MPCOTOOL
00188   fprintf (stderr, "mpcotool:  making optimization\n");
00189 #endif
00190   if (input_open (argc[optind]))
00191     optimize_open ();
00192
00193   // Freeing memory
00194 #if DEBUG_MPCOTOOL
00195   fprintf (stderr, "mpcotool:  freeing memory and closing\n");
00196 #endif
00197   optimize_free ();
00198
00199 #endif
00200
00201   // Closing MPI
00202 #if HAVE_MPI
00203   MPI_Finalize ();
00204 #endif
00205
00206   // Freeing memory
00207   gsl_rng_free (optimize->rng);
00208
00209   // Closing
00210   return 0;
00211 }
```

5.20 mpcotool.h

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
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00013 1.  Redistributions of source code must retain the above copyright notice,
00014 this list of conditions and the following disclaimer.
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00016 2.  Redistributions in binary form must reproduce the above copyright notice,
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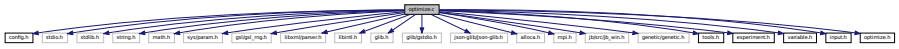
00018 documentation and/or other materials provided with the distribution.
00019
00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #ifndef MPCOTOOL__H
00039 #define MPCOTOOL__H 1
00040
00041 extern int mpcotool (int argn, char **argc);
00042
00043 #endif
```

5.21 optimize.c File Reference

Source file to define the optimization functions.

```
#include "config.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#include <sys/param.h>
#include <gsl/gsl_rng.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <glib/gstdio.h>
#include <json-glib/json-glib.h>
#include <alloca.h>
#include <mpi.h>
#include "jb/src/jb_win.h"
#include "genetic/genetic.h"
#include "tools.h"
#include "experiment.h"
#include "variable.h"
#include "input.h"
#include "optimize.h"
```

Include dependency graph for optimize.c:



Macros

- #define DEBUG_OPTIMIZE 0

  Macro to debug optimize functions.
- #define RM "rm"

  Macro to define the shell remove command.

Functions

- static void optimize_input (unsigned int simulation, char *input, GMappedFile *stencil)
- static double optimize_parse (unsigned int simulation, unsigned int experiment)
- static double optimize_norm_euclidian (unsigned int simulation)
- static double optimize_norm_maximum (unsigned int simulation)
- static double optimize_norm_p (unsigned int simulation)
- static double optimize_norm_taxicab (unsigned int simulation)
- static void optimize_print ()
- static void optimize_save_variables (unsigned int simulation, double error)
- static void optimize_best (unsigned int simulation, double value)
- static void optimize_sequential ()
- static void * optimize_thread (ParallelData *data)
- static void optimize_merge (unsigned int nsaveds, unsigned int *simulation_best, double *error_best)
- static void optimize_synchronise ()
- static void optimize_sweep ()
- static void optimize_MonteCarlo ()
- static void optimize_orthogonal ()
- static void optimize_best_climbing (unsigned int simulation, double value)

- static void optimize_climbing_sequential (unsigned int simulation)
- static void * optimize_climbing_thread (ParallelData *data)
- static double optimize_estimate_climbing_random (unsigned int variable, unsigned int estimate)
- static double optimize_estimate_climbing_coordinates (unsigned int variable, unsigned int estimate)
- static void optimize_step_climbing (unsigned int simulation)
- static void optimize_climbing ()
- static double optimize_genetic_objective (**Entity** *entity)
- static void optimize_genetic ()
- static void optimize_save_old ()
- static void optimize_merge_old ()
- static void optimize_refine ()
- static void optimize_step ()
- static void optimize_iterate ()
- void optimize_free ()
- void optimize_open ()

Variables

- Optimize optimize [1]

  Optimization data.
- unsigned int nthreads_climbing

  Number of threads for the hill climbing method.
- static void(* optimize_algorithm)()

  Pointer to the function to perform a optimization algorithm step.
- static double(* optimize_estimate_climbing)(unsigned int variable, unsigned int estimate)

  Pointer to the function to estimate the climbing.
- static double(* optimize_norm)(unsigned int simulation)

  Pointer to the error norm function.

5.21.1 Detailed Description

Source file to define the optimization functions.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file optimize.c.

5.21.2 Macro Definition Documentation

5.21.2.1 DEBUG_OPTIMIZE

```
#define DEBUG_OPTIMIZE 0
```

Macro to debug optimize functions.

Definition at line 67 of file optimize.c.

5.21.2.2 RM

```
#define RM "rm"
```

Macro to define the shell remove command.

Definition at line 76 of file optimize.c.

5.21.3 Function Documentation

5.21.3.1 optimize_best()

```
static void optimize_best (
             unsigned int simulation,
             double value )  [static]
```

Function to save the best simulations.

Parameters

simulation	Simulation number.
value	Objective function value.

Definition at line 450 of file optimize.c.

```
00452 {
00453   unsigned int i, j;
00454   double e;
00455 #if DEBUG_OPTIMIZE
00456   fprintf (stderr, "optimize_best:  start\n");
00457   fprintf (stderr, "optimize_best:  nsaveds=%u nbest=%u\n",
00458            optimize->nsaveds, optimize->nbest);
00459 #endif
00460   if (optimize->nsaveds < optimize->nbest
00461       || value < optimize->error_best[optimize->nsaveds - 1])
00462     {
00463       if (optimize->nsaveds < optimize->nbest)
00464         ++optimize->nsaveds;
00465       optimize->error_best[optimize->nsaveds - 1] = value;
00466       optimize->simulation_best[optimize->nsaveds - 1] = simulation;
00467       for (i = optimize->nsaveds; --i;)
00468         {
00469           if (optimize->error_best[i] < optimize->error_best[i - 1])
00470             {
00471               j = optimize->simulation_best[i];
00472               e = optimize->error_best[i];
```

```
00473               optimize->simulation_best[i] = optimize->simulation_best[i - 1];
00474               optimize->error_best[i] = optimize->error_best[i - 1];
00475               optimize->simulation_best[i - 1] = j;
00476               optimize->error_best[i - 1] = e;
00477             }
00478           else
00479             break;
00480         }
00481     }
00482 #if DEBUG_OPTIMIZE
00483   fprintf (stderr, "optimize_best:  end\n");
00484 #endif
00485 }
```

5.21.3.2 optimize_best_climbing()

```
static void optimize_best_climbing (
              unsigned int simulation,
              double value )  [static]
```

Function to save the best simulation in a hill climbing method.

Parameters

simulation	Simulation number.
value	Objective function value.

Definition at line 812 of file optimize.c.

```
00814 {
00815 #if DEBUG_OPTIMIZE
00816   fprintf (stderr, "optimize_best_climbing:  start\n");
00817   fprintf (stderr,
00818            "optimize_best_climbing:  simulation=%u value=%.14le best=%.14le\n",
00819            simulation, value, optimize->error_best[0]);
00820 #endif
00821   if (value < optimize->error_best[0])
00822     {
00823       optimize->error_best[0] = value;
00824       optimize->simulation_best[0] = simulation;
00825 #if DEBUG_OPTIMIZE
00826       fprintf (stderr,
00827                "optimize_best_climbing:  BEST simulation=%u value=%.14le\n",
00828                simulation, value);
00829 #endif
00830     }
00831 #if DEBUG_OPTIMIZE
00832   fprintf (stderr, "optimize_best_climbing:  end\n");
00833 #endif
00834 }
```

5.21.3.3 optimize_climbing()

```
static void optimize_climbing ( )  [inline], [static]
```

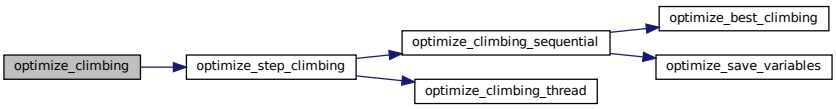
Function to optimize with a hill climbing method.

Definition at line 1040 of file optimize.c.

```
01041 {
01042   unsigned int i, j, k, b, s, adjust;
01043 #if DEBUG_OPTIMIZE
01044   fprintf (stderr, "optimize_climbing:  start\n");
01045 #endif
```

```
01046   for (i = 0; i < optimize->nvariables; ++i)
01047     optimize->climbing[i] = 0.;
01048   b = optimize->simulation_best[0] * optimize->nvariables;
01049   s = optimize->nsimulations;
01050   adjust = 1;
01051   for (i = 0; i < optimize->nsteps; ++i, s += optimize->nestimates, b = k)
01052     {
01053 #if DEBUG_OPTIMIZE
01054       fprintf (stderr, "optimize_climbing:  step=%u old_best=%u\n",
01055                i, optimize->simulation_best[0]);
01056 #endif
01057       optimize_step_climbing (s);
01058       k = optimize->simulation_best[0] * optimize->nvariables;
01059 #if DEBUG_OPTIMIZE
01060       fprintf (stderr, "optimize_climbing:  step=%u best=%u\n",
01061                i, optimize->simulation_best[0]);
01062 #endif
01063       if (k == b)
01064         {
01065           if (adjust)
01066             for (j = 0; j < optimize->nvariables; ++j)
01067               optimize->step[j] *= 0.5;
01068           for (j = 0; j < optimize->nvariables; ++j)
01069             optimize->climbing[j] = 0.;
01070           adjust = 1;
01071         }
01072       else
01073         {
01074           for (j = 0; j < optimize->nvariables; ++j)
01075             {
01076 #if DEBUG_OPTIMIZE
01077               fprintf (stderr,
01078                        "optimize_climbing:  best%u=%.14le old%u=%.14le\n",
01079                        j, optimize->value[k + j], j, optimize->value[b + j]);
01080 #endif
01081               optimize->climbing[j]
01082                 = (1.  - optimize->relaxation) * optimize->climbing[j]
01083                 + optimize->relaxation
01084                 * (optimize->value[k + j] - optimize->value[b + j]);
01085 #if DEBUG_OPTIMIZE
01086               fprintf (stderr, "optimize_climbing:  climbing%u=%.14le\n",
01087                        j, optimize->climbing[j]);
01088 #endif
01089             }
01090           adjust = 0;
01091         }
01092     }
01093 #if DEBUG_OPTIMIZE
01094   fprintf (stderr, "optimize_climbing:  end\n");
01095 #endif
01096 }
```

Here is the call graph for this function:



5.21.3.4 optimize_climbing_sequential()

```
static void optimize_climbing_sequential (
             unsigned int simulation )  [inline], [static]
```

Function to estimate the hill climbing sequentially.

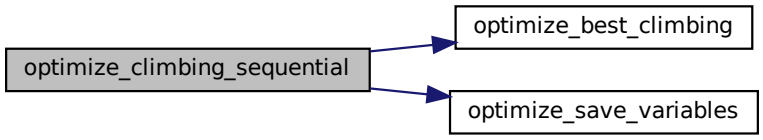
Parameters

simulation	Simulation number.

Definition at line 840 of file optimize.c.

```
00841 {
00842   double e;
00843   unsigned int i, j;
00844 #if DEBUG_OPTIMIZE
00845   fprintf (stderr, "optimize_climbing_sequential:  start\n");
00846   fprintf (stderr, "optimize_climbing_sequential:  nstart_climbing=%u "
00847            "nend_climbing=%u\n",
00848            optimize->nstart_climbing, optimize->nend_climbing);
00849 #endif
00850   for (i = optimize->nstart_climbing; i < optimize->nend_climbing; ++i)
00851     {
00852       j = simulation + i;
00853       e = optimize_norm (j);
00854       optimize_best_climbing (j, e);
00855       optimize_save_variables (j, e);
00856       if (e < optimize->threshold)
00857         {
00858           optimize->stop = 1;
00859           break;
00860         }
00861 #if DEBUG_OPTIMIZE
00862       fprintf (stderr, "optimize_climbing_sequential:  i=%u e=%lg\n", i, e);
00863 #endif
00864     }
00865 #if DEBUG_OPTIMIZE
00866   fprintf (stderr, "optimize_climbing_sequential:  end\n");
00867 #endif
00868 }
```

Here is the call graph for this function:



5.21.3.5 optimize_climbing_thread()

```
static void * optimize_climbing_thread (
             ParallelData * data )  [static]
```

Function to estimate the hill climbing on a thread.

Returns

NULL

Parameters

data	Function data.

Definition at line 876 of file optimize.c.

```
00877 {
00878   unsigned int i, thread;
00879   double e;
00880 #if DEBUG_OPTIMIZE
00881   fprintf (stderr, "optimize_climbing_thread:  start\n");
00882 #endif
00883   thread = data->thread;
00884 #if DEBUG_OPTIMIZE
00885   fprintf (stderr, "optimize_climbing_thread:  thread=%u start=%u end=%u\n",
00886            thread,
00887            optimize->thread_climbing[thread],
00888            optimize->thread_climbing[thread + 1]);
00889 #endif
00890   for (i = optimize->thread_climbing[thread];
00891        i < optimize->thread_climbing[thread + 1]; ++i)
00892     {
00893       e = optimize_norm (i);
00894       g_mutex_lock (mutex);
00895       optimize_best_climbing (i, e);
00896       optimize_save_variables (i, e);
00897       if (e < optimize->threshold)
00898         optimize->stop = 1;
00899       g_mutex_unlock (mutex);
00900       if (optimize->stop)
00901         break;
00902 #if DEBUG_OPTIMIZE
00903       fprintf (stderr, "optimize_climbing_thread:  i=%u e=%lg\n", i, e);
00904 #endif
00905     }
00906 #if DEBUG_OPTIMIZE
00907   fprintf (stderr, "optimize_climbing_thread:  end\n");
00908 #endif
00909   g_thread_exit (NULL);
00910   return NULL;
00911 }
```

5.21.3.6 optimize_estimate_climbing_coordinates()

```
static double optimize_estimate_climbing_coordinates (
              unsigned int variable,
              unsigned int estimate )  [static]
```

Function to estimate a component of the hill climbing vector.

Parameters

variable	Variable number.
estimate	Estimate number.

Definition at line 941 of file optimize.c.

```
00945 {
00946   double x;
00947 #if DEBUG_OPTIMIZE
00948   fprintf (stderr, "optimize_estimate_climbing_coordinates:  start\n");
00949 #endif
00950   x = optimize->climbing[variable];
00951   if (estimate >= (2 * variable) && estimate < (2 * variable + 2))
00952     {
00953       if (estimate & 1)
00954         x += optimize->step[variable];
00955       else
00956         x -= optimize->step[variable];
00957     }
```

```
00958 #if DEBUG_OPTIMIZE
00959   fprintf (stderr,
00960            "optimize_estimate_climbing_coordinates:  climbing%u=%lg\n",
00961            variable, x);
00962   fprintf (stderr, "optimize_estimate_climbing_coordinates:  end\n");
00963 #endif
00964   return x;
00965 }
```

5.21.3.7 optimize_estimate_climbing_random()

```
static double optimize_estimate_climbing_random (
             unsigned int variable,
             unsigned int estimate )  [static]
```

Function to estimate a component of the hill climbing vector.

Parameters

variable	Variable number.
estimate	Estimate number.

Definition at line 917 of file optimize.c.

```
00922 {
00923   double x;
00924 #if DEBUG_OPTIMIZE
00925   fprintf (stderr, "optimize_estimate_climbing_random:  start\n");
00926 #endif
00927   x = optimize->climbing[variable]
00928     + (1.  - 2.  * gsl_rng_uniform (optimize->rng)) * optimize->step[variable];
00929 #if DEBUG_OPTIMIZE
00930   fprintf (stderr, "optimize_estimate_climbing_random:  climbing%u=%lg\n",
00931            variable, x);
00932   fprintf (stderr, "optimize_estimate_climbing_random:  end\n");
00933 #endif
00934   return x;
00935 }
```

5.21.3.8 optimize_free()

```
void optimize_free ( )
```

Function to free the memory used by the Optimize struct.

Definition at line 1397 of file optimize.c.

```
01398 {
01399   unsigned int i, j;
01400 #if DEBUG_OPTIMIZE
01401   fprintf (stderr, "optimize_free:  start\n");
01402 #endif
01403   for (j = 0; j < optimize->ninputs; ++j)
01404     {
01405       for (i = 0; i < optimize->nexperiments; ++i)
01406         g_mapped_file_unref (optimize->file[j][i]);
01407       g_free (optimize->file[j]);
01408     }
01409   g_free (optimize->error_old);
01410   g_free (optimize->value_old);
01411   g_free (optimize->value);
01412   g_free (optimize->genetic_variable);
01413 #if DEBUG_OPTIMIZE
01414   fprintf (stderr, "optimize_free:  end\n");
01415 #endif
01416 }
```

5.21.3.9 optimize_genetic()

```
static void optimize_genetic ( )  [static]
```

Function to optimize with the genetic algorithm.

Definition at line 1137 of file optimize.c.

```
01138 {
01139   double *best_variable = NULL;
01140   char *best_genome = NULL;
01141   double best_objective = 0.;
01142 #if DEBUG_OPTIMIZE
01143   fprintf (stderr, "optimize_genetic:  start\n");
01144   fprintf (stderr, "optimize_genetic:  ntasks=%u nthreads=%u\n", ntasks,
01145            nthreads);
01146   fprintf (stderr,
01147            "optimize_genetic:  nvariables=%u population=%u generations=%u\n",
01148            optimize->nvariables, optimize->nsimulations, optimize->niterations);
01149   fprintf (stderr,
01150            "optimize_genetic:  mutation=%lg reproduction=%lg adaptation=%lg\n",
01151            optimize->mutation_ratio, optimize->reproduction_ratio,
01152            optimize->adaptation_ratio);
01153 #endif
01154   genetic_algorithm_default (optimize->nvariables,
01155                              optimize->genetic_variable,
01156                              optimize->nsimulations,
01157                              optimize->niterations,
01158                              optimize->mutation_ratio,
01159                              optimize->reproduction_ratio,
01160                              optimize->adaptation_ratio,
01161                              optimize->seed,
01162                              optimize->threshold,
01163                              &optimize_genetic_objective,
01164                              &best_genome, &best_variable, &best_objective);
01165 #if DEBUG_OPTIMIZE
01166   fprintf (stderr, "optimize_genetic:  the best\n");
01167 #endif
01168   optimize->error_old = (double *) g_malloc (sizeof (double));
01169   optimize->value_old
01170     = (double *) g_malloc (optimize->nvariables * sizeof (double));
01171   optimize->error_old[0] = best_objective;
01172   memcpy (optimize->value_old, best_variable,
01173           optimize->nvariables * sizeof (double));
01174   g_free (best_genome);
01175   g_free (best_variable);
01176   optimize_print ();
01177 #if DEBUG_OPTIMIZE
01178   fprintf (stderr, "optimize_genetic:  end\n");
01179 #endif
01180 }
```

5.21.3.10 optimize_genetic_objective()

```
static double optimize_genetic_objective (
               Entity * entity )  [static]
```

Function to calculate the objective function of an entity.

Returns

objective function value.

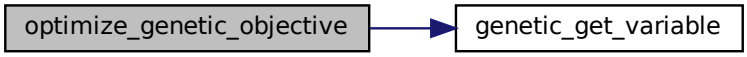
Parameters

entity	entity data.

Definition at line 1104 of file optimize.c.

```
01105 {
01106   unsigned int j;
01107   double objective;
01108   char buffer[64];
01109 #if DEBUG_OPTIMIZE
01110   fprintf (stderr, "optimize_genetic_objective:  start\n");
01111 #endif
01112   for (j = 0; j < optimize->nvariables; ++j)
01113     {
01114       optimize->value[entity->id * optimize->nvariables + j]
01115         = genetic_get_variable (entity, optimize->genetic_variable + j);
01116     }
01117   objective = optimize_norm (entity->id);
01118   g_mutex_lock (mutex);
01119   for (j = 0; j < optimize->nvariables; ++j)
01120     {
01121       snprintf (buffer, 64, "%s ", format[optimize->precision[j]]);
01122       fprintf (optimize->file_variables, buffer,
01123                genetic_get_variable (entity, optimize->genetic_variable + j));
01124     }
01125   fprintf (optimize->file_variables, "%.14le\n", objective);
01126   g_mutex_unlock (mutex);
01127 #if DEBUG_OPTIMIZE
01128   fprintf (stderr, "optimize_genetic_objective:  end\n");
01129 #endif
01130   return objective;
01131 }
```

Here is the call graph for this function:



5.21.3.11 optimize_input()

```
static void optimize_input (
             unsigned int simulation,
             char * input,
             GMappedFile * stencil )  [inline], [static]
```

Function to write the simulation input file.

Parameters

simulation	Simulation number.
input	Input file name.
stencil	Template of the input file name.

Definition at line 95 of file optimize.c.

```
00098 {
00099   char buffer[32], value[32];
00100   GRegex *regex;
00101   FILE *file;
00102   char *buffer2, *buffer3 = NULL, *content;
00103   gsize length;
```

```
00104   unsigned int i;
00105
00106 #if DEBUG_OPTIMIZE
00107   fprintf (stderr, "optimize_input:  start\n");
00108 #endif
00109
00110   // Checking the file
00111   if (!stencil)
00112     goto optimize_input_end;
00113
00114   // Opening stencil
00115   content = g_mapped_file_get_contents (stencil);
00116   length = g_mapped_file_get_length (stencil);
00117 #if DEBUG_OPTIMIZE
00118   fprintf (stderr, "optimize_input:  length=%lu\ncontent:\n%s", length, content);
00119 #endif
00120   file = g_fopen (input, "w");
00121
00122   // Parsing stencil
00123   for (i = 0; i < optimize->nvariables; ++i)
00124     {
00125 #if DEBUG_OPTIMIZE
00126       fprintf (stderr, "optimize_input:  variable=%u\n", i);
00127 #endif
00128       snprintf (buffer, 32, "@variable%u@", i + 1);
00129       regex = g_regex_new (buffer, (GRegexCompileFlags) 0, (GRegexMatchFlags) 0,
00130                            NULL);
00131       if (i == 0)
00132         {
00133           buffer2 = g_regex_replace_literal (regex, content, length, 0,
00134                                              optimize->label[i],
00135                                              (GRegexMatchFlags) 0, NULL);
00136 #if DEBUG_OPTIMIZE
00137           fprintf (stderr, "optimize_input:  buffer2\n%s", buffer2);
00138 #endif
00139         }
00140       else
00141         {
00142           length = strlen (buffer3);
00143           buffer2 = g_regex_replace_literal (regex, buffer3, length, 0,
00144                                              optimize->label[i],
00145                                              (GRegexMatchFlags) 0, NULL);
00146           g_free (buffer3);
00147         }
00148       g_regex_unref (regex);
00149       length = strlen (buffer2);
00150       snprintf (buffer, 32, "@value%u@", i + 1);
00151       regex = g_regex_new (buffer, (GRegexCompileFlags) 0, (GRegexMatchFlags) 0,
00152                            NULL);
00153       snprintf (value, 32, format[optimize->precision[i]],
00154                 optimize->value[simulation * optimize->nvariables + i]);
00155
00156 #if DEBUG_OPTIMIZE
00157       fprintf (stderr, "optimize_input:  value=%s\n", value);
00158 #endif
00159       buffer3 = g_regex_replace_literal (regex, buffer2, length, 0, value,
00160                                          (GRegexMatchFlags) 0, NULL);
00161       g_free (buffer2);
00162       g_regex_unref (regex);
00163     }
00164
00165   // Saving input file
00166   fwrite (buffer3, strlen (buffer3), sizeof (char), file);
00167   g_free (buffer3);
00168   fclose (file);
00169
00170 optimize_input_end:
00171 #if DEBUG_OPTIMIZE
00172   fprintf (stderr, "optimize_input:  end\n");
00173 #endif
00174   return;
00175 }
```

5.21.3.12 optimize_iterate()

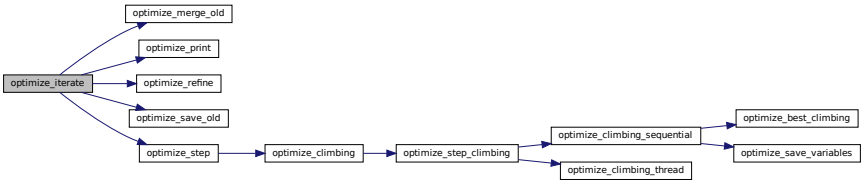
```
static void optimize_iterate ( )  [inline], [static]
```

Function to iterate the algorithm.

Definition at line 1367 of file optimize.c.

```
01368 {
01369   unsigned int i;
01370 #if DEBUG_OPTIMIZE
01371   fprintf (stderr, "optimize_iterate:  start\n");
01372 #endif
01373   optimize->error_old = (double *) g_malloc (optimize->nbest * sizeof (double));
01374   optimize->value_old =
01375     (double *) g_malloc (optimize->nbest * optimize->nvariables *
01376                          sizeof (double));
01377   optimize_step ();
01378   optimize_save_old ();
01379   optimize_refine ();
01380   optimize_print ();
01381   for (i = 1; i < optimize->niterations && !optimize->stop; ++i)
01382     {
01383       optimize_step ();
01384       optimize_merge_old ();
01385       optimize_refine ();
01386       optimize_print ();
01387     }
01388 #if DEBUG_OPTIMIZE
01389   fprintf (stderr, "optimize_iterate:  end\n");
01390 #endif
01391 }
```

Here is the call graph for this function:



5.21.3.13 optimize_merge()

```
static void optimize_merge (
             unsigned int nsaveds,
             unsigned int * simulation_best,
             double * error_best )  [inline], [static]
```

Function to merge the 2 optimization results.

Parameters

nsaveds	Number of saved results.
simulation_best	Array of best simulation numbers.
error_best	Array of best objective function values.

Definition at line 563 of file optimize.c.

```
00568 {
00569   unsigned int i, j, k, s[optimize->nbest];
00570   double e[optimize->nbest];
00571 #if DEBUG_OPTIMIZE
00572   fprintf (stderr, "optimize_merge:  start\n");
00573 #endif
00574   i = j = k = 0;
00575   do
00576     {
```

```
00577       if (i == optimize->nsaveds)
00578         {
00579           s[k] = simulation_best[j];
00580           e[k] = error_best[j];
00581           ++j;
00582           ++k;
00583           if (j == nsaveds)
00584             break;
00585         }
00586       else if (j == nsaveds)
00587         {
00588           s[k] = optimize->simulation_best[i];
00589           e[k] = optimize->error_best[i];
00590           ++i;
00591           ++k;
00592           if (i == optimize->nsaveds)
00593             break;
00594         }
00595       else if (optimize->error_best[i] > error_best[j])
00596         {
00597           s[k] = simulation_best[j];
00598           e[k] = error_best[j];
00599           ++j;
00600           ++k;
00601         }
00602       else
00603         {
00604           s[k] = optimize->simulation_best[i];
00605           e[k] = optimize->error_best[i];
00606           ++i;
00607           ++k;
00608         }
00609     }
00610   while (k < optimize->nbest);
00611   optimize->nsaveds = k;
00612   memcpy (optimize->simulation_best, s, k * sizeof (unsigned int));
00613   memcpy (optimize->error_best, e, k * sizeof (double));
00614 #if DEBUG_OPTIMIZE
00615   fprintf (stderr, "optimize_merge:  end\n");
00616 #endif
00617 }
```

5.21.3.14 optimize_merge_old()

```
static void optimize_merge_old ( )  [inline], [static]
```

Function to merge the best results with the previous step best results on iterative methods.

Definition at line 1218 of file optimize.c.

```
01219 {
01220   unsigned int i, j, k;
01221   double v[optimize->nbest * optimize->nvariables], e[optimize->nbest],
01222     *enew, *eold;
01223 #if DEBUG_OPTIMIZE
01224   fprintf (stderr, "optimize_merge_old:  start\n");
01225 #endif
01226   enew = optimize->error_best;
01227   eold = optimize->error_old;
01228   i = j = k = 0;
01229   do
01230     {
01231       if (*enew < *eold)
01232         {
01233           memcpy (v + k * optimize->nvariables,
01234                   optimize->value
01235                   + optimize->simulation_best[i] * optimize->nvariables,
01236                   optimize->nvariables * sizeof (double));
01237           e[k] = *enew;
01238           ++k;
01239           ++enew;
01240           ++i;
01241         }
01242       else
01243         {
01244           memcpy (v + k * optimize->nvariables,
01245                   optimize->value_old + j * optimize->nvariables,
01246                   optimize->nvariables * sizeof (double));
01247           e[k] = *eold;
```

```
01248           ++k;
01249           ++eold;
01250           ++j;
01251         }
01252     }
01253   while (k < optimize->nbest);
01254   memcpy (optimize->value_old, v, k * optimize->nvariables * sizeof (double));
01255   memcpy (optimize->error_old, e, k * sizeof (double));
01256 #if DEBUG_OPTIMIZE
01257   fprintf (stderr, "optimize_merge_old:  end\n");
01258 #endif
01259 }
```

5.21.3.15 optimize_MonteCarlo()

```
static void optimize_MonteCarlo ( )  [static]
```

Function to optimize with the Monte-Carlo algorithm.

Definition at line 721 of file optimize.c.

```
00722 {
00723   unsigned int i, j;
00724   GThread *thread[nthreads];
00725   ParallelData data[nthreads];
00726 #if DEBUG_OPTIMIZE
00727   fprintf (stderr, "optimize_MonteCarlo:  start\n");
00728 #endif
00729   for (i = 0; i < optimize->nsimulations; ++i)
00730     for (j = 0; j < optimize->nvariables; ++j)
00731       optimize->value[i * optimize->nvariables + j]
00732         = optimize->rangemin[j] + gsl_rng_uniform (optimize->rng)
00733         * (optimize->rangemax[j] - optimize->rangemin[j]);
00734   optimize->nsaveds = 0;
00735   if (nthreads <= 1)
00736     optimize_sequential ();
00737   else
00738     {
00739       for (i = 0; i < nthreads; ++i)
00740         {
00741           data[i].thread = i;
00742           thread[i]
00743             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00744         }
00745       for (i = 0; i < nthreads; ++i)
00746         g_thread_join (thread[i]);
00747     }
00748 #if HAVE_MPI
00749   // Communicating tasks results
00750   optimize_synchronise ();
00751 #endif
00752 #if DEBUG_OPTIMIZE
00753   fprintf (stderr, "optimize_MonteCarlo:  end\n");
00754 #endif
00755 }
```

5.21.3.16 optimize_norm_euclidian()

```
static double optimize_norm_euclidian (
             unsigned int simulation )  [static]
```

Function to calculate the Euclidian error norm.

Returns

Euclidian error norm.

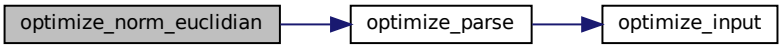
Parameters

simulation	simulation number.

Definition at line 298 of file optimize.c.

```
00299 {
00300   double e, ei;
00301   unsigned int i;
00302 #if DEBUG_OPTIMIZE
00303   fprintf (stderr, "optimize_norm_euclidian:  start\n");
00304 #endif
00305   e = 0.;
00306   for (i = 0; i < optimize->nexperiments; ++i)
00307     {
00308       ei = optimize_parse (simulation, i);
00309       e += ei * ei;
00310     }
00311   e = sqrt (e);
00312 #if DEBUG_OPTIMIZE
00313   fprintf (stderr, "optimize_norm_euclidian:  error=%lg\n", e);
00314   fprintf (stderr, "optimize_norm_euclidian:  end\n");
00315 #endif
00316   return e;
00317 }
```

Here is the call graph for this function:



5.21.3.17 optimize_norm_maximum()

```
static double optimize_norm_maximum (
              unsigned int simulation )  [static]
```

Function to calculate the maximum error norm.

Returns

Maximum error norm.

Parameters

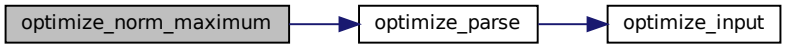
simulation	simulation number.

Definition at line 325 of file optimize.c.

```
00326 {
00327   double e, ei;
00328   unsigned int i;
00329 #if DEBUG_OPTIMIZE
00330   fprintf (stderr, "optimize_norm_maximum:  start\n");
00331 #endif
00332   e = 0.;
00333   for (i = 0; i < optimize->nexperiments; ++i)
```

```
00334     {
00335       ei = fabs (optimize_parse (simulation, i));
00336       e = fmax (e, ei);
00337     }
00338 #if DEBUG_OPTIMIZE
00339   fprintf (stderr, "optimize_norm_maximum:  error=%lg\n", e);
00340   fprintf (stderr, "optimize_norm_maximum:  end\n");
00341 #endif
00342   return e;
00343 }
```

Here is the call graph for this function:



5.21.3.18 optimize_norm_p()

```
static double optimize_norm_p (
              unsigned int simulation )  [static]
```

Function to calculate the P error norm.

Returns

P error norm.

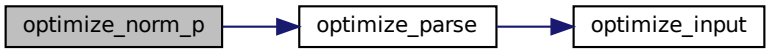
Parameters

simulation	simulation number.

Definition at line 351 of file optimize.c.

```
00352 {
00353   double e, ei;
00354   unsigned int i;
00355 #if DEBUG_OPTIMIZE
00356   fprintf (stderr, "optimize_norm_p:  start\n");
00357 #endif
00358   e = 0.;
00359   for (i = 0; i < optimize->nexperiments; ++i)
00360     {
00361       ei = fabs (optimize_parse (simulation, i));
00362       e += pow (ei, optimize->p);
00363     }
00364   e = pow (e, 1.  / optimize->p);
00365 #if DEBUG_OPTIMIZE
00366   fprintf (stderr, "optimize_norm_p:  error=%lg\n", e);
00367   fprintf (stderr, "optimize_norm_p:  end\n");
00368 #endif
00369   return e;
00370 }
```

Here is the call graph for this function:



5.21.3.19 optimize_norm_taxicab()

```
static double optimize_norm_taxicab (
             unsigned int simulation )  [static]
```

Function to calculate the taxicab error norm.

Returns

Taxicab error norm.

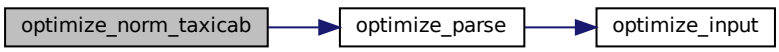
Parameters

simulation	simulation number.

Definition at line 378 of file optimize.c.

```
00379 {
00380   double e;
00381   unsigned int i;
00382 #if DEBUG_OPTIMIZE
00383   fprintf (stderr, "optimize_norm_taxicab:  start\n");
00384 #endif
00385   e = 0.;
00386   for (i = 0; i < optimize->nexperiments; ++i)
00387     e += fabs (optimize_parse (simulation, i));
00388 #if DEBUG_OPTIMIZE
00389   fprintf (stderr, "optimize_norm_taxicab:  error=%lg\n", e);
00390   fprintf (stderr, "optimize_norm_taxicab:  end\n");
00391 #endif
00392   return e;
00393 }
```

Here is the call graph for this function:



5.21.3.20 optimize_open()

```
void optimize_open ( )
```

Function to open and perform a optimization.

Definition at line 1422 of file optimize.c.

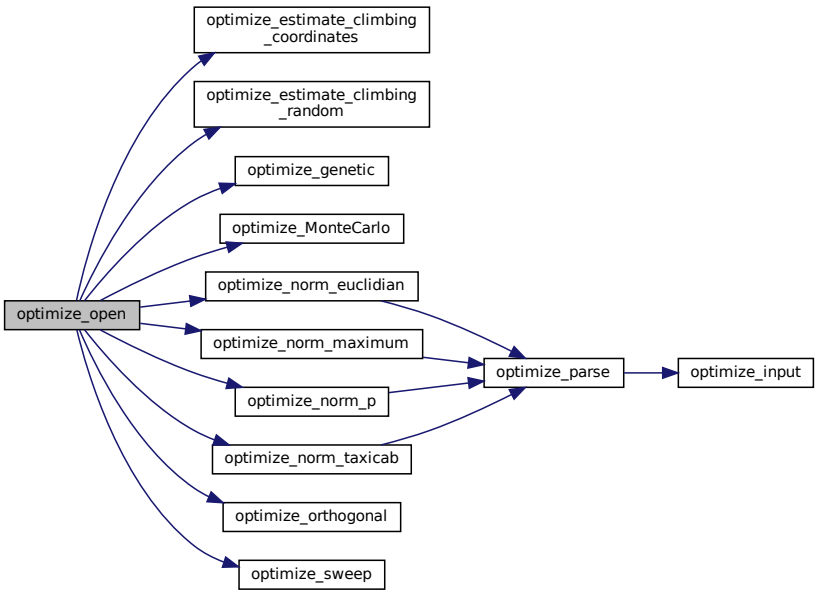
```
01423 {
01424   GTimeZone *tz;
01425   GDateTime *t0, *t;
01426   unsigned int i, j;
01427
01428 #if DEBUG_OPTIMIZE
01429   char *buffer;
01430   fprintf (stderr, "optimize_open:  start\n");
01431 #endif
01432
01433   // Getting initial time
01434 #if DEBUG_OPTIMIZE
01435   fprintf (stderr, "optimize_open:  getting initial time\n");
01436 #endif
01437   tz = g_time_zone_new_utc ();
01438   t0 = g_date_time_new_now (tz);
01439
01440   // Obtaining and initing the pseudo-random numbers generator seed
01441 #if DEBUG_OPTIMIZE
01442   fprintf (stderr, "optimize_open:  getting initial seed\n");
01443 #endif
01444   if (optimize->seed == DEFAULT_RANDOM_SEED)
01445     optimize->seed = input->seed;
01446   gsl_rng_set (optimize->rng, optimize->seed);
01447
01448   // Replacing the working directory
01449 #if DEBUG_OPTIMIZE
01450   fprintf (stderr, "optimize_open:  replacing the working directory\n");
01451 #endif
01452   g_chdir (input->directory);
01453
01454   // Getting results file names
01455   optimize->result = input->result;
01456   optimize->variables = input->variables;
01457
01458   // Obtaining the simulator file
01459   optimize->simulator = input->simulator;
01460
01461   // Obtaining the evaluator file
01462   optimize->evaluator = input->evaluator;
01463
01464   // Reading the algorithm
01465   optimize->algorithm = input->algorithm;
01466   switch (optimize->algorithm)
01467     {
01468     case ALGORITHM_MONTE_CARLO:
01469       optimize_algorithm = optimize_MonteCarlo;
01470       break;
01471     case ALGORITHM_SWEEP:
01472       optimize_algorithm = optimize_sweep;
01473       break;
01474     case ALGORITHM_ORTHOGONAL:
01475       optimize_algorithm = optimize_orthogonal;
01476       break;
01477     default:
01478       optimize_algorithm = optimize_genetic;
01479       optimize->mutation_ratio = input->mutation_ratio;
01480       optimize->reproduction_ratio = input->reproduction_ratio;
01481       optimize->adaptation_ratio = input->adaptation_ratio;
01482     }
01483   optimize->nvariables = input->nvariables;
01484   optimize->nsimulations = input->nsimulations;
01485   optimize->niterations = input->niterations;
01486   optimize->nbest = input->nbest;
01487   optimize->tolerance = input->tolerance;
01488   optimize->nsteps = input->nsteps;
01489   optimize->nestimates = 0;
01490   optimize->threshold = input->threshold;
01491   optimize->stop = 0;
01492   if (input->nsteps)
01493     {
01494       optimize->relaxation = input->relaxation;
01495       switch (input->climbing)
01496         {
01497         case CLIMBING_METHOD_COORDINATES:
01498           optimize->nestimates = 2 * optimize->nvariables;
```

```
01499           optimize_estimate_climbing = optimize_estimate_climbing_coordinates;
01500           break;
01501         default:
01502           optimize->nestimates = input->nestimates;
01503           optimize_estimate_climbing = optimize_estimate_climbing_random;
01504         }
01505     }
01506
01507 #if DEBUG_OPTIMIZE
01508   fprintf (stderr, "optimize_open:  nbest=%u\n", optimize->nbest);
01509 #endif
01510   optimize->simulation_best
01511     = (unsigned int *) alloca (optimize->nbest * sizeof (unsigned int));
01512   optimize->error_best = (double *) alloca (optimize->nbest * sizeof (double));
01513
01514   // Reading the experimental data
01515 #if DEBUG_OPTIMIZE
01516   buffer = g_get_current_dir ();
01517   fprintf (stderr, "optimize_open:  current directory=%s\n", buffer);
01518   g_free (buffer);
01519 #endif
01520   optimize->nexperiments = input->nexperiments;
01521   optimize->ninputs = input->experiment->ninputs;
01522   optimize->experiment
01523     = (char **) alloca (input->nexperiments * sizeof (char *));
01524   optimize->weight = (double *) alloca (input->nexperiments * sizeof (double));
01525   for (i = 0; i < input->experiment->ninputs; ++i)
01526     optimize->file[i] = (GMappedFile **)
01527       g_malloc (input->nexperiments * sizeof (GMappedFile *));
01528   for (i = 0; i < input->nexperiments; ++i)
01529     {
01530 #if DEBUG_OPTIMIZE
01531       fprintf (stderr, "optimize_open:  i=%u\n", i);
01532 #endif
01533       optimize->experiment[i] = input->experiment[i].name;
01534       optimize->weight[i] = input->experiment[i].weight;
01535 #if DEBUG_OPTIMIZE
01536       fprintf (stderr, "optimize_open:  experiment=%s weight=%lg\n",
01537                optimize->experiment[i], optimize->weight[i]);
01538 #endif
01539       for (j = 0; j < input->experiment->ninputs; ++j)
01540         {
01541 #if DEBUG_OPTIMIZE
01542           fprintf (stderr, "optimize_open:  stencil%u\n", j + 1);
01543 #endif
01544           optimize->file[j][i]
01545             = g_mapped_file_new (input->experiment[i].stencil[j], 0, NULL);
01546         }
01547     }
01548
01549   // Reading the variables data
01550 #if DEBUG_OPTIMIZE
01551   fprintf (stderr, "optimize_open:  reading variables\n");
01552 #endif
01553   optimize->label = (char **) alloca (input->nvariables * sizeof (char *));
01554   j = input->nvariables * sizeof (double);
01555   optimize->rangemin = (double *) alloca (j);
01556   optimize->rangeminabs = (double *) alloca (j);
01557   optimize->rangemax = (double *) alloca (j);
01558   optimize->rangemaxabs = (double *) alloca (j);
01559   optimize->step = (double *) alloca (j);
01560   j = input->nvariables * sizeof (unsigned int);
01561   optimize->precision = (unsigned int *) alloca (j);
01562   optimize->nsweeps = (unsigned int *) alloca (j);
01563   optimize->nbits = (unsigned int *) alloca (j);
01564   for (i = 0; i < input->nvariables; ++i)
01565     {
01566       optimize->label[i] = input->variable[i].name;
01567       optimize->rangemin[i] = input->variable[i].rangemin;
01568       optimize->rangeminabs[i] = input->variable[i].rangeminabs;
01569       optimize->rangemax[i] = input->variable[i].rangemax;
01570       optimize->rangemaxabs[i] = input->variable[i].rangemaxabs;
01571       optimize->precision[i] = input->variable[i].precision;
01572       optimize->step[i] = input->variable[i].step;
01573       optimize->nsweeps[i] = input->variable[i].nsweeps;
01574       optimize->nbits[i] = input->variable[i].nbits;
01575     }
01576   if (input->algorithm == ALGORITHM_SWEEP
01577       || input->algorithm == ALGORITHM_ORTHOGONAL)
01578     {
01579       optimize->nsimulations = 1;
01580       for (i = 0; i < input->nvariables; ++i)
01581         {
01582           optimize->nsimulations *= optimize->nsweeps[i];
01583 #if DEBUG_OPTIMIZE
01584           fprintf (stderr, "optimize_open:  nsweeps=%u nsimulations=%u\n",
01585                    optimize->nsweeps[i], optimize->nsimulations);
```

```
01586 #endif
01587         }
01588     }
01589   if (optimize->nsteps)
01590     optimize->climbing
01591       = (double *) alloca (optimize->nvariables * sizeof (double));
01592
01593   // Setting error norm
01594   switch (input->norm)
01595     {
01596     case ERROR_NORM_EUCLIDIAN:
01597       optimize_norm = optimize_norm_euclidian;
01598       break;
01599     case ERROR_NORM_MAXIMUM:
01600       optimize_norm = optimize_norm_maximum;
01601       break;
01602     case ERROR_NORM_P:
01603       optimize_norm = optimize_norm_p;
01604       optimize->p = input->p;
01605       break;
01606     default:
01607       optimize_norm = optimize_norm_taxicab;
01608     }
01609
01610   // Allocating values
01611 #if DEBUG_OPTIMIZE
01612   fprintf (stderr, "optimize_open:  allocating variables\n");
01613   fprintf (stderr, "optimize_open:  nvariables=%u algorithm=%u\n",
01614            optimize->nvariables, optimize->algorithm);
01615 #endif
01616   optimize->genetic_variable = NULL;
01617   if (optimize->algorithm == ALGORITHM_GENETIC)
01618     {
01619       optimize->genetic_variable = (GeneticVariable *)
01620         g_malloc (optimize->nvariables * sizeof (GeneticVariable));
01621       for (i = 0; i < optimize->nvariables; ++i)
01622         {
01623 #if DEBUG_OPTIMIZE
01624           fprintf (stderr, "optimize_open:  i=%u min=%lg max=%lg nbits=%u\n",
01625                    i, optimize->rangemin[i], optimize->rangemax[i],
01626                    optimize->nbits[i]);
01627 #endif
01628           optimize->genetic_variable[i].minimum = optimize->rangemin[i];
01629           optimize->genetic_variable[i].maximum = optimize->rangemax[i];
01630           optimize->genetic_variable[i].nbits = optimize->nbits[i];
01631         }
01632     }
01633 #if DEBUG_OPTIMIZE
01634   fprintf (stderr, "optimize_open:  nvariables=%u nsimulations=%u\n",
01635            optimize->nvariables, optimize->nsimulations);
01636 #endif
01637   optimize->value = (double *)
01638     g_malloc ((optimize->nsimulations
01639                + optimize->nestimates * optimize->nsteps)
01640               * optimize->nvariables * sizeof (double));
01641
01642   // Calculating simulations to perform for each task
01643 #if HAVE_MPI
01644 #if DEBUG_OPTIMIZE
01645   fprintf (stderr, "optimize_open:  rank=%u ntasks=%u\n",
01646            optimize->mpi_rank, ntasks);
01647 #endif
01648   optimize->nstart = optimize->mpi_rank * optimize->nsimulations / ntasks;
01649   optimize->nend = (1 + optimize->mpi_rank) * optimize->nsimulations / ntasks;
01650   if (optimize->nsteps)
01651     {
01652       optimize->nstart_climbing
01653         = optimize->mpi_rank * optimize->nestimates / ntasks;
01654       optimize->nend_climbing
01655         = (1 + optimize->mpi_rank) * optimize->nestimates / ntasks;
01656     }
01657 #else
01658   optimize->nstart = 0;
01659   optimize->nend = optimize->nsimulations;
01660   if (optimize->nsteps)
01661     {
01662       optimize->nstart_climbing = 0;
01663       optimize->nend_climbing = optimize->nestimates;
01664     }
01665 #endif
01666 #if DEBUG_OPTIMIZE
01667   fprintf (stderr, "optimize_open:  nstart=%u nend=%u\n", optimize->nstart,
01668            optimize->nend);
01669 #endif
01670
01671   // Calculating simulations to perform for each thread
01672   optimize->thread
```

```
01673     = (unsigned int *) alloca ((1 + nthreads) * sizeof (unsigned int));
01674   for (i = 0; i <= nthreads; ++i)
01675     {
01676       optimize->thread[i] = optimize->nstart
01677         + i * (optimize->nend - optimize->nstart) / nthreads;
01678 #if DEBUG_OPTIMIZE
01679       fprintf (stderr, "optimize_open:  i=%u thread=%u\n", i,
01680                optimize->thread[i]);
01681 #endif
01682     }
01683   if (optimize->nsteps)
01684     optimize->thread_climbing = (unsigned int *)
01685       alloca ((1 + nthreads_climbing) * sizeof (unsigned int));
01686
01687   // Opening result files
01688   optimize->file_result = g_fopen (optimize->result, "w");
01689   optimize->file_variables = g_fopen (optimize->variables, "w");
01690
01691   // Performing the algorithm
01692   switch (optimize->algorithm)
01693     {
01694       // Genetic algorithm
01695     case ALGORITHM_GENETIC:
01696       optimize_genetic ();
01697       break;
01698
01699       // Iterative algorithm
01700     default:
01701       optimize_iterate ();
01702     }
01703
01704   // Getting calculation time
01705   t = g_date_time_new_now (tz);
01706   optimize->calculation_time = 0.000001 * g_date_time_difference (t, t0);
01707   g_date_time_unref (t);
01708   g_date_time_unref (t0);
01709   g_time_zone_unref (tz);
01710   printf ("%s = %.6lg s\n", _("Calculation time"), optimize->calculation_time);
01711   fprintf (optimize->file_result, "%s = %.6lg s\n",
01712            _("Calculation time"), optimize->calculation_time);
01713
01714   // Closing result files
01715   fclose (optimize->file_variables);
01716   fclose (optimize->file_result);
01717
01718 #if DEBUG_OPTIMIZE
01719   fprintf (stderr, "optimize_open:  end\n");
01720 #endif
01721 }
```

Here is the call graph for this function:



5.21.3.21 optimize_orthogonal()

```
static void optimize_orthogonal ( )  [static]
```

Function to optimize with the orthogonal sampling algorithm.

Definition at line 761 of file optimize.c.

```
00762 {
00763   unsigned int i, j, k, l;
00764   double e;
00765   GThread *thread[nthreads];
00766   ParallelData data[nthreads];
00767 #if DEBUG_OPTIMIZE
00768   fprintf (stderr, "optimize_orthogonal:  start\n");
00769 #endif
00770   for (i = 0; i < optimize->nsimulations; ++i)
00771     {
00772       k = i;
00773       for (j = 0; j < optimize->nvariables; ++j)
00774         {
00775           l = k % optimize->nsweeps[j];
00776           k /= optimize->nsweeps[j];
00777           e = optimize->rangemin[j];
00778           if (optimize->nsweeps[j] > 1)
00779             e += (l + gsl_rng_uniform (optimize->rng))
00780               * (optimize->rangemax[j] - optimize->rangemin[j])
00781               / optimize->nsweeps[j];
00782           optimize->value[i * optimize->nvariables + j] = e;
00783         }
00784     }
00785   optimize->nsaveds = 0;
00786   if (nthreads <= 1)
00787     optimize_sequential ();
00788   else
00789     {
00790       for (i = 0; i < nthreads; ++i)
00791         {
00792           data[i].thread = i;
00793           thread[i]
00794             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00795         }
00796       for (i = 0; i < nthreads; ++i)
00797         g_thread_join (thread[i]);
00798     }
00799 #if HAVE_MPI
00800   // Communicating tasks results
00801   optimize_synchronise ();
00802 #endif
00803 #if DEBUG_OPTIMIZE
00804   fprintf (stderr, "optimize_orthogonal:  end\n");
00805 #endif
00806 }
```

5.21.3.22 optimize_parse()

```
static double optimize_parse (
             unsigned int simulation,
             unsigned int experiment )  [static]
```

Function to parse input files, simulating and calculating the objective function.

Returns

Objective function value.

Parameters

simulation	Simulation number.
experiment	Experiment number.

Definition at line 184 of file optimize.c.

```
00186 {
00187   unsigned int i;
00188   double e;
00189   char buffer[512], input[MAX_NINPUTS][32], output[32], result[32], *buffer2,
00190     *buffer3, *buffer4;
00191   FILE *file_result;
00192
00193 #if DEBUG_OPTIMIZE
00194   fprintf (stderr, "optimize_parse:  start\n");
00195   fprintf (stderr, "optimize_parse:  simulation=%u experiment=%u\n",
00196            simulation, experiment);
00197 #endif
00198
00199   // Opening input files
00200   for (i = 0; i < optimize->ninputs; ++i)
00201     {
00202       snprintf (&input[i][0], 32, "input-%u-%u-%u", i, simulation, experiment);
00203 #if DEBUG_OPTIMIZE
00204       fprintf (stderr, "optimize_parse:  i=%u input=%s\n", i, &input[i][0]);
00205 #endif
00206       optimize_input (simulation, &input[i][0], optimize->file[i][experiment]);
00207     }
00208   for (; i < MAX_NINPUTS; ++i)
00209     strcpy (&input[i][0], "");
00210 #if DEBUG_OPTIMIZE
00211   fprintf (stderr, "optimize_parse:  parsing end\n");
00212 #endif
00213
00214   // Performing the simulation
00215   snprintf (output, 32, "output-%u-%u", simulation, experiment);
00216   buffer2 = g_path_get_dirname (optimize->simulator);
00217   buffer3 = g_path_get_basename (optimize->simulator);
00218   buffer4 = g_build_filename (buffer2, buffer3, NULL);
00219   snprintf (buffer, 512, "\"%s\" %s %s %s %s %s %s %s %s %s",
00220             buffer4, input[0], input[1], input[2], input[3], input[4],
00221             input[5], input[6], input[7], output);
00222   g_free (buffer4);
00223   g_free (buffer3);
00224   g_free (buffer2);
00225 #if DEBUG_OPTIMIZE
00226   fprintf (stderr, "optimize_parse:  %s\n", buffer);
00227 #endif
00228   if (system (buffer) == -1)
00229     error_message = buffer;
00230
00231   // Checking the objective value function
00232   if (optimize->evaluator)
00233     {
00234       snprintf (result, 32, "result-%u-%u", simulation, experiment);
00235       buffer2 = g_path_get_dirname (optimize->evaluator);
00236       buffer3 = g_path_get_basename (optimize->evaluator);
00237       buffer4 = g_build_filename (buffer2, buffer3, NULL);
00238       snprintf (buffer, 512, "\"%s\" %s %s %s",
00239                 buffer4, output, optimize->experiment[experiment], result);
00240       g_free (buffer4);
00241       g_free (buffer3);
00242       g_free (buffer2);
00243 #if DEBUG_OPTIMIZE
00244       fprintf (stderr, "optimize_parse:  %s\n", buffer);
00245       fprintf (stderr, "optimize_parse:  result=%s\n", result);
00246 #endif
00247       if (system (buffer) == -1)
00248         error_message = buffer;
00249       file_result = g_fopen (result, "r");
00250       e = atof (fgets (buffer, 512, file_result));
00251       fclose (file_result);
00252     }
00253   else
00254     {
00255 #if DEBUG_OPTIMIZE
00256       fprintf (stderr, "optimize_parse:  output=%s\n", output);
00257 #endif
00258       strcpy (result, "");
00259       file_result = g_fopen (output, "r");
00260       e = atof (fgets (buffer, 512, file_result));
00261       fclose (file_result);
00262     }
```

```
00263
00264   // Removing files
00265 #if !DEBUG_OPTIMIZE
00266   for (i = 0; i < optimize->ninputs; ++i)
00267     {
00268       if (optimize->file[i][0])
00269         {
00270           snprintf (buffer, 512, RM " %s", &input[i][0]);
00271           if (system (buffer) == -1)
00272             error_message = buffer;
00273         }
00274     }
00275   snprintf (buffer, 512, RM " %s %s", output, result);
00276   if (system (buffer) == -1)
00277     error_message = buffer;
00278 #endif
00279
00280   // Processing pending events
00281   if (show_pending)
00282     show_pending ();
00283
00284 #if DEBUG_OPTIMIZE
00285   fprintf (stderr, "optimize_parse:  end\n");
00286 #endif
00287
00288   // Returning the objective function
00289   return e * optimize->weight[experiment];
00290 }
```

Here is the call graph for this function:

5.21.3.23 optimize_print()

```
static void optimize_print ( )  [static]
```

Function to print the results.

Definition at line 399 of file optimize.c.

```
00400 {
00401   unsigned int i;
00402   char buffer[512];
00403 #if HAVE_MPI
00404   if (optimize->mpi_rank)
00405     return;
00406 #endif
00407   printf ("%s\n", _("Best result"));
00408   fprintf (optimize->file_result, "%s\n", _("Best result"));
00409   printf ("error = %.15le\n", optimize->error_old[0]);
00410   fprintf (optimize->file_result, "error = %.15le\n", optimize->error_old[0]);
00411   for (i = 0; i < optimize->nvariables; ++i)
00412     {
00413       snprintf (buffer, 512, "%s = %s\n",
00414                 optimize->label[i], format[optimize->precision[i]]);
00415       printf (buffer, optimize->value_old[i]);
00416       fprintf (optimize->file_result, buffer, optimize->value_old[i]);
00417     }
00418   fflush (optimize->file_result);
00419 }
```

5.21.3.24 optimize_refine()

```
static void optimize_refine ( )  [inline], [static]
```

Function to refine the search ranges of the variables in iterative algorithms.

Definition at line 1266 of file optimize.c.

```
01267 {
01268   unsigned int i, j;
01269   double d;
01270 #if HAVE_MPI
01271   MPI_Status mpi_stat;
01272 #endif
01273 #if DEBUG_OPTIMIZE
01274   fprintf (stderr, "optimize_refine:  start\n");
01275 #endif
01276 #if HAVE_MPI
01277   if (!optimize->mpi_rank)
01278     {
01279 #endif
01280       for (j = 0; j < optimize->nvariables; ++j)
01281         {
01282           optimize->rangemin[j] = optimize->rangemax[j]
01283             = optimize->value_old[j];
01284         }
01285       for (i = 0; ++i < optimize->nbest;)
01286         {
01287           for (j = 0; j < optimize->nvariables; ++j)
01288             {
01289               optimize->rangemin[j]
01290                 = fmin (optimize->rangemin[j],
01291                         optimize->value_old[i * optimize->nvariables + j]);
01292               optimize->rangemax[j]
01293                 = fmax (optimize->rangemax[j],
01294                         optimize->value_old[i * optimize->nvariables + j]);
01295             }
01296         }
01297       for (j = 0; j < optimize->nvariables; ++j)
01298         {
01299           d = optimize->tolerance
01300             * (optimize->rangemax[j] - optimize->rangemin[j]);
01301           switch (optimize->algorithm)
01302             {
01303             case ALGORITHM_MONTE_CARLO:
01304               d *= 0.5;
01305               break;
01306             default:
01307               if (optimize->nsweeps[j] > 1)
01308                 d /= optimize->nsweeps[j] - 1;
01309               else
01310                 d = 0.;
01311             }
01312           optimize->rangemin[j] -= d;
01313           optimize->rangemin[j]
01314             = fmax (optimize->rangemin[j], optimize->rangeminabs[j]);
01315           optimize->rangemax[j] += d;
01316           optimize->rangemax[j]
01317             = fmin (optimize->rangemax[j], optimize->rangemaxabs[j]);
01318           printf ("%s min=%lg max=%lg\n", optimize->label[j],
01319                   optimize->rangemin[j], optimize->rangemax[j]);
01320           fprintf (optimize->file_result, "%s min=%lg max=%lg\n",
01321                    optimize->label[j], optimize->rangemin[j],
01322                    optimize->rangemax[j]);
01323         }
01324 #if HAVE_MPI
01325       for (i = 1; (int) i < ntasks; ++i)
01326         {
01327           MPI_Send (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, i,
01328                     1, MPI_COMM_WORLD);
01329           MPI_Send (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, i,
01330                     1, MPI_COMM_WORLD);
01331         }
01332     }
01333   else
01334     {
01335       MPI_Recv (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, 0, 1,
01336                 MPI_COMM_WORLD, &mpi_stat);
01337       MPI_Recv (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, 0, 1,
01338                 MPI_COMM_WORLD, &mpi_stat);
01339     }
01340 #endif
01341 #if DEBUG_OPTIMIZE
01342   fprintf (stderr, "optimize_refine:  end\n");
```

```
01343 #endif
01344 }
```

5.21.3.25 optimize_save_old()

```
static void optimize_save_old ( )  [inline], [static]
```

Function to save the best results on iterative methods.

Definition at line 1186 of file optimize.c.

```
01187 {
01188   unsigned int i, j;
01189 #if DEBUG_OPTIMIZE
01190   fprintf (stderr, "optimize_save_old:  start\n");
01191   fprintf (stderr, "optimize_save_old:  nsaveds=%u\n", optimize->nsaveds);
01192 #endif
01193   memcpy (optimize->error_old, optimize->error_best,
01194           optimize->nbest * sizeof (double));
01195   for (i = 0; i < optimize->nbest; ++i)
01196     {
01197       j = optimize->simulation_best[i];
01198 #if DEBUG_OPTIMIZE
01199       fprintf (stderr, "optimize_save_old:  i=%u j=%u\n", i, j);
01200 #endif
01201       memcpy (optimize->value_old + i * optimize->nvariables,
01202               optimize->value + j * optimize->nvariables,
01203               optimize->nvariables * sizeof (double));
01204     }
01205 #if DEBUG_OPTIMIZE
01206   for (i = 0; i < optimize->nvariables; ++i)
01207     fprintf (stderr, "optimize_save_old:  best variable %u=%lg\n",
01208              i, optimize->value_old[i]);
01209   fprintf (stderr, "optimize_save_old:  end\n");
01210 #endif
01211 }
```

5.21.3.26 optimize_save_variables()

```
static void optimize_save_variables (
             unsigned int simulation,
             double error )  [static]
```

Function to save in a file the variables and the error.

Parameters

simulation	Simulation number.
error	Error value.

Definition at line 425 of file optimize.c.

```
00427 {
00428   unsigned int i;
00429   char buffer[64];
00430 #if DEBUG_OPTIMIZE
00431   fprintf (stderr, "optimize_save_variables:  start\n");
00432 #endif
00433   for (i = 0; i < optimize->nvariables; ++i)
00434     {
00435       snprintf (buffer, 64, "%s ", format[optimize->precision[i]]);
00436       fprintf (optimize->file_variables, buffer,
00437                optimize->value[simulation * optimize->nvariables + i]);
00438     }
```

```
00439   fprintf (optimize->file_variables, "%.14le\n", error);
00440   fflush (optimize->file_variables);
00441 #if DEBUG_OPTIMIZE
00442   fprintf (stderr, "optimize_save_variables:  end\n");
00443 #endif
00444 }
```

5.21.3.27 optimize_sequential()

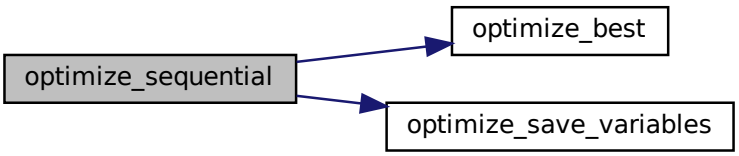
```
static void optimize_sequential ( )  [static]
```

Function to optimize sequentially.

Definition at line 491 of file optimize.c.

```
00492 {
00493   unsigned int i;
00494   double e;
00495 #if DEBUG_OPTIMIZE
00496   fprintf (stderr, "optimize_sequential:  start\n");
00497   fprintf (stderr, "optimize_sequential:  nstart=%u nend=%u\n",
00498            optimize->nstart, optimize->nend);
00499 #endif
00500   for (i = optimize->nstart; i < optimize->nend; ++i)
00501     {
00502       e = optimize_norm (i);
00503       optimize_best (i, e);
00504       optimize_save_variables (i, e);
00505       if (e < optimize->threshold)
00506         {
00507           optimize->stop = 1;
00508           break;
00509         }
00510 #if DEBUG_OPTIMIZE
00511       fprintf (stderr, "optimize_sequential:  i=%u e=%lg\n", i, e);
00512 #endif
00513     }
00514 #if DEBUG_OPTIMIZE
00515   fprintf (stderr, "optimize_sequential:  end\n");
00516 #endif
00517 }
```

Here is the call graph for this function:



5.21.3.28 optimize_step()

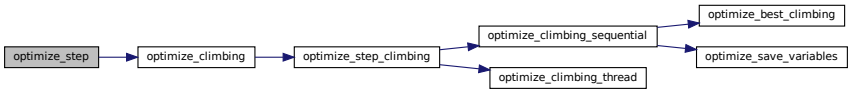
```
static void optimize_step ( )  [static]
```

Function to do a step of the iterative algorithm.

Definition at line 1350 of file optimize.c.

```
01351 {
01352 #if DEBUG_OPTIMIZE
01353   fprintf (stderr, "optimize_step:  start\n");
01354 #endif
01355   optimize_algorithm ();
01356   if (optimize->nsteps)
01357     optimize_climbing ();
01358 #if DEBUG_OPTIMIZE
01359   fprintf (stderr, "optimize_step:  end\n");
01360 #endif
01361 }
```

Here is the call graph for this function:



5.21.3.29 optimize_step_climbing()

```
static void optimize_step_climbing (
             unsigned int simulation )  [inline], [static]
```

Function to do a step of the hill climbing method.

Parameters

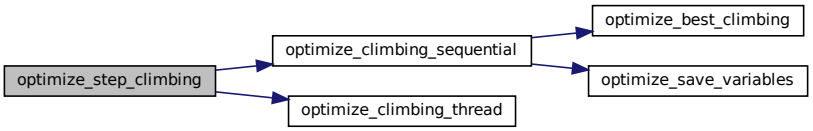
simulation	Simulation number.

Definition at line 971 of file optimize.c.

```
00972 {
00973   GThread *thread[nthreads_climbing];
00974   ParallelData data[nthreads_climbing];
00975   unsigned int i, j, k, b;
00976 #if DEBUG_OPTIMIZE
00977   fprintf (stderr, "optimize_step_climbing:  start\n");
00978 #endif
00979   for (i = 0; i < optimize->nestimates; ++i)
00980     {
00981       k = (simulation + i) * optimize->nvariables;
00982       b = optimize->simulation_best[0] * optimize->nvariables;
00983 #if DEBUG_OPTIMIZE
00984       fprintf (stderr, "optimize_step_climbing:  simulation=%u best=%u\n",
00985                simulation + i, optimize->simulation_best[0]);
00986 #endif
00987       for (j = 0; j < optimize->nvariables; ++j, ++k, ++b)
00988         {
00989 #if DEBUG_OPTIMIZE
00990           fprintf (stderr,
00991                    "optimize_step_climbing:  estimate=%u best%u=%.14le\n",
00992                    i, j, optimize->value[b]);
00993 #endif
```

```
00994           optimize->value[k]
00995             = optimize->value[b] + optimize_estimate_climbing (j, i);
00996           optimize->value[k] = fmin (fmax (optimize->value[k],
00997                                            optimize->rangeminabs[j]),
00998                                      optimize->rangemaxabs[j]);
00999 #if DEBUG_OPTIMIZE
01000           fprintf (stderr,
01001                    "optimize_step_climbing:  estimate=%u variable%u=%.14le\n",
01002                    i, j, optimize->value[k]);
01003 #endif
01004         }
01005     }
01006   if (nthreads_climbing == 1)
01007     optimize_climbing_sequential (simulation);
01008   else
01009     {
01010       for (i = 0; i <= nthreads_climbing; ++i)
01011         {
01012           optimize->thread_climbing[i]
01013             = simulation + optimize->nstart_climbing
01014             + i * (optimize->nend_climbing - optimize->nstart_climbing)
01015             / nthreads_climbing;
01016 #if DEBUG_OPTIMIZE
01017           fprintf (stderr,
01018                    "optimize_step_climbing:  i=%u thread_climbing=%u\n",
01019                    i, optimize->thread_climbing[i]);
01020 #endif
01021         }
01022       for (i = 0; i < nthreads_climbing; ++i)
01023         {
01024           data[i].thread = i;
01025           thread[i] = g_thread_new
01026             (NULL, (GThreadFunc) optimize_climbing_thread, &data[i]);
01027         }
01028       for (i = 0; i < nthreads_climbing; ++i)
01029         g_thread_join (thread[i]);
01030     }
01031 #if DEBUG_OPTIMIZE
01032   fprintf (stderr, "optimize_step_climbing:  end\n");
01033 #endif
01034 }
```

Here is the call graph for this function:



5.21.3.30 optimize_sweep()

```
static void optimize_sweep ( )  [static]
```

Function to optimize with the sweep algorithm.

Definition at line 671 of file optimize.c.

```
00672 {
00673   unsigned int i, j, k, l;
00674   double e;
00675   GThread *thread[nthreads];
00676   ParallelData data[nthreads];
00677 #if DEBUG_OPTIMIZE
00678   fprintf (stderr, "optimize_sweep:  start\n");
00679 #endif
00680   for (i = 0; i < optimize->nsimulations; ++i)
```

```
00681     {
00682       k = i;
00683       for (j = 0; j < optimize->nvariables; ++j)
00684         {
00685           l = k % optimize->nsweeps[j];
00686           k /= optimize->nsweeps[j];
00687           e = optimize->rangemin[j];
00688           if (optimize->nsweeps[j] > 1)
00689             e += l * (optimize->rangemax[j] - optimize->rangemin[j])
00690               / (optimize->nsweeps[j] - 1);
00691           optimize->value[i * optimize->nvariables + j] = e;
00692         }
00693     }
00694   optimize->nsaveds = 0;
00695   if (nthreads <= 1)
00696     optimize_sequential ();
00697   else
00698     {
00699       for (i = 0; i < nthreads; ++i)
00700         {
00701           data[i].thread = i;
00702           thread[i]
00703             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00704         }
00705       for (i = 0; i < nthreads; ++i)
00706         g_thread_join (thread[i]);
00707     }
00708 #if HAVE_MPI
00709   // Communicating tasks results
00710   optimize_synchronise ();
00711 #endif
00712 #if DEBUG_OPTIMIZE
00713   fprintf (stderr, "optimize_sweep:  end\n");
00714 #endif
00715 }
```

5.21.3.31 optimize_synchronise()

```
static void optimize_synchronise ( )  [static]
```

Function to synchronise the optimization results of MPI tasks.

Definition at line 624 of file optimize.c.

```
00625 {
00626   unsigned int i, nsaveds, simulation_best[optimize->nbest], stop;
00627   double error_best[optimize->nbest];
00628   MPI_Status mpi_stat;
00629 #if DEBUG_OPTIMIZE
00630   fprintf (stderr, "optimize_synchronise:  start\n");
00631 #endif
00632   if (optimize->mpi_rank == 0)
00633     {
00634       for (i = 1; (int) i < ntasks; ++i)
00635         {
00636           MPI_Recv (&nsaveds, 1, MPI_INT, i, 1, MPI_COMM_WORLD, &mpi_stat);
00637           MPI_Recv (simulation_best, nsaveds, MPI_INT, i, 1,
00638                     MPI_COMM_WORLD, &mpi_stat);
00639           MPI_Recv (error_best, nsaveds, MPI_DOUBLE, i, 1,
00640                     MPI_COMM_WORLD, &mpi_stat);
00641           optimize_merge (nsaveds, simulation_best, error_best);
00642           MPI_Recv (&stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD, &mpi_stat);
00643           if (stop)
00644             optimize->stop = 1;
00645         }
00646       for (i = 1; (int) i < ntasks; ++i)
00647         MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD);
00648     }
00649   else
00650     {
00651       MPI_Send (&optimize->nsaveds, 1, MPI_INT, 0, 1, MPI_COMM_WORLD);
00652       MPI_Send (optimize->simulation_best, optimize->nsaveds, MPI_INT, 0, 1,
00653                 MPI_COMM_WORLD);
00654       MPI_Send (optimize->error_best, optimize->nsaveds, MPI_DOUBLE, 0, 1,
00655                 MPI_COMM_WORLD);
00656       MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD);
00657       MPI_Recv (&stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD, &mpi_stat);
00658       if (stop)
00659         optimize->stop = 1;
```

```
00660     }
00661 #if DEBUG_OPTIMIZE
00662   fprintf (stderr, "optimize_synchronise:  end\n");
00663 #endif
00664 }
```

5.21.3.32 optimize_thread()

```
static void * optimize_thread (
            ParallelData * data )  [static]
```

Function to optimize on a thread.

Returns

NULL.

Parameters

data	Function data.

Definition at line 525 of file optimize.c.

```
00526 {
00527   unsigned int i, thread;
00528   double e;
00529 #if DEBUG_OPTIMIZE
00530   fprintf (stderr, "optimize_thread:  start\n");
00531 #endif
00532   thread = data->thread;
00533 #if DEBUG_OPTIMIZE
00534   fprintf (stderr, "optimize_thread:  thread=%u start=%u end=%u\n", thread,
00535            optimize->thread[thread], optimize->thread[thread + 1]);
00536 #endif
00537   for (i = optimize->thread[thread]; i < optimize->thread[thread + 1]; ++i)
00538     {
00539       e = optimize_norm (i);
00540       g_mutex_lock (mutex);
00541       optimize_best (i, e);
00542       optimize_save_variables (i, e);
00543       if (e < optimize->threshold)
00544         optimize->stop = 1;
00545       g_mutex_unlock (mutex);
00546       if (optimize->stop)
00547         break;
00548 #if DEBUG_OPTIMIZE
00549       fprintf (stderr, "optimize_thread:  i=%u e=%lg\n", i, e);
00550 #endif
00551     }
00552 #if DEBUG_OPTIMIZE
00553   fprintf (stderr, "optimize_thread:  end\n");
00554 #endif
00555   g_thread_exit (NULL);
00556   return NULL;
00557 }
```

5.21.4 Variable Documentation

5.21.4.1 nthreads_climbing

```
unsigned int nthreads_climbing
```

Number of threads for the hill climbing method.

Definition at line 80 of file optimize.c.

5.21.4.2 optimize

```
Optimize optimize[1]
```

Optimization data.

Definition at line 79 of file optimize.c.

5.21.4.3 optimize_algorithm

```
void(* optimize_algorithm) () ( )  [static]
```

Pointer to the function to perform a optimization algorithm step.

Definition at line 83 of file optimize.c.

5.21.4.4 optimize_estimate_climbing

```
double(* optimize_estimate_climbing) (unsigned int variable, unsigned int estimate) (
             unsigned int variable,
             unsigned int estimate )  [static]
```

Pointer to the function to estimate the climbing.

Definition at line 85 of file optimize.c.

5.21.4.5 optimize_norm

```
double(* optimize_norm) (unsigned int simulation) (
             unsigned int simulation )  [static]
```

Pointer to the error norm function.

Definition at line 88 of file optimize.c.

5.22 optimize.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
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00015
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00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <stdlib.h>
00042 #include <string.h>
00043 #include <math.h>
00044 #include <sys/param.h>
00045 #include <gsl/gsl_rng.h>
00046 #include <libxml/parser.h>
00047 #include <libintl.h>
00048 #include <glib.h>
00049 #include <glib/gstdio.h>
00050 #include <json-glib/json-glib.h>
00051 #ifdef G_OS_WIN32
00052 #include <windows.h>
00053 #elif !defined(__BSD_VISIBLE) && !defined(NetBSD)
00054 #include <alloca.h>
00055 #endif
00056 #if HAVE_MPI
00057 #include <mpi.h>
00058 #endif
00059 #include "jb/src/jb_win.h"
00060 #include "genetic/genetic.h"
00061 #include "tools.h"
00062 #include "experiment.h"
00063 #include "variable.h"
00064 #include "input.h"
00065 #include "optimize.h"
00066
00067 #define DEBUG_OPTIMIZE 0
00068
00073 #ifdef G_OS_WIN32
00074 #define RM "del"
00075 #else
00076 #define RM "rm"
00077 #endif
00078
00079 Optimize optimize[1];
00080 unsigned int nthreads_climbing;
00082
00083 static void (*optimize_algorithm) ();
00085 static double (*optimize_estimate_climbing) (unsigned int variable,
00086                                               unsigned int estimate);
00088 static double (*optimize_norm) (unsigned int simulation);
00090
00094 static inline void
00095 optimize_input (unsigned int simulation,
00096                 char *input,
00097                 GMappedFile * stencil)
00098 {
00099   char buffer[32], value[32];
```

```
00100   GRegex *regex;
00101   FILE *file;
00102   char *buffer2, *buffer3 = NULL, *content;
00103   gsize length;
00104   unsigned int i;
00105
00106 #if DEBUG_OPTIMIZE
00107   fprintf (stderr, "optimize_input:  start\n");
00108 #endif
00109
00110   // Checking the file
00111   if (!stencil)
00112     goto optimize_input_end;
00113
00114   // Opening stencil
00115   content = g_mapped_file_get_contents (stencil);
00116   length = g_mapped_file_get_length (stencil);
00117 #if DEBUG_OPTIMIZE
00118   fprintf (stderr, "optimize_input:  length=%lu\ncontent:\n%s", length, content);
00119 #endif
00120   file = g_fopen (input, "w");
00121
00122   // Parsing stencil
00123   for (i = 0; i < optimize->nvariables; ++i)
00124     {
00125 #if DEBUG_OPTIMIZE
00126       fprintf (stderr, "optimize_input:  variable=%u\n", i);
00127 #endif
00128       snprintf (buffer, 32, "@variable%u@", i + 1);
00129       regex = g_regex_new (buffer, (GRegexCompileFlags) 0, (GRegexMatchFlags) 0,
00130                            NULL);
00131       if (i == 0)
00132         {
00133           buffer2 = g_regex_replace_literal (regex, content, length, 0,
00134                                              optimize->label[i],
00135                                              (GRegexMatchFlags) 0, NULL);
00136 #if DEBUG_OPTIMIZE
00137           fprintf (stderr, "optimize_input:  buffer2\n%s", buffer2);
00138 #endif
00139         }
00140       else
00141         {
00142           length = strlen (buffer3);
00143           buffer2 = g_regex_replace_literal (regex, buffer3, length, 0,
00144                                              optimize->label[i],
00145                                              (GRegexMatchFlags) 0, NULL);
00146           g_free (buffer3);
00147         }
00148       g_regex_unref (regex);
00149       length = strlen (buffer2);
00150       snprintf (buffer, 32, "@value%u@", i + 1);
00151       regex = g_regex_new (buffer, (GRegexCompileFlags) 0, (GRegexMatchFlags) 0,
00152                            NULL);
00153       snprintf (value, 32, format[optimize->precision[i]],
00154                 optimize->value[simulation * optimize->nvariables + i]);
00155
00156 #if DEBUG_OPTIMIZE
00157       fprintf (stderr, "optimize_input:  value=%s\n", value);
00158 #endif
00159       buffer3 = g_regex_replace_literal (regex, buffer2, length, 0, value,
00160                                          (GRegexMatchFlags) 0, NULL);
00161       g_free (buffer2);
00162       g_regex_unref (regex);
00163     }
00164
00165   // Saving input file
00166   fwrite (buffer3, strlen (buffer3), sizeof (char), file);
00167   g_free (buffer3);
00168   fclose (file);
00169
00170 optimize_input_end:
00171 #if DEBUG_OPTIMIZE
00172   fprintf (stderr, "optimize_input:  end\n");
00173 #endif
00174   return;
00175 }
00176
00183 static double
00184 optimize_parse (unsigned int simulation,
00185                 unsigned int experiment)
00186 {
00187   unsigned int i;
00188   double e;
00189   char buffer[512], input[MAX_NINPUTS][32], output[32], result[32], *buffer2,
00190     *buffer3, *buffer4;
00191   FILE *file_result;
00192
```

```
00193 #if DEBUG_OPTIMIZE
00194   fprintf (stderr, "optimize_parse:  start\n");
00195   fprintf (stderr, "optimize_parse:  simulation=%u experiment=%u\n",
00196            simulation, experiment);
00197 #endif
00198
00199   // Opening input files
00200   for (i = 0; i < optimize->ninputs; ++i)
00201     {
00202       snprintf (&input[i][0], 32, "input-%u-%u-%u", i, simulation, experiment);
00203 #if DEBUG_OPTIMIZE
00204       fprintf (stderr, "optimize_parse:  i=%u input=%s\n", i, &input[i][0]);
00205 #endif
00206       optimize_input (simulation, &input[i][0], optimize->file[i][experiment]);
00207     }
00208   for (; i < MAX_NINPUTS; ++i)
00209     strcpy (&input[i][0], "");
00210 #if DEBUG_OPTIMIZE
00211   fprintf (stderr, "optimize_parse:  parsing end\n");
00212 #endif
00213
00214   // Performing the simulation
00215   snprintf (output, 32, "output-%u-%u", simulation, experiment);
00216   buffer2 = g_path_get_dirname (optimize->simulator);
00217   buffer3 = g_path_get_basename (optimize->simulator);
00218   buffer4 = g_build_filename (buffer2, buffer3, NULL);
00219   snprintf (buffer, 512, "\"%s\" %s %s %s %s %s %s %s %s %s",
00220             buffer4, input[0], input[1], input[2], input[3], input[4],
00221             input[5], input[6], input[7], output);
00222   g_free (buffer4);
00223   g_free (buffer3);
00224   g_free (buffer2);
00225 #if DEBUG_OPTIMIZE
00226   fprintf (stderr, "optimize_parse:  %s\n", buffer);
00227 #endif
00228   if (system (buffer) == -1)
00229     error_message = buffer;
00230
00231   // Checking the objective value function
00232   if (optimize->evaluator)
00233     {
00234       snprintf (result, 32, "result-%u-%u", simulation, experiment);
00235       buffer2 = g_path_get_dirname (optimize->evaluator);
00236       buffer3 = g_path_get_basename (optimize->evaluator);
00237       buffer4 = g_build_filename (buffer2, buffer3, NULL);
00238       snprintf (buffer, 512, "\"%s\" %s %s %s",
00239                 buffer4, output, optimize->experiment[experiment], result);
00240       g_free (buffer4);
00241       g_free (buffer3);
00242       g_free (buffer2);
00243 #if DEBUG_OPTIMIZE
00244       fprintf (stderr, "optimize_parse:  %s\n", buffer);
00245       fprintf (stderr, "optimize_parse:  result=%s\n", result);
00246 #endif
00247       if (system (buffer) == -1)
00248         error_message = buffer;
00249       file_result = g_fopen (result, "r");
00250       e = atof (fgets (buffer, 512, file_result));
00251       fclose (file_result);
00252     }
00253   else
00254     {
00255 #if DEBUG_OPTIMIZE
00256       fprintf (stderr, "optimize_parse:  output=%s\n", output);
00257 #endif
00258       strcpy (result, "");
00259       file_result = g_fopen (output, "r");
00260       e = atof (fgets (buffer, 512, file_result));
00261       fclose (file_result);
00262     }
00263
00264   // Removing files
00265 #if !DEBUG_OPTIMIZE
00266   for (i = 0; i < optimize->ninputs; ++i)
00267     {
00268       if (optimize->file[i][0])
00269         {
00270           snprintf (buffer, 512, RM " %s", &input[i][0]);
00271           if (system (buffer) == -1)
00272             error_message = buffer;
00273         }
00274     }
00275   snprintf (buffer, 512, RM " %s %s", output, result);
00276   if (system (buffer) == -1)
00277     error_message = buffer;
00278 #endif
00279
```

```
00280   // Processing pending events
00281   if (show_pending)
00282     show_pending ();
00283
00284 #if DEBUG_OPTIMIZE
00285   fprintf (stderr, "optimize_parse:  end\n");
00286 #endif
00287
00288   // Returning the objective function
00289   return e * optimize->weight[experiment];
00290 }
00291
00297 static double
00298 optimize_norm_euclidian (unsigned int simulation)
00299 {
00300   double e, ei;
00301   unsigned int i;
00302 #if DEBUG_OPTIMIZE
00303   fprintf (stderr, "optimize_norm_euclidian:  start\n");
00304 #endif
00305   e = 0.;
00306   for (i = 0; i < optimize->nexperiments; ++i)
00307     {
00308       ei = optimize_parse (simulation, i);
00309       e += ei * ei;
00310     }
00311   e = sqrt (e);
00312 #if DEBUG_OPTIMIZE
00313   fprintf (stderr, "optimize_norm_euclidian:  error=%lg\n", e);
00314   fprintf (stderr, "optimize_norm_euclidian:  end\n");
00315 #endif
00316   return e;
00317 }
00318
00324 static double
00325 optimize_norm_maximum (unsigned int simulation)
00326 {
00327   double e, ei;
00328   unsigned int i;
00329 #if DEBUG_OPTIMIZE
00330   fprintf (stderr, "optimize_norm_maximum:  start\n");
00331 #endif
00332   e = 0.;
00333   for (i = 0; i < optimize->nexperiments; ++i)
00334     {
00335       ei = fabs (optimize_parse (simulation, i));
00336       e = fmax (e, ei);
00337     }
00338 #if DEBUG_OPTIMIZE
00339   fprintf (stderr, "optimize_norm_maximum:  error=%lg\n", e);
00340   fprintf (stderr, "optimize_norm_maximum:  end\n");
00341 #endif
00342   return e;
00343 }
00344
00350 static double
00351 optimize_norm_p (unsigned int simulation)
00352 {
00353   double e, ei;
00354   unsigned int i;
00355 #if DEBUG_OPTIMIZE
00356   fprintf (stderr, "optimize_norm_p:  start\n");
00357 #endif
00358   e = 0.;
00359   for (i = 0; i < optimize->nexperiments; ++i)
00360     {
00361       ei = fabs (optimize_parse (simulation, i));
00362       e += pow (ei, optimize->p);
00363     }
00364   e = pow (e, 1.  / optimize->p);
00365 #if DEBUG_OPTIMIZE
00366   fprintf (stderr, "optimize_norm_p:  error=%lg\n", e);
00367   fprintf (stderr, "optimize_norm_p:  end\n");
00368 #endif
00369   return e;
00370 }
00371
00377 static double
00378 optimize_norm_taxicab (unsigned int simulation)
00379 {
00380   double e;
00381   unsigned int i;
00382 #if DEBUG_OPTIMIZE
00383   fprintf (stderr, "optimize_norm_taxicab:  start\n");
00384 #endif
00385   e = 0.;
00386   for (i = 0; i < optimize->nexperiments; ++i)
```

```
00387     e += fabs (optimize_parse (simulation, i));
00388 #if DEBUG_OPTIMIZE
00389   fprintf (stderr, "optimize_norm_taxicab:  error=%lg\n", e);
00390   fprintf (stderr, "optimize_norm_taxicab:  end\n");
00391 #endif
00392   return e;
00393 }
00394
00398 static void
00399 optimize_print ()
00400 {
00401   unsigned int i;
00402   char buffer[512];
00403 #if HAVE_MPI
00404   if (optimize->mpi_rank)
00405     return;
00406 #endif
00407   printf ("%s\n", _("Best result"));
00408   fprintf (optimize->file_result, "%s\n", _("Best result"));
00409   printf ("error = %.15le\n", optimize->error_old[0]);
00410   fprintf (optimize->file_result, "error = %.15le\n", optimize->error_old[0]);
00411   for (i = 0; i < optimize->nvariables; ++i)
00412     {
00413       snprintf (buffer, 512, "%s = %s\n",
00414                 optimize->label[i], format[optimize->precision[i]]);
00415       printf (buffer, optimize->value_old[i]);
00416       fprintf (optimize->file_result, buffer, optimize->value_old[i]);
00417     }
00418   fflush (optimize->file_result);
00419 }
00420
00424 static void
00425 optimize_save_variables (unsigned int simulation,
00426                          double error)
00427 {
00428   unsigned int i;
00429   char buffer[64];
00430 #if DEBUG_OPTIMIZE
00431   fprintf (stderr, "optimize_save_variables:  start\n");
00432 #endif
00433   for (i = 0; i < optimize->nvariables; ++i)
00434     {
00435       snprintf (buffer, 64, "%s ", format[optimize->precision[i]]);
00436       fprintf (optimize->file_variables, buffer,
00437                optimize->value[simulation * optimize->nvariables + i]);
00438     }
00439   fprintf (optimize->file_variables, "%.14le\n", error);
00440   fflush (optimize->file_variables);
00441 #if DEBUG_OPTIMIZE
00442   fprintf (stderr, "optimize_save_variables:  end\n");
00443 #endif
00444 }
00445
00449 static void
00450 optimize_best (unsigned int simulation,
00451                double value)
00452 {
00453   unsigned int i, j;
00454   double e;
00455 #if DEBUG_OPTIMIZE
00456   fprintf (stderr, "optimize_best:  start\n");
00457   fprintf (stderr, "optimize_best:  nsaveds=%u nbest=%u\n",
00458            optimize->nsaveds, optimize->nbest);
00459 #endif
00460   if (optimize->nsaveds < optimize->nbest
00461       || value < optimize->error_best[optimize->nsaveds - 1])
00462     {
00463       if (optimize->nsaveds < optimize->nbest)
00464         ++optimize->nsaveds;
00465       optimize->error_best[optimize->nsaveds - 1] = value;
00466       optimize->simulation_best[optimize->nsaveds - 1] = simulation;
00467       for (i = optimize->nsaveds; --i;)
00468         {
00469           if (optimize->error_best[i] < optimize->error_best[i - 1])
00470             {
00471               j = optimize->simulation_best[i];
00472               e = optimize->error_best[i];
00473               optimize->simulation_best[i] = optimize->simulation_best[i - 1];
00474               optimize->error_best[i] = optimize->error_best[i - 1];
00475               optimize->simulation_best[i - 1] = j;
00476               optimize->error_best[i - 1] = e;
00477             }
00478           else
00479             break;
00480         }
00481     }
00482 #if DEBUG_OPTIMIZE
```

```
00483   fprintf (stderr, "optimize_best:  end\n");
00484 #endif
00485 }
00486
00490 static void
00491 optimize_sequential ()
00492 {
00493   unsigned int i;
00494   double e;
00495 #if DEBUG_OPTIMIZE
00496   fprintf (stderr, "optimize_sequential:  start\n");
00497   fprintf (stderr, "optimize_sequential:  nstart=%u nend=%u\n",
00498            optimize->nstart, optimize->nend);
00499 #endif
00500   for (i = optimize->nstart; i < optimize->nend; ++i)
00501     {
00502       e = optimize_norm (i);
00503       optimize_best (i, e);
00504       optimize_save_variables (i, e);
00505       if (e < optimize->threshold)
00506         {
00507           optimize->stop = 1;
00508           break;
00509         }
00510 #if DEBUG_OPTIMIZE
00511       fprintf (stderr, "optimize_sequential:  i=%u e=%lg\n", i, e);
00512 #endif
00513     }
00514 #if DEBUG_OPTIMIZE
00515   fprintf (stderr, "optimize_sequential:  end\n");
00516 #endif
00517 }
00518
00524 static void *
00525 optimize_thread (ParallelData * data)
00526 {
00527   unsigned int i, thread;
00528   double e;
00529 #if DEBUG_OPTIMIZE
00530   fprintf (stderr, "optimize_thread:  start\n");
00531 #endif
00532   thread = data->thread;
00533 #if DEBUG_OPTIMIZE
00534   fprintf (stderr, "optimize_thread:  thread=%u start=%u end=%u\n", thread,
00535            optimize->thread[thread], optimize->thread[thread + 1]);
00536 #endif
00537   for (i = optimize->thread[thread]; i < optimize->thread[thread + 1]; ++i)
00538     {
00539       e = optimize_norm (i);
00540       g_mutex_lock (mutex);
00541       optimize_best (i, e);
00542       optimize_save_variables (i, e);
00543       if (e < optimize->threshold)
00544         optimize->stop = 1;
00545       g_mutex_unlock (mutex);
00546       if (optimize->stop)
00547         break;
00548 #if DEBUG_OPTIMIZE
00549       fprintf (stderr, "optimize_thread:  i=%u e=%lg\n", i, e);
00550 #endif
00551     }
00552 #if DEBUG_OPTIMIZE
00553   fprintf (stderr, "optimize_thread:  end\n");
00554 #endif
00555   g_thread_exit (NULL);
00556   return NULL;
00557 }
00558
00562 static inline void
00563 optimize_merge (unsigned int nsaveds,
00564                 unsigned int *simulation_best,
00566                 double *error_best)
00568 {
00569   unsigned int i, j, k, s[optimize->nbest];
00570   double e[optimize->nbest];
00571 #if DEBUG_OPTIMIZE
00572   fprintf (stderr, "optimize_merge:  start\n");
00573 #endif
00574   i = j = k = 0;
00575   do
00576     {
00577       if (i == optimize->nsaveds)
00578         {
00579           s[k] = simulation_best[j];
00580           e[k] = error_best[j];
00581           ++j;
00582           ++k;
```

```
00583           if (j == nsaveds)
00584             break;
00585         }
00586       else if (j == nsaveds)
00587         {
00588           s[k] = optimize->simulation_best[i];
00589           e[k] = optimize->error_best[i];
00590           ++i;
00591           ++k;
00592           if (i == optimize->nsaveds)
00593             break;
00594         }
00595       else if (optimize->error_best[i] > error_best[j])
00596         {
00597           s[k] = simulation_best[j];
00598           e[k] = error_best[j];
00599           ++j;
00600           ++k;
00601         }
00602       else
00603         {
00604           s[k] = optimize->simulation_best[i];
00605           e[k] = optimize->error_best[i];
00606           ++i;
00607           ++k;
00608         }
00609     }
00610   while (k < optimize->nbest);
00611   optimize->nsaveds = k;
00612   memcpy (optimize->simulation_best, s, k * sizeof (unsigned int));
00613   memcpy (optimize->error_best, e, k * sizeof (double));
00614 #if DEBUG_OPTIMIZE
00615   fprintf (stderr, "optimize_merge:  end\n");
00616 #endif
00617 }
00618
00622 #if HAVE_MPI
00623 static void
00624 optimize_synchronise ()
00625 {
00626   unsigned int i, nsaveds, simulation_best[optimize->nbest], stop;
00627   double error_best[optimize->nbest];
00628   MPI_Status mpi_stat;
00629 #if DEBUG_OPTIMIZE
00630   fprintf (stderr, "optimize_synchronise:  start\n");
00631 #endif
00632   if (optimize->mpi_rank == 0)
00633     {
00634       for (i = 1; (int) i < ntasks; ++i)
00635         {
00636           MPI_Recv (&nsaveds, 1, MPI_INT, i, 1, MPI_COMM_WORLD, &mpi_stat);
00637           MPI_Recv (simulation_best, nsaveds, MPI_INT, i, 1,
00638                     MPI_COMM_WORLD, &mpi_stat);
00639           MPI_Recv (error_best, nsaveds, MPI_DOUBLE, i, 1,
00640                     MPI_COMM_WORLD, &mpi_stat);
00641           optimize_merge (nsaveds, simulation_best, error_best);
00642           MPI_Recv (&stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD, &mpi_stat);
00643           if (stop)
00644             optimize->stop = 1;
00645         }
00646       for (i = 1; (int) i < ntasks; ++i)
00647         MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD);
00648     }
00649   else
00650     {
00651       MPI_Send (&optimize->nsaveds, 1, MPI_INT, 0, 1, MPI_COMM_WORLD);
00652       MPI_Send (optimize->simulation_best, optimize->nsaveds, MPI_INT, 0, 1,
00653                 MPI_COMM_WORLD);
00654       MPI_Send (optimize->error_best, optimize->nsaveds, MPI_DOUBLE, 0, 1,
00655                 MPI_COMM_WORLD);
00656       MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD);
00657       MPI_Recv (&stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD, &mpi_stat);
00658       if (stop)
00659         optimize->stop = 1;
00660     }
00661 #if DEBUG_OPTIMIZE
00662   fprintf (stderr, "optimize_synchronise:  end\n");
00663 #endif
00664 }
00665 #endif
00666
00670 static void
00671 optimize_sweep ()
00672 {
00673   unsigned int i, j, k, l;
00674   double e;
00675   GThread *thread[nthreads];
```

```
00676   ParallelData data[nthreads];
00677 #if DEBUG_OPTIMIZE
00678   fprintf (stderr, "optimize_sweep:  start\n");
00679 #endif
00680   for (i = 0; i < optimize->nsimulations; ++i)
00681     {
00682       k = i;
00683       for (j = 0; j < optimize->nvariables; ++j)
00684         {
00685           l = k % optimize->nsweeps[j];
00686           k /= optimize->nsweeps[j];
00687           e = optimize->rangemin[j];
00688           if (optimize->nsweeps[j] > 1)
00689             e += l * (optimize->rangemax[j] - optimize->rangemin[j])
00690               / (optimize->nsweeps[j] - 1);
00691           optimize->value[i * optimize->nvariables + j] = e;
00692         }
00693     }
00694   optimize->nsaveds = 0;
00695   if (nthreads <= 1)
00696     optimize_sequential ();
00697   else
00698     {
00699       for (i = 0; i < nthreads; ++i)
00700         {
00701           data[i].thread = i;
00702           thread[i]
00703             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00704         }
00705       for (i = 0; i < nthreads; ++i)
00706         g_thread_join (thread[i]);
00707     }
00708 #if HAVE_MPI
00709   // Communicating tasks results
00710   optimize_synchronise ();
00711 #endif
00712 #if DEBUG_OPTIMIZE
00713   fprintf (stderr, "optimize_sweep:  end\n");
00714 #endif
00715 }
00716
00720 static void
00721 optimize_MonteCarlo ()
00722 {
00723   unsigned int i, j;
00724   GThread *thread[nthreads];
00725   ParallelData data[nthreads];
00726 #if DEBUG_OPTIMIZE
00727   fprintf (stderr, "optimize_MonteCarlo:  start\n");
00728 #endif
00729   for (i = 0; i < optimize->nsimulations; ++i)
00730     for (j = 0; j < optimize->nvariables; ++j)
00731       optimize->value[i * optimize->nvariables + j]
00732         = optimize->rangemin[j] + gsl_rng_uniform (optimize->rng)
00733         * (optimize->rangemax[j] - optimize->rangemin[j]);
00734   optimize->nsaveds = 0;
00735   if (nthreads <= 1)
00736     optimize_sequential ();
00737   else
00738     {
00739       for (i = 0; i < nthreads; ++i)
00740         {
00741           data[i].thread = i;
00742           thread[i]
00743             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00744         }
00745       for (i = 0; i < nthreads; ++i)
00746         g_thread_join (thread[i]);
00747     }
00748 #if HAVE_MPI
00749   // Communicating tasks results
00750   optimize_synchronise ();
00751 #endif
00752 #if DEBUG_OPTIMIZE
00753   fprintf (stderr, "optimize_MonteCarlo:  end\n");
00754 #endif
00755 }
00756
00760 static void
00761 optimize_orthogonal ()
00762 {
00763   unsigned int i, j, k, l;
00764   double e;
00765   GThread *thread[nthreads];
00766   ParallelData data[nthreads];
00767 #if DEBUG_OPTIMIZE
00768   fprintf (stderr, "optimize_orthogonal:  start\n");
```

```
00769 #endif
00770   for (i = 0; i < optimize->nsimulations; ++i)
00771     {
00772       k = i;
00773       for (j = 0; j < optimize->nvariables; ++j)
00774         {
00775           l = k % optimize->nsweeps[j];
00776           k /= optimize->nsweeps[j];
00777           e = optimize->rangemin[j];
00778           if (optimize->nsweeps[j] > 1)
00779             e += (l + gsl_rng_uniform (optimize->rng))
00780               * (optimize->rangemax[j] - optimize->rangemin[j])
00781               / optimize->nsweeps[j];
00782           optimize->value[i * optimize->nvariables + j] = e;
00783         }
00784     }
00785   optimize->nsaveds = 0;
00786   if (nthreads <= 1)
00787     optimize_sequential ();
00788   else
00789     {
00790       for (i = 0; i < nthreads; ++i)
00791         {
00792           data[i].thread = i;
00793           thread[i]
00794             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00795         }
00796       for (i = 0; i < nthreads; ++i)
00797         g_thread_join (thread[i]);
00798     }
00799 #if HAVE_MPI
00800   // Communicating tasks results
00801   optimize_synchronise ();
00802 #endif
00803 #if DEBUG_OPTIMIZE
00804   fprintf (stderr, "optimize_orthogonal:  end\n");
00805 #endif
00806 }
00807
00811 static void
00812 optimize_best_climbing (unsigned int simulation,
00813                         double value)
00814 {
00815 #if DEBUG_OPTIMIZE
00816   fprintf (stderr, "optimize_best_climbing:  start\n");
00817   fprintf (stderr,
00818            "optimize_best_climbing:  simulation=%u value=%.14le best=%.14le\n",
00819            simulation, value, optimize->error_best[0]);
00820 #endif
00821   if (value < optimize->error_best[0])
00822     {
00823       optimize->error_best[0] = value;
00824       optimize->simulation_best[0] = simulation;
00825 #if DEBUG_OPTIMIZE
00826       fprintf (stderr,
00827                "optimize_best_climbing:  BEST simulation=%u value=%.14le\n",
00828                simulation, value);
00829 #endif
00830     }
00831 #if DEBUG_OPTIMIZE
00832   fprintf (stderr, "optimize_best_climbing:  end\n");
00833 #endif
00834 }
00835
00839 static inline void
00840 optimize_climbing_sequential (unsigned int simulation)
00841 {
00842   double e;
00843   unsigned int i, j;
00844 #if DEBUG_OPTIMIZE
00845   fprintf (stderr, "optimize_climbing_sequential:  start\n");
00846   fprintf (stderr, "optimize_climbing_sequential:  nstart_climbing=%u "
00847            "nend_climbing=%u\n",
00848            optimize->nstart_climbing, optimize->nend_climbing);
00849 #endif
00850   for (i = optimize->nstart_climbing; i < optimize->nend_climbing; ++i)
00851     {
00852       j = simulation + i;
00853       e = optimize_norm (j);
00854       optimize_best_climbing (j, e);
00855       optimize_save_variables (j, e);
00856       if (e < optimize->threshold)
00857         {
00858           optimize->stop = 1;
00859           break;
00860         }
00861 #if DEBUG_OPTIMIZE
```

```
00862       fprintf (stderr, "optimize_climbing_sequential:  i=%u e=%lg\n", i, e);
00863 #endif
00864     }
00865 #if DEBUG_OPTIMIZE
00866   fprintf (stderr, "optimize_climbing_sequential:  end\n");
00867 #endif
00868 }
00869
00875 static void *
00876 optimize_climbing_thread (ParallelData * data)
00877 {
00878   unsigned int i, thread;
00879   double e;
00880 #if DEBUG_OPTIMIZE
00881   fprintf (stderr, "optimize_climbing_thread:  start\n");
00882 #endif
00883   thread = data->thread;
00884 #if DEBUG_OPTIMIZE
00885   fprintf (stderr, "optimize_climbing_thread:  thread=%u start=%u end=%u\n",
00886            thread,
00887            optimize->thread_climbing[thread],
00888            optimize->thread_climbing[thread + 1]);
00889 #endif
00890   for (i = optimize->thread_climbing[thread];
00891        i < optimize->thread_climbing[thread + 1]; ++i)
00892     {
00893       e = optimize_norm (i);
00894       g_mutex_lock (mutex);
00895       optimize_best_climbing (i, e);
00896       optimize_save_variables (i, e);
00897       if (e < optimize->threshold)
00898         optimize->stop = 1;
00899       g_mutex_unlock (mutex);
00900       if (optimize->stop)
00901         break;
00902 #if DEBUG_OPTIMIZE
00903       fprintf (stderr, "optimize_climbing_thread:  i=%u e=%lg\n", i, e);
00904 #endif
00905     }
00906 #if DEBUG_OPTIMIZE
00907   fprintf (stderr, "optimize_climbing_thread:  end\n");
00908 #endif
00909   g_thread_exit (NULL);
00910   return NULL;
00911 }
00912
00916 static double
00917 optimize_estimate_climbing_random (unsigned int variable,
00919                                    unsigned int estimate
00920                                    __attribute__((unused)))
00922 {
00923   double x;
00924 #if DEBUG_OPTIMIZE
00925   fprintf (stderr, "optimize_estimate_climbing_random:  start\n");
00926 #endif
00927   x = optimize->climbing[variable]
00928     + (1.  - 2.  * gsl_rng_uniform (optimize->rng)) * optimize->step[variable];
00929 #if DEBUG_OPTIMIZE
00930   fprintf (stderr, "optimize_estimate_climbing_random:  climbing%u=%lg\n",
00931            variable, x);
00932   fprintf (stderr, "optimize_estimate_climbing_random:  end\n");
00933 #endif
00934   return x;
00935 }
00936
00940 static double
00941 optimize_estimate_climbing_coordinates (unsigned int variable,
00943                                         unsigned int estimate)
00945 {
00946   double x;
00947 #if DEBUG_OPTIMIZE
00948   fprintf (stderr, "optimize_estimate_climbing_coordinates:  start\n");
00949 #endif
00950   x = optimize->climbing[variable];
00951   if (estimate >= (2 * variable) && estimate < (2 * variable + 2))
00952     {
00953       if (estimate & 1)
00954         x += optimize->step[variable];
00955       else
00956         x -= optimize->step[variable];
00957     }
00958 #if DEBUG_OPTIMIZE
00959   fprintf (stderr,
00960            "optimize_estimate_climbing_coordinates:  climbing%u=%lg\n",
00961            variable, x);
00962   fprintf (stderr, "optimize_estimate_climbing_coordinates:  end\n");
00963 #endif
```

```
00964   return x;
00965 }
00966
00970 static inline void
00971 optimize_step_climbing (unsigned int simulation)
00972 {
00973   GThread *thread[nthreads_climbing];
00974   ParallelData data[nthreads_climbing];
00975   unsigned int i, j, k, b;
00976 #if DEBUG_OPTIMIZE
00977   fprintf (stderr, "optimize_step_climbing:  start\n");
00978 #endif
00979   for (i = 0; i < optimize->nestimates; ++i)
00980     {
00981       k = (simulation + i) * optimize->nvariables;
00982       b = optimize->simulation_best[0] * optimize->nvariables;
00983 #if DEBUG_OPTIMIZE
00984       fprintf (stderr, "optimize_step_climbing:  simulation=%u best=%u\n",
00985                simulation + i, optimize->simulation_best[0]);
00986 #endif
00987       for (j = 0; j < optimize->nvariables; ++j, ++k, ++b)
00988         {
00989 #if DEBUG_OPTIMIZE
00990           fprintf (stderr,
00991                    "optimize_step_climbing:  estimate=%u best%u=%.14le\n",
00992                    i, j, optimize->value[b]);
00993 #endif
00994           optimize->value[k]
00995             = optimize->value[b] + optimize_estimate_climbing (j, i);
00996           optimize->value[k] = fmin (fmax (optimize->value[k],
00997                                            optimize->rangeminabs[j]),
00998                                      optimize->rangemaxabs[j]);
00999 #if DEBUG_OPTIMIZE
01000           fprintf (stderr,
01001                    "optimize_step_climbing:  estimate=%u variable%u=%.14le\n",
01002                    i, j, optimize->value[k]);
01003 #endif
01004         }
01005     }
01006   if (nthreads_climbing == 1)
01007     optimize_climbing_sequential (simulation);
01008   else
01009     {
01010       for (i = 0; i <= nthreads_climbing; ++i)
01011         {
01012           optimize->thread_climbing[i]
01013             = simulation + optimize->nstart_climbing
01014             + i * (optimize->nend_climbing - optimize->nstart_climbing)
01015             / nthreads_climbing;
01016 #if DEBUG_OPTIMIZE
01017           fprintf (stderr,
01018                    "optimize_step_climbing:  i=%u thread_climbing=%u\n",
01019                    i, optimize->thread_climbing[i]);
01020 #endif
01021         }
01022       for (i = 0; i < nthreads_climbing; ++i)
01023         {
01024           data[i].thread = i;
01025           thread[i] = g_thread_new
01026             (NULL, (GThreadFunc) optimize_climbing_thread, &data[i]);
01027         }
01028       for (i = 0; i < nthreads_climbing; ++i)
01029         g_thread_join (thread[i]);
01030     }
01031 #if DEBUG_OPTIMIZE
01032   fprintf (stderr, "optimize_step_climbing:  end\n");
01033 #endif
01034 }
01035
01039 static inline void
01040 optimize_climbing ()
01041 {
01042   unsigned int i, j, k, b, s, adjust;
01043 #if DEBUG_OPTIMIZE
01044   fprintf (stderr, "optimize_climbing:  start\n");
01045 #endif
01046   for (i = 0; i < optimize->nvariables; ++i)
01047     optimize->climbing[i] = 0.;
01048   b = optimize->simulation_best[0] * optimize->nvariables;
01049   s = optimize->nsimulations;
01050   adjust = 1;
01051   for (i = 0; i < optimize->nsteps; ++i, s += optimize->nestimates, b = k)
01052     {
01053 #if DEBUG_OPTIMIZE
01054       fprintf (stderr, "optimize_climbing:  step=%u old_best=%u\n",
01055                i, optimize->simulation_best[0]);
01056 #endif
```

```
01057       optimize_step_climbing (s);
01058       k = optimize->simulation_best[0] * optimize->nvariables;
01059 #if DEBUG_OPTIMIZE
01060       fprintf (stderr, "optimize_climbing:  step=%u best=%u\n",
01061                i, optimize->simulation_best[0]);
01062 #endif
01063       if (k == b)
01064         {
01065           if (adjust)
01066             for (j = 0; j < optimize->nvariables; ++j)
01067               optimize->step[j] *= 0.5;
01068           for (j = 0; j < optimize->nvariables; ++j)
01069             optimize->climbing[j] = 0.;
01070           adjust = 1;
01071         }
01072       else
01073         {
01074           for (j = 0; j < optimize->nvariables; ++j)
01075             {
01076 #if DEBUG_OPTIMIZE
01077               fprintf (stderr,
01078                        "optimize_climbing:  best%u=%.14le old%u=%.14le\n",
01079                        j, optimize->value[k + j], j, optimize->value[b + j]);
01080 #endif
01081               optimize->climbing[j]
01082                 = (1.  - optimize->relaxation) * optimize->climbing[j]
01083                 + optimize->relaxation
01084                 * (optimize->value[k + j] - optimize->value[b + j]);
01085 #if DEBUG_OPTIMIZE
01086               fprintf (stderr, "optimize_climbing:  climbing%u=%.14le\n",
01087                        j, optimize->climbing[j]);
01088 #endif
01089             }
01090           adjust = 0;
01091         }
01092     }
01093 #if DEBUG_OPTIMIZE
01094   fprintf (stderr, "optimize_climbing:  end\n");
01095 #endif
01096 }
01097
01103 static double
01104 optimize_genetic_objective (Entity * entity)
01105 {
01106   unsigned int j;
01107   double objective;
01108   char buffer[64];
01109 #if DEBUG_OPTIMIZE
01110   fprintf (stderr, "optimize_genetic_objective:  start\n");
01111 #endif
01112   for (j = 0; j < optimize->nvariables; ++j)
01113     {
01114       optimize->value[entity->id * optimize->nvariables + j]
01115         = genetic_get_variable (entity, optimize->genetic_variable + j);
01116     }
01117   objective = optimize_norm (entity->id);
01118   g_mutex_lock (mutex);
01119   for (j = 0; j < optimize->nvariables; ++j)
01120     {
01121       snprintf (buffer, 64, "%s ", format[optimize->precision[j]]);
01122       fprintf (optimize->file_variables, buffer,
01123                genetic_get_variable (entity, optimize->genetic_variable + j));
01124     }
01125   fprintf (optimize->file_variables, "%.14le\n", objective);
01126   g_mutex_unlock (mutex);
01127 #if DEBUG_OPTIMIZE
01128   fprintf (stderr, "optimize_genetic_objective:  end\n");
01129 #endif
01130   return objective;
01131 }
01132
01136 static void
01137 optimize_genetic ()
01138 {
01139   double *best_variable = NULL;
01140   char *best_genome = NULL;
01141   double best_objective = 0.;
01142 #if DEBUG_OPTIMIZE
01143   fprintf (stderr, "optimize_genetic:  start\n");
01144   fprintf (stderr, "optimize_genetic:  ntasks=%u nthreads=%u\n", ntasks,
01145            nthreads);
01146   fprintf (stderr,
01147            "optimize_genetic:  nvariables=%u population=%u generations=%u\n",
01148            optimize->nvariables, optimize->nsimulations, optimize->niterations);
01149   fprintf (stderr,
01150            "optimize_genetic:  mutation=%lg reproduction=%lg adaptation=%lg\n",
01151            optimize->mutation_ratio, optimize->reproduction_ratio,
```

```
01152           optimize->adaptation_ratio);
01153 #endif
01154   genetic_algorithm_default (optimize->nvariables,
01155                              optimize->genetic_variable,
01156                              optimize->nsimulations,
01157                              optimize->niterations,
01158                              optimize->mutation_ratio,
01159                              optimize->reproduction_ratio,
01160                              optimize->adaptation_ratio,
01161                              optimize->seed,
01162                              optimize->threshold,
01163                              &optimize_genetic_objective,
01164                              &best_genome, &best_variable, &best_objective);
01165 #if DEBUG_OPTIMIZE
01166   fprintf (stderr, "optimize_genetic:  the best\n");
01167 #endif
01168   optimize->error_old = (double *) g_malloc (sizeof (double));
01169   optimize->value_old
01170     = (double *) g_malloc (optimize->nvariables * sizeof (double));
01171   optimize->error_old[0] = best_objective;
01172   memcpy (optimize->value_old, best_variable,
01173           optimize->nvariables * sizeof (double));
01174   g_free (best_genome);
01175   g_free (best_variable);
01176   optimize_print ();
01177 #if DEBUG_OPTIMIZE
01178   fprintf (stderr, "optimize_genetic:  end\n");
01179 #endif
01180 }
01181
01185 static inline void
01186 optimize_save_old ()
01187 {
01188   unsigned int i, j;
01189 #if DEBUG_OPTIMIZE
01190   fprintf (stderr, "optimize_save_old:  start\n");
01191   fprintf (stderr, "optimize_save_old:  nsaveds=%u\n", optimize->nsaveds);
01192 #endif
01193   memcpy (optimize->error_old, optimize->error_best,
01194           optimize->nbest * sizeof (double));
01195   for (i = 0; i < optimize->nbest; ++i)
01196     {
01197       j = optimize->simulation_best[i];
01198 #if DEBUG_OPTIMIZE
01199       fprintf (stderr, "optimize_save_old:  i=%u j=%u\n", i, j);
01200 #endif
01201       memcpy (optimize->value_old + i * optimize->nvariables,
01202               optimize->value + j * optimize->nvariables,
01203               optimize->nvariables * sizeof (double));
01204     }
01205 #if DEBUG_OPTIMIZE
01206   for (i = 0; i < optimize->nvariables; ++i)
01207     fprintf (stderr, "optimize_save_old:  best variable %u=%lg\n",
01208              i, optimize->value_old[i]);
01209   fprintf (stderr, "optimize_save_old:  end\n");
01210 #endif
01211 }
01212
01217 static inline void
01218 optimize_merge_old ()
01219 {
01220   unsigned int i, j, k;
01221   double v[optimize->nbest * optimize->nvariables], e[optimize->nbest],
01222     *enew, *eold;
01223 #if DEBUG_OPTIMIZE
01224   fprintf (stderr, "optimize_merge_old:  start\n");
01225 #endif
01226   enew = optimize->error_best;
01227   eold = optimize->error_old;
01228   i = j = k = 0;
01229   do
01230     {
01231       if (*enew < *eold)
01232         {
01233           memcpy (v + k * optimize->nvariables,
01234                   optimize->value
01235                   + optimize->simulation_best[i] * optimize->nvariables,
01236                   optimize->nvariables * sizeof (double));
01237           e[k] = *enew;
01238           ++k;
01239           ++enew;
01240           ++i;
01241         }
01242       else
01243         {
01244           memcpy (v + k * optimize->nvariables,
01245                   optimize->value_old + j * optimize->nvariables,
```

```
01246                   optimize->nvariables * sizeof (double));
01247           e[k] = *eold;
01248           ++k;
01249           ++eold;
01250           ++j;
01251         }
01252     }
01253   while (k < optimize->nbest);
01254   memcpy (optimize->value_old, v, k * optimize->nvariables * sizeof (double));
01255   memcpy (optimize->error_old, e, k * sizeof (double));
01256 #if DEBUG_OPTIMIZE
01257   fprintf (stderr, "optimize_merge_old:  end\n");
01258 #endif
01259 }
01260
01265 static inline void
01266 optimize_refine ()
01267 {
01268   unsigned int i, j;
01269   double d;
01270 #if HAVE_MPI
01271   MPI_Status mpi_stat;
01272 #endif
01273 #if DEBUG_OPTIMIZE
01274   fprintf (stderr, "optimize_refine:  start\n");
01275 #endif
01276 #if HAVE_MPI
01277   if (!optimize->mpi_rank)
01278     {
01279 #endif
01280       for (j = 0; j < optimize->nvariables; ++j)
01281         {
01282           optimize->rangemin[j] = optimize->rangemax[j]
01283             = optimize->value_old[j];
01284         }
01285       for (i = 0; ++i < optimize->nbest;)
01286         {
01287           for (j = 0; j < optimize->nvariables; ++j)
01288             {
01289               optimize->rangemin[j]
01290                 = fmin (optimize->rangemin[j],
01291                         optimize->value_old[i * optimize->nvariables + j]);
01292               optimize->rangemax[j]
01293                 = fmax (optimize->rangemax[j],
01294                         optimize->value_old[i * optimize->nvariables + j]);
01295             }
01296         }
01297       for (j = 0; j < optimize->nvariables; ++j)
01298         {
01299           d = optimize->tolerance
01300             * (optimize->rangemax[j] - optimize->rangemin[j]);
01301           switch (optimize->algorithm)
01302             {
01303             case ALGORITHM_MONTE_CARLO:
01304               d *= 0.5;
01305               break;
01306             default:
01307               if (optimize->nsweeps[j] > 1)
01308                 d /= optimize->nsweeps[j] - 1;
01309               else
01310                 d = 0.;
01311             }
01312           optimize->rangemin[j] -= d;
01313           optimize->rangemin[j]
01314             = fmax (optimize->rangemin[j], optimize->rangeminabs[j]);
01315           optimize->rangemax[j] += d;
01316           optimize->rangemax[j]
01317             = fmin (optimize->rangemax[j], optimize->rangemaxabs[j]);
01318           printf ("%s min=%lg max=%lg\n", optimize->label[j],
01319                   optimize->rangemin[j], optimize->rangemax[j]);
01320           fprintf (optimize->file_result, "%s min=%lg max=%lg\n",
01321                    optimize->label[j], optimize->rangemin[j],
01322                    optimize->rangemax[j]);
01323         }
01324 #if HAVE_MPI
01325       for (i = 1; (int) i < ntasks; ++i)
01326         {
01327           MPI_Send (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, i,
01328                     1, MPI_COMM_WORLD);
01329           MPI_Send (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, i,
01330                     1, MPI_COMM_WORLD);
01331         }
01332     }
01333   else
01334     {
01335       MPI_Recv (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, 0, 1,
01336                 MPI_COMM_WORLD, &mpi_stat);
```

```
01337       MPI_Recv (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, 0, 1,
01338                 MPI_COMM_WORLD, &mpi_stat);
01339     }
01340 #endif
01341 #if DEBUG_OPTIMIZE
01342   fprintf (stderr, "optimize_refine:  end\n");
01343 #endif
01344 }
01345
01349 static void
01350 optimize_step ()
01351 {
01352 #if DEBUG_OPTIMIZE
01353   fprintf (stderr, "optimize_step:  start\n");
01354 #endif
01355   optimize_algorithm ();
01356   if (optimize->nsteps)
01357     optimize_climbing ();
01358 #if DEBUG_OPTIMIZE
01359   fprintf (stderr, "optimize_step:  end\n");
01360 #endif
01361 }
01362
01366 static inline void
01367 optimize_iterate ()
01368 {
01369   unsigned int i;
01370 #if DEBUG_OPTIMIZE
01371   fprintf (stderr, "optimize_iterate:  start\n");
01372 #endif
01373   optimize->error_old = (double *) g_malloc (optimize->nbest * sizeof (double));
01374   optimize->value_old =
01375     (double *) g_malloc (optimize->nbest * optimize->nvariables *
01376                          sizeof (double));
01377   optimize_step ();
01378   optimize_save_old ();
01379   optimize_refine ();
01380   optimize_print ();
01381   for (i = 1; i < optimize->niterations && !optimize->stop; ++i)
01382     {
01383       optimize_step ();
01384       optimize_merge_old ();
01385       optimize_refine ();
01386       optimize_print ();
01387     }
01388 #if DEBUG_OPTIMIZE
01389   fprintf (stderr, "optimize_iterate:  end\n");
01390 #endif
01391 }
01392
01396 void
01397 optimize_free ()
01398 {
01399   unsigned int i, j;
01400 #if DEBUG_OPTIMIZE
01401   fprintf (stderr, "optimize_free:  start\n");
01402 #endif
01403   for (j = 0; j < optimize->ninputs; ++j)
01404     {
01405       for (i = 0; i < optimize->nexperiments; ++i)
01406         g_mapped_file_unref (optimize->file[j][i]);
01407       g_free (optimize->file[j]);
01408     }
01409   g_free (optimize->error_old);
01410   g_free (optimize->value_old);
01411   g_free (optimize->value);
01412   g_free (optimize->genetic_variable);
01413 #if DEBUG_OPTIMIZE
01414   fprintf (stderr, "optimize_free:  end\n");
01415 #endif
01416 }
01417
01421 void
01422 optimize_open ()
01423 {
01424   GTimeZone *tz;
01425   GDateTime *t0, *t;
01426   unsigned int i, j;
01427
01428 #if DEBUG_OPTIMIZE
01429   char *buffer;
01430   fprintf (stderr, "optimize_open:  start\n");
01431 #endif
01432
01433   // Getting initial time
01434 #if DEBUG_OPTIMIZE
01435   fprintf (stderr, "optimize_open:  getting initial time\n");
```

```
01436 #endif
01437   tz = g_time_zone_new_utc ();
01438   t0 = g_date_time_new_now (tz);
01439
01440   // Obtaining and initing the pseudo-random numbers generator seed
01441 #if DEBUG_OPTIMIZE
01442   fprintf (stderr, "optimize_open:  getting initial seed\n");
01443 #endif
01444   if (optimize->seed == DEFAULT_RANDOM_SEED)
01445     optimize->seed = input->seed;
01446   gsl_rng_set (optimize->rng, optimize->seed);
01447
01448   // Replacing the working directory
01449 #if DEBUG_OPTIMIZE
01450   fprintf (stderr, "optimize_open:  replacing the working directory\n");
01451 #endif
01452   g_chdir (input->directory);
01453
01454   // Getting results file names
01455   optimize->result = input->result;
01456   optimize->variables = input->variables;
01457
01458   // Obtaining the simulator file
01459   optimize->simulator = input->simulator;
01460
01461   // Obtaining the evaluator file
01462   optimize->evaluator = input->evaluator;
01463
01464   // Reading the algorithm
01465   optimize->algorithm = input->algorithm;
01466   switch (optimize->algorithm)
01467     {
01468     case ALGORITHM_MONTE_CARLO:
01469       optimize_algorithm = optimize_MonteCarlo;
01470       break;
01471     case ALGORITHM_SWEEP:
01472       optimize_algorithm = optimize_sweep;
01473       break;
01474     case ALGORITHM_ORTHOGONAL:
01475       optimize_algorithm = optimize_orthogonal;
01476       break;
01477     default:
01478       optimize_algorithm = optimize_genetic;
01479       optimize->mutation_ratio = input->mutation_ratio;
01480       optimize->reproduction_ratio = input->reproduction_ratio;
01481       optimize->adaptation_ratio = input->adaptation_ratio;
01482     }
01483   optimize->nvariables = input->nvariables;
01484   optimize->nsimulations = input->nsimulations;
01485   optimize->niterations = input->niterations;
01486   optimize->nbest = input->nbest;
01487   optimize->tolerance = input->tolerance;
01488   optimize->nsteps = input->nsteps;
01489   optimize->nestimates = 0;
01490   optimize->threshold = input->threshold;
01491   optimize->stop = 0;
01492   if (input->nsteps)
01493     {
01494       optimize->relaxation = input->relaxation;
01495       switch (input->climbing)
01496         {
01497         case CLIMBING_METHOD_COORDINATES:
01498           optimize->nestimates = 2 * optimize->nvariables;
01499           optimize_estimate_climbing = optimize_estimate_climbing_coordinates;
01500           break;
01501         default:
01502           optimize->nestimates = input->nestimates;
01503           optimize_estimate_climbing = optimize_estimate_climbing_random;
01504         }
01505     }
01506
01507 #if DEBUG_OPTIMIZE
01508   fprintf (stderr, "optimize_open:  nbest=%u\n", optimize->nbest);
01509 #endif
01510   optimize->simulation_best
01511     = (unsigned int *) alloca (optimize->nbest * sizeof (unsigned int));
01512   optimize->error_best = (double *) alloca (optimize->nbest * sizeof (double));
01513
01514   // Reading the experimental data
01515 #if DEBUG_OPTIMIZE
01516   buffer = g_get_current_dir ();
01517   fprintf (stderr, "optimize_open:  current directory=%s\n", buffer);
01518   g_free (buffer);
01519 #endif
01520   optimize->nexperiments = input->nexperiments;
01521   optimize->ninputs = input->experiment->ninputs;
01522   optimize->experiment
```

```
01523     = (char **) alloca (input->nexperiments * sizeof (char *));
01524   optimize->weight = (double *) alloca (input->nexperiments * sizeof (double));
01525   for (i = 0; i < input->experiment->ninputs; ++i)
01526     optimize->file[i] = (GMappedFile **)
01527       g_malloc (input->nexperiments * sizeof (GMappedFile *));
01528   for (i = 0; i < input->nexperiments; ++i)
01529     {
01530 #if DEBUG_OPTIMIZE
01531       fprintf (stderr, "optimize_open:  i=%u\n", i);
01532 #endif
01533       optimize->experiment[i] = input->experiment[i].name;
01534       optimize->weight[i] = input->experiment[i].weight;
01535 #if DEBUG_OPTIMIZE
01536       fprintf (stderr, "optimize_open:  experiment=%s weight=%lg\n",
01537                optimize->experiment[i], optimize->weight[i]);
01538 #endif
01539       for (j = 0; j < input->experiment->ninputs; ++j)
01540         {
01541 #if DEBUG_OPTIMIZE
01542           fprintf (stderr, "optimize_open:  stencil%u\n", j + 1);
01543 #endif
01544           optimize->file[j][i]
01545             = g_mapped_file_new (input->experiment[i].stencil[j], 0, NULL);
01546         }
01547     }
01548
01549   // Reading the variables data
01550 #if DEBUG_OPTIMIZE
01551   fprintf (stderr, "optimize_open:  reading variables\n");
01552 #endif
01553   optimize->label = (char **) alloca (input->nvariables * sizeof (char *));
01554   j = input->nvariables * sizeof (double);
01555   optimize->rangemin = (double *) alloca (j);
01556   optimize->rangeminabs = (double *) alloca (j);
01557   optimize->rangemax = (double *) alloca (j);
01558   optimize->rangemaxabs = (double *) alloca (j);
01559   optimize->step = (double *) alloca (j);
01560   j = input->nvariables * sizeof (unsigned int);
01561   optimize->precision = (unsigned int *) alloca (j);
01562   optimize->nsweeps = (unsigned int *) alloca (j);
01563   optimize->nbits = (unsigned int *) alloca (j);
01564   for (i = 0; i < input->nvariables; ++i)
01565     {
01566       optimize->label[i] = input->variable[i].name;
01567       optimize->rangemin[i] = input->variable[i].rangemin;
01568       optimize->rangeminabs[i] = input->variable[i].rangeminabs;
01569       optimize->rangemax[i] = input->variable[i].rangemax;
01570       optimize->rangemaxabs[i] = input->variable[i].rangemaxabs;
01571       optimize->precision[i] = input->variable[i].precision;
01572       optimize->step[i] = input->variable[i].step;
01573       optimize->nsweeps[i] = input->variable[i].nsweeps;
01574       optimize->nbits[i] = input->variable[i].nbits;
01575     }
01576   if (input->algorithm == ALGORITHM_SWEEP
01577       || input->algorithm == ALGORITHM_ORTHOGONAL)
01578     {
01579       optimize->nsimulations = 1;
01580       for (i = 0; i < input->nvariables; ++i)
01581         {
01582           optimize->nsimulations *= optimize->nsweeps[i];
01583 #if DEBUG_OPTIMIZE
01584           fprintf (stderr, "optimize_open:  nsweeps=%u nsimulations=%u\n",
01585                    optimize->nsweeps[i], optimize->nsimulations);
01586 #endif
01587         }
01588     }
01589   if (optimize->nsteps)
01590     optimize->climbing
01591       = (double *) alloca (optimize->nvariables * sizeof (double));
01592
01593   // Setting error norm
01594   switch (input->norm)
01595     {
01596     case ERROR_NORM_EUCLIDIAN:
01597       optimize_norm = optimize_norm_euclidian;
01598       break;
01599     case ERROR_NORM_MAXIMUM:
01600       optimize_norm = optimize_norm_maximum;
01601       break;
01602     case ERROR_NORM_P:
01603       optimize_norm = optimize_norm_p;
01604       optimize->p = input->p;
01605       break;
01606     default:
01607       optimize_norm = optimize_norm_taxicab;
01608     }
01609
```

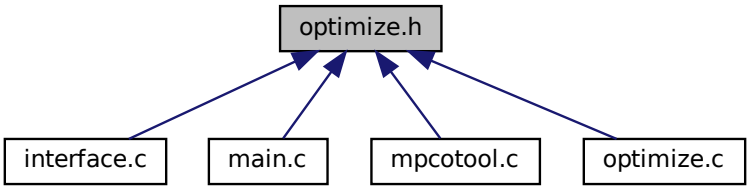
```
01610   // Allocating values
01611 #if DEBUG_OPTIMIZE
01612   fprintf (stderr, "optimize_open:  allocating variables\n");
01613   fprintf (stderr, "optimize_open:  nvariables=%u algorithm=%u\n",
01614            optimize->nvariables, optimize->algorithm);
01615 #endif
01616   optimize->genetic_variable = NULL;
01617   if (optimize->algorithm == ALGORITHM_GENETIC)
01618     {
01619       optimize->genetic_variable = (GeneticVariable *)
01620         g_malloc (optimize->nvariables * sizeof (GeneticVariable));
01621       for (i = 0; i < optimize->nvariables; ++i)
01622         {
01623 #if DEBUG_OPTIMIZE
01624           fprintf (stderr, "optimize_open:  i=%u min=%lg max=%lg nbits=%u\n",
01625                    i, optimize->rangemin[i], optimize->rangemax[i],
01626                    optimize->nbits[i]);
01627 #endif
01628           optimize->genetic_variable[i].minimum = optimize->rangemin[i];
01629           optimize->genetic_variable[i].maximum = optimize->rangemax[i];
01630           optimize->genetic_variable[i].nbits = optimize->nbits[i];
01631         }
01632     }
01633 #if DEBUG_OPTIMIZE
01634   fprintf (stderr, "optimize_open:  nvariables=%u nsimulations=%u\n",
01635            optimize->nvariables, optimize->nsimulations);
01636 #endif
01637   optimize->value = (double *)
01638     g_malloc ((optimize->nsimulations
01639                + optimize->nestimates * optimize->nsteps)
01640               * optimize->nvariables * sizeof (double));
01641
01642   // Calculating simulations to perform for each task
01643 #if HAVE_MPI
01644 #if DEBUG_OPTIMIZE
01645   fprintf (stderr, "optimize_open:  rank=%u ntasks=%u\n",
01646            optimize->mpi_rank, ntasks);
01647 #endif
01648   optimize->nstart = optimize->mpi_rank * optimize->nsimulations / ntasks;
01649   optimize->nend = (1 + optimize->mpi_rank) * optimize->nsimulations / ntasks;
01650   if (optimize->nsteps)
01651     {
01652       optimize->nstart_climbing
01653         = optimize->mpi_rank * optimize->nestimates / ntasks;
01654       optimize->nend_climbing
01655         = (1 + optimize->mpi_rank) * optimize->nestimates / ntasks;
01656     }
01657 #else
01658   optimize->nstart = 0;
01659   optimize->nend = optimize->nsimulations;
01660   if (optimize->nsteps)
01661     {
01662       optimize->nstart_climbing = 0;
01663       optimize->nend_climbing = optimize->nestimates;
01664     }
01665 #endif
01666 #if DEBUG_OPTIMIZE
01667   fprintf (stderr, "optimize_open:  nstart=%u nend=%u\n", optimize->nstart,
01668            optimize->nend);
01669 #endif
01670
01671   // Calculating simulations to perform for each thread
01672   optimize->thread
01673     = (unsigned int *) alloca ((1 + nthreads) * sizeof (unsigned int));
01674   for (i = 0; i <= nthreads; ++i)
01675     {
01676       optimize->thread[i] = optimize->nstart
01677         + i * (optimize->nend - optimize->nstart) / nthreads;
01678 #if DEBUG_OPTIMIZE
01679       fprintf (stderr, "optimize_open:  i=%u thread=%u\n", i,
01680                optimize->thread[i]);
01681 #endif
01682     }
01683   if (optimize->nsteps)
01684     optimize->thread_climbing = (unsigned int *)
01685       alloca ((1 + nthreads_climbing) * sizeof (unsigned int));
01686
01687   // Opening result files
01688   optimize->file_result = g_fopen (optimize->result, "w");
01689   optimize->file_variables = g_fopen (optimize->variables, "w");
01690
01691   // Performing the algorithm
01692   switch (optimize->algorithm)
01693     {
01694       // Genetic algorithm
01695     case ALGORITHM_GENETIC:
01696       optimize_genetic ();
```

```
01697       break;
01698
01699       // Iterative algorithm
01700     default:
01701       optimize_iterate ();
01702     }
01703
01704   // Getting calculation time
01705   t = g_date_time_new_now (tz);
01706   optimize->calculation_time = 0.000001 * g_date_time_difference (t, t0);
01707   g_date_time_unref (t);
01708   g_date_time_unref (t0);
01709   g_time_zone_unref (tz);
01710   printf ("%s = %.6lg s\n", _("Calculation time"), optimize->calculation_time);
01711   fprintf (optimize->file_result, "%s = %.6lg s\n",
01712            _("Calculation time"), optimize->calculation_time);
01713
01714   // Closing result files
01715   fclose (optimize->file_variables);
01716   fclose (optimize->file_result);
01717
01718 #if DEBUG_OPTIMIZE
01719   fprintf (stderr, "optimize_open:  end\n");
01720 #endif
01721 }
```

5.23 optimize.h File Reference

Header file to define the optimization functions.

This graph shows which files directly or indirectly include this file:



Data Structures

- struct Optimize

  Struct to define the optimization ation data.
- struct ParallelData

  Struct to pass to the GThreads parallelized function.

Functions

- void optimize_free ()
- void optimize_open ()

Variables

- int **ntasks**
- unsigned int **nthreads**
- unsigned int nthreads_climbing

  Number of threads for the hill climbing method.
- GMutex **mutex** [1]
- Optimize optimize [1]

  Optimization data.

5.23.1 Detailed Description

Header file to define the optimization functions.

Authors

Javier Burguete.

Copyright

Definition in file optimize.h.

5.23.2 Function Documentation

5.23.2.1 optimize_free()

```
void optimize_free ( )
```

Function to free the memory used by the Optimize struct.

Definition at line 1397 of file optimize.c.

```
01398 {
01399   unsigned int i, j;
01400 #if DEBUG_OPTIMIZE
01401   fprintf (stderr, "optimize_free:  start\n");
01402 #endif
01403   for (j = 0; j < optimize->ninputs; ++j)
01404     {
01405       for (i = 0; i < optimize->nexperiments; ++i)
01406         g_mapped_file_unref (optimize->file[j][i]);
01407       g_free (optimize->file[j]);
01408     }
01409   g_free (optimize->error_old);
01410   g_free (optimize->value_old);
01411   g_free (optimize->value);
01412   g_free (optimize->genetic_variable);
01413 #if DEBUG_OPTIMIZE
01414   fprintf (stderr, "optimize_free:  end\n");
01415 #endif
01416 }
```

5.23.2.2 optimize_open()

```
void optimize_open ( )
```

Function to open and perform a optimization.

Definition at line 1422 of file optimize.c.

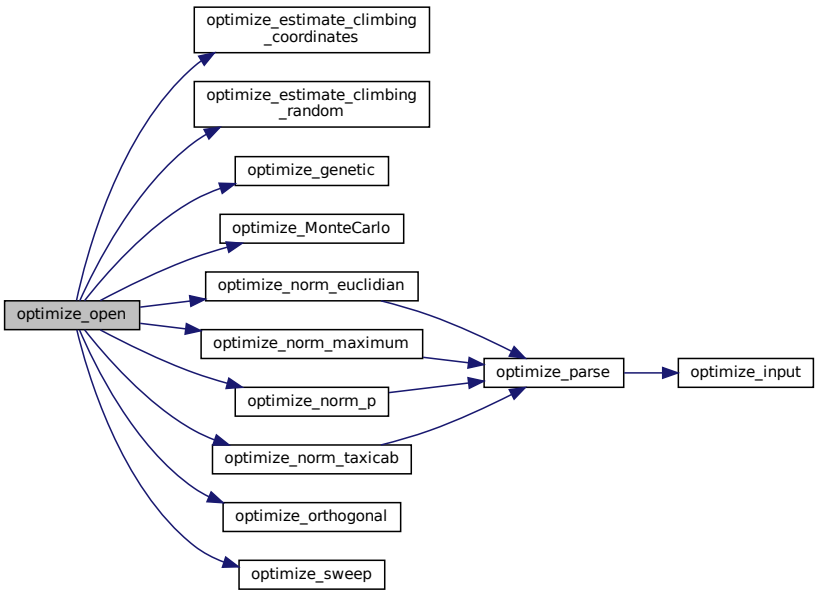
```
01423 {
01424   GTimeZone *tz;
01425   GDateTime *t0, *t;
01426   unsigned int i, j;
01427
01428 #if DEBUG_OPTIMIZE
01429   char *buffer;
01430   fprintf (stderr, "optimize_open:  start\n");
01431 #endif
01432
01433   // Getting initial time
01434 #if DEBUG_OPTIMIZE
01435   fprintf (stderr, "optimize_open:  getting initial time\n");
01436 #endif
01437   tz = g_time_zone_new_utc ();
01438   t0 = g_date_time_new_now (tz);
01439
01440   // Obtaining and initing the pseudo-random numbers generator seed
01441 #if DEBUG_OPTIMIZE
01442   fprintf (stderr, "optimize_open:  getting initial seed\n");
01443 #endif
01444   if (optimize->seed == DEFAULT_RANDOM_SEED)
01445     optimize->seed = input->seed;
01446   gsl_rng_set (optimize->rng, optimize->seed);
01447
01448   // Replacing the working directory
01449 #if DEBUG_OPTIMIZE
01450   fprintf (stderr, "optimize_open:  replacing the working directory\n");
01451 #endif
01452   g_chdir (input->directory);
01453
01454   // Getting results file names
01455   optimize->result = input->result;
01456   optimize->variables = input->variables;
01457
01458   // Obtaining the simulator file
01459   optimize->simulator = input->simulator;
01460
01461   // Obtaining the evaluator file
01462   optimize->evaluator = input->evaluator;
01463
01464   // Reading the algorithm
01465   optimize->algorithm = input->algorithm;
01466   switch (optimize->algorithm)
01467     {
01468     case ALGORITHM_MONTE_CARLO:
01469       optimize_algorithm = optimize_MonteCarlo;
01470       break;
01471     case ALGORITHM_SWEEP:
01472       optimize_algorithm = optimize_sweep;
01473       break;
01474     case ALGORITHM_ORTHOGONAL:
01475       optimize_algorithm = optimize_orthogonal;
01476       break;
01477     default:
01478       optimize_algorithm = optimize_genetic;
01479       optimize->mutation_ratio = input->mutation_ratio;
01480       optimize->reproduction_ratio = input->reproduction_ratio;
01481       optimize->adaptation_ratio = input->adaptation_ratio;
01482     }
01483   optimize->nvariables = input->nvariables;
01484   optimize->nsimulations = input->nsimulations;
01485   optimize->niterations = input->niterations;
01486   optimize->nbest = input->nbest;
01487   optimize->tolerance = input->tolerance;
01488   optimize->nsteps = input->nsteps;
01489   optimize->nestimates = 0;
01490   optimize->threshold = input->threshold;
01491   optimize->stop = 0;
01492   if (input->nsteps)
01493     {
01494       optimize->relaxation = input->relaxation;
01495       switch (input->climbing)
01496         {
01497         case CLIMBING_METHOD_COORDINATES:
01498           optimize->nestimates = 2 * optimize->nvariables;
```

```
01499           optimize_estimate_climbing = optimize_estimate_climbing_coordinates;
01500           break;
01501         default:
01502           optimize->nestimates = input->nestimates;
01503           optimize_estimate_climbing = optimize_estimate_climbing_random;
01504         }
01505     }
01506
01507 #if DEBUG_OPTIMIZE
01508   fprintf (stderr, "optimize_open:  nbest=%u\n", optimize->nbest);
01509 #endif
01510   optimize->simulation_best
01511     = (unsigned int *) alloca (optimize->nbest * sizeof (unsigned int));
01512   optimize->error_best = (double *) alloca (optimize->nbest * sizeof (double));
01513
01514   // Reading the experimental data
01515 #if DEBUG_OPTIMIZE
01516   buffer = g_get_current_dir ();
01517   fprintf (stderr, "optimize_open:  current directory=%s\n", buffer);
01518   g_free (buffer);
01519 #endif
01520   optimize->nexperiments = input->nexperiments;
01521   optimize->ninputs = input->experiment->ninputs;
01522   optimize->experiment
01523     = (char **) alloca (input->nexperiments * sizeof (char *));
01524   optimize->weight = (double *) alloca (input->nexperiments * sizeof (double));
01525   for (i = 0; i < input->experiment->ninputs; ++i)
01526     optimize->file[i] = (GMappedFile **)
01527       g_malloc (input->nexperiments * sizeof (GMappedFile *));
01528   for (i = 0; i < input->nexperiments; ++i)
01529     {
01530 #if DEBUG_OPTIMIZE
01531       fprintf (stderr, "optimize_open:  i=%u\n", i);
01532 #endif
01533       optimize->experiment[i] = input->experiment[i].name;
01534       optimize->weight[i] = input->experiment[i].weight;
01535 #if DEBUG_OPTIMIZE
01536       fprintf (stderr, "optimize_open:  experiment=%s weight=%lg\n",
01537                optimize->experiment[i], optimize->weight[i]);
01538 #endif
01539       for (j = 0; j < input->experiment->ninputs; ++j)
01540         {
01541 #if DEBUG_OPTIMIZE
01542           fprintf (stderr, "optimize_open:  stencil%u\n", j + 1);
01543 #endif
01544           optimize->file[j][i]
01545             = g_mapped_file_new (input->experiment[i].stencil[j], 0, NULL);
01546         }
01547     }
01548
01549   // Reading the variables data
01550 #if DEBUG_OPTIMIZE
01551   fprintf (stderr, "optimize_open:  reading variables\n");
01552 #endif
01553   optimize->label = (char **) alloca (input->nvariables * sizeof (char *));
01554   j = input->nvariables * sizeof (double);
01555   optimize->rangemin = (double *) alloca (j);
01556   optimize->rangeminabs = (double *) alloca (j);
01557   optimize->rangemax = (double *) alloca (j);
01558   optimize->rangemaxabs = (double *) alloca (j);
01559   optimize->step = (double *) alloca (j);
01560   j = input->nvariables * sizeof (unsigned int);
01561   optimize->precision = (unsigned int *) alloca (j);
01562   optimize->nsweeps = (unsigned int *) alloca (j);
01563   optimize->nbits = (unsigned int *) alloca (j);
01564   for (i = 0; i < input->nvariables; ++i)
01565     {
01566       optimize->label[i] = input->variable[i].name;
01567       optimize->rangemin[i] = input->variable[i].rangemin;
01568       optimize->rangeminabs[i] = input->variable[i].rangeminabs;
01569       optimize->rangemax[i] = input->variable[i].rangemax;
01570       optimize->rangemaxabs[i] = input->variable[i].rangemaxabs;
01571       optimize->precision[i] = input->variable[i].precision;
01572       optimize->step[i] = input->variable[i].step;
01573       optimize->nsweeps[i] = input->variable[i].nsweeps;
01574       optimize->nbits[i] = input->variable[i].nbits;
01575     }
01576   if (input->algorithm == ALGORITHM_SWEEP
01577       || input->algorithm == ALGORITHM_ORTHOGONAL)
01578     {
01579       optimize->nsimulations = 1;
01580       for (i = 0; i < input->nvariables; ++i)
01581         {
01582           optimize->nsimulations *= optimize->nsweeps[i];
01583 #if DEBUG_OPTIMIZE
01584           fprintf (stderr, "optimize_open:  nsweeps=%u nsimulations=%u\n",
01585                    optimize->nsweeps[i], optimize->nsimulations);
```

```
01586 #endif
01587         }
01588     }
01589   if (optimize->nsteps)
01590     optimize->climbing
01591       = (double *) alloca (optimize->nvariables * sizeof (double));
01592
01593   // Setting error norm
01594   switch (input->norm)
01595     {
01596     case ERROR_NORM_EUCLIDIAN:
01597       optimize_norm = optimize_norm_euclidian;
01598       break;
01599     case ERROR_NORM_MAXIMUM:
01600       optimize_norm = optimize_norm_maximum;
01601       break;
01602     case ERROR_NORM_P:
01603       optimize_norm = optimize_norm_p;
01604       optimize->p = input->p;
01605       break;
01606     default:
01607       optimize_norm = optimize_norm_taxicab;
01608     }
01609
01610   // Allocating values
01611 #if DEBUG_OPTIMIZE
01612   fprintf (stderr, "optimize_open:  allocating variables\n");
01613   fprintf (stderr, "optimize_open:  nvariables=%u algorithm=%u\n",
01614            optimize->nvariables, optimize->algorithm);
01615 #endif
01616   optimize->genetic_variable = NULL;
01617   if (optimize->algorithm == ALGORITHM_GENETIC)
01618     {
01619       optimize->genetic_variable = (GeneticVariable *)
01620         g_malloc (optimize->nvariables * sizeof (GeneticVariable));
01621       for (i = 0; i < optimize->nvariables; ++i)
01622         {
01623 #if DEBUG_OPTIMIZE
01624           fprintf (stderr, "optimize_open:  i=%u min=%lg max=%lg nbits=%u\n",
01625                    i, optimize->rangemin[i], optimize->rangemax[i],
01626                    optimize->nbits[i]);
01627 #endif
01628           optimize->genetic_variable[i].minimum = optimize->rangemin[i];
01629           optimize->genetic_variable[i].maximum = optimize->rangemax[i];
01630           optimize->genetic_variable[i].nbits = optimize->nbits[i];
01631         }
01632     }
01633 #if DEBUG_OPTIMIZE
01634   fprintf (stderr, "optimize_open:  nvariables=%u nsimulations=%u\n",
01635            optimize->nvariables, optimize->nsimulations);
01636 #endif
01637   optimize->value = (double *)
01638     g_malloc ((optimize->nsimulations
01639                + optimize->nestimates * optimize->nsteps)
01640               * optimize->nvariables * sizeof (double));
01641
01642   // Calculating simulations to perform for each task
01643 #if HAVE_MPI
01644 #if DEBUG_OPTIMIZE
01645   fprintf (stderr, "optimize_open:  rank=%u ntasks=%u\n",
01646            optimize->mpi_rank, ntasks);
01647 #endif
01648   optimize->nstart = optimize->mpi_rank * optimize->nsimulations / ntasks;
01649   optimize->nend = (1 + optimize->mpi_rank) * optimize->nsimulations / ntasks;
01650   if (optimize->nsteps)
01651     {
01652       optimize->nstart_climbing
01653         = optimize->mpi_rank * optimize->nestimates / ntasks;
01654       optimize->nend_climbing
01655         = (1 + optimize->mpi_rank) * optimize->nestimates / ntasks;
01656     }
01657 #else
01658   optimize->nstart = 0;
01659   optimize->nend = optimize->nsimulations;
01660   if (optimize->nsteps)
01661     {
01662       optimize->nstart_climbing = 0;
01663       optimize->nend_climbing = optimize->nestimates;
01664     }
01665 #endif
01666 #if DEBUG_OPTIMIZE
01667   fprintf (stderr, "optimize_open:  nstart=%u nend=%u\n", optimize->nstart,
01668            optimize->nend);
01669 #endif
01670
01671   // Calculating simulations to perform for each thread
01672   optimize->thread
```

```
01673     = (unsigned int *) alloca ((1 + nthreads) * sizeof (unsigned int));
01674   for (i = 0; i <= nthreads; ++i)
01675     {
01676       optimize->thread[i] = optimize->nstart
01677         + i * (optimize->nend - optimize->nstart) / nthreads;
01678 #if DEBUG_OPTIMIZE
01679       fprintf (stderr, "optimize_open:  i=%u thread=%u\n", i,
01680                optimize->thread[i]);
01681 #endif
01682     }
01683   if (optimize->nsteps)
01684     optimize->thread_climbing = (unsigned int *)
01685       alloca ((1 + nthreads_climbing) * sizeof (unsigned int));
01686
01687   // Opening result files
01688   optimize->file_result = g_fopen (optimize->result, "w");
01689   optimize->file_variables = g_fopen (optimize->variables, "w");
01690
01691   // Performing the algorithm
01692   switch (optimize->algorithm)
01693     {
01694       // Genetic algorithm
01695     case ALGORITHM_GENETIC:
01696       optimize_genetic ();
01697       break;
01698
01699       // Iterative algorithm
01700     default:
01701       optimize_iterate ();
01702     }
01703
01704   // Getting calculation time
01705   t = g_date_time_new_now (tz);
01706   optimize->calculation_time = 0.000001 * g_date_time_difference (t, t0);
01707   g_date_time_unref (t);
01708   g_date_time_unref (t0);
01709   g_time_zone_unref (tz);
01710   printf ("%s = %.6lg s\n", _("Calculation time"), optimize->calculation_time);
01711   fprintf (optimize->file_result, "%s = %.6lg s\n",
01712            _("Calculation time"), optimize->calculation_time);
01713
01714   // Closing result files
01715   fclose (optimize->file_variables);
01716   fclose (optimize->file_result);
01717
01718 #if DEBUG_OPTIMIZE
01719   fprintf (stderr, "optimize_open:  end\n");
01720 #endif
01721 }
```

Here is the call graph for this function:



5.23.3 Variable Documentation

5.23.3.1 nthreads_climbing

```
unsigned int nthreads_climbing  [extern]
```

Number of threads for the hill climbing method.

Definition at line 80 of file optimize.c.

5.23.3.2 optimize

```
Optimize optimize[1]  [extern]
```

Optimization data.

Definition at line 79 of file optimize.c.

5.24 optimize.h

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
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00019
00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
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00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #ifndef OPTIMIZE__H
00039 #define OPTIMIZE__H 1
00040
00045 typedef struct
00046 {
00047   GMappedFile **file[MAX_NINPUTS];
00048   char **experiment;
00049   char **label;
00050   gsl_rng *rng;
```

```
00051   GeneticVariable *genetic_variable;
00053   FILE *file_result;
00054   FILE *file_variables;
00055   char *result;
00056   char *variables;
00057   char *simulator;
00058   char *evaluator;
00060   double *value;
00061   double *rangemin;
00062   double *rangemax;
00063   double *rangeminabs;
00064   double *rangemaxabs;
00065   double *error_best;
00066   double *weight;
00067   double *step;
00068   double *climbing;
00069   double *value_old;
00071   double *error_old;
00073   unsigned int *precision;
00074   unsigned int *nsweeps;
00075   unsigned int *nbits;
00077   unsigned int *thread;
00079   unsigned int *thread_climbing;
00082   unsigned int *simulation_best;
00083   double tolerance;
00084   double mutation_ratio;
00085   double reproduction_ratio;
00086   double adaptation_ratio;
00087   double relaxation;
00088   double calculation_time;
00089   double p;
00090   double threshold;
00091   unsigned long int seed;
00093   unsigned int nvariables;
00094   unsigned int nexperiments;
00095   unsigned int ninputs;
00096   unsigned int nsimulations;
00097   unsigned int nsteps;
00099   unsigned int nestimates;
00101   unsigned int algorithm;
00102   unsigned int nstart;
00103   unsigned int nend;
00104   unsigned int nstart_climbing;
00106   unsigned int nend_climbing;
00108   unsigned int niterations;
00109   unsigned int nbest;
00110   unsigned int nsaveds;
00111   unsigned int stop;
00112 #if HAVE_MPI
00113   int mpi_rank;
00114 #endif
00115 } Optimize;
00116
00121 typedef struct
00122 {
00123   unsigned int thread;
00124 } ParallelData;
00125
00126 // Global variables
00127 extern int ntasks;
00128 extern unsigned int nthreads;
00129 extern unsigned int nthreads_climbing;
00130 extern GMutex mutex[1];
00131 extern Optimize optimize[1];
00132
00133 // Public functions
00134 void optimize_free ();
00135 void optimize_open ();
00136
00137 #endif
```

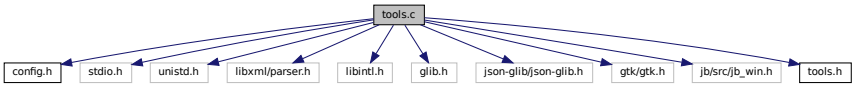
5.25 tools.c File Reference

Source file to define some useful functions.

```
#include "config.h"
#include <stdio.h>
#include <unistd.h>
#include <libxml/parser.h>
```

```
#include <libintl.h>
#include <glib.h>
#include <json-glib/json-glib.h>
#include <gtk/gtk.h>
#include "jb/src/jb_win.h"
#include "tools.h"
```

Include dependency graph for tools.c:



Variables

- GtkWindow * main_window

  Main GtkWindow.
- char * error_message

  Error message.
- void(* show_pending)() = NULL

  Pointer to the function to show pending events.

5.25.1 Detailed Description

Source file to define some useful functions.

Authors

Javier Burguete and Borja Latorre.

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Definition in file tools.c.

5.25.2 Variable Documentation

5.25.2.1 error_message

```
char* error_message
```

Error message.

Definition at line 59 of file tools.c.

5.25.2.2 main_window

```
GtkWindow* main_window
```

Main GtkWindow.

Definition at line 56 of file tools.c.

5.25.2.3 show_pending

```
void(* show_pending) () ( ) = NULL
```

Pointer to the function to show pending events.

Definition at line 60 of file tools.c.

5.26 tools.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
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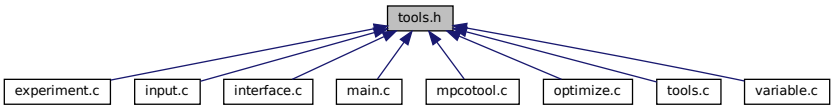
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <unistd.h>
00042 #include <libxml/parser.h>
00043 #include <libintl.h>
00044 #include <glib.h>
00045 #include <json-glib/json-glib.h>
00046 #ifdef G_OS_WIN32
00047 #include <windows.h>
00048 #endif
00049 #if HAVE_GTK
00050 #include <gtk/gtk.h>
00051 #endif
00052 #include "jb/src/jb_win.h"
00053 #include "tools.h"
00054
00055 #if HAVE_GTK
00056 GtkWindow *main_window;
00057 #endif
00058
00059 char *error_message;
00060 void (*show_pending) () = NULL;
```

5.27 tools.h File Reference

Header file to define some useful functions.

This graph shows which files directly or indirectly include this file:



Macros

- #define ERROR_TYPE GTK_MESSAGE_ERROR

  Macro to define the error message type.
- #define INFO_TYPE GTK_MESSAGE_INFO

  Macro to define the information message type.

Variables

- GtkWindow * main_window

  Main GtkWindow.
- GtkWindow * **window_parent**
- char * error_message

  Error message.
- void(* show_pending)()

  Pointer to the function to show pending events.

5.27.1 Detailed Description

Header file to define some useful functions.

Authors

Javier Burguete.

Copyright

Definition in file tools.h.

5.27.2 Macro Definition Documentation

5.27.2.1 ERROR_TYPE

```
#define ERROR_TYPE GTK_MESSAGE_ERROR
```

Macro to define the error message type.

Definition at line 48 of file tools.h.

5.27.2.2 INFO_TYPE

```
#define INFO_TYPE GTK_MESSAGE_INFO
```

Macro to define the information message type.

Definition at line 49 of file tools.h.

5.27.3 Variable Documentation

5.27.3.1 error_message

```
char* error_message  [extern]
```

Error message.

Definition at line 59 of file tools.c.

5.27.3.2 main_window

```
GtkWindow* main_window  [extern]
```

Main GtkWindow.

Definition at line 56 of file tools.c.

5.27.3.3 show_pending

```
void(* show_pending) () ( )  [extern]
```

Pointer to the function to show pending events.

Definition at line 60 of file tools.c.

5.28 tools.h

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
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00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
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00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #ifndef TOOLS__H
00039 #define TOOLS__H 1
00040
00047 #if HAVE_GTK
00048 #define ERROR_TYPE GTK_MESSAGE_ERROR
00049 #define INFO_TYPE GTK_MESSAGE_INFO
00050 extern GtkWindow *main_window;
00051 extern GtkWindow *window_parent;
00052 #else
00053 #define ERROR_TYPE 0
00054 #define INFO_TYPE 0
00055 #endif
00056
00057 // Public functions
00058
00059 extern char *error_message;
00060 extern void (*show_pending) ();
00061
00062 #endif
```

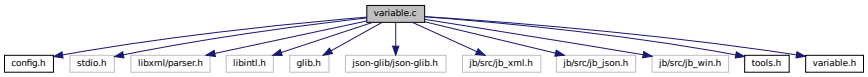
5.29 variable.c File Reference

Source file to define the variable data.

```
#include "config.h"
#include <stdio.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <json-glib/json-glib.h>
#include "jb/src/jb_xml.h"
#include "jb/src/jb_json.h"
#include "jb/src/jb_win.h"
#include "tools.h"
```

```
#include "variable.h"
```

Include dependency graph for variable.c:



Macros

- #define DEBUG_VARIABLE 0

  Macro to debug variable functions.

Functions

- void variable_free (Variable *variable, unsigned int type)
- void variable_error (Variable *variable, char *message)
- int variable_open_xml (Variable *variable, xmlNode *node, unsigned int algorithm, unsigned int nsteps)
- int variable_open_json (Variable *variable, JsonNode *node, unsigned int algorithm, unsigned int nsteps)

Variables

- const char * format [NPRECISIONS]

  Array of C-strings with variable formats.
- const double precision [NPRECISIONS]

  Array of variable precisions.

5.29.1 Detailed Description

Source file to define the variable data.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file variable.c.

5.29.2 Macro Definition Documentation

5.29.2.1 DEBUG_VARIABLE

```
#define DEBUG_VARIABLE 0
```

Macro to debug variable functions.

Definition at line 51 of file variable.c.

5.29.3 Function Documentation

5.29.3.1 variable_error()

```
void variable_error (
            Variable * variable,
            char * message )
```

Function to print a message error opening an Variable struct.

Parameters

variable	Variable struct.
message	Error message.

Definition at line 88 of file variable.c.

```
00092 {
00093   char buffer[64];
00094   if (!variable->name)
00095     snprintf (buffer, 64, "%s:  %s", _("Variable"), message);
00096   else
00097     snprintf (buffer, 64, "%s %s:  %s", _("Variable"), variable->name, message);
00098   error_message = g_strdup (buffer);
00099 }
```

5.29.3.2 variable_free()

```
void variable_free (
            Variable * variable,
            unsigned int type )
```

Function to free the memory of a Variable struct.

Parameters

variable	Variable struct.
type	Type of input file.

Definition at line 67 of file variable.c.

```
00071 {
00072 #if DEBUG_VARIABLE
00073   fprintf (stderr, "variable_free:  start\n");
00074 #endif
00075   if (type == INPUT_TYPE_XML)
00076     xmlFree (variable->name);
00077   else
00078     g_free (variable->name);
00079 #if DEBUG_VARIABLE
00080   fprintf (stderr, "variable_free:  end\n");
00081 #endif
00082 }
```

5.29.3.3 variable_open_json()

```
int variable_open_json (
             Variable * variable,
             JsonNode * node,
             unsigned int algorithm,
             unsigned int nsteps )
```

Function to open the variable file.

Returns

1 on success, 0 on error.

Parameters

variable	Variable struct.
node	XML node.
algorithm	Algorithm type.
nsteps	Number of steps to do the hill climbing method.

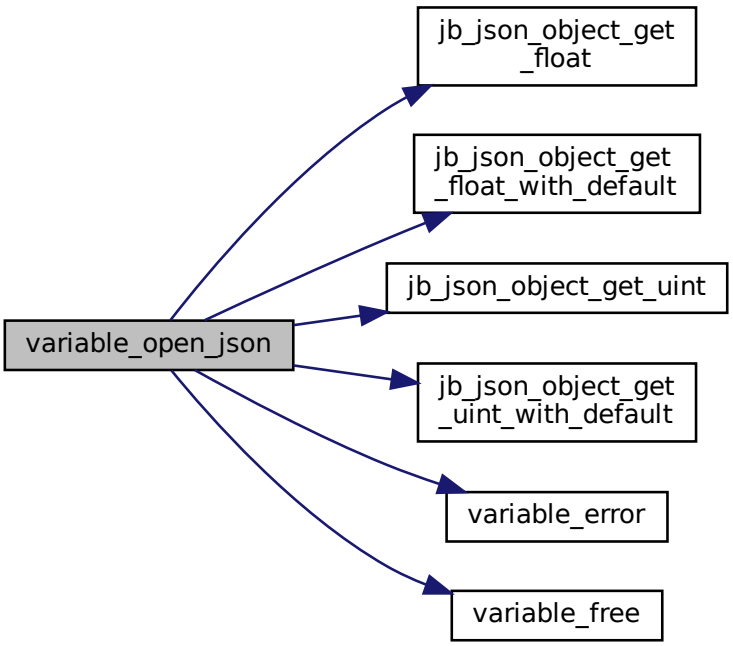
Definition at line 270 of file variable.c.

```
00275 {
00276   JsonObject *object;
00277   const char *label;
00278   int error_code;
00279 #if DEBUG_VARIABLE
00280   fprintf (stderr, "variable_open_json:  start\n");
00281 #endif
00282   object = json_node_get_object (node);
00283   label = json_object_get_string_member (object, LABEL_NAME);
00284   if (!label)
00285     {
00286       variable_error (variable, _("no name"));
00287       goto exit_on_error;
00288     }
00289   variable->name = g_strdup (label);
00290   if (json_object_get_member (object, LABEL_MINIMUM))
00291     {
00292       variable->rangemin
00293         = jb_json_object_get_float (object, LABEL_MINIMUM, &error_code);
00294       if (!error_code)
00295         {
00296           variable_error (variable, _("bad minimum"));
00297           goto exit_on_error;
00298         }
00299       variable->rangeminabs
00300         = jb_json_object_get_float_with_default (object, LABEL_ABSOLUTE_MINIMUM,
00301                                                  &error_code, -G_MAXDOUBLE);
00302       if (!error_code)
00303         {
00304           variable_error (variable, _("bad absolute minimum"));
00305           goto exit_on_error;
```

```
00306         }
00307       if (variable->rangemin < variable->rangeminabs)
00308         {
00309           variable_error (variable, _("minimum range not allowed"));
00310           goto exit_on_error;
00311         }
00312     }
00313   else
00314     {
00315       variable_error (variable, _("no minimum range"));
00316       goto exit_on_error;
00317     }
00318   if (json_object_get_member (object, LABEL_MAXIMUM))
00319     {
00320       variable->rangemax
00321         = jb_json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00322       if (!error_code)
00323         {
00324           variable_error (variable, _("bad maximum"));
00325           goto exit_on_error;
00326         }
00327       variable->rangemaxabs
00328         = jb_json_object_get_float_with_default (object, LABEL_ABSOLUTE_MAXIMUM,
00329                                                  &error_code, G_MAXDOUBLE);
00330       if (!error_code)
00331         {
00332           variable_error (variable, _("bad absolute maximum"));
00333           goto exit_on_error;
00334         }
00335       if (variable->rangemax > variable->rangemaxabs)
00336         {
00337           variable_error (variable, _("maximum range not allowed"));
00338           goto exit_on_error;
00339         }
00340       if (variable->rangemax < variable->rangemin)
00341         {
00342           variable_error (variable, _("bad range"));
00343           goto exit_on_error;
00344         }
00345     }
00346   else
00347     {
00348       variable_error (variable, _("no maximum range"));
00349       goto exit_on_error;
00350     }
00351   variable->precision
00352     = jb_json_object_get_uint_with_default (object, LABEL_PRECISION,
00353                                             &error_code, DEFAULT_PRECISION);
00354   if (!error_code || variable->precision >= NPRECISIONS)
00355     {
00356       variable_error (variable, _("bad precision"));
00357       goto exit_on_error;
00358     }
00359   if (algorithm == ALGORITHM_SWEEP || algorithm == ALGORITHM_ORTHOGONAL)
00360     {
00361       if (json_object_get_member (object, LABEL_NSWEEPS))
00362         {
00363           variable->nsweeps
00364             = jb_json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00365           if (!error_code || !variable->nsweeps)
00366             {
00367               variable_error (variable, _("bad sweeps"));
00368               goto exit_on_error;
00369             }
00370         }
00371       else
00372         {
00373           variable_error (variable, _("no sweeps number"));
00374           goto exit_on_error;
00375         }
00376 #if DEBUG_VARIABLE
00377       fprintf (stderr, "variable_open_json:  nsweeps=%u\n", variable->nsweeps);
00378 #endif
00379     }
00380   if (algorithm == ALGORITHM_GENETIC)
00381     {
00382       // Obtaining bits representing each variable
00383       if (json_object_get_member (object, LABEL_NBITS))
00384         {
00385           variable->nbits
00386             = jb_json_object_get_uint (object, LABEL_NBITS, &error_code);
00387           if (!error_code || !variable->nbits)
00388             {
00389               variable_error (variable, _("invalid bits number"));
00390               goto exit_on_error;
00391             }
00392         }
```

```
00393       else
00394         {
00395           variable_error (variable, _("no bits number"));
00396           goto exit_on_error;
00397         }
00398     }
00399   else if (nsteps)
00400     {
00401       variable->step
00402         = jb_json_object_get_float (object, LABEL_STEP, &error_code);
00403       if (!error_code || variable->step < 0.)
00404         {
00405           variable_error (variable, _("bad step size"));
00406           goto exit_on_error;
00407         }
00408     }
00409
00410 #if DEBUG_VARIABLE
00411   fprintf (stderr, "variable_open_json:  end\n");
00412 #endif
00413   return 1;
00414 exit_on_error:
00415   variable_free (variable, INPUT_TYPE_JSON);
00416 #if DEBUG_VARIABLE
00417   fprintf (stderr, "variable_open_json:  end\n");
00418 #endif
00419   return 0;
00420 }
```

Here is the call graph for this function:



5.29.3.4 variable_open_xml()

```
int variable_open_xml (
            Variable * variable,
```

```
    xmlNode * node,
    unsigned int algorithm,
    unsigned int nsteps )
```

Function to open the variable file.

Returns

1 on success, 0 on error.

Parameters

variable	Variable struct.
node	XML node.
algorithm	Algorithm type.
nsteps	Number of steps to do the hill climbing method.

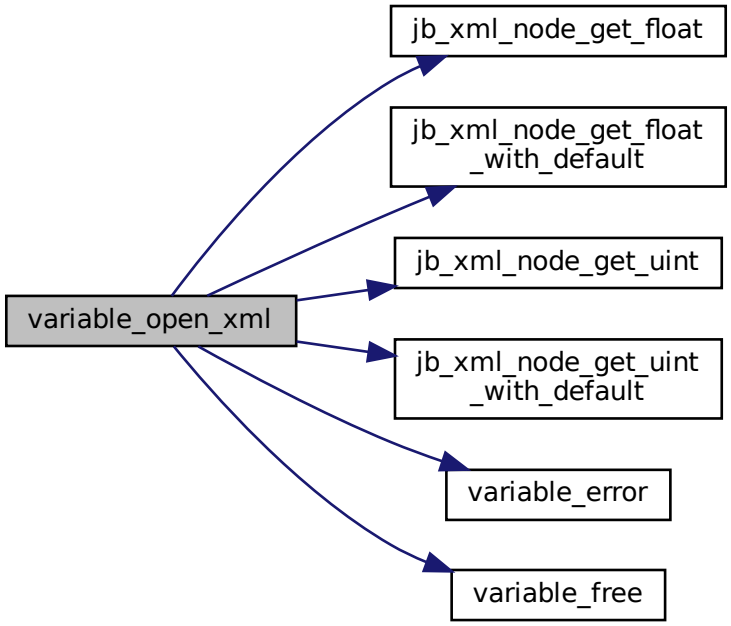
Definition at line 107 of file variable.c.

```
00112 {
00113   int error_code;
00114
00115 #if DEBUG_VARIABLE
00116   fprintf (stderr, "variable_open_xml:  start\n");
00117 #endif
00118
00119   variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00120   if (!variable->name)
00121     {
00122       variable_error (variable, _("no name"));
00123       goto exit_on_error;
00124     }
00125   if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00126     {
00127       variable->rangemin
00128         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MINIMUM,
00129                                  &error_code);
00130       if (!error_code)
00131         {
00132           variable_error (variable, _("bad minimum"));
00133           goto exit_on_error;
00134         }
00135       variable->rangeminabs = jb_xml_node_get_float_with_default
00136         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, &error_code,
00137          -G_MAXDOUBLE);
00138
00139       if (!error_code)
00140         {
00141           variable_error (variable, _("bad absolute minimum"));
00142           goto exit_on_error;
00143         }
00144       if (variable->rangemin < variable->rangeminabs)
00145         {
00146           variable_error (variable, _("minimum range not allowed"));
00147           goto exit_on_error;
00148         }
00149     }
00150   else
00151     {
00152       variable_error (variable, _("no minimum range"));
00153       goto exit_on_error;
00154     }
00155   if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00156     {
00157       variable->rangemax
00158         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MAXIMUM,
00159                                  &error_code);
00160       if (!error_code)
00161         {
00162           variable_error (variable, _("bad maximum"));
00163           goto exit_on_error;
00164         }
00165       variable->rangemaxabs = jb_xml_node_get_float_with_default
00166         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, &error_code,
00167          G_MAXDOUBLE);
00168       if (!error_code)
```

```
00169         {
00170           variable_error (variable, _("bad absolute maximum"));
00171           goto exit_on_error;
00172         }
00173       if (variable->rangemax > variable->rangemaxabs)
00174         {
00175           variable_error (variable, _("maximum range not allowed"));
00176           goto exit_on_error;
00177         }
00178       if (variable->rangemax < variable->rangemin)
00179         {
00180           variable_error (variable, _("bad range"));
00181           goto exit_on_error;
00182         }
00183     }
00184   else
00185     {
00186       variable_error (variable, _("no maximum range"));
00187       goto exit_on_error;
00188     }
00189   variable->precision
00190     = jb_xml_node_get_uint_with_default (node,
00191                                          (const xmlChar *) LABEL_PRECISION,
00192                                          &error_code, DEFAULT_PRECISION);
00193   if (!error_code || variable->precision >= NPRECISIONS)
00194     {
00195       variable_error (variable, _("bad precision"));
00196       goto exit_on_error;
00197     }
00198   if (algorithm == ALGORITHM_SWEEP || algorithm == ALGORITHM_ORTHOGONAL)
00199     {
00200       if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00201         {
00202           variable->nsweeps
00203             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NSWEEPS,
00204                                     &error_code);
00205           if (!error_code || !variable->nsweeps)
00206             {
00207               variable_error (variable, _("bad sweeps"));
00208               goto exit_on_error;
00209             }
00210         }
00211       else
00212         {
00213           variable_error (variable, _("no sweeps number"));
00214           goto exit_on_error;
00215         }
00216 #if DEBUG_VARIABLE
00217       fprintf (stderr, "variable_open_xml:  nsweeps=%u\n", variable->nsweeps);
00218 #endif
00219     }
00220   if (algorithm == ALGORITHM_GENETIC)
00221     {
00222       // Obtaining bits representing each variable
00223       if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00224         {
00225           variable->nbits
00226             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NBITS,
00227                                     &error_code);
00228           if (!error_code || !variable->nbits)
00229             {
00230               variable_error (variable, _("invalid bits number"));
00231               goto exit_on_error;
00232             }
00233         }
00234       else
00235         {
00236           variable_error (variable, _("no bits number"));
00237           goto exit_on_error;
00238         }
00239     }
00240   else if (nsteps)
00241     {
00242       variable->step
00243         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_STEP,
00244                                  &error_code);
00245       if (!error_code || variable->step < 0.)
00246         {
00247           variable_error (variable, _("bad step size"));
00248           goto exit_on_error;
00249         }
00250     }
00251
00252 #if DEBUG_VARIABLE
00253   fprintf (stderr, "variable_open_xml:  end\n");
00254 #endif
00255   return 1;
```

```
00256 exit_on_error:
00257   variable_free (variable, INPUT_TYPE_XML);
00258 #if DEBUG_VARIABLE
00259   fprintf (stderr, "variable_open_xml:  end\n");
00260 #endif
00261   return 0;
00262 }
```

Here is the call graph for this function:



5.29.4 Variable Documentation

5.29.4.1 format

```
const char* format[NPRECISIONS]
```

Initial value:

```
= {
  "%.0lf", "%.1lf", "%.2lf", "%.3lf", "%.4lf", "%.5lf", "%.6lf", "%.7lf",
  "%.8lf", "%.9lf", "%.10lf", "%.11lf", "%.12lf", "%.13lf", "%.14lf"
}
```

Array of C-strings with variable formats.

Definition at line 53 of file variable.c.

5.29.4.2 precision

```
const double precision[NPRECISIONS]
```

Initial value:

```
= {
  1., 0.1, 0.01, 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, 1e-10, 1e-11,
  1e-12, 1e-13, 1e-14
}
```

Array of variable precisions.

Definition at line 58 of file variable.c.

5.30 variable.c

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
00012
00013 1.  Redistributions of source code must retain the above copyright notice,
00014 this list of conditions and the following disclaimer.
00015
00016 2.  Redistributions in binary form must reproduce the above copyright notice,
00017 this list of conditions and the following disclaimer in the
00018 documentation and/or other materials provided with the distribution.
00019
00020 THIS SOFTWARE IS PROVIDED BY AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED
00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00024 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #define _GNU_SOURCE
00039 #include "config.h"
00040 #include <stdio.h>
00041 #include <libxml/parser.h>
00042 #include <libintl.h>
00043 #include <glib.h>
00044 #include <json-glib/json-glib.h>
00045 #include "jb/src/jb_xml.h"
00046 #include "jb/src/jb_json.h"
00047 #include "jb/src/jb_win.h"
00048 #include "tools.h"
00049 #include "variable.h"
00050
00051 #define DEBUG_VARIABLE 0
00052
00053 const char *format[NPRECISIONS] = {
00054   "%.0lf", "%.1lf", "%.2lf", "%.3lf", "%.4lf", "%.5lf", "%.6lf", "%.7lf",
00055   "%.8lf", "%.9lf", "%.10lf", "%.11lf", "%.12lf", "%.13lf", "%.14lf"
00056 };
00057
00058 const double precision[NPRECISIONS] = {
00059   1., 0.1, 0.01, 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, 1e-10, 1e-11,
00060   1e-12, 1e-13, 1e-14
00061 };
00062
00066 void
00067 variable_free (Variable * variable,
00069                unsigned int type)
```

```
00071 {
00072 #if DEBUG_VARIABLE
00073   fprintf (stderr, "variable_free:  start\n");
00074 #endif
00075   if (type == INPUT_TYPE_XML)
00076     xmlFree (variable->name);
00077   else
00078     g_free (variable->name);
00079 #if DEBUG_VARIABLE
00080   fprintf (stderr, "variable_free:  end\n");
00081 #endif
00082 }
00083
00087 void
00088 variable_error (Variable * variable,
00090                 char *message)
00092 {
00093   char buffer[64];
00094   if (!variable->name)
00095     snprintf (buffer, 64, "%s:  %s", _("Variable"), message);
00096   else
00097     snprintf (buffer, 64, "%s %s:  %s", _("Variable"), variable->name, message);
00098   error_message = g_strdup (buffer);
00099 }
00100
00106 int
00107 variable_open_xml (Variable * variable,
00108                    xmlNode * node,
00109                    unsigned int algorithm,
00110                    unsigned int nsteps)
00112 {
00113   int error_code;
00114
00115 #if DEBUG_VARIABLE
00116   fprintf (stderr, "variable_open_xml:  start\n");
00117 #endif
00118
00119   variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00120   if (!variable->name)
00121     {
00122       variable_error (variable, _("no name"));
00123       goto exit_on_error;
00124     }
00125   if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00126     {
00127       variable->rangemin
00128         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MINIMUM,
00129                                  &error_code);
00130       if (!error_code)
00131         {
00132           variable_error (variable, _("bad minimum"));
00133           goto exit_on_error;
00134         }
00135       variable->rangeminabs = jb_xml_node_get_float_with_default
00136         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, &error_code,
00137          -G_MAXDOUBLE);
00138
00139       if (!error_code)
00140         {
00141           variable_error (variable, _("bad absolute minimum"));
00142           goto exit_on_error;
00143         }
00144       if (variable->rangemin < variable->rangeminabs)
00145         {
00146           variable_error (variable, _("minimum range not allowed"));
00147           goto exit_on_error;
00148         }
00149     }
00150   else
00151     {
00152       variable_error (variable, _("no minimum range"));
00153       goto exit_on_error;
00154     }
00155   if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00156     {
00157       variable->rangemax
00158         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MAXIMUM,
00159                                  &error_code);
00160       if (!error_code)
00161         {
00162           variable_error (variable, _("bad maximum"));
00163           goto exit_on_error;
00164         }
00165       variable->rangemaxabs = jb_xml_node_get_float_with_default
00166         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, &error_code,
00167          G_MAXDOUBLE);
00168       if (!error_code)
```

```
00169         {
00170           variable_error (variable, _("bad absolute maximum"));
00171           goto exit_on_error;
00172         }
00173       if (variable->rangemax > variable->rangemaxabs)
00174         {
00175           variable_error (variable, _("maximum range not allowed"));
00176           goto exit_on_error;
00177         }
00178       if (variable->rangemax < variable->rangemin)
00179         {
00180           variable_error (variable, _("bad range"));
00181           goto exit_on_error;
00182         }
00183     }
00184   else
00185     {
00186       variable_error (variable, _("no maximum range"));
00187       goto exit_on_error;
00188     }
00189   variable->precision
00190     = jb_xml_node_get_uint_with_default (node,
00191                                          (const xmlChar *) LABEL_PRECISION,
00192                                          &error_code, DEFAULT_PRECISION);
00193   if (!error_code || variable->precision >= NPRECISIONS)
00194     {
00195       variable_error (variable, _("bad precision"));
00196       goto exit_on_error;
00197     }
00198   if (algorithm == ALGORITHM_SWEEP || algorithm == ALGORITHM_ORTHOGONAL)
00199     {
00200       if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00201         {
00202           variable->nsweeps
00203             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NSWEEPS,
00204                                     &error_code);
00205           if (!error_code || !variable->nsweeps)
00206             {
00207               variable_error (variable, _("bad sweeps"));
00208               goto exit_on_error;
00209             }
00210         }
00211       else
00212         {
00213           variable_error (variable, _("no sweeps number"));
00214           goto exit_on_error;
00215         }
00216 #if DEBUG_VARIABLE
00217       fprintf (stderr, "variable_open_xml:  nsweeps=%u\n", variable->nsweeps);
00218 #endif
00219     }
00220   if (algorithm == ALGORITHM_GENETIC)
00221     {
00222       // Obtaining bits representing each variable
00223       if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00224         {
00225           variable->nbits
00226             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NBITS,
00227                                     &error_code);
00228           if (!error_code || !variable->nbits)
00229             {
00230               variable_error (variable, _("invalid bits number"));
00231               goto exit_on_error;
00232             }
00233         }
00234       else
00235         {
00236           variable_error (variable, _("no bits number"));
00237           goto exit_on_error;
00238         }
00239     }
00240   else if (nsteps)
00241     {
00242       variable->step
00243         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_STEP,
00244                                  &error_code);
00245       if (!error_code || variable->step < 0.)
00246         {
00247           variable_error (variable, _("bad step size"));
00248           goto exit_on_error;
00249         }
00250     }
00251
00252 #if DEBUG_VARIABLE
00253   fprintf (stderr, "variable_open_xml:  end\n");
00254 #endif
00255   return 1;
```

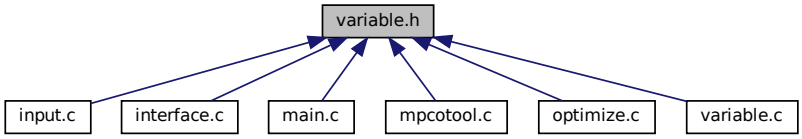
```
00256 exit_on_error:
00257   variable_free (variable, INPUT_TYPE_XML);
00258 #if DEBUG_VARIABLE
00259   fprintf (stderr, "variable_open_xml:  end\n");
00260 #endif
00261   return 0;
00262 }
00263
00269 int
00270 variable_open_json (Variable * variable,
00271                     JsonNode * node,
00272                     unsigned int algorithm,
00273                     unsigned int nsteps)
00275 {
00276   JsonObject *object;
00277   const char *label;
00278   int error_code;
00279 #if DEBUG_VARIABLE
00280   fprintf (stderr, "variable_open_json:  start\n");
00281 #endif
00282   object = json_node_get_object (node);
00283   label = json_object_get_string_member (object, LABEL_NAME);
00284   if (!label)
00285     {
00286       variable_error (variable, _("no name"));
00287       goto exit_on_error;
00288     }
00289   variable->name = g_strdup (label);
00290   if (json_object_get_member (object, LABEL_MINIMUM))
00291     {
00292       variable->rangemin
00293         = jb_json_object_get_float (object, LABEL_MINIMUM, &error_code);
00294       if (!error_code)
00295         {
00296           variable_error (variable, _("bad minimum"));
00297           goto exit_on_error;
00298         }
00299       variable->rangeminabs
00300         = jb_json_object_get_float_with_default (object, LABEL_ABSOLUTE_MINIMUM,
00301                                                  &error_code, -G_MAXDOUBLE);
00302       if (!error_code)
00303         {
00304           variable_error (variable, _("bad absolute minimum"));
00305           goto exit_on_error;
00306         }
00307       if (variable->rangemin < variable->rangeminabs)
00308         {
00309           variable_error (variable, _("minimum range not allowed"));
00310           goto exit_on_error;
00311         }
00312     }
00313   else
00314     {
00315       variable_error (variable, _("no minimum range"));
00316       goto exit_on_error;
00317     }
00318   if (json_object_get_member (object, LABEL_MAXIMUM))
00319     {
00320       variable->rangemax
00321         = jb_json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00322       if (!error_code)
00323         {
00324           variable_error (variable, _("bad maximum"));
00325           goto exit_on_error;
00326         }
00327       variable->rangemaxabs
00328         = jb_json_object_get_float_with_default (object, LABEL_ABSOLUTE_MAXIMUM,
00329                                                  &error_code, G_MAXDOUBLE);
00330       if (!error_code)
00331         {
00332           variable_error (variable, _("bad absolute maximum"));
00333           goto exit_on_error;
00334         }
00335       if (variable->rangemax > variable->rangemaxabs)
00336         {
00337           variable_error (variable, _("maximum range not allowed"));
00338           goto exit_on_error;
00339         }
00340       if (variable->rangemax < variable->rangemin)
00341         {
00342           variable_error (variable, _("bad range"));
00343           goto exit_on_error;
00344         }
00345     }
00346   else
00347     {
00348       variable_error (variable, _("no maximum range"));
```

```
00349       goto exit_on_error;
00350     }
00351   variable->precision
00352     = jb_json_object_get_uint_with_default (object, LABEL_PRECISION,
00353                                             &error_code, DEFAULT_PRECISION);
00354   if (!error_code || variable->precision >= NPRECISIONS)
00355     {
00356       variable_error (variable, _("bad precision"));
00357       goto exit_on_error;
00358     }
00359   if (algorithm == ALGORITHM_SWEEP || algorithm == ALGORITHM_ORTHOGONAL)
00360     {
00361       if (json_object_get_member (object, LABEL_NSWEEPS))
00362         {
00363           variable->nsweeps
00364             = jb_json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00365           if (!error_code || !variable->nsweeps)
00366             {
00367               variable_error (variable, _("bad sweeps"));
00368               goto exit_on_error;
00369             }
00370         }
00371       else
00372         {
00373           variable_error (variable, _("no sweeps number"));
00374           goto exit_on_error;
00375         }
00376 #if DEBUG_VARIABLE
00377       fprintf (stderr, "variable_open_json:  nsweeps=%u\n", variable->nsweeps);
00378 #endif
00379     }
00380   if (algorithm == ALGORITHM_GENETIC)
00381     {
00382       // Obtaining bits representing each variable
00383       if (json_object_get_member (object, LABEL_NBITS))
00384         {
00385           variable->nbits
00386             = jb_json_object_get_uint (object, LABEL_NBITS, &error_code);
00387           if (!error_code || !variable->nbits)
00388             {
00389               variable_error (variable, _("invalid bits number"));
00390               goto exit_on_error;
00391             }
00392         }
00393       else
00394         {
00395           variable_error (variable, _("no bits number"));
00396           goto exit_on_error;
00397         }
00398     }
00399   else if (nsteps)
00400     {
00401       variable->step
00402         = jb_json_object_get_float (object, LABEL_STEP, &error_code);
00403       if (!error_code || variable->step < 0.)
00404         {
00405           variable_error (variable, _("bad step size"));
00406           goto exit_on_error;
00407         }
00408     }
00409
00410 #if DEBUG_VARIABLE
00411   fprintf (stderr, "variable_open_json:  end\n");
00412 #endif
00413   return 1;
00414 exit_on_error:
00415   variable_free (variable, INPUT_TYPE_JSON);
00416 #if DEBUG_VARIABLE
00417   fprintf (stderr, "variable_open_json:  end\n");
00418 #endif
00419   return 0;
00420 }
```

5.31 variable.h File Reference

Header file to define the variable data.

This graph shows which files directly or indirectly include this file:



Data Structures

- struct Variable

  Struct to define the variable data.

Enumerations

- enum Algorithm { ALGORITHM_MONTE_CARLO = 0 , ALGORITHM_SWEEP = 1 , ALGORITHM_GENETIC = 2 , ALGORITHM_ORTHOGONAL = 3 }

  Enum to define the algorithms.

Functions

- void variable_free (Variable *variable, unsigned int type)
- void variable_error (Variable *variable, char *message)
- int variable_open_xml (Variable *variable, xmlNode *node, unsigned int algorithm, unsigned int nsteps)
- int variable_open_json (Variable *variable, JsonNode *node, unsigned int algorithm, unsigned int nsteps)

Variables

- const char * format [NPRECISIONS]

  Array of C-strings with variable formats.
- const double precision [NPRECISIONS]

  Array of variable precisions.

5.31.1 Detailed Description

Header file to define the variable data.

Authors

Javier Burguete.

Copyright

Definition in file variable.h.

5.31.2 Enumeration Type Documentation

5.31.2.1 Algorithm

```
enum Algorithm
```

Enum to define the algorithms.

Enumerator

ALGORITHM_MONTE_CARLO	Monte-Carlo algorithm.
ALGORITHM_SWEEP	Sweep algorithm.
ALGORITHM_GENETIC	Genetic algorithm.
ALGORITHM_ORTHOGONAL	Orthogonal sampling algorithm.

Definition at line 42 of file variable.h.

```
00043 {
00044   ALGORITHM_MONTE_CARLO = 0,
00045   ALGORITHM_SWEEP = 1,
00046   ALGORITHM_GENETIC = 2,
00047   ALGORITHM_ORTHOGONAL = 3
00048 };
```

5.31.3 Function Documentation

5.31.3.1 variable_error()

```
void variable_error (
            Variable * variable,
            char * message )
```

Function to print a message error opening an Variable struct.

Parameters

variable	Variable struct.
message	Error message.

Definition at line 88 of file variable.c.

```
00092 {
00093   char buffer[64];
00094   if (!variable->name)
00095     snprintf (buffer, 64, "%s:  %s", _("Variable"), message);
00096   else
00097     snprintf (buffer, 64, "%s %s:  %s", _("Variable"), variable->name, message);
00098   error_message = g_strdup (buffer);
00099 }
```

5.31.3.2 variable_free()

```
void variable_free (
            Variable * variable,
            unsigned int type )
```

Function to free the memory of a Variable struct.

Parameters

variable	Variable struct.
type	Type of input file.

Definition at line 67 of file variable.c.

```
00071 {
00072 #if DEBUG_VARIABLE
00073   fprintf (stderr, "variable_free:  start\n");
00074 #endif
00075   if (type == INPUT_TYPE_XML)
00076     xmlFree (variable->name);
00077   else
00078     g_free (variable->name);
00079 #if DEBUG_VARIABLE
00080   fprintf (stderr, "variable_free:  end\n");
00081 #endif
00082 }
```

5.31.3.3 variable_open_json()

```
int variable_open_json (
            Variable * variable,
            JsonNode * node,
            unsigned int algorithm,
            unsigned int nsteps )
```

Function to open the variable file.

Returns

1 on success, 0 on error.

Parameters

variable	Variable struct.
node	XML node.
algorithm	Algorithm type.
nsteps	Number of steps to do the hill climbing method.

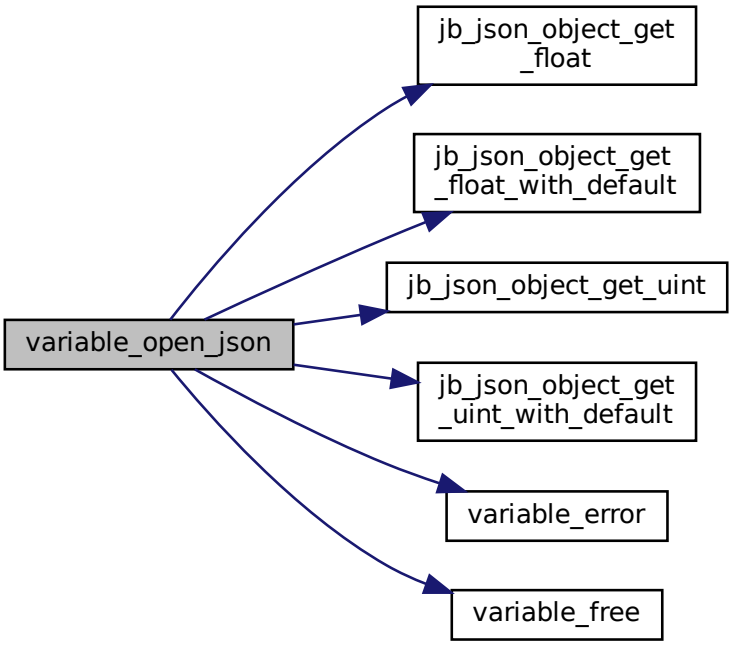
Definition at line 270 of file variable.c.

```
00275 {
00276   JsonObject *object;
```

```
00277   const char *label;
00278   int error_code;
00279 #if DEBUG_VARIABLE
00280   fprintf (stderr, "variable_open_json:  start\n");
00281 #endif
00282   object = json_node_get_object (node);
00283   label = json_object_get_string_member (object, LABEL_NAME);
00284   if (!label)
00285     {
00286       variable_error (variable, _("no name"));
00287       goto exit_on_error;
00288     }
00289   variable->name = g_strdup (label);
00290   if (json_object_get_member (object, LABEL_MINIMUM))
00291     {
00292       variable->rangemin
00293         = jb_json_object_get_float (object, LABEL_MINIMUM, &error_code);
00294       if (!error_code)
00295         {
00296           variable_error (variable, _("bad minimum"));
00297           goto exit_on_error;
00298         }
00299       variable->rangeminabs
00300         = jb_json_object_get_float_with_default (object, LABEL_ABSOLUTE_MINIMUM,
00301                                                  &error_code, -G_MAXDOUBLE);
00302       if (!error_code)
00303         {
00304           variable_error (variable, _("bad absolute minimum"));
00305           goto exit_on_error;
00306         }
00307       if (variable->rangemin < variable->rangeminabs)
00308         {
00309           variable_error (variable, _("minimum range not allowed"));
00310           goto exit_on_error;
00311         }
00312     }
00313   else
00314     {
00315       variable_error (variable, _("no minimum range"));
00316       goto exit_on_error;
00317     }
00318   if (json_object_get_member (object, LABEL_MAXIMUM))
00319     {
00320       variable->rangemax
00321         = jb_json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00322       if (!error_code)
00323         {
00324           variable_error (variable, _("bad maximum"));
00325           goto exit_on_error;
00326         }
00327       variable->rangemaxabs
00328         = jb_json_object_get_float_with_default (object, LABEL_ABSOLUTE_MAXIMUM,
00329                                                  &error_code, G_MAXDOUBLE);
00330       if (!error_code)
00331         {
00332           variable_error (variable, _("bad absolute maximum"));
00333           goto exit_on_error;
00334         }
00335       if (variable->rangemax > variable->rangemaxabs)
00336         {
00337           variable_error (variable, _("maximum range not allowed"));
00338           goto exit_on_error;
00339         }
00340       if (variable->rangemax < variable->rangemin)
00341         {
00342           variable_error (variable, _("bad range"));
00343           goto exit_on_error;
00344         }
00345     }
00346   else
00347     {
00348       variable_error (variable, _("no maximum range"));
00349       goto exit_on_error;
00350     }
00351   variable->precision
00352     = jb_json_object_get_uint_with_default (object, LABEL_PRECISION,
00353                                             &error_code, DEFAULT_PRECISION);
00354   if (!error_code || variable->precision >= NPRECISIONS)
00355     {
00356       variable_error (variable, _("bad precision"));
00357       goto exit_on_error;
00358     }
00359   if (algorithm == ALGORITHM_SWEEP || algorithm == ALGORITHM_ORTHOGONAL)
00360     {
00361       if (json_object_get_member (object, LABEL_NSWEEPS))
00362         {
00363           variable->nsweeps
```

```
00364             = jb_json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00365           if (!error_code || !variable->nsweeps)
00366             {
00367               variable_error (variable, _("bad sweeps"));
00368               goto exit_on_error;
00369             }
00370         }
00371       else
00372         {
00373           variable_error (variable, _("no sweeps number"));
00374           goto exit_on_error;
00375         }
00376 #if DEBUG_VARIABLE
00377       fprintf (stderr, "variable_open_json:  nsweeps=%u\n", variable->nsweeps);
00378 #endif
00379     }
00380   if (algorithm == ALGORITHM_GENETIC)
00381     {
00382       // Obtaining bits representing each variable
00383       if (json_object_get_member (object, LABEL_NBITS))
00384         {
00385           variable->nbits
00386             = jb_json_object_get_uint (object, LABEL_NBITS, &error_code);
00387           if (!error_code || !variable->nbits)
00388             {
00389               variable_error (variable, _("invalid bits number"));
00390               goto exit_on_error;
00391             }
00392         }
00393       else
00394         {
00395           variable_error (variable, _("no bits number"));
00396           goto exit_on_error;
00397         }
00398     }
00399   else if (nsteps)
00400     {
00401       variable->step
00402         = jb_json_object_get_float (object, LABEL_STEP, &error_code);
00403       if (!error_code || variable->step < 0.)
00404         {
00405           variable_error (variable, _("bad step size"));
00406           goto exit_on_error;
00407         }
00408     }
00409
00410 #if DEBUG_VARIABLE
00411   fprintf (stderr, "variable_open_json:  end\n");
00412 #endif
00413   return 1;
00414 exit_on_error:
00415   variable_free (variable, INPUT_TYPE_JSON);
00416 #if DEBUG_VARIABLE
00417   fprintf (stderr, "variable_open_json:  end\n");
00418 #endif
00419   return 0;
00420 }
```

Here is the call graph for this function:



5.31.3.4 variable_open_xml()

```
int variable_open_xml (
              Variable * variable,
              xmlNode * node,
              unsigned int algorithm,
              unsigned int nsteps )
```

Function to open the variable file.

Returns

1 on success, 0 on error.

Parameters

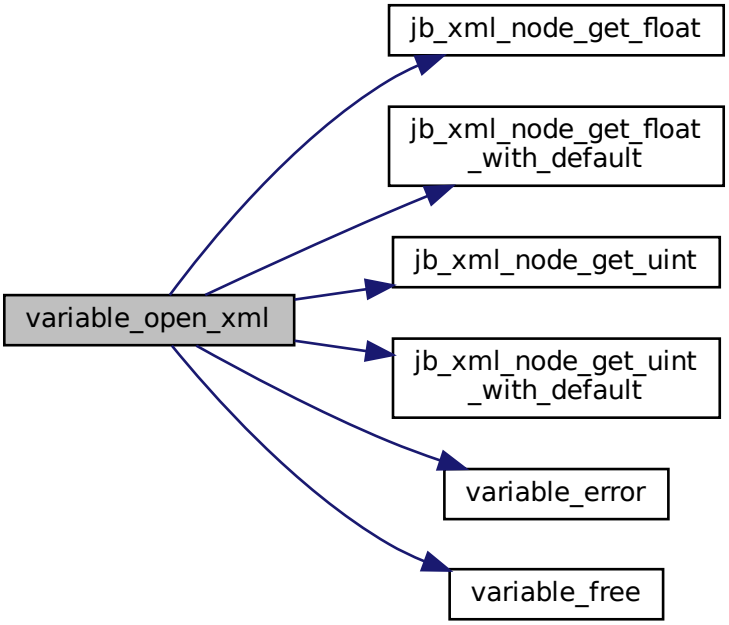
variable	Variable struct.
node	XML node.
algorithm	Algorithm type.
nsteps	Number of steps to do the hill climbing method.

Definition at line 107 of file variable.c.

```
00112 {
00113   int error_code;
00114
00115 #if DEBUG_VARIABLE
00116   fprintf (stderr, "variable_open_xml:  start\n");
00117 #endif
00118
00119   variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00120   if (!variable->name)
00121     {
00122       variable_error (variable, _("no name"));
00123       goto exit_on_error;
00124     }
00125   if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00126     {
00127       variable->rangemin
00128         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MINIMUM,
00129                                  &error_code);
00130       if (!error_code)
00131         {
00132           variable_error (variable, _("bad minimum"));
00133           goto exit_on_error;
00134         }
00135       variable->rangeminabs = jb_xml_node_get_float_with_default
00136         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, &error_code,
00137          -G_MAXDOUBLE);
00138
00139       if (!error_code)
00140         {
00141           variable_error (variable, _("bad absolute minimum"));
00142           goto exit_on_error;
00143         }
00144       if (variable->rangemin < variable->rangeminabs)
00145         {
00146           variable_error (variable, _("minimum range not allowed"));
00147           goto exit_on_error;
00148         }
00149     }
00150   else
00151     {
00152       variable_error (variable, _("no minimum range"));
00153       goto exit_on_error;
00154     }
00155   if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00156     {
00157       variable->rangemax
00158         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_MAXIMUM,
00159                                  &error_code);
00160       if (!error_code)
00161         {
00162           variable_error (variable, _("bad maximum"));
00163           goto exit_on_error;
00164         }
00165       variable->rangemaxabs = jb_xml_node_get_float_with_default
00166         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, &error_code,
00167          G_MAXDOUBLE);
00168       if (!error_code)
00169         {
00170           variable_error (variable, _("bad absolute maximum"));
00171           goto exit_on_error;
00172         }
00173       if (variable->rangemax > variable->rangemaxabs)
00174         {
00175           variable_error (variable, _("maximum range not allowed"));
00176           goto exit_on_error;
00177         }
00178       if (variable->rangemax < variable->rangemin)
00179         {
00180           variable_error (variable, _("bad range"));
00181           goto exit_on_error;
00182         }
00183     }
00184   else
00185     {
00186       variable_error (variable, _("no maximum range"));
00187       goto exit_on_error;
00188     }
00189   variable->precision
00190     = jb_xml_node_get_uint_with_default (node,
00191                                          (const xmlChar *) LABEL_PRECISION,
00192                                          &error_code, DEFAULT_PRECISION);
00193   if (!error_code || variable->precision >= NPRECISIONS)
00194     {
00195       variable_error (variable, _("bad precision"));
00196       goto exit_on_error;
00197     }
```

```
00198   if (algorithm == ALGORITHM_SWEEP || algorithm == ALGORITHM_ORTHOGONAL)
00199     {
00200       if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00201         {
00202           variable->nsweeps
00203             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NSWEEPS,
00204                                     &error_code);
00205           if (!error_code || !variable->nsweeps)
00206             {
00207               variable_error (variable, _("bad sweeps"));
00208               goto exit_on_error;
00209             }
00210         }
00211       else
00212         {
00213           variable_error (variable, _("no sweeps number"));
00214           goto exit_on_error;
00215         }
00216 #if DEBUG_VARIABLE
00217       fprintf (stderr, "variable_open_xml:  nsweeps=%u\n", variable->nsweeps);
00218 #endif
00219     }
00220   if (algorithm == ALGORITHM_GENETIC)
00221     {
00222       // Obtaining bits representing each variable
00223       if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00224         {
00225           variable->nbits
00226             = jb_xml_node_get_uint (node, (const xmlChar *) LABEL_NBITS,
00227                                     &error_code);
00228           if (!error_code || !variable->nbits)
00229             {
00230               variable_error (variable, _("invalid bits number"));
00231               goto exit_on_error;
00232             }
00233         }
00234       else
00235         {
00236           variable_error (variable, _("no bits number"));
00237           goto exit_on_error;
00238         }
00239     }
00240   else if (nsteps)
00241     {
00242       variable->step
00243         = jb_xml_node_get_float (node, (const xmlChar *) LABEL_STEP,
00244                                  &error_code);
00245       if (!error_code || variable->step < 0.)
00246         {
00247           variable_error (variable, _("bad step size"));
00248           goto exit_on_error;
00249         }
00250     }
00251
00252 #if DEBUG_VARIABLE
00253   fprintf (stderr, "variable_open_xml:  end\n");
00254 #endif
00255   return 1;
00256 exit_on_error:
00257   variable_free (variable, INPUT_TYPE_XML);
00258 #if DEBUG_VARIABLE
00259   fprintf (stderr, "variable_open_xml:  end\n");
00260 #endif
00261   return 0;
00262 }
```

Here is the call graph for this function:



5.31.4 Variable Documentation

5.31.4.1 format

```
const char* format[NPRECISIONS]  [extern]
```

Array of C-strings with variable formats.

Definition at line 53 of file variable.c.

5.31.4.2 precision

```
const double precision[NPRECISIONS]  [extern]
```

Array of variable precisions.

Definition at line 58 of file variable.c.

5.32 variable.h

Go to the documentation of this file.

```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool.  A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2023, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
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00019
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00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00023 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
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00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00038 #ifndef VARIABLE__H
00039 #define VARIABLE__H 1
00040
00042 enum Algorithm
00043 {
00044   ALGORITHM_MONTE_CARLO = 0,
00045   ALGORITHM_SWEEP = 1,
00046   ALGORITHM_GENETIC = 2,
00047   ALGORITHM_ORTHOGONAL = 3
00048 };
00049
00054 typedef struct
00055 {
00056   char *name;
00057   double rangemin;
00058   double rangemax;
00059   double rangeminabs;
00060   double rangemaxabs;
00061   double step;
00062   unsigned int precision;
00063   unsigned int nsweeps;
00064   unsigned int nbits;
00065 } Variable;
00066
00067 extern const char *format[NPRECISIONS];
00068 extern const double precision[NPRECISIONS];
00069
00070 // Public functions
00071 void variable_free (Variable * variable, unsigned int type);
00072 void variable_error (Variable * variable, char *message);
00073 int variable_open_xml (Variable * variable, xmlNode * node,
00074                        unsigned int algorithm, unsigned int nsteps);
00075 int variable_open_json (Variable * variable, JsonNode * node,
00076                         unsigned int algorithm, unsigned int nsteps);
00077
00078 #endif
```

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