MPCOTool

4.0.1

Generated by Doxygen 1.8.13

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Data Structure Documentation

3.1 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.

3.1.1 Detailed Description

Struct to define the experiment data.

Definition at line 45 of file experiment.h.

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

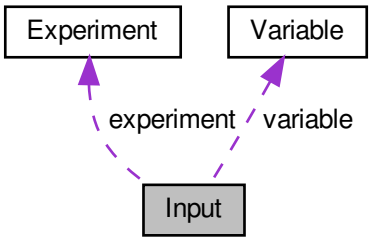
- experiment.h

3.2 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.

3.2.1 Detailed Description

Struct to define the optimization input file.

Definition at line 65 of file input.h.

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

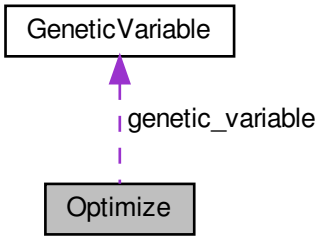
- input.h

3.3 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.

3.3.1 Detailed Description

Struct to define the optimization ation data.

Definition at line 45 of file optimize.h.

3.3.2 Field Documentation

3.3.2.1 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.

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

- optimize.h

3.4 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.

3.4.1 Detailed Description

Struct to define the options dialog.

Definition at line 48 of file interface.h.

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

- interface.h

3.5 ParallelData Struct Reference

Struct to pass to the GThreads parallelized function.

`#include <optimize.h>`

Data Fields

- unsigned int thread
  Thread number.

3.5.1 Detailed Description

Struct to pass to the GThreads parallelized function.

Definition at line 121 of file optimize.h.

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

- optimize.h

3.6 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.

3.6.1 Detailed Description

Struct to define the running dialog.

Definition at line 66 of file interface.h.

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

- interface.h

3.7 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.

3.7.1 Detailed Description

Struct to define the variable data.

Definition at line 54 of file variable.h.

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

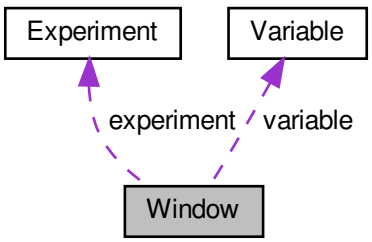
- variable.h

3.8 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.
- GtkToolbar * bar_buttons
  GtkToolbar to store the main buttons.
- GtkToolButton * button_open
  Open GtkToolButton.
- GtkToolButton * button_save
  Save GtkToolButton.
- GtkToolButton * button_run
  Run GtkToolButton.
- GtkToolButton * button_options
  Options GtkToolButton.
- GtkToolButton * button_help
  Help GtkToolButton.
- GtkToolButton * button_about
  Help GtkToolButton.
- GtkToolButton * button_exit
  Exit GtkToolButton.
- GtkGrid * grid_files
  Files GtkGrid.
- GtkLabel * label_simulator
  Simulator program GtkLabel.
- GtkFileChooserButton * button_simulator
  Simulator program GtkFileChooserButton.
- GtkCheckButton * check_evaluator
  Evaluator program GtkCheckButton.
- GtkFileChooserButton * button_evaluator
  Evaluator program GtkFileChooserButton.
- 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 GtkButtons 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 GtkButtons 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]

  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.
- GtkFileChooserButton * button_experiment

  GtkFileChooserButton 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.
- GtkFileChooserButton * button_template [MAX_NINPUTS]

  Array of GtkFileChooserButtons 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.

3.8.1 Detailed Description

Struct to define the main window.

Definition at line 78 of file interface.h.

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

- interface.h

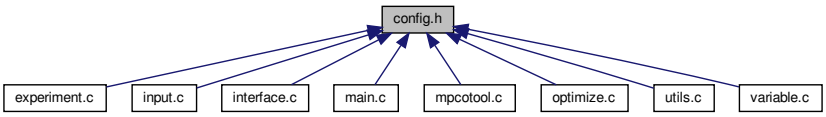
Chapter 4

File Documentation

4.1 config.h File Reference

Configuration header file.

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



Macros

- #define _(string) (gettext(string))
- #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.

4.1.1 Detailed Description

Configuration header file.

Authors

Javier Burguete and Borja Latorre.

Copyright

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Definition in file config.h.

4.1.2 Enumeration Type Documentation

4.1.2.1 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 126 of file config.h.

```
00127 {
00128   INPUT_TYPE_XML = 0,
00129   INPUT_TYPE_JSON = 1
00130 };
```

4.2 config.h

```
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.
00010
00011 Redistribution and use in source and binary forms, with or without modification,
00012 are permitted provided that the following conditions are met:
00013
00014     1. Redistributions of source code must retain the above copyright notice,
00015        this list of conditions and the following disclaimer.
00016
00017     2. Redistributions in binary form must reproduce the above copyright notice,
00018        this list of conditions and the following disclaimer in the
00019        documentation and/or other materials provided with the distribution.
00020
00021 THIS SOFTWARE IS PROVIDED BY AUTHORS ``AS IS'' AND ANY EXPRESS OR IMPLIED
00022 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00023 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
00024 SHALL AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
00025 SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
00026 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00027 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
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 // Gettext simplification
00043 #define _(string) (gettext(string))
00044
00045 // Array sizes
00046
00047 #define MAX_NINPUTS 8
00048 #define NALGORITHMS 4
00050 #define NCLIMBINGS 2
00051 #define NNORMS 4
00052 #define NPRECISIONS 15
00053
00054 // Default choices
00055
00056 #define DEFAULT_PRECISION (NPRECISIONS - 1)
00057 #define DEFAULT_RANDOM_SEED 7007
00058 #define DEFAULT_RELAXATION 1.
00059
00060 // Interface labels
00061
00062 #define LOCALE_DIR "locales"
00063 #define PROGRAM_INTERFACE "mpcotool"
00064
00065 // Labels
00066
00067 #define LABEL_ABSOLUTE_MINIMUM "absolute_minimum"
00068 #define LABEL_ABSOLUTE_MAXIMUM "absolute_maximum"
00070 #define LABEL_ADAPTATION "adaptation"
00072 #define LABEL_ALGORITHM "algorithm"
00073 #define LABEL_CLIMBING "climbing"
00074 #define LABEL_COORDINATES "coordinates"
00075 #define LABEL_EUCLIDIAN "euclidian"
00076 #define LABEL_EVALUATOR "evaluator"
00077 #define LABEL_EXPERIMENT "experiment"
00078 #define LABEL_EXPERIMENTS "experiments"
00079 #define LABEL_GENETIC "genetic"
00080 #define LABEL_MINIMUM "minimum"
00081 #define LABEL_MAXIMUM "maximum"
00082 #define LABEL_MONTE_CARLO "Monte-Carlo"
00083 #define LABEL_MUTATION "mutation"
00084 #define LABEL_NAME "name"
```

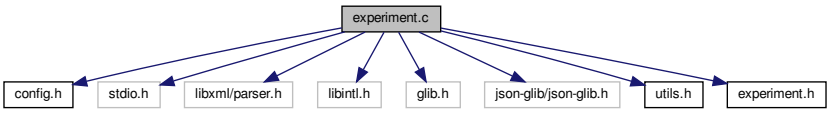
```
00085 #define LABEL_NBEST "nbest"
00086 #define LABEL_NBITS "nbits"
00087 #define LABEL_NESTIMATES "nestimates"
00088 #define LABEL_NGENERATIONS "ngenerations"
00089 #define LABEL_NITERATIONS "niterations"
00090 #define LABEL_NORM "norm"
00091 #define LABEL_NPOPULATION "npopulation"
00092 #define LABEL_NSIMULATIONS "nsimulations"
00093 #define LABEL_NSTEPS "nsteps"
00094 #define LABEL_NSWEEPS "nsweeps"
00095 #define LABEL_OPTIMIZE "optimize"
00096 #define LABEL_ORTHOGONAL "orthogonal"
00097 #define LABEL_P "p"
00098 #define LABEL_PRECISION "precision"
00099 #define LABEL_RANDOM "random"
00100 #define LABEL_RELAXATION "relaxation"
00101 #define LABEL_REPRODUCTION "reproduction"
00102 #define LABEL_RESULT_FILE "result_file"
00103 #define LABEL_SIMULATOR "simulator"
00104 #define LABEL_SEED "seed"
00105 #define LABEL_STEP "step"
00106 #define LABEL_SWEEP "sweep"
00107 #define LABEL_TAXICAB "taxicab"
00108 #define LABEL_TEMPLATE1 "template1"
00109 #define LABEL_TEMPLATE2 "template2"
00110 #define LABEL_TEMPLATE3 "template3"
00111 #define LABEL_TEMPLATE4 "template4"
00112 #define LABEL_TEMPLATE5 "template5"
00113 #define LABEL_TEMPLATE6 "template6"
00114 #define LABEL_TEMPLATE7 "template7"
00115 #define LABEL_TEMPLATE8 "template8"
00116 #define LABEL_THRESHOLD "threshold"
00117 #define LABEL_TOLERANCE "tolerance"
00118 #define LABEL_VARIABLE "variable"
00119 #define LABEL_VARIABLES "variables"
00120 #define LABEL_VARIABLES_FILE "variables_file"
00121 #define LABEL_WEIGHT "weight"
00122
00123 // Enumerations
00124
00126 enum INPUT_TYPE
00127 {
00128   INPUT_TYPE_XML = 0,
00129   INPUT_TYPE_JSON = 1
00130 };
00131
00132 #endif
```

4.3 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 "utils.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.

4.3.1 Detailed Description

Source file to define the experiment data.

Authors

Javier Burguete and Borja Latorre.

Copyright

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Definition in file experiment.c.

4.3.2 Function Documentation

4.3.2.1 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 109 of file experiment.c.

```
00111 {
00112   char buffer[64];
00113   if (!experiment->name)
00114     snprintf (buffer, 64, "%s: %s", _("Experiment"), message);
00115   else
00116     snprintf (buffer, 64, "%s %s: %s", _("Experiment"),
00117               experiment->name, message);
00118   error_message = g_strdup (buffer);
00119 }
```

4.3.2.2 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 80 of file experiment.c.

```
00082 {
00083   unsigned int i;
00084 #if DEBUG_EXPERIMENT
00085   fprintf (stderr, "experiment_free: start\n");
00086 #endif
00087   if (type == INPUT_TYPE_XML)
00088     {
00089       for (i = 0; i < experiment->ninputs; ++i)
00090         xmlFree (experiment->stencil[i]);
00091       xmlFree (experiment->name);
00092     }
00093   else
00094     {
00095       for (i = 0; i < experiment->ninputs; ++i)
00096         g_free (experiment->stencil[i]);
00097       g_free (experiment->name);
00098     }
00099   experiment->ninputs = 0;
00100 #if DEBUG_EXPERIMENT
00101   fprintf (stderr, "experiment_free: end\n");
00102 #endif
00103 }
```

4.3.2.3 experiment_new()

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

Function to create a new Experiment struct.

Parameters

experiment	Experiment struct.

Definition at line 61 of file experiment.c.

```
00062 {
00063   unsigned int i;
00064 #if DEBUG_EXPERIMENT
00065   fprintf (stderr, "experiment_new: start\n");
00066 #endif
00067   experiment->name = NULL;
00068   experiment->ninputs = 0;
00069   for (i = 0; i < MAX_NINPUTS; ++i)
00070     experiment->stencil[i] = NULL;
00071 #if DEBUG_EXPERIMENT
00072   fprintf (stderr, "input_new: end\n");
00073 #endif
00074 }
```

4.3.2.4 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.

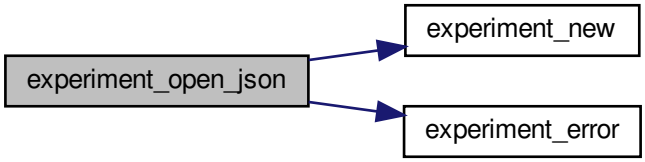
Definition at line 231 of file experiment.c.

```
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     = json_object_get_float_with_default (object,
      LABEL_WEIGHT, 1.,
00265                                           &error_code);
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:



4.3.2.5 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

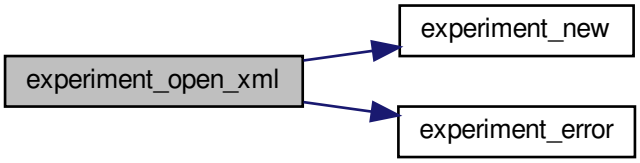
experiment	Experiment struct.
node	XML node.
ninputs	Number of the simulator input files.

Definition at line 127 of file experiment.c.

```
00131 {
00132   char buffer[64];
00133   int error_code;
00134   unsigned int i;
00135 
00136 #if DEBUG_EXPERIMENT
00137   fprintf (stderr, "experiment_open_xml: start\n");
00138 #endif
00139 
00140   // Resetting experiment data
00141   experiment_new (experiment);
```

```
00142
00143   // Reading the experimental data
00144   experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00145   if (!experiment->name)
00146     {
00147       experiment_error (experiment, _("no data file name"));
00148       goto exit_on_error;
00149     }
00150 #if DEBUG_EXPERIMENT
00151   fprintf (stderr, "experiment_open_xml: name=%s\n", experiment->name);
00152 #endif
00153   experiment->weight
00154     =
00155     xml_node_get_float_with_default (node, (const xmlChar *)
      LABEL_WEIGHT, 1.,
00156                                      &error_code);
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:



4.3.3 Variable Documentation

4.3.3.1 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 50 of file experiment.c.

4.4 experiment.c

```
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 2012-2018, 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 "utils.h"
00046 #include "experiment.h"
00047
00048 #define DEBUG_EXPERIMENT 0
00049
00050 const char *stencil[MAX_NINPUTS] = {
00051   LABEL_TEMPLATE1, LABEL_TEMPLATE2,
      LABEL_TEMPLATE3, LABEL_TEMPLATE4,
00052   LABEL_TEMPLATE5, LABEL_TEMPLATE6,
      LABEL_TEMPLATE7, LABEL_TEMPLATE8
00053 };
00054
00056
00060 static void
00061 experiment_new (Experiment * experiment)
00062 {
00063   unsigned int i;
00064 #if DEBUG_EXPERIMENT
00065   fprintf (stderr, "experiment_new: start\n");
00066 #endif
00067   experiment->name = NULL;
00068   experiment->ninputs = 0;
00069   for (i = 0; i < MAX_NINPUTS; ++i)
00070     experiment->stencil[i] = NULL;
00071 #if DEBUG_EXPERIMENT
00072   fprintf (stderr, "input_new: end\n");
00073 #endif
00074 }
00075
00079 void
00080 experiment_free (Experiment * experiment,
00081                  unsigned int type)
00082 {
00083   unsigned int i;
00084 #if DEBUG_EXPERIMENT
00085   fprintf (stderr, "experiment_free: start\n");
00086 #endif
00087   if (type == INPUT_TYPE_XML)
00088     {
00089       for (i = 0; i < experiment->ninputs; ++i)
00090         xmlFree (experiment->stencil[i]);
00091       xmlFree (experiment->name);
00092     }
00093   else
00094     {
00095       for (i = 0; i < experiment->ninputs; ++i)
00096         g_free (experiment->stencil[i]);
00097       g_free (experiment->name);
00098     }
00099   experiment->ninputs = 0;
00100 #if DEBUG_EXPERIMENT
00101   fprintf (stderr, "experiment_free: end\n");
00102 #endif
00103 }
00104
00108 void
00109 experiment_error (Experiment * experiment,
00110                   char *message)
00111 {
00112   char buffer[64];
00113   if (!experiment->name)
00114     snprintf (buffer, 64, "%s: %s", _("Experiment"), message);
00115   else
00116     snprintf (buffer, 64, "%s %s: %s", _("Experiment"),
00117               experiment->name, message);
00118   error_message = g_strdup (buffer);
00119 }
00120
00126 int
00127 experiment_open_xml (Experiment * experiment,
```

```
00128                     xmlNode * node,
00129                     unsigned int ninputs)
00131 {
00132   char buffer[64];
00133   int error_code;
00134   unsigned int i;
00135
00136 #if DEBUG_EXPERIMENT
00137   fprintf (stderr, "experiment_open_xml: start\n");
00138 #endif
00139
00140   // Resetting experiment data
00141   experiment_new (experiment);
00142
00143   // Reading the experimental data
00144   experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00145   if (!experiment->name)
00146     {
00147       experiment_error (experiment, _("no data file name"));
00148       goto exit_on_error;
00149     }
00150 #if DEBUG_EXPERIMENT
00151   fprintf (stderr, "experiment_open_xml: name=%s\n", experiment->name);
00152 #endif
00153   experiment->weight
00154     =
00155     xml_node_get_float_with_default (node, (const xmlChar *)
    LABEL_WEIGHT, 1.,
00156                                      &error_code);
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
```

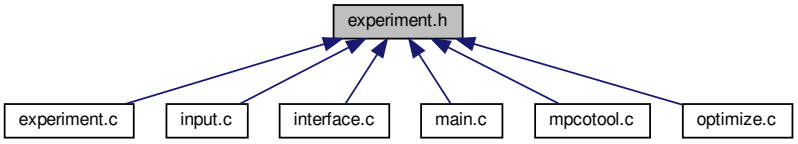
```
00215   return 1;
00216
00217 exit_on_error:
00218   experiment_free (experiment, INPUT_TYPE_XML);
00219 #if DEBUG_EXPERIMENT
00220   fprintf (stderr, "experiment_open_xml: end\n");
00221 #endif
00222   return 0;
00223 }
00224
00230 int
00231 experiment_open_json (Experiment * experiment,
00232                       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     = json_object_get_float_with_default (object,
      LABEL_WEIGHT, 1.,
00265                                           &error_code);
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 }
```

4.5 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.

4.5.1 Detailed Description

Header file to define the experiment data.

Authors

Javier Burguete.

Copyright

Definition in file experiment.h.

4.5.2 Function Documentation

4.5.2.1 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 109 of file experiment.c.

```
00111 {
00112   char buffer[64];
00113   if (!experiment->name)
00114     snprintf (buffer, 64, "%s: %s", _("Experiment"), message);
00115   else
00116     snprintf (buffer, 64, "%s %s: %s", _("Experiment"),
00117               experiment->name, message);
00118   error_message = g_strdup (buffer);
00119 }
```

4.5.2.2 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 80 of file experiment.c.

```
00082 {
00083   unsigned int i;
00084 #if DEBUG_EXPERIMENT
00085   fprintf (stderr, "experiment_free: start\n");
00086 #endif
00087   if (type == INPUT_TYPE_XML)
00088     {
00089       for (i = 0; i < experiment->ninputs; ++i)
00090         xmlFree (experiment->stencil[i]);
00091       xmlFree (experiment->name);
00092     }
00093   else
00094     {
00095       for (i = 0; i < experiment->ninputs; ++i)
00096         g_free (experiment->stencil[i]);
00097       g_free (experiment->name);
00098     }
00099   experiment->ninputs = 0;
00100 #if DEBUG_EXPERIMENT
00101   fprintf (stderr, "experiment_free: end\n");
00102 #endif
00103 }
```

4.5.2.3 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.

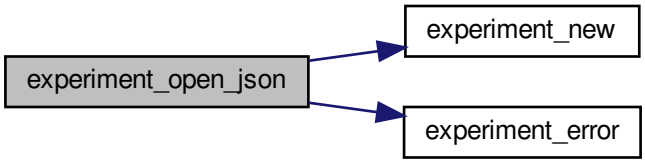
Definition at line 231 of file experiment.c.

```
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     = json_object_get_float_with_default (object,
      LABEL_WEIGHT, 1.,
00265                                           &error_code);
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:



4.5.2.4 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

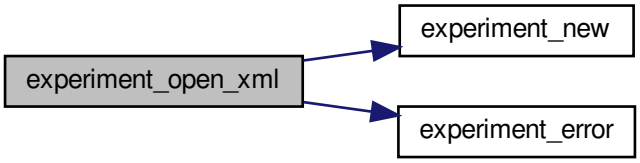
experiment	Experiment struct.
node	XML node.
ninputs	Number of the simulator input files.

Definition at line 127 of file experiment.c.

```
00131 {
00132   char buffer[64];
00133   int error_code;
00134   unsigned int i;
00135
00136 #if DEBUG_EXPERIMENT
00137   fprintf (stderr, "experiment_open_xml: start\n");
00138 #endif
00139
00140   // Resetting experiment data
00141   experiment_new (experiment);
00142
```

```
00143   // Reading the experimental data
00144   experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00145   if (!experiment->name)
00146     {
00147       experiment_error (experiment, _("no data file name"));
00148       goto exit_on_error;
00149     }
00150 #if DEBUG_EXPERIMENT
00151   fprintf (stderr, "experiment_open_xml: name=%s\n", experiment->name);
00152 #endif
00153   experiment->weight
00154     =
00155     xml_node_get_float_with_default (node, (const xmlChar *)
      LABEL_WEIGHT, 1.,
00156                                      &error_code);
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:



4.6 experiment.h

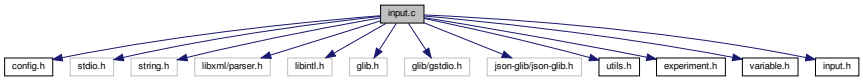
```
00001 /*
00002 MPCOTool:
00003 The Multi-Purposes Calibration and Optimization Tool. A software to perform
00004 calibrations or optimizations of empirical parameters.
00005
00006 AUTHORS: Javier Burguete and Borja Latorre.
00007
00008 Copyright 2012-2018, AUTHORS.
00009
00010 Redistribution and 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 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
```

4.7 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 "utils.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.

4.7.1 Detailed Description

Source file to define the input functions.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file input.c.

4.7.2 Function Documentation

4.7.2.1 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 119 of file input.c.

```
00120 {
00121   char buffer[64];
00122   snprintf (buffer, 64, "%s: %s\n", _("Input"), message);
00123   error_message = g_strdup (buffer);
00124 }
```

4.7.2.2 input_free()

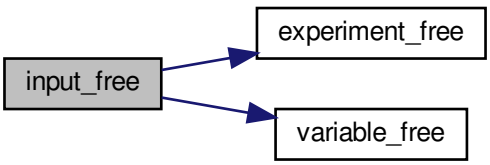
```
void input_free ( )
```

Function to free the memory of the input file data.

Definition at line 81 of file input.c.

```
00082 {
00083   unsigned int i;
00084 #if DEBUG_INPUT
00085   fprintf (stderr, "input_free: start\n");
00086 #endif
00087   g_free (input->name);
00088   g_free (input->directory);
00089   for (i = 0; i < input->nexperiments; ++i)
00090     experiment_free (input->experiment + i, input->
      type);
00091   for (i = 0; i < input->nvariables; ++i)
00092     variable_free (input->variable + i, input->
      type);
00093   g_free (input->experiment);
00094   g_free (input->variable);
00095   if (input->type == INPUT_TYPE_XML)
00096     {
00097       xmlFree (input->evaluator);
00098       xmlFree (input->simulator);
00099       xmlFree (input->result);
00100       xmlFree (input->variables);
00101     }
00102   else
00103     {
00104       g_free (input->evaluator);
00105       g_free (input->simulator);
00106       g_free (input->result);
00107       g_free (input->variables);
00108     }
00109   input->nexperiments = input->nvariables =
      input->nsteps = 0;
00110 #if DEBUG_INPUT
00111   fprintf (stderr, "input_free: end\n");
00112 #endif
00113 }
```

Here is the call graph for this function:



4.7.2.3 input_new()

```
void input_new ( )
```

Function to create a new Input struct.

Definition at line 63 of file input.c.

```
00064 {
00065 #if DEBUG_INPUT
00066   fprintf (stderr, "input_new: start\n");
00067 #endif
00068   input->nvariables = input->nexperiments =
      input->nsteps = 0;
```

```
00069   input->simulator = input->evaluator = input->
      directory = input->name = NULL;
00070   input->experiment = NULL;
00071   input->variable = NULL;
00072 #if DEBUG_INPUT
00073   fprintf (stderr, "input_new: end\n");
00074 #endif
00075 }
```

4.7.2.4 input_open()

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

Function to open the input file.

Returns

1_on_success, 0_on_error.

Parameters

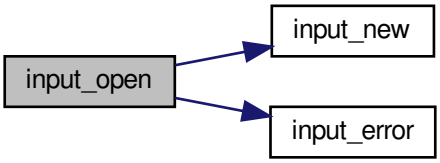
filename	Input data file name.

Definition at line 957 of file input.c.

```
00958 {
00959   xmlDoc *doc;
00960   JsonParser *parser;
00961
00962 #if DEBUG_INPUT
00963   fprintf (stderr, "input_open: start\n");
00964 #endif
00965
00966   // Resetting input data
00967   input_new ();
00968
00969   // Opening input file
00970 #if DEBUG_INPUT
00971   fprintf (stderr, "input_open: opening the input file %s\n", filename);
00972   fprintf (stderr, "input_open: trying XML format\n");
00973 #endif
00974   doc = xmlParseFile (filename);
00975   if (!doc)
00976     {
00977 #if DEBUG_INPUT
00978       fprintf (stderr, "input_open: trying JSON format\n");
00979 #endif
00980       parser = json_parser_new ();
00981       if (!json_parser_load_from_file (parser, filename, NULL))
00982         {
00983           input_error (_("Unable to parse the input file"));
00984           goto exit_on_error;
00985         }
00986       if (!input_open_json (parser))
00987         goto exit_on_error;
00988     }
00989   else if (!input_open_xml (doc))
00990     goto exit_on_error;
00991
00992   // Getting the working directory
00993   input->directory = g_path_get_dirname (filename);
00994   input->name = g_path_get_basename (filename);
00995
00996 #if DEBUG_INPUT
00997   fprintf (stderr, "input_open: end\n");
```

```
00998 #endif
00999   return 1;
01000
01001 exit_on_error:
01002   show_error (error_message);
01003   g_free (error_message);
01004   input_free ();
01005 #if DEBUG_INPUT
01006   fprintf (stderr, "input_open: end\n");
01007 #endif
01008   return 0;
01009 }
```

Here is the call graph for this function:



4.7.2.5 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 568 of file input.c.

```
00569 {
00570   JsonNode *node, *child;
00571   JsonObject *object;
00572   JsonArray *array;
00573   const char *buffer;
00574   int error_code;
00575   unsigned int i, n;
00576
00577 #if DEBUG_INPUT
00578   fprintf (stderr, "input_open_json: start\n");
00579 #endif
```

```
00580
00581   // Resetting input data
00582   input->type = INPUT_TYPE_JSON;
00583
00584   // Getting the root node
00585 #if DEBUG_INPUT
00586   fprintf (stderr, "input_open_json: getting the root node\n");
00587 #endif
00588   node = json_parser_get_root (parser);
00589   object = json_node_get_object (node);
00590
00591   // Getting result and variables file names
00592   if (!input->result)
00593     {
00594       buffer = json_object_get_string_member (object, LABEL_RESULT_FILE);
00595       if (!buffer)
00596         buffer = result_name;
00597       input->result = g_strdup (buffer);
00598     }
00599   else
00600     input->result = g_strdup (result_name);
00601   if (!input->variables)
00602     {
00603       buffer = json_object_get_string_member (object, LABEL_VARIABLES_FILE);
00604       if (!buffer)
00605         buffer = variables_name;
00606       input->variables = g_strdup (buffer);
00607     }
00608   else
00609     input->variables = g_strdup (variables_name);
00610
00611   // Opening simulator program name
00612   buffer = json_object_get_string_member (object, LABEL_SIMULATOR);
00613   if (!buffer)
00614     {
00615       input_error (_("Bad simulator program"));
00616       goto exit_on_error;
00617     }
00618   input->simulator = g_strdup (buffer);
00619
00620   // Opening evaluator program name
00621   buffer = json_object_get_string_member (object, LABEL_EVALUATOR);
00622   if (buffer)
00623     input->evaluator = g_strdup (buffer);
00624
00625   // Obtaining pseudo-random numbers generator seed
00626   input->seed
00627     = json_object_get_uint_with_default (object,
      LABEL_SEED,
00628                                          DEFAULT_RANDOM_SEED, &error_code);
00629   if (error_code)
00630     {
00631       input_error (_("Bad pseudo-random numbers generator seed"));
00632       goto exit_on_error;
00633     }
00634
00635   // Opening algorithm
00636   buffer = json_object_get_string_member (object, LABEL_ALGORITHM);
00637   if (!strcmp (buffer, LABEL_MONTE_CARLO))
00638     {
00639       input->algorithm = ALGORITHM_MONTE_CARLO;
00640
00641       // Obtaining simulations number
00642       input->nsimulations
00643         = json_object_get_int (object, LABEL_NSIMULATIONS, &error_code
      );
00644       if (error_code)
00645         {
00646           input_error (_("Bad simulations number"));
00647           goto exit_on_error;
00648         }
00649     }
00650   else if (!strcmp (buffer, LABEL_SWEEP))
00651     input->algorithm = ALGORITHM_SWEEP;
00652   else if (!strcmp (buffer, LABEL_ORTHOGONAL))
00653     input->algorithm = ALGORITHM_ORTHOGONAL;
00654   else if (!strcmp (buffer, LABEL_GENETIC))
00655     {
00656       input->algorithm = ALGORITHM_GENETIC;
00657
00658       // Obtaining population
00659       if (json_object_get_member (object, LABEL_NPOPULATION))
00660         {
00661           input->nsimulations
00662             = json_object_get_uint (object,
      LABEL_NPOPULATION, &error_code);
00663           if (error_code || input->nsimulations < 3)
```

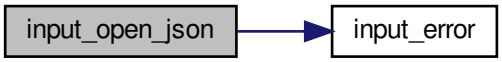
```
00664             {
00665               input_error (_("Invalid population number"));
00666               goto exit_on_error;
00667             }
00668         }
00669       else
00670         {
00671           input_error (_("No population number"));
00672           goto exit_on_error;
00673         }
00674
00675       // Obtaining generations
00676       if (json_object_get_member (object, LABEL_NGENERATIONS))
00677         {
00678           input->niterations
00679             = json_object_get_uint (object,
      LABEL_NGENERATIONS, &error_code);
00680           if (error_code || !input->niterations)
00681             {
00682               input_error (_("Invalid generations number"));
00683               goto exit_on_error;
00684             }
00685         }
00686       else
00687         {
00688           input_error (_("No generations number"));
00689           goto exit_on_error;
00690         }
00691
00692       // Obtaining mutation probability
00693       if (json_object_get_member (object, LABEL_MUTATION))
00694         {
00695           input->mutation_ratio
00696             = json_object_get_float (object, LABEL_MUTATION, &error_code
      );
00697           if (error_code || input->mutation_ratio < 0.
00698               || input->mutation_ratio >= 1.)
00699             {
00700               input_error (_("Invalid mutation probability"));
00701               goto exit_on_error;
00702             }
00703         }
00704       else
00705         {
00706           input_error (_("No mutation probability"));
00707           goto exit_on_error;
00708         }
00709
00710       // Obtaining reproduction probability
00711       if (json_object_get_member (object, LABEL_REPRODUCTION))
00712         {
00713           input->reproduction_ratio
00714             = json_object_get_float (object,
      LABEL_REPRODUCTION, &error_code);
00715           if (error_code || input->reproduction_ratio < 0.
00716               || input->reproduction_ratio >= 1.0)
00717             {
00718               input_error (_("Invalid reproduction probability"));
00719               goto exit_on_error;
00720             }
00721         }
00722       else
00723         {
00724           input_error (_("No reproduction probability"));
00725           goto exit_on_error;
00726         }
00727
00728       // Obtaining adaptation probability
00729       if (json_object_get_member (object, LABEL_ADAPTATION))
00730         {
00731           input->adaptation_ratio
00732             = json_object_get_float (object,
      LABEL_ADAPTATION, &error_code);
00733           if (error_code || input->adaptation_ratio < 0.
00734               || input->adaptation_ratio >= 1.)
00735             {
00736               input_error (_("Invalid adaptation probability"));
00737               goto exit_on_error;
00738             }
00739         }
00740       else
00741         {
00742           input_error (_("No adaptation probability"));
00743           goto exit_on_error;
00744         }
00745
00746       // Checking survivals
```

```
00747       i = input->mutation_ratio * input->nsimulations;
00748       i += input->reproduction_ratio * input->
    nsimulations;
00749       i += input->adaptation_ratio * input->
    nsimulations;
00750       if (i > input->nsimulations - 2)
00751         {
00752           input_error
00753             (_("No enough survival entities to reproduce the population"));
00754           goto exit_on_error;
00755         }
00756     }
00757   else
00758     {
00759       input_error (_("Unknown algorithm"));
00760       goto exit_on_error;
00761     }
00762
00763   if (input->algorithm == ALGORITHM_MONTE_CARLO
00764       || input->algorithm == ALGORITHM_SWEEP
00765       || input->algorithm == ALGORITHM_ORTHOGONAL)
00766     {
00767
00768       // Obtaining iterations number
00769       input->niterations
00770         = json_object_get_uint (object, LABEL_NITERATIONS, &error_code
    );
00771       if (error_code == 1)
00772         input->niterations = 1;
00773       else if (error_code)
00774         {
00775           input_error (_("Bad iterations number"));
00776           goto exit_on_error;
00777         }
00778
00779       // Obtaining best number
00780       input->nbest
00781         = json_object_get_uint_with_default (object,
    LABEL_NBEST, 1,
00782                                              &error_code);
00783       if (error_code || !input->nbest)
00784         {
00785           input_error (_("Invalid best number"));
00786           goto exit_on_error;
00787         }
00788
00789       // Obtaining tolerance
00790       input->tolerance
00791         = json_object_get_float_with_default (object,
    LABEL_TOLERANCE, 0.,
00792                                               &error_code);
00793       if (error_code || input->tolerance < 0.)
00794         {
00795           input_error (_("Invalid tolerance"));
00796           goto exit_on_error;
00797         }
00798
00799       // Getting hill climbing method parameters
00800       if (json_object_get_member (object, LABEL_NSTEPS))
00801         {
00802           input->nsteps
00803             = json_object_get_uint (object, LABEL_NSTEPS, &error_code);
00804           if (error_code)
00805             {
00806               input_error (_("Invalid steps number"));
00807               goto exit_on_error;
00808             }
00809           buffer = json_object_get_string_member (object, LABEL_CLIMBING);
00810           if (!strcmp (buffer, LABEL_COORDINATES))
00811             input->climbing = CLIMBING_METHOD_COORDINATES;
00812           else if (!strcmp (buffer, LABEL_RANDOM))
00813             {
00814               input->climbing = CLIMBING_METHOD_RANDOM;
00815               input->nestimates
00816                 = json_object_get_uint (object,
    LABEL_NESTIMATES, &error_code);
00817               if (error_code || !input->nestimates)
00818                 {
00819                   input_error (_("Invalid estimates number"));
00820                   goto exit_on_error;
00821                 }
00822             }
00823           else
00824             {
00825               input_error (_("Unknown method to estimate the hill climbing"));
00826               goto exit_on_error;
00827             }
```

```
00828           input->relaxation
00829             = json_object_get_float_with_default (object,
    LABEL_RELAXATION,
00830                                                   DEFAULT_RELAXATION,
00831                                                   &error_code);
00832           if (error_code || input->relaxation < 0. || input->
    relaxation > 2.)
00833             {
00834               input_error (_("Invalid relaxation parameter"));
00835               goto exit_on_error;
00836             }
00837         }
00838       else
00839         input->nsteps = 0;
00840     }
00841   // Obtaining the threshold
00842   input->threshold
00843     = json_object_get_float_with_default (object,
    LABEL_THRESHOLD, 0.,
00844                                           &error_code);
00845   if (error_code)
00846     {
00847       input_error (_("Invalid threshold"));
00848       goto exit_on_error;
00849     }
00850
00851   // Reading the experimental data
00852   array = json_object_get_array_member (object, LABEL_EXPERIMENTS);
00853   n = json_array_get_length (array);
00854   input->experiment = (Experiment *) g_malloc (n * sizeof (
    Experiment));
00855   for (i = 0; i < n; ++i)
00856     {
00857 #if DEBUG_INPUT
00858       fprintf (stderr, "input_open_json: nexperiments=%u\n",
00859                input->nexperiments);
00860 #endif
00861       child = json_array_get_element (array, i);
00862       if (!input->nexperiments)
00863         {
00864           if (!experiment_open_json (input->experiment, child, 0))
00865             goto exit_on_error;
00866         }
00867       else
00868         {
00869           if (!experiment_open_json (input->experiment +
    input->nexperiments,
00870                                      child, input->experiment->
    ninputs))
00871             goto exit_on_error;
00872         }
00873       ++input->nexperiments;
00874 #if DEBUG_INPUT
00875       fprintf (stderr, "input_open_json: nexperiments=%u\n",
00876                input->nexperiments);
00877 #endif
00878     }
00879   if (!input->nexperiments)
00880     {
00881       input_error (_("No optimization experiments"));
00882       goto exit_on_error;
00883     }
00884
00885   // Reading the variables data
00886   array = json_object_get_array_member (object, LABEL_VARIABLES);
00887   n = json_array_get_length (array);
00888   input->variable = (Variable *) g_malloc (n * sizeof (
    Variable));
00889   for (i = 0; i < n; ++i)
00890     {
00891 #if DEBUG_INPUT
00892       fprintf (stderr, "input_open_json: nvariables=%u\n", input->
    nvariables);
00893 #endif
00894       child = json_array_get_element (array, i);
00895       if (!variable_open_json (input->variable +
    input->nvariables, child,
00896                                input->algorithm, input->
    nsteps))
00897         goto exit_on_error;
00898       ++input->nvariables;
00899     }
00900   if (!input->nvariables)
00901     {
00902       input_error (_("No optimization variables"));
00903       goto exit_on_error;
00904     }
```

```
00905
00906   // Obtaining the error norm
00907   if (json_object_get_member (object, LABEL_NORM))
00908     {
00909       buffer = json_object_get_string_member (object, LABEL_NORM);
00910       if (!strcmp (buffer, LABEL_EUCLIDIAN))
00911         input->norm = ERROR_NORM_EUCLIDIAN;
00912       else if (!strcmp (buffer, LABEL_MAXIMUM))
00913         input->norm = ERROR_NORM_MAXIMUM;
00914       else if (!strcmp (buffer, LABEL_P))
00915         {
00916           input->norm = ERROR_NORM_P;
00917           input->p = json_object_get_float (object,
      LABEL_P, &error_code);
00918           if (!error_code)
00919             {
00920               input_error (_("Bad P parameter"));
00921               goto exit_on_error;
00922             }
00923         }
00924       else if (!strcmp (buffer, LABEL_TAXICAB))
00925         input->norm = ERROR_NORM_TAXICAB;
00926       else
00927         {
00928           input_error (_("Unknown error norm"));
00929           goto exit_on_error;
00930         }
00931     }
00932   else
00933     input->norm = ERROR_NORM_EUCLIDIAN;
00934
00935   // Closing the JSON document
00936   g_object_unref (parser);
00937
00938 #if DEBUG_INPUT
00939   fprintf (stderr, "input_open_json: end\n");
00940 #endif
00941   return 1;
00942
00943 exit_on_error:
00944   g_object_unref (parser);
00945 #if DEBUG_INPUT
00946   fprintf (stderr, "input_open_json: end\n");
00947 #endif
00948   return 0;
00949 }
```

Here is the call graph for this function:



4.7.2.6 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 132 of file input.c.

```
00133 {
00134   char buffer2[64];
00135   xmlNode *node, *child;
00136   xmlChar *buffer;
00137   int error_code;
00138   unsigned int i;
00139
00140 #if DEBUG_INPUT
00141   fprintf (stderr, "input_open_xml: start\n");
00142 #endif
00143
00144   // Resetting input data
00145   buffer = NULL;
00146   input->type = INPUT_TYPE_XML;
00147
00148   // Getting the root node
00149 #if DEBUG_INPUT
00150   fprintf (stderr, "input_open_xml: getting the root node\n");
00151 #endif
00152   node = xmlDocGetRootElement (doc);
00153   if (xmlStrcmp (node->name, (const xmlChar *) LABEL_OPTIMIZE))
00154     {
00155       input_error (_("Bad root XML node"));
00156       goto exit_on_error;
00157     }
00158
00159   // Getting result and variables file names
00160   if (!input->result)
00161     {
00162       input->result =
00163         (char *) xmlGetProp (node, (const xmlChar *) LABEL_RESULT_FILE);
00164       if (!input->result)
00165         input->result = (char *) xmlStrdup ((const xmlChar *)
      result_name);
00166     }
00167 #if DEBUG_INPUT
00168   fprintf (stderr, "input_open_xml: result file=%s\n", input->result);
00169 #endif
00170   if (!input->variables)
00171     {
00172       input->variables =
00173         (char *) xmlGetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE);
00174       if (!input->variables)
00175         input->variables =
00176           (char *) xmlStrdup ((const xmlChar *) variables_name);
00177     }
00178 #if DEBUG_INPUT
00179   fprintf (stderr, "input_open_xml: variables file=%s\n", input->variables);
00180 #endif
00181
00182   // Opening simulator program name
00183   input->simulator =
00184     (char *) xmlGetProp (node, (const xmlChar *) LABEL_SIMULATOR);
00185   if (!input->simulator)
00186     {
00187       input_error (_("Bad simulator program"));
00188       goto exit_on_error;
00189     }
00190
00191   // Opening evaluator program name
00192   input->evaluator =
00193     (char *) xmlGetProp (node, (const xmlChar *) LABEL_EVALUATOR);
00194
00195   // Obtaining pseudo-random numbers generator seed
00196   input->seed
00197     = xml_node_get_uint_with_default (node, (const xmlChar *)
      LABEL_SEED,
00198                                       DEFAULT_RANDOM_SEED, &error_code);
00199   if (error_code)
00200     {
00201       input_error (_("Bad pseudo-random numbers generator seed"));
00202       goto exit_on_error;
00203     }
00204
00205   // Opening algorithm
00206   buffer = xmlGetProp (node, (const xmlChar *) LABEL_ALGORITHM);
```

```
00207   if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MONTE_CARLO))
00208     {
00209       input->algorithm = ALGORITHM_MONTE_CARLO;
00210
00211       // Obtaining simulations number
00212       input->nsimulations
00213         = xml_node_get_int (node, (const xmlChar *)
      LABEL_NSIMULATIONS,
00214                             &error_code);
00215       if (error_code)
00216         {
00217           input_error (_("Bad simulations number"));
00218           goto exit_on_error;
00219         }
00220     }
00221   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_SWEEP))
00222     input->algorithm = ALGORITHM_SWEEP;
00223   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_ORTHOGONAL))
00224     input->algorithm = ALGORITHM_ORTHOGONAL;
00225   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_GENETIC))
00226     {
00227       input->algorithm = ALGORITHM_GENETIC;
00228
00229       // Obtaining population
00230       if (xmlHasProp (node, (const xmlChar *) LABEL_NPOPULATION))
00231         {
00232           input->nsimulations
00233             = xml_node_get_uint (node, (const xmlChar *) LABEL_NPOPULATION,
00234                                  &error_code);
00235           if (error_code || input->nsimulations < 3)
00236             {
00237               input_error (_("Invalid population number"));
00238               goto exit_on_error;
00239             }
00240         }
00241       else
00242         {
00243           input_error (_("No population number"));
00244           goto exit_on_error;
00245         }
00246
00247       // Obtaining generations
00248       if (xmlHasProp (node, (const xmlChar *) LABEL_NGENERATIONS))
00249         {
00250           input->niterations
00251             = xml_node_get_uint (node, (const xmlChar *) LABEL_NGENERATIONS,
00252                                  &error_code);
00253           if (error_code || !input->niterations)
00254             {
00255               input_error (_("Invalid generations number"));
00256               goto exit_on_error;
00257             }
00258         }
00259       else
00260         {
00261           input_error (_("No generations number"));
00262           goto exit_on_error;
00263         }
00264
00265       // Obtaining mutation probability
00266       if (xmlHasProp (node, (const xmlChar *) LABEL_MUTATION))
00267         {
00268           input->mutation_ratio
00269             = xml_node_get_float (node, (const xmlChar *) LABEL_MUTATION,
00270                                   &error_code);
00271           if (error_code || input->mutation_ratio < 0.
00272               || input->mutation_ratio >= 1.)
00273             {
00274               input_error (_("Invalid mutation probability"));
00275               goto exit_on_error;
00276             }
00277         }
00278       else
00279         {
00280           input_error (_("No mutation probability"));
00281           goto exit_on_error;
00282         }
00283
00284       // Obtaining reproduction probability
00285       if (xmlHasProp (node, (const xmlChar *) LABEL_REPRODUCTION))
00286         {
00287           input->reproduction_ratio
00288             = xml_node_get_float (node, (const xmlChar *) LABEL_REPRODUCTION,
00289                                   &error_code);
00290           if (error_code || input->reproduction_ratio < 0.
00291               || input->reproduction_ratio >= 1.0)
00292             {
```

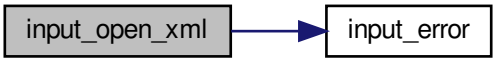
```
00293               input_error (_("Invalid reproduction probability"));
00294               goto exit_on_error;
00295             }
00296         }
00297       else
00298         {
00299           input_error (_("No reproduction probability"));
00300           goto exit_on_error;
00301         }
00302
00303       // Obtaining adaptation probability
00304       if (xmlHasProp (node, (const xmlChar *) LABEL_ADAPTATION))
00305         {
00306           input->adaptation_ratio
00307             = xml_node_get_float (node, (const xmlChar *) LABEL_ADAPTATION,
00308                                   &error_code);
00309           if (error_code || input->adaptation_ratio < 0.
00310               || input->adaptation_ratio >= 1.)
00311             {
00312               input_error (_("Invalid adaptation probability"));
00313               goto exit_on_error;
00314             }
00315         }
00316       else
00317         {
00318           input_error (_("No adaptation probability"));
00319           goto exit_on_error;
00320         }
00321
00322       // Checking survivals
00323       i = input->mutation_ratio * input->nsimulations;
00324       i += input->reproduction_ratio * input->
      nsimulations;
00325       i += input->adaptation_ratio * input->
      nsimulations;
00326       if (i > input->nsimulations - 2)
00327         {
00328           input_error
00329             (_("No enough survival entities to reproduce the population"));
00330           goto exit_on_error;
00331         }
00332     }
00333   else
00334     {
00335       input_error (_("Unknown algorithm"));
00336       goto exit_on_error;
00337     }
00338   xmlFree (buffer);
00339   buffer = NULL;
00340
00341   if (input->algorithm == ALGORITHM_MONTE_CARLO
00342       || input->algorithm == ALGORITHM_SWEEP
00343       || input->algorithm == ALGORITHM_ORTHOGONAL)
00344     {
00345
00346       // Obtaining iterations number
00347       input->niterations
00348         = xml_node_get_uint (node, (const xmlChar *)
      LABEL_NITERATIONS,
00349                              &error_code);
00350       if (error_code == 1)
00351         input->niterations = 1;
00352       else if (error_code)
00353         {
00354           input_error (_("Bad iterations number"));
00355           goto exit_on_error;
00356         }
00357
00358       // Obtaining best number
00359       input->nbest
00360         = xml_node_get_uint_with_default (node, (const xmlChar *)
      LABEL_NBEST,
00361                                           1, &error_code);
00362       if (error_code || !input->nbest)
00363         {
00364           input_error (_("Invalid best number"));
00365           goto exit_on_error;
00366         }
00367
00368       // Obtaining tolerance
00369       input->tolerance
00370         = xml_node_get_float_with_default (node,
00371                                            (const xmlChar *) LABEL_TOLERANCE,
00372                                            0., &error_code);
00373       if (error_code || input->tolerance < 0.)
00374         {
00375           input_error (_("Invalid tolerance"));
```

```
00376           goto exit_on_error;
00377         }
00378
00379       // Getting hill climbing method parameters
00380       if (xmlHasProp (node, (const xmlChar *) LABEL_NSTEPS))
00381         {
00382           input->nsteps =
00383             xml_node_get_uint (node, (const xmlChar *) LABEL_NSTEPS,
00384                                &error_code);
00385           if (error_code)
00386             {
00387               input_error (_("Invalid steps number"));
00388               goto exit_on_error;
00389             }
00390 #if DEBUG_INPUT
00391           fprintf (stderr, "input_open_xml: nsteps=%u\n", input->nsteps);
00392 #endif
00393           buffer = xmlGetProp (node, (const xmlChar *) LABEL_CLIMBING);
00394           if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_COORDINATES))
00395             input->climbing = CLIMBING_METHOD_COORDINATES;
00396           else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_RANDOM))
00397             {
00398               input->climbing = CLIMBING_METHOD_RANDOM;
00399               input->nestimates
00400                 = xml_node_get_uint (node, (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             = xml_node_get_float_with_default (node,
00417                                                (const xmlChar *)
00418                                                LABEL_RELAXATION,
00419                                                DEFAULT_RELAXATION, &error_code);
00420           if (error_code || input->relaxation < 0. || input->
    relaxation > 2.)
00421             {
00422               input_error (_("Invalid relaxation parameter"));
00423               goto exit_on_error;
00424             }
00425         }
00426       else
00427         input->nsteps = 0;
00428     }
00429   // Obtaining the threshold
00430   input->threshold =
00431     xml_node_get_float_with_default (node, (const xmlChar *)
    LABEL_THRESHOLD,
00432                                      0., &error_code);
00433   if (error_code)
00434     {
00435       input_error (_("Invalid threshold"));
00436       goto exit_on_error;
00437     }
00438
00439   // Reading the experimental data
00440   for (child = node->children; child; child = child->next)
00441     {
00442       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_EXPERIMENT))
00443         break;
00444 #if DEBUG_INPUT
00445       fprintf (stderr, "input_open_xml: nexperiments=%u\n",
00446                input->nexperiments);
00447 #endif
00448       input->experiment = (Experiment *)
00449         g_realloc (input->experiment,
00450                    (1 + input->nexperiments) * sizeof (
    Experiment));
00451       if (!input->nexperiments)
00452         {
00453           if (!experiment_open_xml (input->experiment, child, 0))
00454             goto exit_on_error;
00455         }
00456       else
00457         {
00458           if (!experiment_open_xml (input->experiment +
```

```
      input->nexperiments,
00459                                     child, input->experiment->
      ninputs))
00460             goto exit_on_error;
00461         }
00462       ++input->nexperiments;
00463 #if DEBUG_INPUT
00464       fprintf (stderr, "input_open_xml: nexperiments=%u\n",
00465                input->nexperiments);
00466 #endif
00467     }
00468   if (!input->nexperiments)
00469     {
00470       input_error (_("No optimization experiments"));
00471       goto exit_on_error;
00472     }
00473   buffer = NULL;
00474
00475   // Reading the variables data
00476   if (input->algorithm == ALGORITHM_SWEEP
00477       || input->algorithm == ALGORITHM_ORTHOGONAL)
00478     input->nsimulations = 1;
00479   for (; child; child = child->next)
00480     {
00481 #if DEBUG_INPUT
00482       fprintf (stderr, "input_open_xml: nvariables=%u\n", input->nvariables);
00483 #endif
00484       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_VARIABLE))
00485         {
00486           snprintf (buffer2, 64, "%s %u: %s",
00487                     _("Variable"), input->nvariables + 1, _("bad XML node"));
00488           input_error (buffer2);
00489           goto exit_on_error;
00490         }
00491       input->variable = (Variable *)
00492         g_realloc (input->variable,
00493                    (1 + input->nvariables) * sizeof (Variable));
00494       if (!variable_open_xml (input->variable +
      input->nvariables, child,
00495                               input->algorithm, input->nsteps))
00496         goto exit_on_error;
00497       if (input->algorithm == ALGORITHM_SWEEP
00498           || input->algorithm == ALGORITHM_ORTHOGONAL)
00499         input->nsimulations *= input->variable[
      input->nvariables].nsweeps;
00500       ++input->nvariables;
00501     }
00502   if (!input->nvariables)
00503     {
00504       input_error (_("No optimization variables"));
00505       goto exit_on_error;
00506     }
00507   if (input->nbest > input->nsimulations)
00508     {
00509       input_error (_("Best number higher than simulations number"));
00510       goto exit_on_error;
00511     }
00512   buffer = NULL;
00513
00514   // Obtaining the error norm
00515   if (xmlHasProp (node, (const xmlChar *) LABEL_NORM))
00516     {
00517       buffer = xmlGetProp (node, (const xmlChar *) LABEL_NORM);
00518       if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_EUCLIDIAN))
00519         input->norm = ERROR_NORM_EUCLIDIAN;
00520       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MAXIMUM))
00521         input->norm = ERROR_NORM_MAXIMUM;
00522       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_P))
00523         {
00524           input->norm = ERROR_NORM_P;
00525           input->p
00526             = xml_node_get_float (node, (const xmlChar *) LABEL_P, &error_code);
00527           if (error_code)
00528             {
00529               input_error (_("Bad P parameter"));
00530               goto exit_on_error;
00531             }
00532         }
00533       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_TAXICAB))
00534         input->norm = ERROR_NORM_TAXICAB;
00535       else
00536         {
00537           input_error (_("Unknown error norm"));
00538           goto exit_on_error;
00539         }
00540       xmlFree (buffer);
00541     }
```

```
00542   else
00543     input->norm = ERROR_NORM_EUCLIDIAN;
00544
00545   // Closing the XML document
00546   xmlFreeDoc (doc);
00547
00548 #if DEBUG_INPUT
00549   fprintf (stderr, "input_open_xml: end\n");
00550 #endif
00551   return 1;
00552
00553 exit_on_error:
00554   xmlFree (buffer);
00555   xmlFreeDoc (doc);
00556 #if DEBUG_INPUT
00557   fprintf (stderr, "input_open_xml: end\n");
00558 #endif
00559   return 0;
00560 }
```

Here is the call graph for this function:



4.8 input.c

```
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 2012-2018, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
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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.
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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 <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 "utils.h"
00048 #include "experiment.h"
00049 #include "variable.h"
00050 #include "input.h"
00051
00052 #define DEBUG_INPUT 0
00053
00054 Input input[1];
00055
00056 const char *result_name = "result";
00057 const char *variables_name = "variables";
00058
00062 void
00063 input_new ()
00064 {
00065 #if DEBUG_INPUT
00066   fprintf (stderr, "input_new: start\n");
00067 #endif
00068   input->nvariables = input->nexperiments = input->nsteps = 0;
00069   input->simulator = input->evaluator = input->directory = input->
      name = NULL;
00070   input->experiment = NULL;
00071   input->variable = NULL;
00072 #if DEBUG_INPUT
00073   fprintf (stderr, "input_new: end\n");
00074 #endif
00075 }
00076
00080 void
00081 input_free ()
00082 {
00083   unsigned int i;
00084 #if DEBUG_INPUT
00085   fprintf (stderr, "input_free: start\n");
00086 #endif
00087   g_free (input->name);
00088   g_free (input->directory);
00089   for (i = 0; i < input->nexperiments; ++i)
00090     experiment_free (input->experiment + i, input->type);
00091   for (i = 0; i < input->nvariables; ++i)
00092     variable_free (input->variable + i, input->type);
00093   g_free (input->experiment);
00094   g_free (input->variable);
00095   if (input->type == INPUT_TYPE_XML)
00096     {
00097       xmlFree (input->evaluator);
00098       xmlFree (input->simulator);
00099       xmlFree (input->result);
00100       xmlFree (input->variables);
00101     }
00102   else
00103     {
00104       g_free (input->evaluator);
00105       g_free (input->simulator);
00106       g_free (input->result);
00107       g_free (input->variables);
00108     }
00109   input->nexperiments = input->nvariables = input->nsteps = 0;
00110 #if DEBUG_INPUT
00111   fprintf (stderr, "input_free: end\n");
00112 #endif
00113 }
00114
00118 static void
00119 input_error (char *message)
00120 {
00121   char buffer[64];
00122   snprintf (buffer, 64, "%s: %s\n", _("Input"), message);
00123   error_message = g_strdup (buffer);
00124 }
00125
00131 static inline int
00132 input_open_xml (xmlDoc * doc)
00133 {
00134   char buffer2[64];
00135   xmlNode *node, *child;
00136   xmlChar *buffer;
00137   int error_code;
00138   unsigned int i;
00139
00140 #if DEBUG_INPUT
00141   fprintf (stderr, "input_open_xml: start\n");
00142 #endif
00143
00144   // Resetting input data
00145   buffer = NULL;
00146   input->type = INPUT_TYPE_XML;
```

```
00147
00148   // Getting the root node
00149 #if DEBUG_INPUT
00150   fprintf (stderr, "input_open_xml: getting the root node\n");
00151 #endif
00152   node = xmlDocGetRootElement (doc);
00153   if (xmlStrcmp (node->name, (const xmlChar *) LABEL_OPTIMIZE))
00154     {
00155       input_error (_("Bad root XML node"));
00156       goto exit_on_error;
00157     }
00158
00159   // Getting result and variables file names
00160   if (!input->result)
00161     {
00162       input->result =
00163         (char *) xmlGetProp (node, (const xmlChar *) LABEL_RESULT_FILE);
00164       if (!input->result)
00165         input->result = (char *) xmlStrdup ((const xmlChar *) result_name);
00166     }
00167 #if DEBUG_INPUT
00168   fprintf (stderr, "input_open_xml: result file=%s\n", input->result);
00169 #endif
00170   if (!input->variables)
00171     {
00172       input->variables =
00173         (char *) xmlGetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE);
00174       if (!input->variables)
00175         input->variables =
00176           (char *) xmlStrdup ((const xmlChar *) variables_name);
00177     }
00178 #if DEBUG_INPUT
00179   fprintf (stderr, "input_open_xml: variables file=%s\n", input->variables);
00180 #endif
00181
00182   // Opening simulator program name
00183   input->simulator =
00184     (char *) xmlGetProp (node, (const xmlChar *) LABEL_SIMULATOR);
00185   if (!input->simulator)
00186     {
00187       input_error (_("Bad simulator program"));
00188       goto exit_on_error;
00189     }
00190
00191   // Opening evaluator program name
00192   input->evaluator =
00193     (char *) xmlGetProp (node, (const xmlChar *) LABEL_EVALUATOR);
00194
00195   // Obtaining pseudo-random numbers generator seed
00196   input->seed
00197     = xml_node_get_uint_with_default (node, (const xmlChar *)
      LABEL_SEED,
00198                                       DEFAULT_RANDOM_SEED, &error_code);
00199   if (error_code)
00200     {
00201       input_error (_("Bad pseudo-random numbers generator seed"));
00202       goto exit_on_error;
00203     }
00204
00205   // Opening algorithm
00206   buffer = xmlGetProp (node, (const xmlChar *) LABEL_ALGORITHM);
00207   if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MONTE_CARLO))
00208     {
00209       input->algorithm = ALGORITHM_MONTE_CARLO;
00210
00211       // Obtaining simulations number
00212       input->nsimulations
00213         = xml_node_get_int (node, (const xmlChar *)
      LABEL_NSIMULATIONS,
00214                             &error_code);
00215       if (error_code)
00216         {
00217           input_error (_("Bad simulations number"));
00218           goto exit_on_error;
00219         }
00220     }
00221   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_SWEEP))
00222     input->algorithm = ALGORITHM_SWEEP;
00223   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_ORTHOGONAL))
00224     input->algorithm = ALGORITHM_ORTHOGONAL;
00225   else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_GENETIC))
00226     {
00227       input->algorithm = ALGORITHM_GENETIC;
00228
00229       // Obtaining population
00230       if (xmlHasProp (node, (const xmlChar *) LABEL_NPOPULATION))
00231         {
```

```
00232           input->nsimulations
00233             = xml_node_get_uint (node, (const xmlChar *) LABEL_NPOPULATION,
00234                                  &error_code);
00235           if (error_code || input->nsimulations < 3)
00236             {
00237               input_error (_("Invalid population number"));
00238               goto exit_on_error;
00239             }
00240         }
00241       else
00242         {
00243           input_error (_("No population number"));
00244           goto exit_on_error;
00245         }
00246
00247       // Obtaining generations
00248       if (xmlHasProp (node, (const xmlChar *) LABEL_NGENERATIONS))
00249         {
00250           input->niterations
00251             = xml_node_get_uint (node, (const xmlChar *) LABEL_NGENERATIONS,
00252                                  &error_code);
00253           if (error_code || !input->niterations)
00254             {
00255               input_error (_("Invalid generations number"));
00256               goto exit_on_error;
00257             }
00258         }
00259       else
00260         {
00261           input_error (_("No generations number"));
00262           goto exit_on_error;
00263         }
00264
00265       // Obtaining mutation probability
00266       if (xmlHasProp (node, (const xmlChar *) LABEL_MUTATION))
00267         {
00268           input->mutation_ratio
00269             = xml_node_get_float (node, (const xmlChar *) LABEL_MUTATION,
00270                                   &error_code);
00271           if (error_code || input->mutation_ratio < 0.
00272               || input->mutation_ratio >= 1.)
00273             {
00274               input_error (_("Invalid mutation probability"));
00275               goto exit_on_error;
00276             }
00277         }
00278       else
00279         {
00280           input_error (_("No mutation probability"));
00281           goto exit_on_error;
00282         }
00283
00284       // Obtaining reproduction probability
00285       if (xmlHasProp (node, (const xmlChar *) LABEL_REPRODUCTION))
00286         {
00287           input->reproduction_ratio
00288             = xml_node_get_float (node, (const xmlChar *) LABEL_REPRODUCTION,
00289                                   &error_code);
00290           if (error_code || input->reproduction_ratio < 0.
00291               || input->reproduction_ratio >= 1.0)
00292             {
00293               input_error (_("Invalid reproduction probability"));
00294               goto exit_on_error;
00295             }
00296         }
00297       else
00298         {
00299           input_error (_("No reproduction probability"));
00300           goto exit_on_error;
00301         }
00302
00303       // Obtaining adaptation probability
00304       if (xmlHasProp (node, (const xmlChar *) LABEL_ADAPTATION))
00305         {
00306           input->adaptation_ratio
00307             = xml_node_get_float (node, (const xmlChar *) LABEL_ADAPTATION,
00308                                   &error_code);
00309           if (error_code || input->adaptation_ratio < 0.
00310               || input->adaptation_ratio >= 1.)
00311             {
00312               input_error (_("Invalid adaptation probability"));
00313               goto exit_on_error;
00314             }
00315         }
00316       else
00317         {
00318           input_error (_("No adaptation probability"));
```

```
00319           goto exit_on_error;
00320         }
00321
00322       // Checking survivals
00323       i = input->mutation_ratio * input->nsimulations;
00324       i += input->reproduction_ratio * input->nsimulations;
00325       i += input->adaptation_ratio * input->nsimulations;
00326       if (i > input->nsimulations - 2)
00327         {
00328           input_error
00329             (_("No enough survival entities to reproduce the population"));
00330           goto exit_on_error;
00331         }
00332     }
00333   else
00334     {
00335       input_error (_("Unknown algorithm"));
00336       goto exit_on_error;
00337     }
00338   xmlFree (buffer);
00339   buffer = NULL;
00340
00341   if (input->algorithm == ALGORITHM_MONTE_CARLO
00342       || input->algorithm == ALGORITHM_SWEEP
00343       || input->algorithm == ALGORITHM_ORTHOGONAL)
00344     {
00345
00346       // Obtaining iterations number
00347       input->niterations
00348         = xml_node_get_uint (node, (const xmlChar *)
     LABEL_NITERATIONS,
00349                              &error_code);
00350       if (error_code == 1)
00351         input->niterations = 1;
00352       else if (error_code)
00353         {
00354           input_error (_("Bad iterations number"));
00355           goto exit_on_error;
00356         }
00357
00358       // Obtaining best number
00359       input->nbest
00360         = xml_node_get_uint_with_default (node, (const xmlChar *)
     LABEL_NBEST,
00361                                           1, &error_code);
00362       if (error_code || !input->nbest)
00363         {
00364           input_error (_("Invalid best number"));
00365           goto exit_on_error;
00366         }
00367
00368       // Obtaining tolerance
00369       input->tolerance
00370         = xml_node_get_float_with_default (node,
00371                                            (const xmlChar *) LABEL_TOLERANCE,
00372                                            0., &error_code);
00373       if (error_code || input->tolerance < 0.)
00374         {
00375           input_error (_("Invalid tolerance"));
00376           goto exit_on_error;
00377         }
00378
00379       // Getting hill climbing method parameters
00380       if (xmlHasProp (node, (const xmlChar *) LABEL_NSTEPS))
00381         {
00382           input->nsteps =
00383             xml_node_get_uint (node, (const xmlChar *) LABEL_NSTEPS,
00384                                &error_code);
00385           if (error_code)
00386             {
00387               input_error (_("Invalid steps number"));
00388               goto exit_on_error;
00389             }
00390 #if DEBUG_INPUT
00391           fprintf (stderr, "input_open_xml: nsteps=%u\n", input->nsteps);
00392 #endif
00393           buffer = xmlGetProp (node, (const xmlChar *) LABEL_CLIMBING);
00394           if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_COORDINATES))
00395             input->climbing = CLIMBING_METHOD_COORDINATES;
00396           else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_RANDOM))
00397             {
00398               input->climbing = CLIMBING_METHOD_RANDOM;
00399               input->nestimates
00400                 = xml_node_get_uint (node, (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             = xml_node_get_float_with_default (node,
00417                                                (const xmlChar *)
00418                                                LABEL_RELAXATION,
00419                                                DEFAULT_RELAXATION, &error_code);
00420           if (error_code || input->relaxation < 0. || input->
      relaxation > 2.)
00421             {
00422               input_error (_("Invalid relaxation parameter"));
00423               goto exit_on_error;
00424             }
00425         }
00426       else
00427         input->nsteps = 0;
00428     }
00429   // Obtaining the threshold
00430   input->threshold =
00431     xml_node_get_float_with_default (node, (const xmlChar *)
      LABEL_THRESHOLD,
00432                                      0., &error_code);
00433   if (error_code)
00434     {
00435       input_error (_("Invalid threshold"));
00436       goto exit_on_error;
00437     }
00438
00439   // Reading the experimental data
00440   for (child = node->children; child; child = child->next)
00441     {
00442       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_EXPERIMENT))
00443         break;
00444 #if DEBUG_INPUT
00445       fprintf (stderr, "input_open_xml: nexperiments=%u\n",
00446                input->nexperiments);
00447 #endif
00448       input->experiment = (Experiment *)
00449         g_realloc (input->experiment,
00450                    (1 + input->nexperiments) * sizeof (Experiment));
00451       if (!input->nexperiments)
00452         {
00453           if (!experiment_open_xml (input->experiment, child, 0))
00454             goto exit_on_error;
00455         }
00456       else
00457         {
00458           if (!experiment_open_xml (input->experiment + input->
      nexperiments,
00459                                     child, input->experiment->ninputs))
00460             goto exit_on_error;
00461         }
00462       ++input->nexperiments;
00463 #if DEBUG_INPUT
00464       fprintf (stderr, "input_open_xml: nexperiments=%u\n",
00465                input->nexperiments);
00466 #endif
00467     }
00468   if (!input->nexperiments)
00469     {
00470       input_error (_("No optimization experiments"));
00471       goto exit_on_error;
00472     }
00473   buffer = NULL;
00474
00475   // Reading the variables data
00476   if (input->algorithm == ALGORITHM_SWEEP
00477       || input->algorithm == ALGORITHM_ORTHOGONAL)
00478     input->nsimulations = 1;
00479   for (; child; child = child->next)
00480     {
00481 #if DEBUG_INPUT
00482       fprintf (stderr, "input_open_xml: nvariables=%u\n", input->nvariables);
00483 #endif
00484       if (xmlStrcmp (child->name, (const xmlChar *) LABEL_VARIABLE))
00485         {
00486           snprintf (buffer2, 64, "%s %u: %s",
```

```
00487                     _("Variable"), input->nvariables + 1, _("bad XML node"));
00488           input_error (buffer2);
00489           goto exit_on_error;
00490         }
00491       input->variable = (Variable *)
00492         g_realloc (input->variable,
00493                    (1 + input->nvariables) * sizeof (Variable));
00494       if (!variable_open_xml (input->variable + input->
    nvariables, child,
00495                               input->algorithm, input->nsteps))
00496         goto exit_on_error;
00497       if (input->algorithm == ALGORITHM_SWEEP
00498           || input->algorithm == ALGORITHM_ORTHOGONAL)
00499         input->nsimulations *= input->variable[input->
    nvariables].nsweeps;
00500       ++input->nvariables;
00501     }
00502   if (!input->nvariables)
00503     {
00504       input_error (_("No optimization variables"));
00505       goto exit_on_error;
00506     }
00507   if (input->nbest > input->nsimulations)
00508     {
00509       input_error (_("Best number higher than simulations number"));
00510       goto exit_on_error;
00511     }
00512   buffer = NULL;
00513
00514   // Obtaining the error norm
00515   if (xmlHasProp (node, (const xmlChar *) LABEL_NORM))
00516     {
00517       buffer = xmlGetProp (node, (const xmlChar *) LABEL_NORM);
00518       if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_EUCLIDIAN))
00519         input->norm = ERROR_NORM_EUCLIDIAN;
00520       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MAXIMUM))
00521         input->norm = ERROR_NORM_MAXIMUM;
00522       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_P))
00523         {
00524           input->norm = ERROR_NORM_P;
00525           input->p
00526             = xml_node_get_float (node, (const xmlChar *) LABEL_P, &error_code);
00527           if (error_code)
00528             {
00529               input_error (_("Bad P parameter"));
00530               goto exit_on_error;
00531             }
00532         }
00533       else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_TAXICAB))
00534         input->norm = ERROR_NORM_TAXICAB;
00535       else
00536         {
00537           input_error (_("Unknown error norm"));
00538           goto exit_on_error;
00539         }
00540       xmlFree (buffer);
00541     }
00542   else
00543     input->norm = ERROR_NORM_EUCLIDIAN;
00544
00545   // Closing the XML document
00546   xmlFreeDoc (doc);
00547
00548 #if DEBUG_INPUT
00549   fprintf (stderr, "input_open_xml: end\n");
00550 #endif
00551   return 1;
00552
00553 exit_on_error:
00554   xmlFree (buffer);
00555   xmlFreeDoc (doc);
00556 #if DEBUG_INPUT
00557   fprintf (stderr, "input_open_xml: end\n");
00558 #endif
00559   return 0;
00560 }
00561
00567 static inline int
00568 input_open_json (JsonParser * parser)
00569 {
00570   JsonNode *node, *child;
00571   JsonObject *object;
00572   JsonArray *array;
00573   const char *buffer;
00574   int error_code;
00575   unsigned int i, n;
00576
```

```
00577 #if DEBUG_INPUT
00578   fprintf (stderr, "input_open_json: start\n");
00579 #endif
00580
00581   // Resetting input data
00582   input->type = INPUT_TYPE_JSON;
00583
00584   // Getting the root node
00585 #if DEBUG_INPUT
00586   fprintf (stderr, "input_open_json: getting the root node\n");
00587 #endif
00588   node = json_parser_get_root (parser);
00589   object = json_node_get_object (node);
00590
00591   // Getting result and variables file names
00592   if (!input->result)
00593     {
00594       buffer = json_object_get_string_member (object, LABEL_RESULT_FILE);
00595       if (!buffer)
00596         buffer = result_name;
00597       input->result = g_strdup (buffer);
00598     }
00599   else
00600     input->result = g_strdup (result_name);
00601   if (!input->variables)
00602     {
00603       buffer = json_object_get_string_member (object, LABEL_VARIABLES_FILE);
00604       if (!buffer)
00605         buffer = variables_name;
00606       input->variables = g_strdup (buffer);
00607     }
00608   else
00609     input->variables = g_strdup (variables_name);
00610
00611   // Opening simulator program name
00612   buffer = json_object_get_string_member (object, LABEL_SIMULATOR);
00613   if (!buffer)
00614     {
00615       input_error (_("Bad simulator program"));
00616       goto exit_on_error;
00617     }
00618   input->simulator = g_strdup (buffer);
00619
00620   // Opening evaluator program name
00621   buffer = json_object_get_string_member (object, LABEL_EVALUATOR);
00622   if (buffer)
00623     input->evaluator = g_strdup (buffer);
00624
00625   // Obtaining pseudo-random numbers generator seed
00626   input->seed
00627     = json_object_get_uint_with_default (object,
      LABEL_SEED,
00628                                          DEFAULT_RANDOM_SEED, &error_code);
00629   if (error_code)
00630     {
00631       input_error (_("Bad pseudo-random numbers generator seed"));
00632       goto exit_on_error;
00633     }
00634
00635   // Opening algorithm
00636   buffer = json_object_get_string_member (object, LABEL_ALGORITHM);
00637   if (!strcmp (buffer, LABEL_MONTE_CARLO))
00638     {
00639       input->algorithm = ALGORITHM_MONTE_CARLO;
00640
00641       // Obtaining simulations number
00642       input->nsimulations
00643         = json_object_get_int (object, LABEL_NSIMULATIONS, &error_code
      );
00644       if (error_code)
00645         {
00646           input_error (_("Bad simulations number"));
00647           goto exit_on_error;
00648         }
00649     }
00650   else if (!strcmp (buffer, LABEL_SWEEP))
00651     input->algorithm = ALGORITHM_SWEEP;
00652   else if (!strcmp (buffer, LABEL_ORTHOGONAL))
00653     input->algorithm = ALGORITHM_ORTHOGONAL;
00654   else if (!strcmp (buffer, LABEL_GENETIC))
00655     {
00656       input->algorithm = ALGORITHM_GENETIC;
00657
00658       // Obtaining population
00659       if (json_object_get_member (object, LABEL_NPOPULATION))
00660         {
00661           input->nsimulations
```

```
00662             = json_object_get_uint (object,
      LABEL_NPOPULATION, &error_code);
00663           if (error_code || input->nsimulations < 3)
00664             {
00665               input_error (_("Invalid population number"));
00666               goto exit_on_error;
00667             }
00668         }
00669       else
00670         {
00671           input_error (_("No population number"));
00672           goto exit_on_error;
00673         }
00674
00675       // Obtaining generations
00676       if (json_object_get_member (object, LABEL_NGENERATIONS))
00677         {
00678           input->niterations
00679             = json_object_get_uint (object,
      LABEL_NGENERATIONS, &error_code);
00680           if (error_code || !input->niterations)
00681             {
00682               input_error (_("Invalid generations number"));
00683               goto exit_on_error;
00684             }
00685         }
00686       else
00687         {
00688           input_error (_("No generations number"));
00689           goto exit_on_error;
00690         }
00691
00692       // Obtaining mutation probability
00693       if (json_object_get_member (object, LABEL_MUTATION))
00694         {
00695           input->mutation_ratio
00696             = json_object_get_float (object, LABEL_MUTATION, &error_code
      );
00697           if (error_code || input->mutation_ratio < 0.
00698               || input->mutation_ratio >= 1.)
00699             {
00700               input_error (_("Invalid mutation probability"));
00701               goto exit_on_error;
00702             }
00703         }
00704       else
00705         {
00706           input_error (_("No mutation probability"));
00707           goto exit_on_error;
00708         }
00709
00710       // Obtaining reproduction probability
00711       if (json_object_get_member (object, LABEL_REPRODUCTION))
00712         {
00713           input->reproduction_ratio
00714             = json_object_get_float (object,
      LABEL_REPRODUCTION, &error_code);
00715           if (error_code || input->reproduction_ratio < 0.
00716               || input->reproduction_ratio >= 1.0)
00717             {
00718               input_error (_("Invalid reproduction probability"));
00719               goto exit_on_error;
00720             }
00721         }
00722       else
00723         {
00724           input_error (_("No reproduction probability"));
00725           goto exit_on_error;
00726         }
00727
00728       // Obtaining adaptation probability
00729       if (json_object_get_member (object, LABEL_ADAPTATION))
00730         {
00731           input->adaptation_ratio
00732             = json_object_get_float (object,
      LABEL_ADAPTATION, &error_code);
00733           if (error_code || input->adaptation_ratio < 0.
00734               || input->adaptation_ratio >= 1.)
00735             {
00736               input_error (_("Invalid adaptation probability"));
00737               goto exit_on_error;
00738             }
00739         }
00740       else
00741         {
00742           input_error (_("No adaptation probability"));
00743           goto exit_on_error;
```

```
00744         }
00745
00746       // Checking survivals
00747       i = input->mutation_ratio * input->nsimulations;
00748       i += input->reproduction_ratio * input->nsimulations;
00749       i += input->adaptation_ratio * input->nsimulations;
00750       if (i > input->nsimulations - 2)
00751         {
00752           input_error
00753             (_("No enough survival entities to reproduce the population"));
00754           goto exit_on_error;
00755         }
00756     }
00757   else
00758     {
00759       input_error (_("Unknown algorithm"));
00760       goto exit_on_error;
00761     }
00762
00763   if (input->algorithm == ALGORITHM_MONTE_CARLO
00764       || input->algorithm == ALGORITHM_SWEEP
00765       || input->algorithm == ALGORITHM_ORTHOGONAL)
00766     {
00767
00768       // Obtaining iterations number
00769       input->niterations
00770         = json_object_get_uint (object, LABEL_NITERATIONS, &error_code
    );
00771       if (error_code == 1)
00772         input->niterations = 1;
00773       else if (error_code)
00774         {
00775           input_error (_("Bad iterations number"));
00776           goto exit_on_error;
00777         }
00778
00779       // Obtaining best number
00780       input->nbest
00781         = json_object_get_uint_with_default (object,
    LABEL_NBEST, 1,
00782                                              &error_code);
00783       if (error_code || !input->nbest)
00784         {
00785           input_error (_("Invalid best number"));
00786           goto exit_on_error;
00787         }
00788
00789       // Obtaining tolerance
00790       input->tolerance
00791         = json_object_get_float_with_default (object,
    LABEL_TOLERANCE, 0.,
00792                                               &error_code);
00793       if (error_code || input->tolerance < 0.)
00794         {
00795           input_error (_("Invalid tolerance"));
00796           goto exit_on_error;
00797         }
00798
00799       // Getting hill climbing method parameters
00800       if (json_object_get_member (object, LABEL_NSTEPS))
00801         {
00802           input->nsteps
00803             = json_object_get_uint (object, LABEL_NSTEPS, &error_code);
00804           if (error_code)
00805             {
00806               input_error (_("Invalid steps number"));
00807               goto exit_on_error;
00808             }
00809           buffer = json_object_get_string_member (object, LABEL_CLIMBING);
00810           if (!strcmp (buffer, LABEL_COORDINATES))
00811             input->climbing = CLIMBING_METHOD_COORDINATES;
00812           else if (!strcmp (buffer, LABEL_RANDOM))
00813             {
00814               input->climbing = CLIMBING_METHOD_RANDOM;
00815               input->nestimates
00816                 = json_object_get_uint (object,
    LABEL_NESTIMATES, &error_code);
00817               if (error_code || !input->nestimates)
00818                 {
00819                   input_error (_("Invalid estimates number"));
00820                   goto exit_on_error;
00821                 }
00822             }
00823           else
00824             {
00825               input_error (_("Unknown method to estimate the hill climbing"));
00826               goto exit_on_error;
```

```
00827             }
00828           input->relaxation
00829             = json_object_get_float_with_default (object,
      LABEL_RELAXATION,
00830                                                   DEFAULT_RELAXATION,
00831                                                   &error_code);
00832           if (error_code || input->relaxation < 0. || input->
      relaxation > 2.)
00833             {
00834               input_error (_("Invalid relaxation parameter"));
00835               goto exit_on_error;
00836             }
00837         }
00838       else
00839         input->nsteps = 0;
00840     }
00841   // Obtaining the threshold
00842   input->threshold
00843     = json_object_get_float_with_default (object,
      LABEL_THRESHOLD, 0.,
00844                                           &error_code);
00845   if (error_code)
00846     {
00847       input_error (_("Invalid threshold"));
00848       goto exit_on_error;
00849     }
00850
00851   // Reading the experimental data
00852   array = json_object_get_array_member (object, LABEL_EXPERIMENTS);
00853   n = json_array_get_length (array);
00854   input->experiment = (Experiment *) g_malloc (n * sizeof (
      Experiment));
00855   for (i = 0; i < n; ++i)
00856     {
00857 #if DEBUG_INPUT
00858       fprintf (stderr, "input_open_json: nexperiments=%u\n",
00859                input->nexperiments);
00860 #endif
00861       child = json_array_get_element (array, i);
00862       if (!input->nexperiments)
00863         {
00864           if (!experiment_open_json (input->experiment, child, 0))
00865             goto exit_on_error;
00866         }
00867       else
00868         {
00869           if (!experiment_open_json (input->experiment + input->
      nexperiments,
00870                                      child, input->experiment->ninputs))
00871             goto exit_on_error;
00872         }
00873       ++input->nexperiments;
00874 #if DEBUG_INPUT
00875       fprintf (stderr, "input_open_json: nexperiments=%u\n",
00876                input->nexperiments);
00877 #endif
00878     }
00879   if (!input->nexperiments)
00880     {
00881       input_error (_("No optimization experiments"));
00882       goto exit_on_error;
00883     }
00884
00885   // Reading the variables data
00886   array = json_object_get_array_member (object, LABEL_VARIABLES);
00887   n = json_array_get_length (array);
00888   input->variable = (Variable *) g_malloc (n * sizeof (Variable));
00889   for (i = 0; i < n; ++i)
00890     {
00891 #if DEBUG_INPUT
00892       fprintf (stderr, "input_open_json: nvariables=%u\n", input->nvariables);
00893 #endif
00894       child = json_array_get_element (array, i);
00895       if (!variable_open_json (input->variable + input->
      nvariables, child,
00896                                input->algorithm, input->nsteps))
00897         goto exit_on_error;
00898       ++input->nvariables;
00899     }
00900   if (!input->nvariables)
00901     {
00902       input_error (_("No optimization variables"));
00903       goto exit_on_error;
00904     }
00905
00906   // Obtaining the error norm
00907   if (json_object_get_member (object, LABEL_NORM))
```

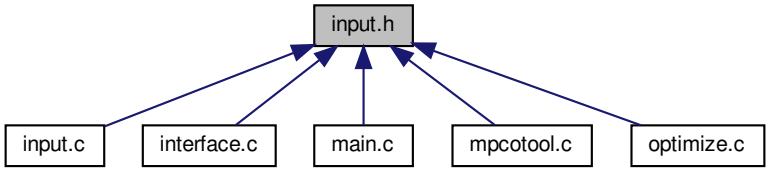
```
00908     {
00909       buffer = json_object_get_string_member (object, LABEL_NORM);
00910       if (!strcmp (buffer, LABEL_EUCLIDIAN))
00911         input->norm = ERROR_NORM_EUCLIDIAN;
00912       else if (!strcmp (buffer, LABEL_MAXIMUM))
00913         input->norm = ERROR_NORM_MAXIMUM;
00914       else if (!strcmp (buffer, LABEL_P))
00915         {
00916           input->norm = ERROR_NORM_P;
00917           input->p = json_object_get_float (object,
      LABEL_P, &error_code);
00918           if (!error_code)
00919             {
00920               input_error (_("Bad P parameter"));
00921               goto exit_on_error;
00922             }
00923         }
00924       else if (!strcmp (buffer, LABEL_TAXICAB))
00925         input->norm = ERROR_NORM_TAXICAB;
00926       else
00927         {
00928           input_error (_("Unknown error norm"));
00929           goto exit_on_error;
00930         }
00931     }
00932   else
00933     input->norm = ERROR_NORM_EUCLIDIAN;
00934
00935   // Closing the JSON document
00936   g_object_unref (parser);
00937
00938 #if DEBUG_INPUT
00939   fprintf (stderr, "input_open_json: end\n");
00940 #endif
00941   return 1;
00942
00943 exit_on_error:
00944   g_object_unref (parser);
00945 #if DEBUG_INPUT
00946   fprintf (stderr, "input_open_json: end\n");
00947 #endif
00948   return 0;
00949 }
00950
00956 int
00957 input_open (char *filename)
00958 {
00959   xmlDoc *doc;
00960   JsonParser *parser;
00961
00962 #if DEBUG_INPUT
00963   fprintf (stderr, "input_open: start\n");
00964 #endif
00965
00966   // Resetting input data
00967   input_new ();
00968
00969   // Opening input file
00970 #if DEBUG_INPUT
00971   fprintf (stderr, "input_open: opening the input file %s\n", filename);
00972   fprintf (stderr, "input_open: trying XML format\n");
00973 #endif
00974   doc = xmlParseFile (filename);
00975   if (!doc)
00976     {
00977 #if DEBUG_INPUT
00978       fprintf (stderr, "input_open: trying JSON format\n");
00979 #endif
00980       parser = json_parser_new ();
00981       if (!json_parser_load_from_file (parser, filename, NULL))
00982         {
00983           input_error (_("Unable to parse the input file"));
00984           goto exit_on_error;
00985         }
00986       if (!input_open_json (parser))
00987         goto exit_on_error;
00988     }
00989   else if (!input_open_xml (doc))
00990     goto exit_on_error;
00991
00992   // Getting the working directory
00993   input->directory = g_path_get_dirname (filename);
00994   input->name = g_path_get_basename (filename);
00995
00996 #if DEBUG_INPUT
00997   fprintf (stderr, "input_open: end\n");
00998 #endif
```

```
00999   return 1;
01000
01001 exit_on_error:
01002   show_error (error_message);
01003   g_free (error_message);
01004   input_free ();
01005 #if DEBUG_INPUT
01006   fprintf (stderr, "input_open: end\n");
01007 #endif
01008   return 0;
01009 }
```

4.9 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.

4.9.1 Detailed Description

Header file to define the input functions.

Authors

Javier Burguete.

Copyright

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Definition in file input.h.

4.9.2 Enumeration Type Documentation

4.9.2.1 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 };
```

4.9.2.2 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 };
```

4.9.3 Function Documentation

4.9.3.1 input_free()

```
void input_free ( )
```

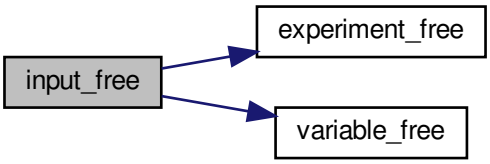
Function to free the memory of the input file data.

Definition at line 81 of file input.c.

```
00082 {
00083   unsigned int i;
00084 #if DEBUG_INPUT
00085   fprintf (stderr, "input_free: start\n");
00086 #endif
00087   g_free (input->name);
00088   g_free (input->directory);
00089   for (i = 0; i < input->nexperiments; ++i)
00090     experiment_free (input->experiment + i, input->
      type);
00091   for (i = 0; i < input->nvariables; ++i)
00092     variable_free (input->variable + i, input->
      type);
00093   g_free (input->experiment);
00094   g_free (input->variable);
00095   if (input->type == INPUT_TYPE_XML)
00096     {
00097       xmlFree (input->evaluator);
00098       xmlFree (input->simulator);
00099       xmlFree (input->result);
00100       xmlFree (input->variables);
00101     }
00102   else
00103     {
```

```
00104       g_free (input->evaluator);
00105       g_free (input->simulator);
00106       g_free (input->result);
00107       g_free (input->variables);
00108     }
00109   input->nexperiments = input->nvariables =
      input->nsteps = 0;
00110 #if DEBUG_INPUT
00111   fprintf (stderr, "input_free: end\n");
00112 #endif
00113 }
```

Here is the call graph for this function:



4.9.3.2 input_new()

```
void input_new ( )
```

Function to create a new Input struct.

Definition at line 63 of file input.c.

```
00064 {
00065 #if DEBUG_INPUT
00066   fprintf (stderr, "input_new: start\n");
00067 #endif
00068   input->nvariables = input->nexperiments =
      input->nsteps = 0;
00069   input->simulator = input->evaluator = input->
      directory = input->name = NULL;
00070   input->experiment = NULL;
00071   input->variable = NULL;
00072 #if DEBUG_INPUT
00073   fprintf (stderr, "input_new: end\n");
00074 #endif
00075 }
```

4.9.3.3 input_open()

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

Function to open the input file.

Returns

1_on_success, 0_on_error.

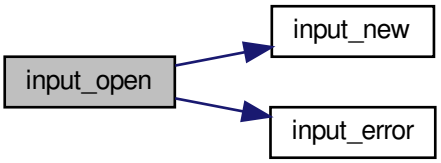
Parameters

filename	Input data file name.

Definition at line 957 of file input.c.

```
00958 {
00959   xmlDoc *doc;
00960   JsonParser *parser;
00961
00962 #if DEBUG_INPUT
00963   fprintf (stderr, "input_open: start\n");
00964 #endif
00965
00966   // Resetting input data
00967   input_new ();
00968
00969   // Opening input file
00970 #if DEBUG_INPUT
00971   fprintf (stderr, "input_open: opening the input file %s\n", filename);
00972   fprintf (stderr, "input_open: trying XML format\n");
00973 #endif
00974   doc = xmlParseFile (filename);
00975   if (!doc)
00976     {
00977 #if DEBUG_INPUT
00978       fprintf (stderr, "input_open: trying JSON format\n");
00979 #endif
00980       parser = json_parser_new ();
00981       if (!json_parser_load_from_file (parser, filename, NULL))
00982         {
00983           input_error (_("Unable to parse the input file"));
00984           goto exit_on_error;
00985         }
00986       if (!input_open_json (parser))
00987         goto exit_on_error;
00988     }
00989   else if (!input_open_xml (doc))
00990     goto exit_on_error;
00991
00992   // Getting the working directory
00993   input->directory = g_path_get_dirname (filename);
00994   input->name = g_path_get_basename (filename);
00995
00996 #if DEBUG_INPUT
00997   fprintf (stderr, "input_open: end\n");
00998 #endif
00999   return 1;
01000
01001 exit_on_error:
01002   show_error (error_message);
01003   g_free (error_message);
01004   input_free ();
01005 #if DEBUG_INPUT
01006   fprintf (stderr, "input_open: end\n");
01007 #endif
01008   return 0;
01009 }
```

Here is the call graph for this function:



4.10 input.h

```
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 2012-2018, 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
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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 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
```

4.11 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 "genetic/genetic.h"
#include "utils.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 0

  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 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 int 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 window_name_experiment ()
- static void window_weight_experiment ()
- static void window_inputs_experiment ()
- 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 window_open ()
- 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.

4.11.1 Detailed Description

Source file to define the graphical interface functions.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file interface.c.

4.11.2 Function Documentation

4.11.2.1 input_save()

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

Function to save the input file.

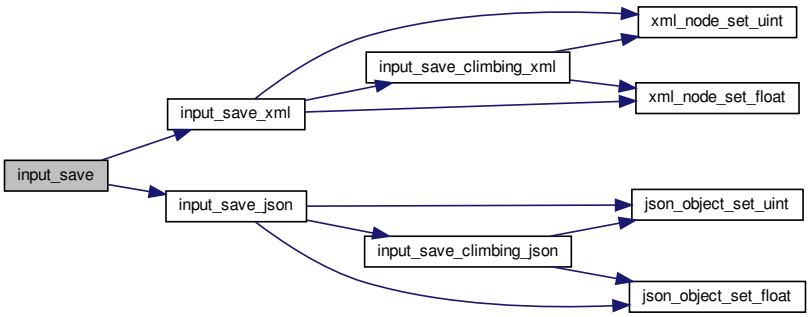
Parameters

filename	Input file name.

Definition at line 585 of file interface.c.

```
00586 {
00587   xmlDoc *doc;
00588   JsonGenerator *generator;
00589
00590 #if DEBUG_INTERFACE
00591   fprintf (stderr, "input_save: start\n");
00592 #endif
00593
00594   // Getting the input file directory
00595   input->name = g_path_get_basename (filename);
00596   input->directory = g_path_get_dirname (filename);
00597
00598   if (input->type == INPUT_TYPE_XML)
00599     {
00600       // Opening the input file
00601       doc = xmlNewDoc ((const xmlChar *) "1.0");
00602       input_save_xml (doc);
00603
00604       // Saving the XML file
00605       xmlSaveFormatFile (filename, doc, 1);
00606
00607       // Freeing memory
00608       xmlFreeDoc (doc);
00609     }
00610   else
00611     {
00612       // Opening the input file
00613       generator = json_generator_new ();
00614       json_generator_set_pretty (generator, TRUE);
00615       input_save_json (generator);
00616
00617       // Saving the JSON file
00618       json_generator_to_file (generator, filename, NULL);
00619
00620       // Freeing memory
00621       g_object_unref (generator);
00622     }
00623
00624 #if DEBUG_INTERFACE
00625   fprintf (stderr, "input_save: end\n");
00626 #endif
00627 }
```

Here is the call graph for this function:



4.11.2.2 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.

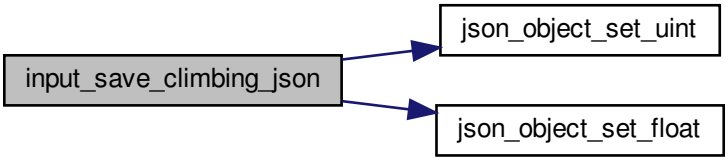
Parameters

node	JSON node.

Definition at line 202 of file interface.c.

```
00203 {
00204   JsonObject *object;
00205 #if DEBUG_INTERFACE
00206   fprintf (stderr, "input_save_climbing_json: start\n");
00207 #endif
00208   object = json_node_get_object (node);
00209   if (input->nsteps)
00210     {
00211       json_object_set_uint (object, LABEL_NSTEPS,
      input->nsteps);
00212       if (input->relaxation != DEFAULT_RELAXATION)
00213         json_object_set_float (object, LABEL_RELAXATION,
      input->relaxation);
00214       switch (input->climbing)
00215         {
00216         case CLIMBING_METHOD_COORDINATES:
00217           json_object_set_string_member (object, LABEL_CLIMBING,
00218                                          LABEL_COORDINATES);
00219           break;
00220         default:
00221           json_object_set_string_member (object, LABEL_CLIMBING,
      LABEL_RANDOM);
00222           json_object_set_uint (object, LABEL_NESTIMATES,
      input->nestimates);
00223         }
00224     }
00225 #if DEBUG_INTERFACE
00226   fprintf (stderr, "input_save_climbing_json: end\n");
00227 #endif
00228 }
```

Here is the call graph for this function:



4.11.2.3 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.

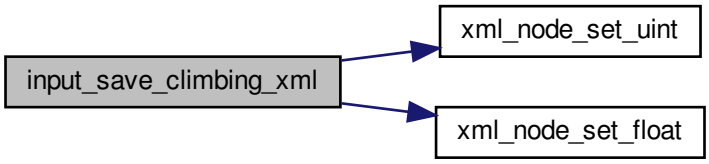
Parameters

node	XML node.

Definition at line 169 of file interface.c.

```
00170 {
00171 #if DEBUG_INTERFACE
00172   fprintf (stderr, "input_save_climbing_xml: start\n");
00173 #endif
00174   if (input->nsteps)
00175     {
00176       xml_node_set_uint (node, (const xmlChar *) LABEL_NSTEPS,
      input->nsteps);
00177       if (input->relaxation != DEFAULT_RELAXATION)
00178         xml_node_set_float (node, (const xmlChar *)
      LABEL_RELAXATION,
00179                             input->relaxation);
00180       switch (input->climbing)
00181         {
00182         case CLIMBING_METHOD_COORDINATES:
00183           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00184                       (const xmlChar *) LABEL_COORDINATES);
00185           break;
00186         default:
00187           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00188                       (const xmlChar *) LABEL_RANDOM);
00189           xml_node_set_uint (node, (const xmlChar *)
      LABEL_NESTIMATES,
00190                              input->nestimates);
00191         }
00192     }
00193 #if DEBUG_INTERFACE
00194   fprintf (stderr, "input_save_climbing_xml: end\n");
00195 #endif
00196 }
```

Here is the call graph for this function:



4.11.2.4 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.

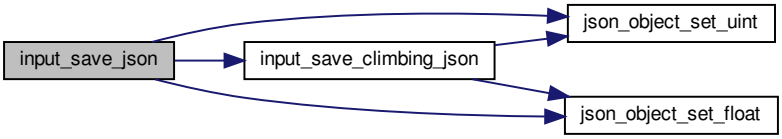
Definition at line 414 of file interface.c.

```
00415 {
00416   unsigned int i, j;
00417   char *buffer;
00418   JsonNode *node, *child;
00419   JsonObject *object;
00420   JsonArray *array;
00421   GFile *file, *file2;
00422
00423 #if DEBUG_INTERFACE
00424   fprintf (stderr, "input_save_json: start\n");
00425 #endif
00426
00427   // Setting root JSON node
00428   node = json_node_new (JSON_NODE_OBJECT);
00429   object = json_node_get_object (node);
00430   json_generator_set_root (generator, node);
00431
00432   // Adding properties to the root JSON node
00433   if (strcmp (input->result, result_name))
00434     json_object_set_string_member (object, LABEL_RESULT_FILE,
      input->result);
00435   if (strcmp (input->variables, variables_name))
00436     json_object_set_string_member (object, LABEL_VARIABLES_FILE,
00437                                    input->variables);
00438   file = g_file_new_for_path (input->directory);
00439   file2 = g_file_new_for_path (input->simulator);
00440   buffer = g_file_get_relative_path (file, file2);
00441   g_object_unref (file2);
00442   json_object_set_string_member (object, LABEL_SIMULATOR, buffer);
00443   g_free (buffer);
00444   if (input->evaluator)
00445     {
00446       file2 = g_file_new_for_path (input->evaluator);
00447       buffer = g_file_get_relative_path (file, file2);
```

```
00448       g_object_unref (file2);
00449       if (strlen (buffer))
00450         json_object_set_string_member (object, LABEL_EVALUATOR, buffer);
00451       g_free (buffer);
00452     }
00453   if (input->seed != DEFAULT_RANDOM_SEED)
00454     json_object_set_uint (object, LABEL_SEED,
      input->seed);
00455
00456   // Setting the algorithm
00457   buffer = (char *) g_slice_alloc (64);
00458   switch (input->algorithm)
00459     {
00460     case ALGORITHM_MONTE_CARLO:
00461       json_object_set_string_member (object, LABEL_ALGORITHM,
00462                                      LABEL_MONTE_CARLO);
00463       snprintf (buffer, 64, "%u", input->nsimulations);
00464       json_object_set_string_member (object, LABEL_NSIMULATIONS, buffer);
00465       snprintf (buffer, 64, "%u", input->niterations);
00466       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00467       snprintf (buffer, 64, "%.3lg", input->tolerance);
00468       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00469       snprintf (buffer, 64, "%u", input->nbest);
00470       json_object_set_string_member (object, LABEL_NBEST, buffer);
00471       input_save_climbing_json (node);
00472       break;
00473     case ALGORITHM_SWEEP:
00474       json_object_set_string_member (object, LABEL_ALGORITHM,
      LABEL_SWEEP);
00475       snprintf (buffer, 64, "%u", input->niterations);
00476       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00477       snprintf (buffer, 64, "%.3lg", input->tolerance);
00478       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00479       snprintf (buffer, 64, "%u", input->nbest);
00480       json_object_set_string_member (object, LABEL_NBEST, buffer);
00481       input_save_climbing_json (node);
00482       break;
00483     case ALGORITHM_ORTHOGONAL:
00484       json_object_set_string_member (object, LABEL_ALGORITHM,
      LABEL_ORTHOGONAL);
00485       snprintf (buffer, 64, "%u", input->niterations);
00486       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00487       snprintf (buffer, 64, "%.3lg", input->tolerance);
00488       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00489       snprintf (buffer, 64, "%u", input->nbest);
00490       json_object_set_string_member (object, LABEL_NBEST, buffer);
00491       input_save_climbing_json (node);
00492       break;
00493     default:
00494       json_object_set_string_member (object, LABEL_ALGORITHM,
      LABEL_GENETIC);
00495       snprintf (buffer, 64, "%u", input->nsimulations);
00496       json_object_set_string_member (object, LABEL_NPOPULATION, buffer);
00497       snprintf (buffer, 64, "%u", input->niterations);
00498       json_object_set_string_member (object, LABEL_NGENERATIONS, buffer);
00499       snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00500       json_object_set_string_member (object, LABEL_MUTATION, buffer);
00501       snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00502       json_object_set_string_member (object, LABEL_REPRODUCTION, buffer);
00503       snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00504       json_object_set_string_member (object, LABEL_ADAPTATION, buffer);
00505       break;
00506     }
00507   g_slice_free1 (64, buffer);
00508   if (input->threshold != 0.)
00509     json_object_set_float (object, LABEL_THRESHOLD,
      input->threshold);
00510
00511   // Setting the experimental data
00512   array = json_array_new ();
00513   for (i = 0; i < input->nexperiments; ++i)
00514     {
00515       child = json_node_new (JSON_NODE_OBJECT);
00516       object = json_node_get_object (child);
00517       json_object_set_string_member (object, LABEL_NAME,
00518                                      input->experiment[i].name);
00519       if (input->experiment[i].weight != 1.)
00520         json_object_set_float (object, LABEL_WEIGHT,
00521                                input->experiment[i].weight);
00522       for (j = 0; j < input->experiment->ninputs; ++j)
00523         json_object_set_string_member (object, stencil[j],
00524                                        input->experiment[i].
      stencil[j]);
00525       json_array_add_element (array, child);
00526     }
00527   json_object_set_array_member (object, LABEL_EXPERIMENTS, array);
00528
```

```
00529   // Setting the variables data
00530   array = json_array_new ();
00531   for (i = 0; i < input->nvariables; ++i)
00532     {
00533       child = json_node_new (JSON_NODE_OBJECT);
00534       object = json_node_get_object (child);
00535       json_object_set_string_member (object, LABEL_NAME,
00536                                      input->variable[i].name);
00537       json_object_set_float (object, LABEL_MINIMUM,
00538                              input->variable[i].rangemin);
00539       if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00540         json_object_set_float (object,
    LABEL_ABSOLUTE_MINIMUM,
00541                                input->variable[i].rangeminabs);
00542       json_object_set_float (object, LABEL_MAXIMUM,
00543                              input->variable[i].rangemax);
00544       if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00545         json_object_set_float (object,
    LABEL_ABSOLUTE_MAXIMUM,
00546                                input->variable[i].rangemaxabs);
00547       if (input->variable[i].precision !=
    DEFAULT_PRECISION)
00548         json_object_set_uint (object, LABEL_PRECISION,
00549                               input->variable[i].precision);
00550       if (input->algorithm == ALGORITHM_SWEEP
00551           || input->algorithm == ALGORITHM_ORTHOGONAL)
00552         json_object_set_uint (object, LABEL_NSWEEPS,
00553                               input->variable[i].nsweeps);
00554       else if (input->algorithm == ALGORITHM_GENETIC)
00555         json_object_set_uint (object, LABEL_NBITS,
    input->variable[i].nbits);
00556       if (input->nsteps)
00557         json_object_set_float (object, LABEL_STEP,
    input->variable[i].step);
00558       json_array_add_element (array, child);
00559     }
00560   json_object_set_array_member (object, LABEL_VARIABLES, array);
00561
00562   // Saving the error norm
00563   switch (input->norm)
00564     {
00565     case ERROR_NORM_MAXIMUM:
00566       json_object_set_string_member (object, LABEL_NORM, LABEL_MAXIMUM);
00567       break;
00568     case ERROR_NORM_P:
00569       json_object_set_string_member (object, LABEL_NORM, LABEL_P);
00570       json_object_set_float (object, LABEL_P, input->
    p);
00571       break;
00572     case ERROR_NORM_TAXICAB:
00573       json_object_set_string_member (object, LABEL_NORM, LABEL_TAXICAB);
00574     }
00575
00576 #if DEBUG_INTERFACE
00577   fprintf (stderr, "input_save_json: end\n");
00578 #endif
00579 }
```

Here is the call graph for this function:



4.11.2.5 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.

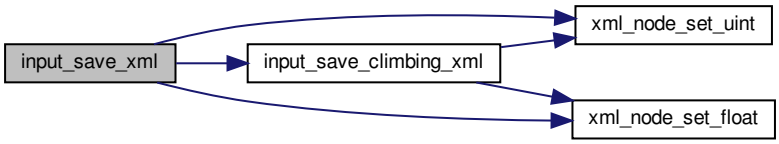
Definition at line 234 of file interface.c.

```
00235 {
00236   unsigned int i, j;
00237   char *buffer;
00238   xmlNode *node, *child;
00239   GFile *file, *file2;
00240
00241 #if DEBUG_INTERFACE
00242   fprintf (stderr, "input_save_xml: start\n");
00243 #endif
00244
00245   // Setting root XML node
00246   node = xmlNewDocNode (doc, 0, (const xmlChar *) LABEL_OPTIMIZE, 0);
00247   xmlDocSetRootElement (doc, node);
00248
00249   // Adding properties to the root XML node
00250   if (xmlStrcmp
00251       ((const xmlChar *) input->result, (const xmlChar *) result_name))
00252     xmlSetProp (node, (const xmlChar *) LABEL_RESULT_FILE,
00253                 (xmlChar *) input->result);
00254   if (xmlStrcmp
00255       ((const xmlChar *) input->variables, (const xmlChar *)
      variables_name))
00256     xmlSetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE,
00257                 (xmlChar *) input->variables);
00258   file = g_file_new_for_path (input->directory);
00259   file2 = g_file_new_for_path (input->simulator);
00260   buffer = g_file_get_relative_path (file, file2);
00261   g_object_unref (file2);
00262   xmlSetProp (node, (const xmlChar *) LABEL_SIMULATOR, (xmlChar *) buffer);
00263   g_free (buffer);
00264   if (input->evaluator)
00265     {
00266       file2 = g_file_new_for_path (input->evaluator);
00267       buffer = g_file_get_relative_path (file, file2);
00268       g_object_unref (file2);
00269       if (xmlStrlen ((xmlChar *) buffer))
00270         xmlSetProp (node, (const xmlChar *) LABEL_EVALUATOR,
00271                     (xmlChar *) buffer);
00272       g_free (buffer);
00273     }
00274   if (input->seed != DEFAULT_RANDOM_SEED)
00275     xml_node_set_uint (node, (const xmlChar *) LABEL_SEED,
      input->seed);
00276
00277   // Setting the algorithm
00278   buffer = (char *) g_slice_alloc (64);
00279   switch (input->algorithm)
00280     {
00281     case ALGORITHM_MONTE_CARLO:
00282       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00283                   (const xmlChar *) LABEL_MONTE_CARLO);
00284       snprintf (buffer, 64, "%u", input->nsimulations);
00285       xmlSetProp (node, (const xmlChar *) LABEL_NSIMULATIONS,
00286                   (xmlChar *) buffer);
00287       snprintf (buffer, 64, "%u", input->niterations);
00288       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00289                   (xmlChar *) buffer);
00290       snprintf (buffer, 64, "%.31g", input->tolerance);
00291       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00292       snprintf (buffer, 64, "%u", input->nbest);
00293       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00294       input_save_climbing_xml (node);
00295       break;
00296     case ALGORITHM_SWEEP:
```

```
00297       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00298                   (const xmlChar *) LABEL_SWEEP);
00299       snprintf (buffer, 64, "%u", input->niterations);
00300       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00301                   (xmlChar *) buffer);
00302       snprintf (buffer, 64, "%.3lg", input->tolerance);
00303       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00304       snprintf (buffer, 64, "%u", input->nbest);
00305       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00306       input_save_climbing_xml (node);
00307       break;
00308     case ALGORITHM_ORTHOGONAL:
00309       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00310                   (const xmlChar *) LABEL_ORTHOGONAL);
00311       snprintf (buffer, 64, "%u", input->niterations);
00312       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00313                   (xmlChar *) buffer);
00314       snprintf (buffer, 64, "%.3lg", input->tolerance);
00315       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00316       snprintf (buffer, 64, "%u", input->nbest);
00317       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00318       input_save_climbing_xml (node);
00319       break;
00320     default:
00321       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00322                   (const xmlChar *) LABEL_GENETIC);
00323       snprintf (buffer, 64, "%u", input->nsimulations);
00324       xmlSetProp (node, (const xmlChar *) LABEL_NPOPULATION,
00325                   (xmlChar *) buffer);
00326       snprintf (buffer, 64, "%u", input->niterations);
00327       xmlSetProp (node, (const xmlChar *) LABEL_NGENERATIONS,
00328                   (xmlChar *) buffer);
00329       snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00330       xmlSetProp (node, (const xmlChar *) LABEL_MUTATION, (xmlChar *) buffer);
00331       snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00332       xmlSetProp (node, (const xmlChar *) LABEL_REPRODUCTION,
00333                   (xmlChar *) buffer);
00334       snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00335       xmlSetProp (node, (const xmlChar *) LABEL_ADAPTATION, (xmlChar *) buffer);
00336       break;
00337     }
00338   g_slice_free1 (64, buffer);
00339   if (input->threshold != 0.)
00340     xml_node_set_float (node, (const xmlChar *)
    LABEL_THRESHOLD,
00341                         input->threshold);
00342
00343   // Setting the experimental data
00344   for (i = 0; i < input->nexperiments; ++i)
00345     {
00346       child = xmlNewChild (node, 0, (const xmlChar *) LABEL_EXPERIMENT, 0);
00347       xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00348                   (xmlChar *) input->experiment[i].name);
00349       if (input->experiment[i].weight != 1.)
00350         xml_node_set_float (child, (const xmlChar *)
    LABEL_WEIGHT,
00351                             input->experiment[i].weight);
00352       for (j = 0; j < input->experiment->ninputs; ++j)
00353         xmlSetProp (child, (const xmlChar *) stencil[j],
00354                     (xmlChar *) input->experiment[i].stencil[j]);
00355     }
00356
00357   // Setting the variables data
00358   for (i = 0; i < input->nvariables; ++i)
00359     {
00360       child = xmlNewChild (node, 0, (const xmlChar *) LABEL_VARIABLE, 0);
00361       xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00362                   (xmlChar *) input->variable[i].name);
00363       xml_node_set_float (child, (const xmlChar *)
    LABEL_MINIMUM,
00364                           input->variable[i].rangemin);
00365       if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00366         xml_node_set_float (child, (const xmlChar *)
    LABEL_ABSOLUTE_MINIMUM,
00367                             input->variable[i].rangeminabs);
00368       xml_node_set_float (child, (const xmlChar *)
    LABEL_MAXIMUM,
00369                           input->variable[i].rangemax);
00370       if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00371         xml_node_set_float (child, (const xmlChar *)
    LABEL_ABSOLUTE_MAXIMUM,
00372                             input->variable[i].rangemaxabs);
00373       if (input->variable[i].precision !=
    DEFAULT_PRECISION)
00374         xml_node_set_uint (child, (const xmlChar *)
    LABEL_PRECISION,
00375                            input->variable[i].precision);
```

```
00376       if (input->algorithm == ALGORITHM_SWEEP
00377           || input->algorithm == ALGORITHM_ORTHOGONAL)
00378         xml_node_set_uint (child, (const xmlChar *)
      LABEL_NSWEEPS,
00379                            input->variable[i].nsweeps);
00380       else if (input->algorithm == ALGORITHM_GENETIC)
00381         xml_node_set_uint (child, (const xmlChar *) LABEL_NBITS,
00382                            input->variable[i].nbits);
00383       if (input->nsteps)
00384         xml_node_set_float (child, (const xmlChar *)
      LABEL_STEP,
00385                             input->variable[i].step);
00386     }
00387
00388   // Saving the error norm
00389   switch (input->norm)
00390     {
00391     case ERROR_NORM_MAXIMUM:
00392       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00393                   (const xmlChar *) LABEL_MAXIMUM);
00394       break;
00395     case ERROR_NORM_P:
00396       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00397                   (const xmlChar *) LABEL_P);
00398       xml_node_set_float (node, (const xmlChar *) LABEL_P,
      input->p);
00399       break;
00400     case ERROR_NORM_TAXICAB:
00401       xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00402                   (const xmlChar *) LABEL_TAXICAB);
00403     }
00404
00405 #if DEBUG_INTERFACE
00406   fprintf (stderr, "input_save: end\n");
00407 #endif
00408 }
```

Here is the call graph for this function:



4.11.2.6 options_new()

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

Function to open the options dialog.

Definition at line 633 of file interface.c.

```
00634 {
00635 #if DEBUG_INTERFACE
00636   fprintf (stderr, "options_new: start\n");
00637 #endif
00638   options->label_seed = (GtkLabel *)
00639     gtk_label_new (_("Pseudo-random numbers generator seed"));
00640   options->spin_seed = (GtkSpinButton *)
00641     gtk_spin_button_new_with_range (0., (gdouble) G_MAXULONG, 1.);
00642   gtk_widget_set_tooltip_text
```

```
00643     (GTK_WIDGET (options->spin_seed),
00644      _("Seed to init the pseudo-random numbers generator"));
00645   gtk_spin_button_set_value (options->spin_seed, (gdouble) input->
      seed);
00646   options->label_threads = (GtkLabel *)
00647     gtk_label_new (_("Threads number for the stochastic algorithm"));
00648   options->spin_threads
00649     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00650   gtk_widget_set_tooltip_text
00651     (GTK_WIDGET (options->spin_threads),
00652      _("Number of threads to perform the calibration/optimization for "
00653        "the stochastic algorithm"));
00654   gtk_spin_button_set_value (options->spin_threads, (gdouble)
      nthreads);
00655   options->label_climbing = (GtkLabel *)
00656     gtk_label_new (_("Threads number for the hill climbing method"));
00657   options->spin_climbing =
00658     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00659   gtk_widget_set_tooltip_text
00660     (GTK_WIDGET (options->spin_climbing),
00661      _("Number of threads to perform the calibration/optimization for the "
00662        "hill climbing method"));
00663   gtk_spin_button_set_value (options->spin_climbing,
00664                              (gdouble) nthreads_climbing);
00665   options->grid = (GtkGrid *) gtk_grid_new ();
00666   gtk_grid_attach (options->grid, GTK_WIDGET (options->
      label_seed), 0, 0, 1, 1);
00667   gtk_grid_attach (options->grid, GTK_WIDGET (options->
      spin_seed), 1, 0, 1, 1);
00668   gtk_grid_attach (options->grid, GTK_WIDGET (options->
      label_threads),
00669                    0, 1, 1, 1);
00670   gtk_grid_attach (options->grid, GTK_WIDGET (options->
      spin_threads),
00671                    1, 1, 1, 1);
00672   gtk_grid_attach (options->grid, GTK_WIDGET (options->
      label_climbing), 0, 2, 1,
00673                    1);
00674   gtk_grid_attach (options->grid, GTK_WIDGET (options->
      spin_climbing), 1, 2, 1,
00675                    1);
00676   gtk_widget_show_all (GTK_WIDGET (options->grid));
00677   options->dialog = (GtkDialog *)
00678     gtk_dialog_new_with_buttons (_("Options"),
00679                                  window->window,
00680                                  GTK_DIALOG_MODAL,
00681                                  _("_OK"), GTK_RESPONSE_OK,
00682                                  _("_Cancel"), GTK_RESPONSE_CANCEL, NULL);
00683   gtk_container_add
00684     (GTK_CONTAINER (gtk_dialog_get_content_area (options->dialog)),
00685      GTK_WIDGET (options->grid));
00686   if (gtk_dialog_run (options->dialog) == GTK_RESPONSE_OK)
00687     {
00688       input->seed
00689         = (unsigned long int) gtk_spin_button_get_value (options->
      spin_seed);
00690       nthreads = gtk_spin_button_get_value_as_int (options->
      spin_threads);
00691       nthreads_climbing
00692         = gtk_spin_button_get_value_as_int (options->spin_climbing);
00693     }
00694   gtk_widget_destroy (GTK_WIDGET (options->dialog));
00695 #if DEBUG_INTERFACE
00696   fprintf (stderr, "options_new: end\n");
00697 #endif
00698 }
```

4.11.2.7 running_new()

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

Function to open the running dialog.

Definition at line 704 of file interface.c.

```
00705 {
00706 #if DEBUG_INTERFACE
00707   fprintf (stderr, "running_new: start\n");
00708 #endif
00709   running->label = (GtkLabel *) gtk_label_new (_("Calculating ..."));
00710   running->spinner = (GtkSpinner *) gtk_spinner_new ();
00711   running->grid = (GtkGrid *) gtk_grid_new ();
00712   gtk_grid_attach (running->grid, GTK_WIDGET (running->label), 0, 0, 1, 1);
00713   gtk_grid_attach (running->grid, GTK_WIDGET (running->spinner), 0, 1, 1, 1);
00714   running->dialog = (GtkDialog *)
00715     gtk_dialog_new_with_buttons (_("Calculating"),
00716                                  window->window, GTK_DIALOG_MODAL, NULL, NULL);
00717   gtk_container_add (GTK_CONTAINER
00718                      (gtk_dialog_get_content_area (running->dialog)),
00719                      GTK_WIDGET (running->grid));
00720   gtk_spinner_start (running->spinner);
00721   gtk_widget_show_all (GTK_WIDGET (running->dialog));
00722 #if DEBUG_INTERFACE
00723   fprintf (stderr, "running_new: end\n");
00724 #endif
00725 }
```

4.11.2.8 window_about()

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

Function to show an about dialog.

Definition at line 1058 of file interface.c.

```
01059 {
01060   static const gchar *authors[] = {
01061     "Javier Burguete Tolosa <jburguete@eead.csic.es>",
01062     "Borja Latorre Garcés <borja.latorre@csic.es>",
01063     NULL
01064   };
01065 #if DEBUG_INTERFACE
01066   fprintf (stderr, "window_about: start\n");
01067 #endif
01068   gtk_show_about_dialog
01069     (window->window,
01070      "program_name", "MPCOTool",
01071      "comments",
01072      _("The Multi-Purposes Calibration and Optimization Tool.\n"
01073        "A software to perform calibrations or optimizations of empirical "
01074        "parameters"),
01075      "authors", authors,
01076      "translator-credits",
01077      "Javier Burguete Tolosa <jburguete@eead.csic.es> "
01078      "(english, french and spanish)\n"
01079      "Uğur Çayoğlu (german)",
01080      "version", "4.0.1",
01081      "copyright", "Copyright 2012-2018 Javier Burguete Tolosa",
01082      "logo", window->logo,
01083      "website", "https://github.com/jburguete/mpcotool",
01084      "license-type", GTK_LICENSE_BSD, NULL);
01085 #if DEBUG_INTERFACE
01086   fprintf (stderr, "window_about: end\n");
01087 #endif
01088 }
```

4.11.2.9 window_add_experiment()

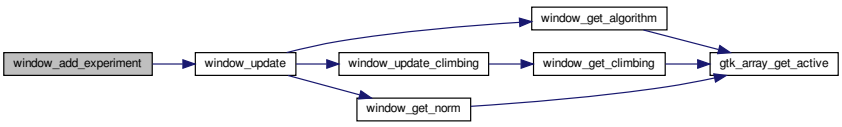
```
static void window_add_experiment ( )  [static]
```

Function to add an experiment in the main window.

Definition at line 1393 of file interface.c.

```
01394 {
01395   unsigned int i, j;
01396 #if DEBUG_INTERFACE
01397   fprintf (stderr, "window_add_experiment: start\n");
01398 #endif
01399   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01400   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01401   gtk_combo_box_text_insert_text
01402     (window->combo_experiment, i, input->experiment[i].
      name);
01403   g_signal_handler_unblock (window->combo_experiment,
      window->id_experiment);
01404   input->experiment = (Experiment *) g_realloc
01405     (input->experiment, (input->nexperiments + 1) * sizeof (
      Experiment));
01406   for (j = input->nexperiments - 1; j > i; --j)
01407     memcpy (input->experiment + j + 1, input->experiment + j,
01408             sizeof (Experiment));
01409   input->experiment[j + 1].weight = input->experiment[j].
      weight;
01410   input->experiment[j + 1].ninputs = input->
      experiment[j].ninputs;
01411   if (input->type == INPUT_TYPE_XML)
01412     {
01413       input->experiment[j + 1].name
01414         = (char *) xmlStrdup ((xmlChar *) input->experiment[j].
      name);
01415       for (j = 0; j < input->experiment->ninputs; ++j)
01416         input->experiment[i + 1].stencil[j]
01417           = (char *) xmlStrdup ((xmlChar *) input->experiment[i].
      stencil[j]);
01418     }
01419   else
01420     {
01421       input->experiment[j + 1].name = g_strdup (input->
      experiment[j].name);
01422       for (j = 0; j < input->experiment->ninputs; ++j)
01423         input->experiment[i + 1].stencil[j]
01424           = g_strdup (input->experiment[i].stencil[j]);
01425     }
01426   ++input->nexperiments;
01427   for (j = 0; j < input->experiment->ninputs; ++j)
01428     g_signal_handler_block (window->button_template[j],
      window->id_input[j]);
01429   g_signal_handler_block
01430     (window->button_experiment, window->
      id_experiment_name);
01431   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i + 1);
01432   g_signal_handler_unblock
01433     (window->button_experiment, window->
      id_experiment_name);
01434   for (j = 0; j < input->experiment->ninputs; ++j)
01435     g_signal_handler_unblock (window->button_template[j],
      window->id_input[j]);
01436   window_update ();
01437 #if DEBUG_INTERFACE
01438   fprintf (stderr, "window_add_experiment: end\n");
01439 #endif
01440 }
```

Here is the call graph for this function:



4.11.2.10 window_add_variable()

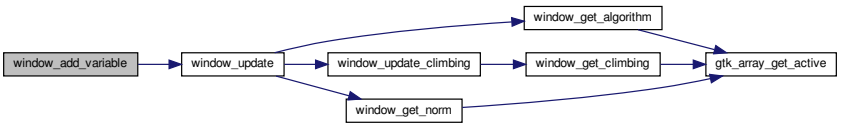
```
static void window_add_variable ( )  [static]
```

Function to add a variable in the main window.

Definition at line 1656 of file interface.c.

```
01657 {
01658   unsigned int i, j;
01659 #if DEBUG_INTERFACE
01660   fprintf (stderr, "window_add_variable: start\n");
01661 #endif
01662   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01663   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01664   gtk_combo_box_text_insert_text (window->combo_variable, i,
01665                                   input->variable[i].name);
01666   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
01667   input->variable = (Variable *) g_realloc
01668     (input->variable, (input->nvariables + 1) * sizeof (
      Variable));
01669   for (j = input->nvariables - 1; j > i; --j)
01670     memcpy (input->variable + j + 1, input->variable + j, sizeof (
      Variable));
01671   memcpy (input->variable + j + 1, input->variable + j, sizeof (
      Variable));
01672   if (input->type == INPUT_TYPE_XML)
01673     input->variable[j + 1].name
01674       = (char *) xmlStrdup ((xmlChar *) input->variable[j].name);
01675   else
01676     input->variable[j + 1].name = g_strdup (input->
      variable[j].name);
01677   ++input->nvariables;
01678   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01679   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i + 1);
01680   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01681   window_update ();
01682 #if DEBUG_INTERFACE
01683   fprintf (stderr, "window_add_variable: end\n");
01684 #endif
01685 }
```

Here is the call graph for this function:



4.11.2.11 window_get_algorithm()

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

Function to get the stochastic algorithm number.

Returns

Stochastic algorithm number.

Definition at line 733 of file interface.c.

```
00734 {
00735   unsigned int i;
00736 #if DEBUG_INTERFACE
00737   fprintf (stderr, "window_get_algorithm: start\n");
00738 #endif
00739   i = gtk_array_get_active (window->button_algorithm,
      NALGORITHMS);
00740 #if DEBUG_INTERFACE
00741   fprintf (stderr, "window_get_algorithm: %u\n", i);
00742   fprintf (stderr, "window_get_algorithm: end\n");
00743 #endif
00744   return i;
00745 }
```

Here is the call graph for this function:

4.11.2.12 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 753 of file interface.c.

```
00754 {
00755   unsigned int i;
00756 #if DEBUG_INTERFACE
00757   fprintf (stderr, "window_get_climbing: start\n");
00758 #endif
00759   i = gtk_array_get_active (window->button_climbing,
      NCLIMBINGS);
00760 #if DEBUG_INTERFACE
00761   fprintf (stderr, "window_get_climbing: %u\n", i);
00762   fprintf (stderr, "window_get_climbing: end\n");
00763 #endif
00764   return i;
00765 }
```

Here is the call graph for this function:

4.11.2.13 window_get_norm()

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

Function to get the norm method number.

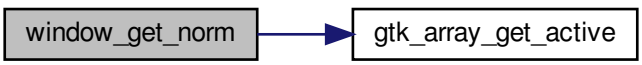
Returns

Norm method number.

Definition at line 773 of file interface.c.

```
00774 {
00775   unsigned int i;
00776 #if DEBUG_INTERFACE
00777   fprintf (stderr, "window_get_norm: start\n");
00778 #endif
00779   i = gtk_array_get_active (window->button_norm,
      NNORMS);
00780 #if DEBUG_INTERFACE
00781   fprintf (stderr, "window_get_norm: %u\n", i);
00782   fprintf (stderr, "window_get_norm: end\n");
00783 #endif
00784   return i;
00785 }
```

Here is the call graph for this function:



4.11.2.14 window_help()

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

Function to show a help dialog.

Definition at line 1030 of file interface.c.

```
01031 {
01032   char *buffer, *buffer2;
01033 #if DEBUG_INTERFACE
01034   fprintf (stderr, "window_help: start\n");
01035 #endif
01036   buffer2 = g_build_filename (window->application_directory, "..", "manuals",
01037                               _("user-manual.pdf"), NULL);
01038   buffer = g_filename_to_uri (buffer2, NULL, NULL);
01039   g_free (buffer2);
01040 #if GTK_MINOR_VERSION >= 22
01041   gtk_show_uri_on_window (window->window, buffer, GDK_CURRENT_TIME, NULL);
01042 #else
01043   gtk_show_uri (NULL, buffer, GDK_CURRENT_TIME, NULL);
01044 #endif
01045 #if DEBUG_INTERFACE
01046   fprintf (stderr, "window_help: uri=%s\n", buffer);
01047 #endif
01048   g_free (buffer);
01049 #if DEBUG_INTERFACE
01050   fprintf (stderr, "window_help: end\n");
01051 #endif
01052 }
```

4.11.2.15 window_inputs_experiment()

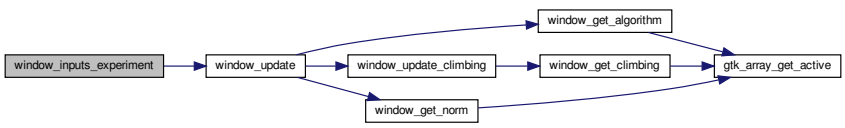
```
static void window_inputs_experiment ( )  [static]
```

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

Definition at line 1493 of file interface.c.

```
01494 {
01495   unsigned int j;
01496 #if DEBUG_INTERFACE
01497   fprintf (stderr, "window_inputs_experiment: start\n");
01498 #endif
01499   j = input->experiment->ninputs - 1;
01500   if (j
01501       && !gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01502                                         (window->check_template[j])))
01503     --input->experiment->ninputs;
01504   if (input->experiment->ninputs < MAX_NINPUTS
01505       && gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01506                                        (window->check_template[j])))
01507     ++input->experiment->ninputs;
01508   window_update ();
01509 #if DEBUG_INTERFACE
01510   fprintf (stderr, "window_inputs_experiment: end\n");
01511 #endif
01512 }
```

Here is the call graph for this function:



4.11.2.16 window_label_variable()

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

Function to set the variable label in the main window.

Definition at line 1691 of file interface.c.

```
01692 {
01693   unsigned int i;
01694   const char *buffer;
01695 #if DEBUG_INTERFACE
01696   fprintf (stderr, "window_label_variable: start\n");
01697 #endif
01698   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01699   buffer = gtk_entry_get_text (window->entry_variable);
01700   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01701   gtk_combo_box_text_remove (window->combo_variable, i);
01702   gtk_combo_box_text_insert_text (window->combo_variable, i, buffer);
01703   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01704   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
01705 #if DEBUG_INTERFACE
01706   fprintf (stderr, "window_label_variable: end\n");
01707 #endif
01708 }
```

4.11.2.17 window_name_experiment()

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

Function to set the experiment name in the main window.

Definition at line 1446 of file interface.c.

```
01447 {
01448   unsigned int i;
01449   char *buffer;
01450   GFile *file1, *file2;
01451 #if DEBUG_INTERFACE
01452   fprintf (stderr, "window_name_experiment: start\n");
01453 #endif
01454   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01455   file1
01456     = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->
      button_experiment));
01457   file2 = g_file_new_for_path (input->directory);
01458   buffer = g_file_get_relative_path (file2, file1);
01459   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01460   gtk_combo_box_text_remove (window->combo_experiment, i);
01461   gtk_combo_box_text_insert_text (window->combo_experiment, i, buffer);
01462   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01463   g_signal_handler_unblock (window->combo_experiment,
      window->id_experiment);
01464   g_free (buffer);
01465   g_object_unref (file2);
01466   g_object_unref (file1);
01467 #if DEBUG_INTERFACE
01468   fprintf (stderr, "window_name_experiment: end\n");
01469 #endif
01470 }
```

4.11.2.18 window_new()

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

Function to open the main window.

Parameters

application	GtkApplication struct.

Definition at line 2066 of file interface.c.

```
02067 {
02068   unsigned int i;
02069   char *buffer, *buffer2, buffer3[64];
02070   char *label_algorithm[NALGORITHMS] = {
02071     "_Monte-Carlo", _("_Sweep"), _("_Genetic"), _("_Orthogonal")
02072   };
02073   char *tip_algorithm[NALGORITHMS] = {
02074     _("Monte-Carlo brute force algorithm"),
02075     _("Sweep brute force algorithm"),
02076     _("Genetic algorithm"),
02077     _("Orthogonal sampling brute force algorithm"),
02078   };
02079   char *label_climbing[NCLIMBINGS] = {
02080     _("_Coordinates climbing"), _("_Random climbing")
02081   };
02082   char *tip_climbing[NCLIMBINGS] = {
02083     _("Coordinates climbing estimate method"),
02084     _("Random climbing estimate method")
02085   };
02086   char *label_norm[NNORMS] = { "L2", "L", "Lp", "L1" };
02087   char *tip_norm[NNORMS] = {
02088     _("Euclidean error norm (L2)"),
02089     _("Maximum error norm (L)"),
02090     _("P error norm (Lp)"),
02091     _("Taxicab error norm (L1)")
02092   };
02093
02094 #if DEBUG_INTERFACE
02095   fprintf (stderr, "window_new: start\n");
02096 #endif
02097
02098   // Creating the window
02099   window->window = main_window
02100     = (GtkWindow *) gtk_application_window_new (application);
02101
02102   // Finish when closing the window
02103   g_signal_connect_swapped (window->window, "delete-event",
02104                             G_CALLBACK (g_application_quit),
02105                             G_APPLICATION (application));
02106
02107   // Setting the window title
02108   gtk_window_set_title (window->window, "MPCOTool");
02109
02110   // Creating the open button
02111   window->button_open = (GtkToolButton *) gtk_tool_button_new
02112     (gtk_image_new_from_icon_name ("document-open",
02113                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Open"));
02114   g_signal_connect (window->button_open, "clicked", window_open, NULL);
02115
02116   // Creating the save button
02117   window->button_save = (GtkToolButton *) gtk_tool_button_new
02118     (gtk_image_new_from_icon_name ("document-save",
02119                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Save"));
02120   g_signal_connect (window->button_save, "clicked", (GCallback)
      window_save,
02121                     NULL);
02122
02123   // Creating the run button
02124   window->button_run = (GtkToolButton *) gtk_tool_button_new
02125     (gtk_image_new_from_icon_name ("system-run",
02126                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Run"));
02127   g_signal_connect (window->button_run, "clicked", window_run, NULL);
02128
02129   // Creating the options button
02130   window->button_options = (GtkToolButton *) gtk_tool_button_new
02131     (gtk_image_new_from_icon_name ("preferences-system",
02132                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Options"));
02133   g_signal_connect (window->button_options, "clicked",
      options_new, NULL);
02134
02135   // Creating the help button
02136   window->button_help = (GtkToolButton *) gtk_tool_button_new
02137     (gtk_image_new_from_icon_name ("help-browser",
02138                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Help"));
02139   g_signal_connect (window->button_help, "clicked", window_help, NULL);
02140
```

```
02141   // Creating the about button
02142   window->button_about = (GtkToolButton *) gtk_tool_button_new
02143     (gtk_image_new_from_icon_name ("help-about",
02144                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("About"));
02145   g_signal_connect (window->button_about, "clicked",
      window_about, NULL);
02146
02147   // Creating the exit button
02148   window->button_exit = (GtkToolButton *) gtk_tool_button_new
02149     (gtk_image_new_from_icon_name ("application-exit",
02150                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Exit"));
02151   g_signal_connect_swapped (window->button_exit, "clicked",
02152                             G_CALLBACK (g_application_quit),
02153                             G_APPLICATION (application));
02154
02155   // Creating the buttons bar
02156   window->bar_buttons = (GtkToolbar *) gtk_toolbar_new ();
02157   gtk_toolbar_insert
02158     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_open), 0);
02159   gtk_toolbar_insert
02160     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_save), 1);
02161   gtk_toolbar_insert
02162     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_run), 2);
02163   gtk_toolbar_insert
02164     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_options), 3);
02165   gtk_toolbar_insert
02166     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_help), 4);
02167   gtk_toolbar_insert
02168     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_about), 5);
02169   gtk_toolbar_insert
02170     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_exit), 6);
02171   gtk_toolbar_set_style (window->bar_buttons, GTK_TOOLBAR_BOTH);
02172
02173   // Creating the simulator program label and entry
02174   window->label_simulator = (GtkLabel *) gtk_label_new (_("Simulator program"));
02175   window->button_simulator = (GtkFileChooserButton *)
02176     gtk_file_chooser_button_new (_("Simulator program"),
02177                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02178   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_simulator),
02179                                _("Simulator program executable file"));
02180   gtk_widget_set_hexpand (GTK_WIDGET (window->button_simulator), TRUE);
02181
02182   // Creating the evaluator program label and entry
02183   window->check_evaluator = (GtkCheckButton *)
02184     gtk_check_button_new_with_mnemonic (_("_Evaluator program"));
02185   g_signal_connect (window->check_evaluator, "toggled",
      window_update, NULL);
02186   window->button_evaluator = (GtkFileChooserButton *)
02187     gtk_file_chooser_button_new (_("Evaluator program"),
02188                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02189   gtk_widget_set_tooltip_text
02190     (GTK_WIDGET (window->button_evaluator),
02191      _("Optional evaluator program executable file"));
02192
02193   // Creating the results files labels and entries
02194   window->label_result = (GtkLabel *) gtk_label_new (_("Result file"));
02195   window->entry_result = (GtkEntry *) gtk_entry_new ();
02196   gtk_widget_set_tooltip_text
02197     (GTK_WIDGET (window->entry_result), _("Best results file"));
02198   window->label_variables = (GtkLabel *) gtk_label_new (_("Variables file"));
02199   window->entry_variables = (GtkEntry *) gtk_entry_new ();
02200   gtk_widget_set_tooltip_text
02201     (GTK_WIDGET (window->entry_variables), _("All simulated results file"));
02202
02203   // Creating the files grid and attaching widgets
02204   window->grid_files = (GtkGrid *) gtk_grid_new ();
02205   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      label_simulator),
02206                    0, 0, 1, 1);
02207   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      button_simulator),
02208                    1, 0, 1, 1);
02209   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      check_evaluator),
02210                    0, 1, 1, 1);
02211   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      button_evaluator),
02212                    1, 1, 1, 1);
02213   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      label_result),
```

```
02214                   0, 2, 1, 1);
02215   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      entry_result),
02216                   1, 2, 1, 1);
02217   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      label_variables),
02218                   0, 3, 1, 1);
02219   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      entry_variables),
02220                   1, 3, 1, 1);
02221
02222   // Creating the algorithm properties
02223   window->label_simulations = (GtkLabel *) gtk_label_new
02224     (_("Simulations number"));
02225   window->spin_simulations
02226     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02227   gtk_widget_set_tooltip_text
02228     (GTK_WIDGET (window->spin_simulations),
02229      _("Number of simulations to perform for each iteration"));
02230   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_simulations), TRUE);
02231   window->label_iterations = (GtkLabel *)
02232     gtk_label_new (_("Iterations number"));
02233   window->spin_iterations
02234     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02235   gtk_widget_set_tooltip_text
02236     (GTK_WIDGET (window->spin_iterations), _("Number of iterations"));
02237   g_signal_connect
02238     (window->spin_iterations, "value-changed",
      window_update, NULL);
02239   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_iterations), TRUE);
02240   window->label_tolerance = (GtkLabel *) gtk_label_new (_("Tolerance"));
02241   window->spin_tolerance =
02242     (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02243   gtk_widget_set_tooltip_text
02244     (GTK_WIDGET (window->spin_tolerance),
02245      _("Tolerance to set the variable interval on the next iteration"));
02246   window->label_bests = (GtkLabel *) gtk_label_new (_("Bests number"));
02247   window->spin_bests
02248     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02249   gtk_widget_set_tooltip_text
02250     (GTK_WIDGET (window->spin_bests),
02251      _("Number of best simulations used to set the variable interval "
02252        "on the next iteration"));
02253   window->label_population
02254     = (GtkLabel *) gtk_label_new (_("Population number"));
02255   window->spin_population
02256     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02257   gtk_widget_set_tooltip_text
02258     (GTK_WIDGET (window->spin_population),
02259      _("Number of population for the genetic algorithm"));
02260   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_population), TRUE);
02261   window->label_generations
02262     = (GtkLabel *) gtk_label_new (_("Generations number"));
02263   window->spin_generations
02264     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02265   gtk_widget_set_tooltip_text
02266     (GTK_WIDGET (window->spin_generations),
02267      _("Number of generations for the genetic algorithm"));
02268   window->label_mutation = (GtkLabel *) gtk_label_new (_("Mutation ratio"));
02269   window->spin_mutation
02270     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02271   gtk_widget_set_tooltip_text
02272     (GTK_WIDGET (window->spin_mutation),
02273      _("Ratio of mutation for the genetic algorithm"));
02274   window->label_reproduction
02275     = (GtkLabel *) gtk_label_new (_("Reproduction ratio"));
02276   window->spin_reproduction
02277     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02278   gtk_widget_set_tooltip_text
02279     (GTK_WIDGET (window->spin_reproduction),
02280      _("Ratio of reproduction for the genetic algorithm"));
02281   window->label_adaptation = (GtkLabel *) gtk_label_new (_("Adaptation ratio"));
02282   window->spin_adaptation
02283     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02284   gtk_widget_set_tooltip_text
02285     (GTK_WIDGET (window->spin_adaptation),
02286      _("Ratio of adaptation for the genetic algorithm"));
02287   window->label_threshold = (GtkLabel *) gtk_label_new (_("Threshold"));
02288   window->spin_threshold = (GtkSpinButton *)
02289     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE,
02290                                     precision[DEFAULT_PRECISION]);
02291   gtk_widget_set_tooltip_text
02292     (GTK_WIDGET (window->spin_threshold),
02293      _("Threshold in the objective function to finish the simulations"));
02294   window->scrolled_threshold =
02295     (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02296   gtk_container_add (GTK_CONTAINER (window->scrolled_threshold),
```

```
02297                     GTK_WIDGET (window->spin_threshold));
02298 //  gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_threshold), TRUE);
02299 //  gtk_widget_set_halign (GTK_WIDGET (window->scrolled_threshold),
02300 //                         GTK_ALIGN_FILL);
02301
02302   // Creating the hill climbing method properties
02303   window->check_climbing = (GtkCheckButton *)
02304     gtk_check_button_new_with_mnemonic (_("_Hill climbing method"));
02305   g_signal_connect (window->check_climbing, "clicked",
      window_update, NULL);
02306   window->grid_climbing = (GtkGrid *) gtk_grid_new ();
02307   window->button_climbing[0] = (GtkRadioButton *)
02308     gtk_radio_button_new_with_mnemonic (NULL, label_climbing[0]);
02309   gtk_grid_attach (window->grid_climbing,
02310                    GTK_WIDGET (window->button_climbing[0]), 0, 0, 1, 1);
02311   g_signal_connect (window->button_climbing[0], "clicked",
      window_update, NULL);
02312   for (i = 0; ++i < NCLIMBINGS;)
02313     {
02314       window->button_climbing[i] = (GtkRadioButton *)
02315         gtk_radio_button_new_with_mnemonic
02316         (gtk_radio_button_get_group (window->button_climbing[0]),
02317          label_climbing[i]);
02318       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_climbing[i]),
02319                                    tip_climbing[i]);
02320       gtk_grid_attach (window->grid_climbing,
02321                        GTK_WIDGET (window->button_climbing[i]), 0, i, 1, 1);
02322       g_signal_connect (window->button_climbing[i], "clicked",
      window_update,
02323                         NULL);
02324     }
02325   window->label_steps = (GtkLabel *) gtk_label_new (_("Steps number"));
02326   window->spin_steps = (GtkSpinButton *)
02327     gtk_spin_button_new_with_range (1., 1.e12, 1.);
02328   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_steps), TRUE);
02329   window->label_estimates
02330     = (GtkLabel *) gtk_label_new (_("Climbing estimates number"));
02331   window->spin_estimates = (GtkSpinButton *)
02332     gtk_spin_button_new_with_range (1., 1.e3, 1.);
02333   window->label_relaxation
02334     = (GtkLabel *) gtk_label_new (_("Relaxation parameter"));
02335   window->spin_relaxation = (GtkSpinButton *)
02336     gtk_spin_button_new_with_range (0., 2., 0.001);
02337   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_steps),
02338                    0, NCLIMBINGS, 1, 1);
02339   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_steps),
02340                    1, NCLIMBINGS, 1, 1);
02341   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_estimates),
02342                    0, NCLIMBINGS + 1, 1, 1);
02343   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_estimates),
02344                    1, NCLIMBINGS + 1, 1, 1);
02345   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_relaxation),
02346                    0, NCLIMBINGS + 2, 1, 1);
02347   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_relaxation),
02348                    1, NCLIMBINGS + 2, 1, 1);
02349
02350   // Creating the array of algorithms
02351   window->grid_algorithm = (GtkGrid *) gtk_grid_new ();
02352   window->button_algorithm[0] = (GtkRadioButton *)
02353     gtk_radio_button_new_with_mnemonic (NULL, label_algorithm[0]);
02354   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[0]),
02355                                tip_algorithm[0]);
02356   gtk_grid_attach (window->grid_algorithm,
02357                    GTK_WIDGET (window->button_algorithm[0]), 0, 0, 1, 1);
02358   g_signal_connect (window->button_algorithm[0], "clicked",
02359                     window_set_algorithm, NULL);
02360   for (i = 0; ++i < NALGORITHMS;)
02361     {
02362       window->button_algorithm[i] = (GtkRadioButton *)
02363         gtk_radio_button_new_with_mnemonic
02364         (gtk_radio_button_get_group (window->button_algorithm[0]),
02365          label_algorithm[i]);
02366       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[i]),
02367                                    tip_algorithm[i]);
02368       gtk_grid_attach (window->grid_algorithm,
02369                        GTK_WIDGET (window->button_algorithm[i]), 0, i, 1, 1);
02370       g_signal_connect (window->button_algorithm[i], "clicked",
02371                         window_set_algorithm, NULL);
02372     }
02373   gtk_grid_attach (window->grid_algorithm,
02374                    GTK_WIDGET (window->label_simulations),
```

```
02375                     0, NALGORITHMS, 1, 1);
02376   gtk_grid_attach (window->grid_algorithm,
02377                    GTK_WIDGET (window->spin_simulations), 1, NALGORITHMS, 1, 1);
02378   gtk_grid_attach (window->grid_algorithm,
02379                    GTK_WIDGET (window->label_iterations),
02380                    0, NALGORITHMS + 1, 1, 1);
02381   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_iterations),
02382                    1, NALGORITHMS + 1, 1, 1);
02383   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_tolerance),
02384                    0, NALGORITHMS + 2, 1, 1);
02385   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_tolerance),
02386                    1, NALGORITHMS + 2, 1, 1);
02387   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_bests),
02388                    0, NALGORITHMS + 3, 1, 1);
02389   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_bests),
02390                    1, NALGORITHMS + 3, 1, 1);
02391   gtk_grid_attach (window->grid_algorithm,
02392                    GTK_WIDGET (window->label_population),
02393                    0, NALGORITHMS + 4, 1, 1);
02394   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_population),
02395                    1, NALGORITHMS + 4, 1, 1);
02396   gtk_grid_attach (window->grid_algorithm,
02397                    GTK_WIDGET (window->label_generations),
02398                    0, NALGORITHMS + 5, 1, 1);
02399   gtk_grid_attach (window->grid_algorithm,
02400                    GTK_WIDGET (window->spin_generations),
02401                    1, NALGORITHMS + 5, 1, 1);
02402   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_mutation),
02403                    0, NALGORITHMS + 6, 1, 1);
02404   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_mutation),
02405                    1, NALGORITHMS + 6, 1, 1);
02406   gtk_grid_attach (window->grid_algorithm,
02407                    GTK_WIDGET (window->label_reproduction),
02408                    0, NALGORITHMS + 7, 1, 1);
02409   gtk_grid_attach (window->grid_algorithm,
02410                    GTK_WIDGET (window->spin_reproduction),
02411                    1, NALGORITHMS + 7, 1, 1);
02412   gtk_grid_attach (window->grid_algorithm,
02413                    GTK_WIDGET (window->label_adaptation),
02414                    0, NALGORITHMS + 8, 1, 1);
02415   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_adaptation),
02416                    1, NALGORITHMS + 8, 1, 1);
02417   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->check_climbing),
02418                    0, NALGORITHMS + 9, 2, 1);
02419   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->grid_climbing),
02420                    0, NALGORITHMS + 10, 2, 1);
02421   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_threshold),
02422                    0, NALGORITHMS + 11, 1, 1);
02423   gtk_grid_attach (window->grid_algorithm,
02424                    GTK_WIDGET (window->scrolled_threshold),
02425                    1, NALGORITHMS + 11, 1, 1);
02426   window->frame_algorithm = (GtkFrame *) gtk_frame_new (_("Algorithm"));
02427   gtk_container_add (GTK_CONTAINER (window->frame_algorithm),
02428                      GTK_WIDGET (window->grid_algorithm));
02429
02430   // Creating the variable widgets
02431   window->combo_variable = (GtkComboBoxText *) gtk_combo_box_text_new ();
02432   gtk_widget_set_tooltip_text
02433     (GTK_WIDGET (window->combo_variable), _("Variables selector"));
02434   window->id_variable = g_signal_connect
02435     (window->combo_variable, "changed", window_set_variable, NULL);
02436   window->button_add_variable = (GtkButton *)
02437     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02438   g_signal_connect (window->button_add_variable, "clicked",
      window_add_variable,
02439                     NULL);
02440   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_variable),
02441                                _("Add variable"));
02442   window->button_remove_variable = (GtkButton *)
02443     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02444   g_signal_connect (window->button_remove_variable, "clicked",
02445                     window_remove_variable, NULL);
02446   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_variable),
02447                                _("Remove variable"));
02448   window->label_variable = (GtkLabel *) gtk_label_new (_("Name"));
```

```
02449   window->entry_variable = (GtkEntry *) gtk_entry_new ();
02450   gtk_widget_set_tooltip_text
02451     (GTK_WIDGET (window->entry_variable), _("Variable name"));
02452   gtk_widget_set_hexpand (GTK_WIDGET (window->entry_variable), TRUE);
02453   window->id_variable_label = g_signal_connect
02454     (window->entry_variable, "changed",
      window_label_variable, NULL);
02455   window->label_min = (GtkLabel *) gtk_label_new (_("Minimum"));
02456   window->spin_min = (GtkSpinButton *) gtk_spin_button_new_with_range
02457     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02458   gtk_widget_set_tooltip_text
02459     (GTK_WIDGET (window->spin_min), _("Minimum initial value of the variable"));
02460   window->scrolled_min
02461     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02462   gtk_container_add (GTK_CONTAINER (window->scrolled_min),
02463                      GTK_WIDGET (window->spin_min));
02464   g_signal_connect (window->spin_min, "value-changed",
02465                     window_rangemin_variable, NULL);
02466   window->label_max = (GtkLabel *) gtk_label_new (_("Maximum"));
02467   window->spin_max = (GtkSpinButton *) gtk_spin_button_new_with_range
02468     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02469   gtk_widget_set_tooltip_text
02470     (GTK_WIDGET (window->spin_max), _("Maximum initial value of the variable"));
02471   window->scrolled_max
02472     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02473   gtk_container_add (GTK_CONTAINER (window->scrolled_max),
02474                      GTK_WIDGET (window->spin_max));
02475   g_signal_connect (window->spin_max, "value-changed",
02476                     window_rangemax_variable, NULL);
02477   window->check_minabs = (GtkCheckButton *)
02478     gtk_check_button_new_with_mnemonic (_("_Absolute minimum"));
02479   g_signal_connect (window->check_minabs, "toggled",
      window_update, NULL);
02480   window->spin_minabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02481     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02482   gtk_widget_set_tooltip_text
02483     (GTK_WIDGET (window->spin_minabs),
02484      _("Minimum allowed value of the variable"));
02485   window->scrolled_minabs
02486     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02487   gtk_container_add (GTK_CONTAINER (window->scrolled_minabs),
02488                      GTK_WIDGET (window->spin_minabs));
02489   g_signal_connect (window->spin_minabs, "value-changed",
02490                     window_rangeminabs_variable, NULL);
02491   window->check_maxabs = (GtkCheckButton *)
02492     gtk_check_button_new_with_mnemonic (_("_Absolute maximum"));
02493   g_signal_connect (window->check_maxabs, "toggled",
      window_update, NULL);
02494   window->spin_maxabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02495     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02496   gtk_widget_set_tooltip_text
02497     (GTK_WIDGET (window->spin_maxabs),
02498      _("Maximum allowed value of the variable"));
02499   window->scrolled_maxabs
02500     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02501   gtk_container_add (GTK_CONTAINER (window->scrolled_maxabs),
02502                      GTK_WIDGET (window->spin_maxabs));
02503   g_signal_connect (window->spin_maxabs, "value-changed",
02504                     window_rangemaxabs_variable, NULL);
02505   window->label_precision = (GtkLabel *) gtk_label_new (_("Precision digits"));
02506   window->spin_precision = (GtkSpinButton *)
02507     gtk_spin_button_new_with_range (0., (gdouble) DEFAULT_PRECISION, 1.);
02508   gtk_widget_set_tooltip_text
02509     (GTK_WIDGET (window->spin_precision),
02510      _("Number of precision floating point digits\n"
02511        "0 is for integer numbers"));
02512   g_signal_connect (window->spin_precision, "value-changed",
02513                     window_precision_variable, NULL);
02514   window->label_sweeps = (GtkLabel *) gtk_label_new (_("Sweeps number"));
02515   window->spin_sweeps =
02516     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02517   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_sweeps),
02518                                _("Number of steps sweeping the variable"));
02519   g_signal_connect (window->spin_sweeps, "value-changed",
02520                     window_update_variable, NULL);
02521   window->label_bits = (GtkLabel *) gtk_label_new (_("Bits number"));
02522   window->spin_bits
02523     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
02524   gtk_widget_set_tooltip_text
02525     (GTK_WIDGET (window->spin_bits),
02526      _("Number of bits to encode the variable"));
02527   g_signal_connect
02528     (window->spin_bits, "value-changed", window_update_variable, NULL)
    ;
02529   window->label_step = (GtkLabel *) gtk_label_new (_("Step size"));
02530   window->spin_step = (GtkSpinButton *) gtk_spin_button_new_with_range
02531     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
```

```
02532   gtk_widget_set_tooltip_text
02533     (GTK_WIDGET (window->spin_step),
02534      _("Initial step size for the hill climbing method"));
02535   window->scrolled_step
02536     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02537   gtk_container_add (GTK_CONTAINER (window->scrolled_step),
02538                      GTK_WIDGET (window->spin_step));
02539   g_signal_connect
02540     (window->spin_step, "value-changed", window_step_variable, NULL);
02541   window->grid_variable = (GtkGrid *) gtk_grid_new ();
02542   gtk_grid_attach (window->grid_variable,
02543                    GTK_WIDGET (window->combo_variable), 0, 0, 2, 1);
02544   gtk_grid_attach (window->grid_variable,
02545                    GTK_WIDGET (window->button_add_variable), 2, 0, 1, 1);
02546   gtk_grid_attach (window->grid_variable,
02547                    GTK_WIDGET (window->button_remove_variable), 3, 0, 1, 1);
02548   gtk_grid_attach (window->grid_variable,
02549                    GTK_WIDGET (window->label_variable), 0, 1, 1, 1);
02550   gtk_grid_attach (window->grid_variable,
02551                    GTK_WIDGET (window->entry_variable), 1, 1, 3, 1);
02552   gtk_grid_attach (window->grid_variable,
02553                    GTK_WIDGET (window->label_min), 0, 2, 1, 1);
02554   gtk_grid_attach (window->grid_variable,
02555                    GTK_WIDGET (window->scrolled_min), 1, 2, 3, 1);
02556   gtk_grid_attach (window->grid_variable,
02557                    GTK_WIDGET (window->label_max), 0, 3, 1, 1);
02558   gtk_grid_attach (window->grid_variable,
02559                    GTK_WIDGET (window->scrolled_max), 1, 3, 3, 1);
02560   gtk_grid_attach (window->grid_variable,
02561                    GTK_WIDGET (window->check_minabs), 0, 4, 1, 1);
02562   gtk_grid_attach (window->grid_variable,
02563                    GTK_WIDGET (window->scrolled_minabs), 1, 4, 3, 1);
02564   gtk_grid_attach (window->grid_variable,
02565                    GTK_WIDGET (window->check_maxabs), 0, 5, 1, 1);
02566   gtk_grid_attach (window->grid_variable,
02567                    GTK_WIDGET (window->scrolled_maxabs), 1, 5, 3, 1);
02568   gtk_grid_attach (window->grid_variable,
02569                    GTK_WIDGET (window->label_precision), 0, 6, 1, 1);
02570   gtk_grid_attach (window->grid_variable,
02571                    GTK_WIDGET (window->spin_precision), 1, 6, 3, 1);
02572   gtk_grid_attach (window->grid_variable,
02573                    GTK_WIDGET (window->label_sweeps), 0, 7, 1, 1);
02574   gtk_grid_attach (window->grid_variable,
02575                    GTK_WIDGET (window->spin_sweeps), 1, 7, 3, 1);
02576   gtk_grid_attach (window->grid_variable,
02577                    GTK_WIDGET (window->label_bits), 0, 8, 1, 1);
02578   gtk_grid_attach (window->grid_variable,
02579                    GTK_WIDGET (window->spin_bits), 1, 8, 3, 1);
02580   gtk_grid_attach (window->grid_variable,
02581                    GTK_WIDGET (window->label_step), 0, 9, 1, 1);
02582   gtk_grid_attach (window->grid_variable,
02583                    GTK_WIDGET (window->scrolled_step), 1, 9, 3, 1);
02584   window->frame_variable = (GtkFrame *) gtk_frame_new (_("Variable"));
02585   gtk_container_add (GTK_CONTAINER (window->frame_variable),
02586                      GTK_WIDGET (window->grid_variable));
02587
02588   // Creating the experiment widgets
02589   window->combo_experiment = (GtkComboBoxText *) gtk_combo_box_text_new ();
02590   gtk_widget_set_tooltip_text (GTK_WIDGET (window->combo_experiment),
02591                                _("Experiment selector"));
02592   window->id_experiment = g_signal_connect
02593     (window->combo_experiment, "changed",
      window_set_experiment, NULL);
02594   window->button_add_experiment = (GtkButton *)
02595     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02596   g_signal_connect
02597     (window->button_add_experiment, "clicked",
      window_add_experiment, NULL);
02598   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_experiment),
02599                                _("Add experiment"));
02600   window->button_remove_experiment = (GtkButton *)
02601     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02602   g_signal_connect (window->button_remove_experiment, "clicked",
02603                     window_remove_experiment, NULL);
02604   gtk_widget_set_tooltip_text (GTK_WIDGET (window->
      button_remove_experiment),
02605                                _("Remove experiment"));
02606   window->label_experiment
02607     = (GtkLabel *) gtk_label_new (_("Experimental data file"));
02608   window->button_experiment = (GtkFileChooserButton *)
02609     gtk_file_chooser_button_new (_("Experimental data file"),
02610                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02611   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_experiment),
02612                                _("Experimental data file"));
02613   window->id_experiment_name
02614     = g_signal_connect (window->button_experiment, "selection-changed",
02615                         window_name_experiment, NULL);
```

```
02616   gtk_widget_set_hexpand (GTK_WIDGET (window->button_experiment), TRUE);
02617   window->label_weight = (GtkLabel *) gtk_label_new (_("Weight"));
02618   window->spin_weight
02619     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02620   gtk_widget_set_tooltip_text
02621     (GTK_WIDGET (window->spin_weight),
02622      _("Weight factor to build the objective function"));
02623   g_signal_connect
02624     (window->spin_weight, "value-changed",
      window_weight_experiment, NULL);
02625   window->grid_experiment = (GtkGrid *) gtk_grid_new ();
02626   gtk_grid_attach (window->grid_experiment,
02627                    GTK_WIDGET (window->combo_experiment), 0, 0, 2, 1);
02628   gtk_grid_attach (window->grid_experiment,
02629                    GTK_WIDGET (window->button_add_experiment), 2, 0, 1, 1);
02630   gtk_grid_attach (window->grid_experiment,
02631                    GTK_WIDGET (window->button_remove_experiment), 3, 0, 1, 1)
      ;
02632   gtk_grid_attach (window->grid_experiment,
02633                    GTK_WIDGET (window->label_experiment), 0, 1, 1, 1);
02634   gtk_grid_attach (window->grid_experiment,
02635                    GTK_WIDGET (window->button_experiment), 1, 1, 3, 1);
02636   gtk_grid_attach (window->grid_experiment,
02637                    GTK_WIDGET (window->label_weight), 0, 2, 1, 1);
02638   gtk_grid_attach (window->grid_experiment,
02639                    GTK_WIDGET (window->spin_weight), 1, 2, 3, 1);
02640   for (i = 0; i < MAX_NINPUTS; ++i)
02641     {
02642       snprintf (buffer3, 64, "%s %u", _("Input template"), i + 1);
02643       window->check_template[i] = (GtkCheckButton *)
02644         gtk_check_button_new_with_label (buffer3);
02645       window->id_template[i]
02646         = g_signal_connect (window->check_template[i], "toggled",
02647                             window_inputs_experiment, NULL);
02648       gtk_grid_attach (window->grid_experiment,
02649                        GTK_WIDGET (window->check_template[i]), 0, 3 + i, 1, 1);
02650       window->button_template[i] = (GtkFileChooserButton *)
02651         gtk_file_chooser_button_new (_("Input template"),
02652                                      GTK_FILE_CHOOSER_ACTION_OPEN);
02653       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_template[i]),
02654                                    _("Experimental input template file"));
02655       window->id_input[i] =
02656         g_signal_connect_swapped (window->button_template[i],
02657                                   "selection-changed",
02658                                   (GCallback) window_template_experiment,
02659                                   (void *) (size_t) i);
02660       gtk_grid_attach (window->grid_experiment,
02661                        GTK_WIDGET (window->button_template[i]), 1, 3 + i, 3, 1);
02662     }
02663   window->frame_experiment = (GtkFrame *) gtk_frame_new (_("Experiment"));
02664   gtk_container_add (GTK_CONTAINER (window->frame_experiment),
02665                      GTK_WIDGET (window->grid_experiment));
02666
02667   // Creating the error norm widgets
02668   window->frame_norm = (GtkFrame *) gtk_frame_new (_("Error norm"));
02669   window->grid_norm = (GtkGrid *) gtk_grid_new ();
02670   gtk_container_add (GTK_CONTAINER (window->frame_norm),
02671                      GTK_WIDGET (window->grid_norm));
02672   window->button_norm[0] = (GtkRadioButton *)
02673     gtk_radio_button_new_with_mnemonic (NULL, label_norm[0]);
02674   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[0]),
02675                                tip_norm[0]);
02676   gtk_grid_attach (window->grid_norm,
02677                    GTK_WIDGET (window->button_norm[0]), 0, 0, 1, 1);
02678   g_signal_connect (window->button_norm[0], "clicked",
      window_update, NULL);
02679   for (i = 0; ++i < NNORMS;)
02680     {
02681       window->button_norm[i] = (GtkRadioButton *)
02682         gtk_radio_button_new_with_mnemonic
02683         (gtk_radio_button_get_group (window->button_norm[0]), label_norm[i]);
02684       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[i]),
02685                                    tip_norm[i]);
02686       gtk_grid_attach (window->grid_norm,
02687                        GTK_WIDGET (window->button_norm[i]), 0, i, 1, 1);
02688       g_signal_connect (window->button_norm[i], "clicked",
      window_update, NULL);
02689     }
02690   window->label_p = (GtkLabel *) gtk_label_new (_("P parameter"));
02691   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->
      label_p), 1, 1, 1, 1);
02692   window->spin_p = (GtkSpinButton *)
02693     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE, 0.01);
02694   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_p),
02695                                _("P parameter for the P error norm"));
02696   window->scrolled_p =
02697     (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
```

```
02698   gtk_container_add (GTK_CONTAINER (window->scrolled_p),
02699                      GTK_WIDGET (window->spin_p));
02700   gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_p), TRUE);
02701   gtk_widget_set_halign (GTK_WIDGET (window->scrolled_p), GTK_ALIGN_FILL);
02702   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->
      scrolled_p),
02703                    1, 2, 1, 2);
02704
02705   // Creating the grid and attaching the widgets to the grid
02706   window->grid = (GtkGrid *) gtk_grid_new ();
02707   gtk_grid_attach (window->grid, GTK_WIDGET (window->bar_buttons), 0, 0, 3, 1);
02708   gtk_grid_attach (window->grid, GTK_WIDGET (window->grid_files), 0, 1, 1, 1);
02709   gtk_grid_attach (window->grid,
02710                    GTK_WIDGET (window->frame_algorithm), 0, 2, 1, 1);
02711   gtk_grid_attach (window->grid,
02712                    GTK_WIDGET (window->frame_variable), 1, 2, 1, 1);
02713   gtk_grid_attach (window->grid,
02714                    GTK_WIDGET (window->frame_experiment), 2, 2, 1, 1);
02715   gtk_grid_attach (window->grid, GTK_WIDGET (window->frame_norm), 1, 1, 2, 1);
02716   gtk_container_add (GTK_CONTAINER (window->window), GTK_WIDGET (
      window->grid));
02717
02718   // Setting the window logo
02719   window->logo = gdk_pixbuf_new_from_xpm_data (logo);
02720   gtk_window_set_icon (window->window, window->logo);
02721
02722   // Showing the window
02723   gtk_widget_show_all (GTK_WIDGET (window->window));
02724
02725   // In GTK+ 3.16 and 3.18 the default scrolled size is wrong
02726 #if GTK_MINOR_VERSION >= 16
02727   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_min), -1, 40);
02728   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_max), -1, 40);
02729   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_minabs), -1, 40);
02730   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_maxabs), -1, 40);
02731   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_step), -1, 40);
02732   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_p), -1, 40);
02733   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_threshold), -1, 40);
02734 #endif
02735
02736   // Reading initial example
02737   input_new ();
02738   buffer2 = g_get_current_dir ();
02739   buffer = g_build_filename (buffer2, "..", "tests", "test1", INPUT_FILE, NULL);
02740   g_free (buffer2);
02741   window_read (buffer);
02742   g_free (buffer);
02743
02744 #if DEBUG_INTERFACE
02745   fprintf (stderr, "window_new: start\n");
02746 #endif
02747 }
```

4.11.2.19 window_open()

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

Function to open the input data.

Definition at line 1980 of file interface.c.

```
01981 {
01982   GtkFileChooserDialog *dlg;
01983   GtkFileFilter *filter;
01984   char *buffer, *directory, *name;
01985
01986 #if DEBUG_INTERFACE
01987   fprintf (stderr, "window_open: start\n");
01988 #endif
01989
01990   // Saving a backup of the current input file
01991   directory = g_strdup (input->directory);
01992   name = g_strdup (input->name);
01993
01994   // Opening dialog
```

```
01995   dlg = (GtkFileChooserDialog *)
01996     gtk_file_chooser_dialog_new (_("Open input file"),
01997                                  window->window,
01998                                  GTK_FILE_CHOOSER_ACTION_OPEN,
01999                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02000                                  _("_OK"), GTK_RESPONSE_OK, NULL);
02001
02002   // Adding XML filter
02003   filter = (GtkFileFilter *) gtk_file_filter_new ();
02004   gtk_file_filter_set_name (filter, "XML");
02005   gtk_file_filter_add_pattern (filter, "*.xml");
02006   gtk_file_filter_add_pattern (filter, "*.XML");
02007   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02008
02009   // Adding JSON filter
02010   filter = (GtkFileFilter *) gtk_file_filter_new ();
02011   gtk_file_filter_set_name (filter, "JSON");
02012   gtk_file_filter_add_pattern (filter, "*.json");
02013   gtk_file_filter_add_pattern (filter, "*.JSON");
02014   gtk_file_filter_add_pattern (filter, "*.js");
02015   gtk_file_filter_add_pattern (filter, "*.JS");
02016   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02017
02018   // If OK saving
02019   while (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
02020     {
02021
02022       // Traying to open the input file
02023       buffer = gtk_file_chooser_get_filename (GTK_FILE_CHOOSER (dlg));
02024       if (!window_read (buffer))
02025         {
02026 #if DEBUG_INTERFACE
02027           fprintf (stderr, "window_open: error reading input file\n");
02028 #endif
02029           g_free (buffer);
02030
02031           // Reading backup file on error
02032           buffer = g_build_filename (directory, name, NULL);
02033           input->result = input->variables = NULL;
02034           if (!input_open (buffer))
02035             {
02036
02037               // Closing on backup file reading error
02038 #if DEBUG_INTERFACE
02039               fprintf (stderr, "window_read: error reading backup file\n");
02040 #endif
02041               g_free (buffer);
02042               break;
02043             }
02044           g_free (buffer);
02045         }
02046       else
02047         {
02048           g_free (buffer);
02049           break;
02050         }
02051     }
02052
02053   // Freeing and closing
02054   g_free (name);
02055   g_free (directory);
02056   gtk_widget_destroy (GTK_WIDGET (dlg));
02057 #if DEBUG_INTERFACE
02058   fprintf (stderr, "window_open: end\n");
02059 #endif
02060 }
```

4.11.2.20 window_precision_variable()

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

Function to update the variable precision in the main window.

Definition at line 1714 of file interface.c.

```
01715 {
01716   unsigned int i;
01717 #if DEBUG_INTERFACE
01718   fprintf (stderr, "window_precision_variable: start\n");
01719 #endif
01720   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01721   input->variable[i].precision
01722     = (unsigned int) gtk_spin_button_get_value_as_int (window->
      spin_precision);
01723   gtk_spin_button_set_digits (window->spin_min, input->
      variable[i].precision);
01724   gtk_spin_button_set_digits (window->spin_max, input->
      variable[i].precision);
01725   gtk_spin_button_set_digits (window->spin_minabs,
01726                               input->variable[i].precision);
01727   gtk_spin_button_set_digits (window->spin_maxabs,
01728                               input->variable[i].precision);
01729 #if DEBUG_INTERFACE
01730   fprintf (stderr, "window_precision_variable: end\n");
01731 #endif
01732 }
```

4.11.2.21 window_rangemax_variable()

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

Function to update the variable rangemax in the main window.

Definition at line 1755 of file interface.c.

```
01756 {
01757   unsigned int i;
01758 #if DEBUG_INTERFACE
01759   fprintf (stderr, "window_rangemax_variable: start\n");
01760 #endif
01761   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01762   input->variable[i].rangemax = gtk_spin_button_get_value (
      window->spin_max);
01763 #if DEBUG_INTERFACE
01764   fprintf (stderr, "window_rangemax_variable: end\n");
01765 #endif
01766 }
```

4.11.2.22 window_rangemaxabs_variable()

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

Function to update the variable rangemaxabs in the main window.

Definition at line 1790 of file interface.c.

```
01791 {
01792   unsigned int i;
01793 #if DEBUG_INTERFACE
01794   fprintf (stderr, "window_rangemaxabs_variable: start\n");
01795 #endif
01796   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01797   input->variable[i].rangemaxabs
01798     = gtk_spin_button_get_value (window->spin_maxabs);
01799 #if DEBUG_INTERFACE
01800   fprintf (stderr, "window_rangemaxabs_variable: end\n");
01801 #endif
01802 }
```

4.11.2.23 window_rangemin_variable()

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

Function to update the variable rangemin in the main window.

Definition at line 1738 of file interface.c.

```
01739 {
01740   unsigned int i;
01741 #if DEBUG_INTERFACE
01742   fprintf (stderr, "window_rangemin_variable: start\n");
01743 #endif
01744   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01745   input->variable[i].rangemin = gtk_spin_button_get_value (
      window->spin_min);
01746 #if DEBUG_INTERFACE
01747   fprintf (stderr, "window_rangemin_variable: end\n");
01748 #endif
01749 }
```

4.11.2.24 window_rangeminabs_variable()

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

Function to update the variable rangeminabs in the main window.

Definition at line 1772 of file interface.c.

```
01773 {
01774   unsigned int i;
01775 #if DEBUG_INTERFACE
01776   fprintf (stderr, "window_rangeminabs_variable: start\n");
01777 #endif
01778   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01779   input->variable[i].rangeminabs
01780     = gtk_spin_button_get_value (window->spin_minabs);
01781 #if DEBUG_INTERFACE
01782   fprintf (stderr, "window_rangeminabs_variable: end\n");
01783 #endif
01784 }
```

4.11.2.25 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

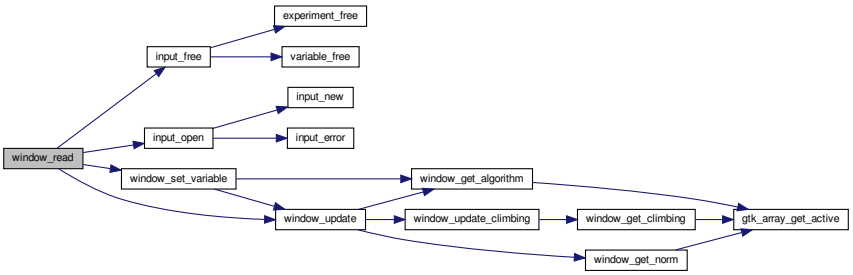
filename	File name.

Definition at line 1864 of file interface.c.

```
01865 {
01866   unsigned int i;
01867   char *buffer;
01868 #if DEBUG_INTERFACE
01869   fprintf (stderr, "window_read: start\n");
01870 #endif
01871
01872   // Reading new input file
01873   input_free ();
01874   input->result = input->variables = NULL;
01875   if (!input_open (filename))
01876     {
01877 #if DEBUG_INTERFACE
01878       fprintf (stderr, "window_read: end\n");
01879 #endif
01880       return 0;
01881     }
01882
01883   // Setting GTK+ widgets data
01884   gtk_entry_set_text (window->entry_result, input->result);
01885   gtk_entry_set_text (window->entry_variables, input->
      variables);
01886   buffer = g_build_filename (input->directory, input->
      simulator, NULL);
01887   gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01888                                  (window->button_simulator), buffer);
01889   g_free (buffer);
01890   gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON (window->check_evaluator),
01891                                 (size_t) input->evaluator);
01892   if (input->evaluator)
01893     {
01894       buffer = g_build_filename (input->directory, input->
      evaluator, NULL);
01895       gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01896                                      (window->button_evaluator), buffer);
01897       g_free (buffer);
01898     }
01899   gtk_toggle_button_set_active
01900     (GTK_TOGGLE_BUTTON (window->button_algorithm[input->
      algorithm]), TRUE);
01901   switch (input->algorithm)
01902     {
01903     case ALGORITHM_MONTE_CARLO:
01904       gtk_spin_button_set_value (window->spin_simulations,
01905                                  (gdouble) input->nsimulations);
01906       // fallthrough
01907     case ALGORITHM_SWEEP:
01908     case ALGORITHM_ORTHOGONAL:
01909       gtk_spin_button_set_value (window->spin_iterations,
01910                                  (gdouble) input->niterations);
01911       gtk_spin_button_set_value (window->spin_bests, (gdouble)
      input->nbest);
01912       gtk_spin_button_set_value (window->spin_tolerance,
      input->tolerance);
01913       gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON
01914                                     (window->check_climbing),
      input->nsteps);
01915       if (input->nsteps)
01916         {
01917           gtk_toggle_button_set_active
01918             (GTK_TOGGLE_BUTTON (window->button_climbing[
      input->climbing]),
01919              TRUE);
01920           gtk_spin_button_set_value (window->spin_steps,
01921                                      (gdouble) input->nsteps);
01922           gtk_spin_button_set_value (window->spin_relaxation,
01923                                      (gdouble) input->relaxation);
01924           switch (input->climbing)
01925             {
01926             case CLIMBING_METHOD_RANDOM:
01927               gtk_spin_button_set_value (window->spin_estimates,
01928                                          (gdouble) input->nestimates);
01929             }
01930         }
01931       break;
01932     default:
```

```
01933       gtk_spin_button_set_value (window->spin_population,
01934                                  (gdouble) input->nsimulations);
01935       gtk_spin_button_set_value (window->spin_generations,
01936                                  (gdouble) input->niterations);
01937       gtk_spin_button_set_value (window->spin_mutation, input->
      mutation_ratio);
01938       gtk_spin_button_set_value (window->spin_reproduction,
01939                                  input->reproduction_ratio);
01940       gtk_spin_button_set_value (window->spin_adaptation,
01941                                  input->adaptation_ratio);
01942     }
01943   gtk_toggle_button_set_active
01944     (GTK_TOGGLE_BUTTON (window->button_norm[input->norm]), TRUE);
01945   gtk_spin_button_set_value (window->spin_p, input->p);
01946   gtk_spin_button_set_value (window->spin_threshold, input->
      threshold);
01947   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01948   g_signal_handler_block (window->button_experiment,
01949                           window->id_experiment_name);
01950   gtk_combo_box_text_remove_all (window->combo_experiment);
01951   for (i = 0; i < input->nexperiments; ++i)
01952     gtk_combo_box_text_append_text (window->combo_experiment,
01953                                     input->experiment[i].name);
01954   g_signal_handler_unblock
01955     (window->button_experiment, window->
      id_experiment_name);
01956   g_signal_handler_unblock (window->combo_experiment,
      window->id_experiment);
01957   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), 0);
01958   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01959   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01960   gtk_combo_box_text_remove_all (window->combo_variable);
01961   for (i = 0; i < input->nvariables; ++i)
01962     gtk_combo_box_text_append_text (window->combo_variable,
01963                                     input->variable[i].name);
01964   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01965   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
01966   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), 0);
01967   window_set_variable ();
01968   window_update ();
01969
01970 #if DEBUG_INTERFACE
01971   fprintf (stderr, "window_read: end\n");
01972 #endif
01973   return 1;
01974 }
```

Here is the call graph for this function:



4.11.2.26 window_remove_experiment()

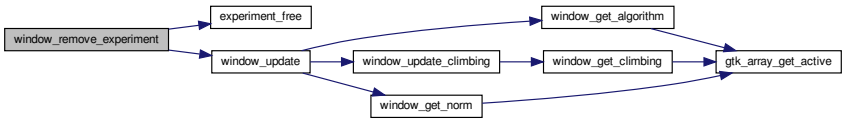
```
static void window_remove_experiment ( )  [static]
```

Function to remove an experiment in the main window.

Definition at line 1356 of file interface.c.

```
01357 {
01358   unsigned int i, j;
01359 #if DEBUG_INTERFACE
01360   fprintf (stderr, "window_remove_experiment: start\n");
01361 #endif
01362   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01363   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01364   gtk_combo_box_text_remove (window->combo_experiment, i);
01365   g_signal_handler_unblock (window->combo_experiment,
      window->id_experiment);
01366   experiment_free (input->experiment + i, input->
      type);
01367   --input->nexperiments;
01368   for (j = i; j < input->nexperiments; ++j)
01369     memcpy (input->experiment + j, input->experiment + j + 1,
01370             sizeof (Experiment));
01371   j = input->nexperiments - 1;
01372   if (i > j)
01373     i = j;
01374   for (j = 0; j < input->experiment->ninputs; ++j)
01375     g_signal_handler_block (window->button_template[j],
      window->id_input[j]);
01376   g_signal_handler_block
01377     (window->button_experiment, window->
      id_experiment_name);
01378   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01379   g_signal_handler_unblock
01380     (window->button_experiment, window->
      id_experiment_name);
01381   for (j = 0; j < input->experiment->ninputs; ++j)
01382     g_signal_handler_unblock (window->button_template[j],
      window->id_input[j]);
01383   window_update ();
01384 #if DEBUG_INTERFACE
01385   fprintf (stderr, "window_remove_experiment: end\n");
01386 #endif
01387 }
```

Here is the call graph for this function:



4.11.2.27 window_remove_variable()

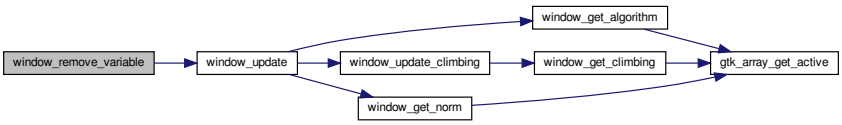
```
static void window_remove_variable ( )  [static]
```

Function to remove a variable in the main window.

Definition at line 1626 of file interface.c.

```
01627 {
01628   unsigned int i, j;
01629 #if DEBUG_INTERFACE
01630   fprintf (stderr, "window_remove_variable: start\n");
01631 #endif
01632   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01633   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01634   gtk_combo_box_text_remove (window->combo_variable, i);
01635   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
01636   xmlFree (input->variable[i].name);
01637   --input->nvariables;
01638   for (j = i; j < input->nvariables; ++j)
01639     memcpy (input->variable + j, input->variable + j + 1, sizeof (
      Variable));
01640   j = input->nvariables - 1;
01641   if (i > j)
01642     i = j;
01643   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01644   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01645   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01646   window_update ();
01647 #if DEBUG_INTERFACE
01648   fprintf (stderr, "window_remove_variable: end\n");
01649 #endif
01650 }
```

Here is the call graph for this function:



4.11.2.28 window_run()

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

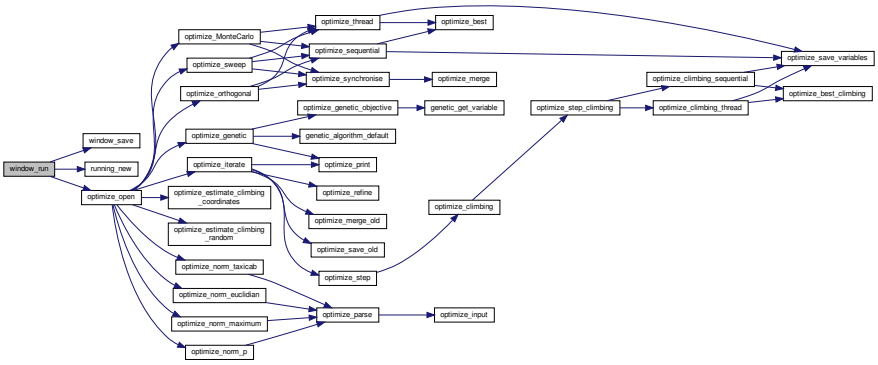
Function to run a optimization.

Definition at line 975 of file interface.c.

```
00976 {
00977   unsigned int i;
00978   char *msg, *msg2, buffer[64], buffer2[64];
00979 #if DEBUG_INTERFACE
00980   fprintf (stderr, "window_run: start\n");
00981 #endif
00982   if (!window_save ())
00983     {
00984 #if DEBUG_INTERFACE
00985       fprintf (stderr, "window_run: end\n");
00986 #endif
00987       return;
00988     }
00989   running_new ();
00990   while (gtk_events_pending ())
00991     gtk_main_iteration ();
00992   optimize_open ();
00993 #if DEBUG_INTERFACE
00994   fprintf (stderr, "window_run: closing running dialog\n");
00995 #endif
```

```
00996   gtk_spinner_stop (running->spinner);
00997   gtk_widget_destroy (GTK_WIDGET (running->dialog));
00998 #if DEBUG_INTERFACE
00999   fprintf (stderr, "window_run: displaying results\n");
01000 #endif
01001   snprintf (buffer, 64, "error = %.15le\n", optimize->error_old[0]);
01002   msg2 = g_strdup (buffer);
01003   for (i = 0; i < optimize->nvariables; ++i, msg2 = msg)
01004     {
01005       snprintf (buffer, 64, "%s = %s\n",
01006                 input->variable[i].name, format[input->
      variable[i].precision]);
01007       snprintf (buffer2, 64, buffer, optimize->value_old[i]);
01008       msg = g_strconcat (msg2, buffer2, NULL);
01009       g_free (msg2);
01010     }
01011   snprintf (buffer, 64, "%s = %.6lg s", _("Calculation time"),
01012             optimize->calculation_time);
01013   msg = g_strconcat (msg2, buffer, NULL);
01014   g_free (msg2);
01015   show_message (_("Best result"), msg, INFO_TYPE);
01016   g_free (msg);
01017 #if DEBUG_INTERFACE
01018   fprintf (stderr, "window_run: freeing memory\n");
01019 #endif
01020   optimize_free ();
01021 #if DEBUG_INTERFACE
01022   fprintf (stderr, "window_run: end\n");
01023 #endif
01024 }
```

Here is the call graph for this function:



4.11.2.29 window_save()

```
static int window_save ( )  [static]
```

Function to save the input file.

Returns

1 on OK, 0 on Cancel.

Definition at line 824 of file interface.c.

```
00825 {
00826   GtkFileChooserDialog *dlg;
00827   GtkFileFilter *filter1, *filter2;
00828   char *buffer;
00829 
00830 #if DEBUG_INTERFACE
00831   fprintf (stderr, "window_save: start\n");
00832 #endif
00833 
00834   // Opening the saving dialog
00835   dlg = (GtkFileChooserDialog *)
00836     gtk_file_chooser_dialog_new (_("Save file"),
00837                                  window->window,
00838                                  GTK_FILE_CHOOSER_ACTION_SAVE,
00839                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
00840                                  _("_OK"), GTK_RESPONSE_OK, NULL);
00841   gtk_file_chooser_set_do_overwrite_confirmation (GTK_FILE_CHOOSER (dlg), TRUE);
00842   buffer = g_build_filename (input->directory, input->name, NULL);
00843   gtk_file_chooser_set_filename (GTK_FILE_CHOOSER (dlg), buffer);
00844   g_free (buffer);
00845 
00846   // Adding XML filter
00847   filter1 = (GtkFileFilter *) gtk_file_filter_new ();
00848   gtk_file_filter_set_name (filter1, "XML");
00849   gtk_file_filter_add_pattern (filter1, "*.xml");
00850   gtk_file_filter_add_pattern (filter1, "*.XML");
00851   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter1);
00852 
00853   // Adding JSON filter
00854   filter2 = (GtkFileFilter *) gtk_file_filter_new ();
00855   gtk_file_filter_set_name (filter2, "JSON");
00856   gtk_file_filter_add_pattern (filter2, "*.json");
00857   gtk_file_filter_add_pattern (filter2, "*.JSON");
00858   gtk_file_filter_add_pattern (filter2, "*.js");
00859   gtk_file_filter_add_pattern (filter2, "*.JS");
00860   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter2);
00861 
00862   if (input->type == INPUT_TYPE_XML)
00863     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter1);
00864   else
00865     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter2);
00866 
00867   // If OK response then saving
00868   if (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
00869     {
00870       // Setting input file type
00871       filter1 = gtk_file_chooser_get_filter (GTK_FILE_CHOOSER (dlg));
00872       buffer = (char *) gtk_file_filter_get_name (filter1);
00873       if (!strcmp (buffer, "XML"))
00874         input->type = INPUT_TYPE_XML;
00875       else
00876         input->type = INPUT_TYPE_JSON;
00877 
00878       // Adding properties to the root XML node
00879       input->simulator = gtk_file_chooser_get_filename
00880         (GTK_FILE_CHOOSER (window->button_simulator));
00881       if (gtk_toggle_button_get_active
00882           (GTK_TOGGLE_BUTTON (window->check_evaluator)))
00883         input->evaluator = gtk_file_chooser_get_filename
00884           (GTK_FILE_CHOOSER (window->button_evaluator));
00885       else
00886         input->evaluator = NULL;
00887       if (input->type == INPUT_TYPE_XML)
00888         {
00889           input->result
00890             = (char *) xmlStrdup ((const xmlChar *)
00891                                   gtk_entry_get_text (window->entry_result));
00892           input->variables
00893             = (char *) xmlStrdup ((const xmlChar *)
00894                                   gtk_entry_get_text (window->
    entry_variables));
00895         }
00896       else
00897         {
00898           input->result = g_strdup (gtk_entry_get_text (window->
    entry_result));
00899           input->variables =
00900             g_strdup (gtk_entry_get_text (window->entry_variables));
00901         }
00902 
00903       // Setting the algorithm
00904       switch (window_get_algorithm ())
00905         {
00906         case ALGORITHM_MONTE_CARLO:
00907           input->algorithm = ALGORITHM_MONTE_CARLO;
00908           input->nsimulations
00909             = gtk_spin_button_get_value_as_int (window->spin_simulations);
```

```
00910           input->niterations
00911             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00912           input->tolerance = gtk_spin_button_get_value (window->
      spin_tolerance);
00913           input->nbest = gtk_spin_button_get_value_as_int (window->
      spin_bests);
00914           window_save_climbing ();
00915           break;
00916         case ALGORITHM_SWEEP:
00917           input->algorithm = ALGORITHM_SWEEP;
00918           input->niterations
00919             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00920           input->tolerance = gtk_spin_button_get_value (window->
      spin_tolerance);
00921           input->nbest = gtk_spin_button_get_value_as_int (window->
      spin_bests);
00922           window_save_climbing ();
00923           break;
00924         case ALGORITHM_ORTHOGONAL:
00925           input->algorithm = ALGORITHM_ORTHOGONAL;
00926           input->niterations
00927             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00928           input->tolerance = gtk_spin_button_get_value (window->
      spin_tolerance);
00929           input->nbest = gtk_spin_button_get_value_as_int (window->
      spin_bests);
00930           window_save_climbing ();
00931           break;
00932         default:
00933           input->algorithm = ALGORITHM_GENETIC;
00934           input->nsimulations
00935             = gtk_spin_button_get_value_as_int (window->spin_population);
00936           input->niterations
00937             = gtk_spin_button_get_value_as_int (window->spin_generations);
00938           input->mutation_ratio
00939             = gtk_spin_button_get_value (window->spin_mutation);
00940           input->reproduction_ratio
00941             = gtk_spin_button_get_value (window->spin_reproduction);
00942           input->adaptation_ratio
00943             = gtk_spin_button_get_value (window->spin_adaptation);
00944           break;
00945         }
00946       input->norm = window_get_norm ();
00947       input->p = gtk_spin_button_get_value (window->spin_p);
00948       input->threshold = gtk_spin_button_get_value (window->
      spin_threshold);
00949
00950       // Saving the XML file
00951       buffer = gtk_file_chooser_get_filename (GTK_FILE_CHOOSER (dlg));
00952       input_save (buffer);
00953
00954       // Closing and freeing memory
00955       g_free (buffer);
00956       gtk_widget_destroy (GTK_WIDGET (dlg));
00957 #if DEBUG_INTERFACE
00958       fprintf (stderr, "window_save: end\n");
00959 #endif
00960       return 1;
00961     }
00962
00963   // Closing and freeing memory
00964   gtk_widget_destroy (GTK_WIDGET (dlg));
00965 #if DEBUG_INTERFACE
00966   fprintf (stderr, "window_save: end\n");
00967 #endif
00968   return 0;
00969 }
```

4.11.2.30 window_save_climbing()

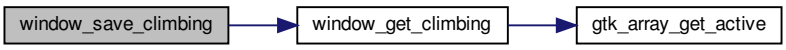
```
static void window_save_climbing ( )  [static]
```

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

Definition at line 791 of file interface.c.

```
00792 {
00793 #if DEBUG_INTERFACE
00794   fprintf (stderr, "window_save_climbing: start\n");
00795 #endif
00796   if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->
      check_climbing)))
00797     {
00798       input->nsteps = gtk_spin_button_get_value_as_int (window->
      spin_steps);
00799       input->relaxation = gtk_spin_button_get_value (window->
      spin_relaxation);
00800       switch (window_get_climbing ())
00801         {
00802         case CLIMBING_METHOD_COORDINATES:
00803           input->climbing = CLIMBING_METHOD_COORDINATES;
00804           break;
00805         default:
00806           input->climbing = CLIMBING_METHOD_RANDOM;
00807           input->nestimates
00808             = gtk_spin_button_get_value_as_int (window->spin_estimates);
00809         }
00810     }
00811   else
00812     input->nsteps = 0;
00813 #if DEBUG_INTERFACE
00814   fprintf (stderr, "window_save_climbing: end\n");
00815 #endif
00816 }
```

Here is the call graph for this function:



4.11.2.31 window_set_algorithm()

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

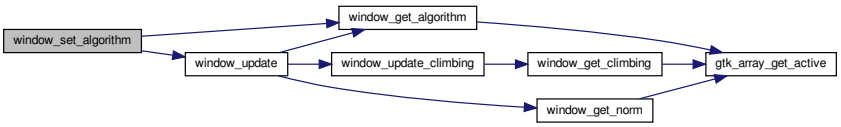
Function to avoid memory errors changing the algorithm.

Definition at line 1282 of file interface.c.

```
01283 {
01284   int i;
01285 #if DEBUG_INTERFACE
01286   fprintf (stderr, "window_set_algorithm: start\n");
01287 #endif
01288   i = window_get_algorithm ();
01289   switch (i)
01290     {
01291     case ALGORITHM_SWEEP:
01292     case ALGORITHM_ORTHOGONAL:
01293       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01294       if (i < 0)
01295         i = 0;
01296       gtk_spin_button_set_value (window->spin_sweeps,
01297                                  (gdouble) input->variable[i].
      nsweeps);
01298       break;
01299     case ALGORITHM_GENETIC:
01300       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01301       if (i < 0)
01302         i = 0;
```

```
01303       gtk_spin_button_set_value (window->spin_bits,
01304                                  (gdouble) input->variable[i].nbits);
01305     }
01306   window_update ();
01307 #if DEBUG_INTERFACE
01308   fprintf (stderr, "window_set_algorithm: end\n");
01309 #endif
01310 }
```

Here is the call graph for this function:



4.11.2.32 window_set_experiment()

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

Function to set the experiment data in the main window.

Definition at line 1316 of file interface.c.

```
01317 {
01318   unsigned int i, j;
01319   char *buffer1, *buffer2;
01320 #if DEBUG_INTERFACE
01321   fprintf (stderr, "window_set_experiment: start\n");
01322 #endif
01323   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01324   gtk_spin_button_set_value (window->spin_weight, input->
      experiment[i].weight);
01325   buffer1 = gtk_combo_box_text_get_active_text (window->combo_experiment);
01326   buffer2 = g_build_filename (input->directory, buffer1, NULL);
01327   g_free (buffer1);
01328   g_signal_handler_block
01329     (window->button_experiment, window->
      id_experiment_name);
01330   gtk_file_chooser_set_filename
01331     (GTK_FILE_CHOOSER (window->button_experiment), buffer2);
01332   g_signal_handler_unblock
01333     (window->button_experiment, window->
      id_experiment_name);
01334   g_free (buffer2);
01335   for (j = 0; j < input->experiment->ninputs; ++j)
01336     {
01337       g_signal_handler_block (window->button_template[j],
      window->id_input[j]);
01338       buffer2 =
01339         g_build_filename (input->directory, input->experiment[i].
      stencil[j],
01340                           NULL);
01341       gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01342                                      (window->button_template[j]), buffer2);
01343       g_free (buffer2);
01344       g_signal_handler_unblock
01345         (window->button_template[j], window->id_input[j]);
01346     }
01347 #if DEBUG_INTERFACE
01348   fprintf (stderr, "window_set_experiment: end\n");
01349 #endif
01350 }
```

4.11.2.33 window_set_variable()

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

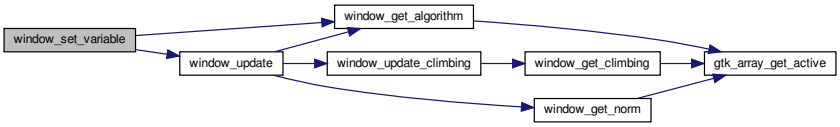
Function to set the variable data in the main window.

Definition at line 1549 of file interface.c.

```
01550 {
01551   unsigned int i;
01552 #if DEBUG_INTERFACE
01553   fprintf (stderr, "window_set_variable: start\n");
01554 #endif
01555   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01556   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01557   gtk_entry_set_text (window->entry_variable, input->
      variable[i].name);
01558   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01559   gtk_spin_button_set_value (window->spin_min, input->
      variable[i].rangemin);
01560   gtk_spin_button_set_value (window->spin_max, input->
      variable[i].rangemax);
01561   if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
01562     {
01563       gtk_spin_button_set_value (window->spin_minabs,
01564                                  input->variable[i].rangeminabs);
01565       gtk_toggle_button_set_active
01566         (GTK_TOGGLE_BUTTON (window->check_minabs), 1);
01567     }
01568   else
01569     {
01570       gtk_spin_button_set_value (window->spin_minabs, -G_MAXDOUBLE);
01571       gtk_toggle_button_set_active
01572         (GTK_TOGGLE_BUTTON (window->check_minabs), 0);
01573     }
01574   if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
01575     {
01576       gtk_spin_button_set_value (window->spin_maxabs,
01577                                  input->variable[i].rangemaxabs);
01578       gtk_toggle_button_set_active
01579         (GTK_TOGGLE_BUTTON (window->check_maxabs), 1);
01580     }
01581   else
01582     {
01583       gtk_spin_button_set_value (window->spin_maxabs, G_MAXDOUBLE);
01584       gtk_toggle_button_set_active
01585         (GTK_TOGGLE_BUTTON (window->check_maxabs), 0);
01586     }
01587   gtk_spin_button_set_value (window->spin_precision,
01588                              input->variable[i].precision);
01589   gtk_spin_button_set_value (window->spin_steps, (gdouble) input->
      nsteps);
01590   if (input->nsteps)
01591     gtk_spin_button_set_value (window->spin_step, input->
      variable[i].step);
01592 #if DEBUG_INTERFACE
01593   fprintf (stderr, "window_set_variable: precision[%u]=%u\n", i,
01594            input->variable[i].precision);
01595 #endif
01596   switch (window_get_algorithm ())
01597     {
01598     case ALGORITHM_SWEEP:
01599     case ALGORITHM_ORTHOGONAL:
01600       gtk_spin_button_set_value (window->spin_sweeps,
01601                                  (gdouble) input->variable[i].
      nsweeps);
01602 #if DEBUG_INTERFACE
01603       fprintf (stderr, "window_set_variable: nsweeps[%u]=%u\n", i,
01604                input->variable[i].nsweeps);
01605 #endif
01606       break;
01607     case ALGORITHM_GENETIC:
01608       gtk_spin_button_set_value (window->spin_bits,
01609                                  (gdouble) input->variable[i].nbits);
01610 #if DEBUG_INTERFACE
01611       fprintf (stderr, "window_set_variable: nbits[%u]=%u\n", i,
01612                input->variable[i].nbits);
01613 #endif
01614       break;
01615     }
```

```
01616   window_update ();
01617 #if DEBUG_INTERFACE
01618   fprintf (stderr, "window_set_variable: end\n");
01619 #endif
01620 }
```

Here is the call graph for this function:



4.11.2.34 window_step_variable()

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

Function to update the variable step in the main window.

Definition at line 1808 of file interface.c.

```
01809 {
01810   unsigned int i;
01811 #if DEBUG_INTERFACE
01812   fprintf (stderr, "window_step_variable: start\n");
01813 #endif
01814   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01815   input->variable[i].step = gtk_spin_button_get_value (window->
      spin_step);
01816 #if DEBUG_INTERFACE
01817   fprintf (stderr, "window_step_variable: end\n");
01818 #endif
01819 }
```

4.11.2.35 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 1518 of file interface.c.

```
01520 {
01521   unsigned int i, j;
01522   char *buffer;
01523   GFile *file1, *file2;
01524 #if DEBUG_INTERFACE
01525   fprintf (stderr, "window_template_experiment: start\n");
01526 #endif
01527   i = (size_t) data;
01528   j = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01529   file1
01530     = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->button_template[i]));
01531   file2 = g_file_new_for_path (input->directory);
01532   buffer = g_file_get_relative_path (file2, file1);
01533   if (input->type == INPUT_TYPE_XML)
01534     input->experiment[j].stencil[i] = (char *) xmlStrdup ((xmlChar *) buffer);
01535   else
01536     input->experiment[j].stencil[i] = g_strdup (buffer);
01537   g_free (buffer);
01538   g_object_unref (file2);
01539   g_object_unref (file1);
01540 #if DEBUG_INTERFACE
01541   fprintf (stderr, "window_template_experiment: end\n");
01542 #endif
01543 }
```

4.11.2.36 window_update()

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

Function to update the main window view.

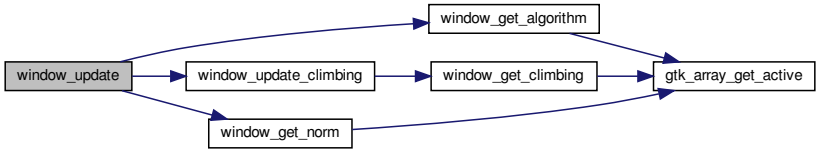
Definition at line 1125 of file interface.c.

```
01126 {
01127   unsigned int i;
01128 #if DEBUG_INTERFACE
01129   fprintf (stderr, "window_update: start\n");
01130 #endif
01131   gtk_widget_set_sensitive
01132     (GTK_WIDGET (window->button_evaluator),
01133      gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01134                                    (window->check_evaluator)));
01135   gtk_widget_hide (GTK_WIDGET (window->label_simulations));
01136   gtk_widget_hide (GTK_WIDGET (window->spin_simulations));
01137   gtk_widget_hide (GTK_WIDGET (window->label_iterations));
01138   gtk_widget_hide (GTK_WIDGET (window->spin_iterations));
01139   gtk_widget_hide (GTK_WIDGET (window->label_tolerance));
01140   gtk_widget_hide (GTK_WIDGET (window->spin_tolerance));
01141   gtk_widget_hide (GTK_WIDGET (window->label_bests));
01142   gtk_widget_hide (GTK_WIDGET (window->spin_bests));
01143   gtk_widget_hide (GTK_WIDGET (window->label_population));
01144   gtk_widget_hide (GTK_WIDGET (window->spin_population));
01145   gtk_widget_hide (GTK_WIDGET (window->label_generations));
01146   gtk_widget_hide (GTK_WIDGET (window->spin_generations));
01147   gtk_widget_hide (GTK_WIDGET (window->label_mutation));
01148   gtk_widget_hide (GTK_WIDGET (window->spin_mutation));
01149   gtk_widget_hide (GTK_WIDGET (window->label_reproduction));
01150   gtk_widget_hide (GTK_WIDGET (window->spin_reproduction));
01151   gtk_widget_hide (GTK_WIDGET (window->label_adaptation));
01152   gtk_widget_hide (GTK_WIDGET (window->spin_adaptation));
01153   gtk_widget_hide (GTK_WIDGET (window->label_sweeps));
01154   gtk_widget_hide (GTK_WIDGET (window->spin_sweeps));
01155   gtk_widget_hide (GTK_WIDGET (window->label_bits));
01156   gtk_widget_hide (GTK_WIDGET (window->spin_bits));
01157   gtk_widget_hide (GTK_WIDGET (window->check_climbing));
01158   gtk_widget_hide (GTK_WIDGET (window->grid_climbing));
01159   gtk_widget_hide (GTK_WIDGET (window->label_step));
01160   gtk_widget_hide (GTK_WIDGET (window->spin_step));
01161   gtk_widget_hide (GTK_WIDGET (window->label_p));
01162   gtk_widget_hide (GTK_WIDGET (window->spin_p));
01163   i = gtk_spin_button_get_value_as_int (window->spin_iterations);
01164   switch (window_get_algorithm ())
01165     {
01166     case ALGORITHM_MONTE_CARLO:
01167       gtk_widget_show (GTK_WIDGET (window->label_simulations));
```

```
01168       gtk_widget_show (GTK_WIDGET (window->spin_simulations));
01169       gtk_widget_show (GTK_WIDGET (window->label_iterations));
01170       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01171       if (i > 1)
01172         {
01173           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01174           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01175           gtk_widget_show (GTK_WIDGET (window->label_bests));
01176           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01177         }
01178       window_update_climbing ();
01179       break;
01180     case ALGORITHM_SWEEP:
01181     case ALGORITHM_ORTHOGONAL:
01182       gtk_widget_show (GTK_WIDGET (window->label_iterations));
01183       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01184       if (i > 1)
01185         {
01186           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01187           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01188           gtk_widget_show (GTK_WIDGET (window->label_bests));
01189           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01190         }
01191       gtk_widget_show (GTK_WIDGET (window->label_sweeps));
01192       gtk_widget_show (GTK_WIDGET (window->spin_sweeps));
01193       gtk_widget_show (GTK_WIDGET (window->check_climbing));
01194       window_update_climbing ();
01195       break;
01196     default:
01197       gtk_widget_show (GTK_WIDGET (window->label_population));
01198       gtk_widget_show (GTK_WIDGET (window->spin_population));
01199       gtk_widget_show (GTK_WIDGET (window->label_generations));
01200       gtk_widget_show (GTK_WIDGET (window->spin_generations));
01201       gtk_widget_show (GTK_WIDGET (window->label_mutation));
01202       gtk_widget_show (GTK_WIDGET (window->spin_mutation));
01203       gtk_widget_show (GTK_WIDGET (window->label_reproduction));
01204       gtk_widget_show (GTK_WIDGET (window->spin_reproduction));
01205       gtk_widget_show (GTK_WIDGET (window->label_adaptation));
01206       gtk_widget_show (GTK_WIDGET (window->spin_adaptation));
01207       gtk_widget_show (GTK_WIDGET (window->label_bits));
01208       gtk_widget_show (GTK_WIDGET (window->spin_bits));
01209     }
01210   gtk_widget_set_sensitive
01211     (GTK_WIDGET (window->button_remove_experiment),
      input->nexperiments > 1);
01212   gtk_widget_set_sensitive
01213     (GTK_WIDGET (window->button_remove_variable),
      input->nvariables > 1);
01214   for (i = 0; i < input->experiment->ninputs; ++i)
01215     {
01216       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01217       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01218       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 0);
01219       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i]), 1);
01220       g_signal_handler_block
01221         (window->check_template[i], window->
      id_template[i]);
01222       g_signal_handler_block (window->button_template[i],
      window->id_input[i]);
01223       gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON
01224                                     (window->check_template[i]), 1);
01225       g_signal_handler_unblock (window->button_template[i],
01226                                 window->id_input[i]);
01227       g_signal_handler_unblock (window->check_template[i],
01228                                 window->id_template[i]);
01229     }
01230   if (i > 0)
01231     {
01232       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i - 1]), 1);
01233       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i - 1]),
01234                                 gtk_toggle_button_get_active
01235                                 GTK_TOGGLE_BUTTON (window->check_template
01236                                                    [i - 1]));
01237     }
01238   if (i < MAX_NINPUTS)
01239     {
01240       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01241       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01242       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 1);
01243       gtk_widget_set_sensitive
01244         (GTK_WIDGET (window->button_template[i]),
01245          gtk_toggle_button_get_active
01246          GTK_TOGGLE_BUTTON (window->check_template[i]));
01247       g_signal_handler_block
01248         (window->check_template[i], window->
      id_template[i]);
01249       g_signal_handler_block (window->button_template[i],
```

```
      window->id_input[i]);
01250       gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON
01251                                     (window->check_template[i]), 0);
01252       g_signal_handler_unblock (window->button_template[i],
01253                                 window->id_input[i]);
01254       g_signal_handler_unblock (window->check_template[i],
01255                                 window->id_template[i]);
01256     }
01257   while (++i < MAX_NINPUTS)
01258     {
01259       gtk_widget_hide (GTK_WIDGET (window->check_template[i]));
01260       gtk_widget_hide (GTK_WIDGET (window->button_template[i]));
01261     }
01262   gtk_widget_set_sensitive
01263     (GTK_WIDGET (window->spin_minabs),
01264      gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_minabs)));
01265   gtk_widget_set_sensitive
01266     (GTK_WIDGET (window->spin_maxabs),
01267      gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_maxabs)));
01268   if (window_get_norm () == ERROR_NORM_P)
01269     {
01270       gtk_widget_show (GTK_WIDGET (window->label_p));
01271       gtk_widget_show (GTK_WIDGET (window->spin_p));
01272     }
01273 #if DEBUG_INTERFACE
01274   fprintf (stderr, "window_update: end\n");
01275 #endif
01276 }
```

Here is the call graph for this function:



4.11.2.37 window_update_climbing()

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

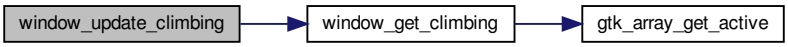
Function to update hill climbing method widgets view in the main window.

Definition at line 1094 of file interface.c.

```
01095 {
01096 #if DEBUG_INTERFACE
01097   fprintf (stderr, "window_update_climbing: start\n");
01098 #endif
01099   gtk_widget_show (GTK_WIDGET (window->check_climbing));
01100   if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->
      check_climbing)))
01101     {
01102       gtk_widget_show (GTK_WIDGET (window->grid_climbing));
01103       gtk_widget_show (GTK_WIDGET (window->label_step));
01104       gtk_widget_show (GTK_WIDGET (window->spin_step));
01105     }
01106   switch (window_get_climbing ())
01107     {
01108     case CLIMBING_METHOD_COORDINATES:
01109       gtk_widget_hide (GTK_WIDGET (window->label_estimates));
01110       gtk_widget_hide (GTK_WIDGET (window->spin_estimates));
01111       break;
```

```
01112     default:
01113       gtk_widget_show (GTK_WIDGET (window->label_estimates));
01114       gtk_widget_show (GTK_WIDGET (window->spin_estimates));
01115     }
01116 #if DEBUG_INTERFACE
01117   fprintf (stderr, "window_update_climbing: end\n");
01118 #endif
01119 }
```

Here is the call graph for this function:



4.11.2.38 window_update_variable()

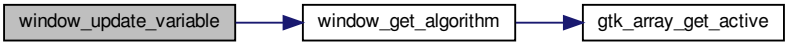
```
static void window_update_variable ( )  [static]
```

Function to update the variable data in the main window.

Definition at line 1825 of file interface.c.

```
01826 {
01827   int i;
01828 #if DEBUG_INTERFACE
01829   fprintf (stderr, "window_update_variable: start\n");
01830 #endif
01831   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01832   if (i < 0)
01833     i = 0;
01834   switch (window_get_algorithm ())
01835     {
01836     case ALGORITHM_SWEEP:
01837     case ALGORITHM_ORTHOGONAL:
01838       input->variable[i].nsweeps
01839         = gtk_spin_button_get_value_as_int (window->spin_sweeps);
01840 #if DEBUG_INTERFACE
01841       fprintf (stderr, "window_update_variable: nsweeps[%d]=%u\n", i,
01842                input->variable[i].nsweeps);
01843 #endif
01844       break;
01845     case ALGORITHM_GENETIC:
01846       input->variable[i].nbits
01847         = gtk_spin_button_get_value_as_int (window->spin_bits);
01848 #if DEBUG_INTERFACE
01849       fprintf (stderr, "window_update_variable: nbits[%d]=%u\n", i,
01850                input->variable[i].nbits);
01851 #endif
01852     }
01853 #if DEBUG_INTERFACE
01854   fprintf (stderr, "window_update_variable: end\n");
01855 #endif
01856 }
```

Here is the call graph for this function:



4.11.2.39 window_weight_experiment()

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

Function to update the experiment weight in the main window.

Definition at line 1476 of file interface.c.

```
01477 {
01478   unsigned int i;
01479 #if DEBUG_INTERFACE
01480   fprintf (stderr, "window_weight_experiment: start\n");
01481 #endif
01482   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01483   input->experiment[i].weight = gtk_spin_button_get_value (
      window->spin_weight);
01484 #if DEBUG_INTERFACE
01485   fprintf (stderr, "window_weight_experiment: end\n");
01486 #endif
01487 }
```

4.12 interface.c

```
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 2012-2018, 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.
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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 <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 "genetic/genetic.h"
00059 #include "utils.h"
```

```
00060 #include "experiment.h"
00061 #include "variable.h"
00062 #include "input.h"
00063 #include "optimize.h"
00064 #include "interface.h"
00065
00066 #define DEBUG_INTERFACE 0
00067
00068
00072 #ifdef G_OS_WIN32
00073 #define INPUT_FILE "test-ga-win.xml"
00074 #else
00075 #define INPUT_FILE "test-ga.xml"
00076 #endif
00077
00078 Window window[1];
00080
00081 static const char *logo[] = {
00082   "32 32 3 1",
00083   "     c None",
00084   ".    c #0000FF",
00085   "+    c #FF0000",
00086   "                                ",
00087   "                                ",
00088   "                                ",
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 const char * logo[] = {
00122 "32 32 3 1",
00123 "     c #FFFFFFFFFFFF",
00124 ".    c #00000000FFFF",
00125 "X    c #FFFF00000000",
00126 "                                ",
00127 "                                ",
00128 "                                ",
00129 "     .      .      .      .     ",
00130 "     .      .      .      .     ",
00131 "     .      .      .      .     ",
00132 "     .      .      .      .     ",
00133 "     .      .     XXX     .     ",
00134 "     .      .    XXXXX    .     ",
00135 "     .      .    XXXXX    .     ",
00136 "     .      .    XXXXX    .     ",
00137 "    XXX     .     XXX    XXX    ",
00138 "   XXXXX    .      .    XXXXX   ",
00139 "   XXXXX    .      .    XXXXX   ",
00140 "   XXXXX    .      .    XXXXX   ",
00141 "    XXX     .      .     XXX    ",
00142 "     .      .      .      .     ",
00143 "     .     XXX     .      .     ",
00144 "     .    XXXXX    .      .     ",
00145 "     .    XXXXX    .      .     ",
00146 "     .    XXXXX    .      .     ",
00147 "     .     XXX     .      .     ",
00148 "     .      .      .      .     ",
00149 "     .      .      .      .     ",
00150 "     .      .      .      .     ",
```

```
00151 "     .      .      .      .     ",
00152 "     .      .      .      .     ",
00153 "     .      .      .      .     ",
00154 "     .      .      .      .     ",
00155 "                               ",
00156 "                               ",
00157 "                               "};
00158 */
00159
00160 static Options options[1];
00162 static Running running[1];
00164
00168 static void
00169 input_save_climbing_xml (xmlNode * node)
00170 {
00171 #if DEBUG_INTERFACE
00172   fprintf (stderr, "input_save_climbing_xml: start\n");
00173 #endif
00174   if (input->nsteps)
00175     {
00176       xml_node_set_uint (node, (const xmlChar *) LABEL_NSTEPS,
      input->nsteps);
00177       if (input->relaxation != DEFAULT_RELAXATION)
00178         xml_node_set_float (node, (const xmlChar *)
      LABEL_RELAXATION,
00179                             input->relaxation);
00180       switch (input->climbing)
00181         {
00182         case CLIMBING_METHOD_COORDINATES:
00183           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00184                       (const xmlChar *) LABEL_COORDINATES);
00185           break;
00186         default:
00187           xmlSetProp (node, (const xmlChar *) LABEL_CLIMBING,
00188                       (const xmlChar *) LABEL_RANDOM);
00189           xml_node_set_uint (node, (const xmlChar *)
      LABEL_NESTIMATES,
00190                              input->nestimates);
00191         }
00192     }
00193 #if DEBUG_INTERFACE
00194   fprintf (stderr, "input_save_climbing_xml: end\n");
00195 #endif
00196 }
00197
00201 static void
00202 input_save_climbing_json (JsonNode * node)
00203 {
00204   JsonObject *object;
00205 #if DEBUG_INTERFACE
00206   fprintf (stderr, "input_save_climbing_json: start\n");
00207 #endif
00208   object = json_node_get_object (node);
00209   if (input->nsteps)
00210     {
00211       json_object_set_uint (object, LABEL_NSTEPS,
      input->nsteps);
00212       if (input->relaxation != DEFAULT_RELAXATION)
00213         json_object_set_float (object, LABEL_RELAXATION,
      input->relaxation);
00214       switch (input->climbing)
00215         {
00216         case CLIMBING_METHOD_COORDINATES:
00217           json_object_set_string_member (object, LABEL_CLIMBING,
00218                                          LABEL_COORDINATES);
00219           break;
00220         default:
00221           json_object_set_string_member (object, LABEL_CLIMBING,
      LABEL_RANDOM);
00222           json_object_set_uint (object, LABEL_NESTIMATES,
      input->nestimates);
00223         }
00224     }
00225 #if DEBUG_INTERFACE
00226   fprintf (stderr, "input_save_climbing_json: end\n");
00227 #endif
00228 }
00229
00233 static inline void
00234 input_save_xml (xmlDoc * doc)
00235 {
00236   unsigned int i, j;
00237   char *buffer;
00238   xmlNode *node, *child;
00239   GFile *file, *file2;
00240
00241 #if DEBUG_INTERFACE
```

```
00242   fprintf (stderr, "input_save_xml: start\n");
00243 #endif
00244
00245   // Setting root XML node
00246   node = xmlNewDocNode (doc, 0, (const xmlChar *) LABEL_OPTIMIZE, 0);
00247   xmlDocSetRootElement (doc, node);
00248
00249   // Adding properties to the root XML node
00250   if (xmlStrcmp
00251       ((const xmlChar *) input->result, (const xmlChar *) result_name))
00252     xmlSetProp (node, (const xmlChar *) LABEL_RESULT_FILE,
00253                 (xmlChar *) input->result);
00254   if (xmlStrcmp
00255       ((const xmlChar *) input->variables, (const xmlChar *)
      variables_name))
00256     xmlSetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE,
00257                 (xmlChar *) input->variables);
00258   file = g_file_new_for_path (input->directory);
00259   file2 = g_file_new_for_path (input->simulator);
00260   buffer = g_file_get_relative_path (file, file2);
00261   g_object_unref (file2);
00262   xmlSetProp (node, (const xmlChar *) LABEL_SIMULATOR, (xmlChar *) buffer);
00263   g_free (buffer);
00264   if (input->evaluator)
00265     {
00266       file2 = g_file_new_for_path (input->evaluator);
00267       buffer = g_file_get_relative_path (file, file2);
00268       g_object_unref (file2);
00269       if (xmlStrlen ((xmlChar *) buffer))
00270         xmlSetProp (node, (const xmlChar *) LABEL_EVALUATOR,
00271                     (xmlChar *) buffer);
00272       g_free (buffer);
00273     }
00274   if (input->seed != DEFAULT_RANDOM_SEED)
00275     xml_node_set_uint (node, (const xmlChar *) LABEL_SEED,
      input->seed);
00276
00277   // Setting the algorithm
00278   buffer = (char *) g_slice_alloc (64);
00279   switch (input->algorithm)
00280     {
00281     case ALGORITHM_MONTE_CARLO:
00282       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00283                   (const xmlChar *) LABEL_MONTE_CARLO);
00284       snprintf (buffer, 64, "%u", input->nsimulations);
00285       xmlSetProp (node, (const xmlChar *) LABEL_NSIMULATIONS,
00286                   (xmlChar *) buffer);
00287       snprintf (buffer, 64, "%u", input->niterations);
00288       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00289                   (xmlChar *) buffer);
00290       snprintf (buffer, 64, "%.3lg", input->tolerance);
00291       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00292       snprintf (buffer, 64, "%u", input->nbest);
00293       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00294       input_save_climbing_xml (node);
00295       break;
00296     case ALGORITHM_SWEEP:
00297       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00298                   (const xmlChar *) LABEL_SWEEP);
00299       snprintf (buffer, 64, "%u", input->niterations);
00300       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00301                   (xmlChar *) buffer);
00302       snprintf (buffer, 64, "%.3lg", input->tolerance);
00303       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00304       snprintf (buffer, 64, "%u", input->nbest);
00305       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00306       input_save_climbing_xml (node);
00307       break;
00308     case ALGORITHM_ORTHOGONAL:
00309       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00310                   (const xmlChar *) LABEL_ORTHOGONAL);
00311       snprintf (buffer, 64, "%u", input->niterations);
00312       xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00313                   (xmlChar *) buffer);
00314       snprintf (buffer, 64, "%.3lg", input->tolerance);
00315       xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00316       snprintf (buffer, 64, "%u", input->nbest);
00317       xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00318       input_save_climbing_xml (node);
00319       break;
00320     default:
00321       xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00322                   (const xmlChar *) LABEL_GENETIC);
00323       snprintf (buffer, 64, "%u", input->nsimulations);
00324       xmlSetProp (node, (const xmlChar *) LABEL_NPOPULATION,
00325                   (xmlChar *) buffer);
00326       snprintf (buffer, 64, "%u", input->niterations);
```

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

```
00403     }
00404
00405 #if DEBUG_INTERFACE
00406   fprintf (stderr, "input_save: end\n");
00407 #endif
00408 }
00409
00413 static inline void
00414 input_save_json (JsonGenerator * generator)
00415 {
00416   unsigned int i, j;
00417   char *buffer;
00418   JsonNode *node, *child;
00419   JsonObject *object;
00420   JsonArray *array;
00421   GFile *file, *file2;
00422
00423 #if DEBUG_INTERFACE
00424   fprintf (stderr, "input_save_json: start\n");
00425 #endif
00426
00427   // Setting root JSON node
00428   node = json_node_new (JSON_NODE_OBJECT);
00429   object = json_node_get_object (node);
00430   json_generator_set_root (generator, node);
00431
00432   // Adding properties to the root JSON node
00433   if (strcmp (input->result, result_name))
00434     json_object_set_string_member (object, LABEL_RESULT_FILE,
      input->result);
00435   if (strcmp (input->variables, variables_name))
00436     json_object_set_string_member (object, LABEL_VARIABLES_FILE,
00437                                    input->variables);
00438   file = g_file_new_for_path (input->directory);
00439   file2 = g_file_new_for_path (input->simulator);
00440   buffer = g_file_get_relative_path (file, file2);
00441   g_object_unref (file2);
00442   json_object_set_string_member (object, LABEL_SIMULATOR, buffer);
00443   g_free (buffer);
00444   if (input->evaluator)
00445     {
00446       file2 = g_file_new_for_path (input->evaluator);
00447       buffer = g_file_get_relative_path (file, file2);
00448       g_object_unref (file2);
00449       if (strlen (buffer))
00450         json_object_set_string_member (object, LABEL_EVALUATOR, buffer);
00451       g_free (buffer);
00452     }
00453   if (input->seed != DEFAULT_RANDOM_SEED)
00454     json_object_set_uint (object, LABEL_SEED,
      input->seed);
00455
00456   // Setting the algorithm
00457   buffer = (char *) g_slice_alloc (64);
00458   switch (input->algorithm)
00459     {
00460     case ALGORITHM_MONTE_CARLO:
00461       json_object_set_string_member (object, LABEL_ALGORITHM,
00462                                      LABEL_MONTE_CARLO);
00463       snprintf (buffer, 64, "%u", input->nsimulations);
00464       json_object_set_string_member (object, LABEL_NSIMULATIONS, buffer);
00465       snprintf (buffer, 64, "%u", input->niterations);
00466       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00467       snprintf (buffer, 64, "%.3lg", input->tolerance);
00468       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00469       snprintf (buffer, 64, "%u", input->nbest);
00470       json_object_set_string_member (object, LABEL_NBEST, buffer);
00471       input_save_climbing_json (node);
00472       break;
00473     case ALGORITHM_SWEEP:
00474       json_object_set_string_member (object, LABEL_ALGORITHM,
      LABEL_SWEEP);
00475       snprintf (buffer, 64, "%u", input->niterations);
00476       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00477       snprintf (buffer, 64, "%.3lg", input->tolerance);
00478       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00479       snprintf (buffer, 64, "%u", input->nbest);
00480       json_object_set_string_member (object, LABEL_NBEST, buffer);
00481       input_save_climbing_json (node);
00482       break;
00483     case ALGORITHM_ORTHOGONAL:
00484       json_object_set_string_member (object, LABEL_ALGORITHM,
      LABEL_ORTHOGONAL);
00485       snprintf (buffer, 64, "%u", input->niterations);
00486       json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00487       snprintf (buffer, 64, "%.3lg", input->tolerance);
00488       json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
```

```
00489       snprintf (buffer, 64, "%u", input->nbest);
00490       json_object_set_string_member (object, LABEL_NBEST, buffer);
00491       input_save_climbing_json (node);
00492       break;
00493     default:
00494       json_object_set_string_member (object, LABEL_ALGORITHM,
    LABEL_GENETIC);
00495       snprintf (buffer, 64, "%u", input->nsimulations);
00496       json_object_set_string_member (object, LABEL_NPOPULATION, buffer);
00497       snprintf (buffer, 64, "%u", input->niterations);
00498       json_object_set_string_member (object, LABEL_NGENERATIONS, buffer);
00499       snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00500       json_object_set_string_member (object, LABEL_MUTATION, buffer);
00501       snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00502       json_object_set_string_member (object, LABEL_REPRODUCTION, buffer);
00503       snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00504       json_object_set_string_member (object, LABEL_ADAPTATION, buffer);
00505       break;
00506     }
00507   g_slice_free1 (64, buffer);
00508   if (input->threshold != 0.)
00509     json_object_set_float (object, LABEL_THRESHOLD,
    input->threshold);
00510
00511   // Setting the experimental data
00512   array = json_array_new ();
00513   for (i = 0; i < input->nexperiments; ++i)
00514     {
00515       child = json_node_new (JSON_NODE_OBJECT);
00516       object = json_node_get_object (child);
00517       json_object_set_string_member (object, LABEL_NAME,
00518                                      input->experiment[i].name);
00519       if (input->experiment[i].weight != 1.)
00520         json_object_set_float (object, LABEL_WEIGHT,
00521                                input->experiment[i].weight);
00522       for (j = 0; j < input->experiment->ninputs; ++j)
00523         json_object_set_string_member (object, stencil[j],
00524                                        input->experiment[i].
    stencil[j]);
00525       json_array_add_element (array, child);
00526     }
00527   json_object_set_array_member (object, LABEL_EXPERIMENTS, array);
00528
00529   // Setting the variables data
00530   array = json_array_new ();
00531   for (i = 0; i < input->nvariables; ++i)
00532     {
00533       child = json_node_new (JSON_NODE_OBJECT);
00534       object = json_node_get_object (child);
00535       json_object_set_string_member (object, LABEL_NAME,
00536                                      input->variable[i].name);
00537       json_object_set_float (object, LABEL_MINIMUM,
00538                              input->variable[i].rangemin);
00539       if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00540         json_object_set_float (object,
    LABEL_ABSOLUTE_MINIMUM,
00541                                input->variable[i].rangeminabs);
00542       json_object_set_float (object, LABEL_MAXIMUM,
00543                              input->variable[i].rangemax);
00544       if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00545         json_object_set_float (object,
    LABEL_ABSOLUTE_MAXIMUM,
00546                                input->variable[i].rangemaxabs);
00547       if (input->variable[i].precision !=
    DEFAULT_PRECISION)
00548         json_object_set_uint (object, LABEL_PRECISION,
00549                               input->variable[i].precision);
00550       if (input->algorithm == ALGORITHM_SWEEP
00551           || input->algorithm == ALGORITHM_ORTHOGONAL)
00552         json_object_set_uint (object, LABEL_NSWEEPS,
00553                               input->variable[i].nsweeps);
00554       else if (input->algorithm == ALGORITHM_GENETIC)
00555         json_object_set_uint (object, LABEL_NBITS,
    input->variable[i].nbits);
00556       if (input->nsteps)
00557         json_object_set_float (object, LABEL_STEP,
    input->variable[i].step);
00558       json_array_add_element (array, child);
00559     }
00560   json_object_set_array_member (object, LABEL_VARIABLES, array);
00561
00562   // Saving the error norm
00563   switch (input->norm)
00564     {
00565     case ERROR_NORM_MAXIMUM:
00566       json_object_set_string_member (object, LABEL_NORM, LABEL_MAXIMUM);
00567       break;
```

```
00568     case ERROR_NORM_P:
00569       json_object_set_string_member (object, LABEL_NORM, LABEL_P);
00570       json_object_set_float (object, LABEL_P, input->
      p);
00571       break;
00572     case ERROR_NORM_TAXICAB:
00573       json_object_set_string_member (object, LABEL_NORM, LABEL_TAXICAB);
00574     }
00575
00576 #if DEBUG_INTERFACE
00577   fprintf (stderr, "input_save_json: end\n");
00578 #endif
00579 }
00580
00584 static inline void
00585 input_save (char *filename)
00586 {
00587   xmlDoc *doc;
00588   JsonGenerator *generator;
00589
00590 #if DEBUG_INTERFACE
00591   fprintf (stderr, "input_save: start\n");
00592 #endif
00593
00594   // Getting the input file directory
00595   input->name = g_path_get_basename (filename);
00596   input->directory = g_path_get_dirname (filename);
00597
00598   if (input->type == INPUT_TYPE_XML)
00599     {
00600       // Opening the input file
00601       doc = xmlNewDoc ((const xmlChar *) "1.0");
00602       input_save_xml (doc);
00603
00604       // Saving the XML file
00605       xmlSaveFormatFile (filename, doc, 1);
00606
00607       // Freeing memory
00608       xmlFreeDoc (doc);
00609     }
00610   else
00611     {
00612       // Opening the input file
00613       generator = json_generator_new ();
00614       json_generator_set_pretty (generator, TRUE);
00615       input_save_json (generator);
00616
00617       // Saving the JSON file
00618       json_generator_to_file (generator, filename, NULL);
00619
00620       // Freeing memory
00621       g_object_unref (generator);
00622     }
00623
00624 #if DEBUG_INTERFACE
00625   fprintf (stderr, "input_save: end\n");
00626 #endif
00627 }
00628
00632 static void
00633 options_new ()
00634 {
00635 #if DEBUG_INTERFACE
00636   fprintf (stderr, "options_new: start\n");
00637 #endif
00638   options->label_seed = (GtkLabel *)
00639     gtk_label_new (_("Pseudo-random numbers generator seed"));
00640   options->spin_seed = (GtkSpinButton *)
00641     gtk_spin_button_new_with_range (0., (gdouble) G_MAXULONG, 1.);
00642   gtk_widget_set_tooltip_text
00643     (GTK_WIDGET (options->spin_seed),
00644      _("Seed to init the pseudo-random numbers generator"));
00645   gtk_spin_button_set_value (options->spin_seed, (gdouble) input->
      seed);
00646   options->label_threads = (GtkLabel *)
00647     gtk_label_new (_("Threads number for the stochastic algorithm"));
00648   options->spin_threads
00649     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00650   gtk_widget_set_tooltip_text
00651     (GTK_WIDGET (options->spin_threads),
00652      _("Number of threads to perform the calibration/optimization for "
00653        "the stochastic algorithm"));
00654   gtk_spin_button_set_value (options->spin_threads, (gdouble)
      nthreads);
00655   options->label_climbing = (GtkLabel *)
00656     gtk_label_new (_("Threads number for the hill climbing method"));
00657   options->spin_climbing =
```

```
00658     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00659   gtk_widget_set_tooltip_text
00660     (GTK_WIDGET (options->spin_climbing),
00661      _("Number of threads to perform the calibration/optimization for the "
00662        "hill climbing method"));
00663   gtk_spin_button_set_value (options->spin_climbing,
00664                              (gdouble) nthreads_climbing);
00665   options->grid = (GtkGrid *) gtk_grid_new ();
00666   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_seed), 0, 0, 1, 1);
00667   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_seed), 1, 0, 1, 1);
00668   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_threads),
00669                    0, 1, 1, 1);
00670   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_threads),
00671                    1, 1, 1, 1);
00672   gtk_grid_attach (options->grid, GTK_WIDGET (options->label_climbing), 0, 2, 1,
00673                    1);
00674   gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_climbing), 1, 2, 1,
00675                    1);
00676   gtk_widget_show_all (GTK_WIDGET (options->grid));
00677   options->dialog = (GtkDialog *)
00678     gtk_dialog_new_with_buttons (_("Options"),
00679                                  window->window,
00680                                  GTK_DIALOG_MODAL,
00681                                  _("_OK"), GTK_RESPONSE_OK,
00682                                  _("_Cancel"), GTK_RESPONSE_CANCEL, NULL);
00683   gtk_container_add
00684     (GTK_CONTAINER (gtk_dialog_get_content_area (options->dialog)),
00685      GTK_WIDGET (options->grid));
00686   if (gtk_dialog_run (options->dialog) == GTK_RESPONSE_OK)
00687     {
00688       input->seed
00689         = (unsigned long int) gtk_spin_button_get_value (options->spin_seed);
00690       nthreads = gtk_spin_button_get_value_as_int (options->spin_threads);
00691       nthreads_climbing
00692         = gtk_spin_button_get_value_as_int (options->spin_climbing);
00693     }
00694   gtk_widget_destroy (GTK_WIDGET (options->dialog));
00695 #if DEBUG_INTERFACE
00696   fprintf (stderr, "options_new: end\n");
00697 #endif
00698 }
00699
00703 static inline void
00704 running_new ()
00705 {
00706 #if DEBUG_INTERFACE
00707   fprintf (stderr, "running_new: start\n");
00708 #endif
00709   running->label = (GtkLabel *) gtk_label_new (_("Calculating ..."));
00710   running->spinner = (GtkSpinner *) gtk_spinner_new ();
00711   running->grid = (GtkGrid *) gtk_grid_new ();
00712   gtk_grid_attach (running->grid, GTK_WIDGET (running->label), 0, 0, 1, 1);
00713   gtk_grid_attach (running->grid, GTK_WIDGET (running->spinner), 0, 1, 1, 1);
00714   running->dialog = (GtkDialog *)
00715     gtk_dialog_new_with_buttons (_("Calculating"),
00716                                  window->window, GTK_DIALOG_MODAL, NULL, NULL);
00717   gtk_container_add (GTK_CONTAINER
00718                      (gtk_dialog_get_content_area (running->dialog)),
00719                      GTK_WIDGET (running->grid));
00720   gtk_spinner_start (running->spinner);
00721   gtk_widget_show_all (GTK_WIDGET (running->dialog));
00722 #if DEBUG_INTERFACE
00723   fprintf (stderr, "running_new: end\n");
00724 #endif
00725 }
00726
00732 static unsigned int
00733 window_get_algorithm ()
00734 {
00735   unsigned int i;
00736 #if DEBUG_INTERFACE
00737   fprintf (stderr, "window_get_algorithm: start\n");
00738 #endif
00739   i = gtk_array_get_active (window->button_algorithm,
      NALGORITHMS);
00740 #if DEBUG_INTERFACE
00741   fprintf (stderr, "window_get_algorithm: %u\n", i);
00742   fprintf (stderr, "window_get_algorithm: end\n");
00743 #endif
00744   return i;
00745 }
00746
00752 static unsigned int
00753 window_get_climbing ()
00754 {
00755   unsigned int i;
00756 #if DEBUG_INTERFACE
```

```
00757   fprintf (stderr, "window_get_climbing: start\n");
00758 #endif
00759   i = gtk_array_get_active (window->button_climbing,
      NCLIMBINGS);
00760 #if DEBUG_INTERFACE
00761   fprintf (stderr, "window_get_climbing: %u\n", i);
00762   fprintf (stderr, "window_get_climbing: end\n");
00763 #endif
00764   return i;
00765 }
00766
00772 static unsigned int
00773 window_get_norm ()
00774 {
00775   unsigned int i;
00776 #if DEBUG_INTERFACE
00777   fprintf (stderr, "window_get_norm: start\n");
00778 #endif
00779   i = gtk_array_get_active (window->button_norm,
      NNORMS);
00780 #if DEBUG_INTERFACE
00781   fprintf (stderr, "window_get_norm: %u\n", i);
00782   fprintf (stderr, "window_get_norm: end\n");
00783 #endif
00784   return i;
00785 }
00786
00790 static void
00791 window_save_climbing ()
00792 {
00793 #if DEBUG_INTERFACE
00794   fprintf (stderr, "window_save_climbing: start\n");
00795 #endif
00796   if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_climbing)))
00797     {
00798       input->nsteps = gtk_spin_button_get_value_as_int (window->
      spin_steps);
00799       input->relaxation = gtk_spin_button_get_value (window->
      spin_relaxation);
00800       switch (window_get_climbing ())
00801         {
00802         case CLIMBING_METHOD_COORDINATES:
00803           input->climbing = CLIMBING_METHOD_COORDINATES;
00804           break;
00805         default:
00806           input->climbing = CLIMBING_METHOD_RANDOM;
00807           input->nestimates
00808             = gtk_spin_button_get_value_as_int (window->spin_estimates);
00809         }
00810     }
00811   else
00812     input->nsteps = 0;
00813 #if DEBUG_INTERFACE
00814   fprintf (stderr, "window_save_climbing: end\n");
00815 #endif
00816 }
00817
00823 static int
00824 window_save ()
00825 {
00826   GtkFileChooserDialog *dlg;
00827   GtkFileFilter *filter1, *filter2;
00828   char *buffer;
00829
00830 #if DEBUG_INTERFACE
00831   fprintf (stderr, "window_save: start\n");
00832 #endif
00833
00834   // Opening the saving dialog
00835   dlg = (GtkFileChooserDialog *)
00836     gtk_file_chooser_dialog_new (_("Save file"),
00837                                  window->window,
00838                                  GTK_FILE_CHOOSER_ACTION_SAVE,
00839                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
00840                                  _("_OK"), GTK_RESPONSE_OK, NULL);
00841   gtk_file_chooser_set_do_overwrite_confirmation (GTK_FILE_CHOOSER (dlg), TRUE);
00842   buffer = g_build_filename (input->directory, input->name, NULL);
00843   gtk_file_chooser_set_filename (GTK_FILE_CHOOSER (dlg), buffer);
00844   g_free (buffer);
00845
00846   // Adding XML filter
00847   filter1 = (GtkFileFilter *) gtk_file_filter_new ();
00848   gtk_file_filter_set_name (filter1, "XML");
00849   gtk_file_filter_add_pattern (filter1, "*.xml");
00850   gtk_file_filter_add_pattern (filter1, "*.XML");
00851   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter1);
00852
```

```
00853   // Adding JSON filter
00854   filter2 = (GtkFileFilter *) gtk_file_filter_new ();
00855   gtk_file_filter_set_name (filter2, "JSON");
00856   gtk_file_filter_add_pattern (filter2, "*.json");
00857   gtk_file_filter_add_pattern (filter2, "*.JSON");
00858   gtk_file_filter_add_pattern (filter2, "*.js");
00859   gtk_file_filter_add_pattern (filter2, "*.JS");
00860   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter2);
00861
00862   if (input->type == INPUT_TYPE_XML)
00863     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter1);
00864   else
00865     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter2);
00866
00867   // If OK response then saving
00868   if (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
00869     {
00870       // Setting input file type
00871       filter1 = gtk_file_chooser_get_filter (GTK_FILE_CHOOSER (dlg));
00872       buffer = (char *) gtk_file_filter_get_name (filter1);
00873       if (!strcmp (buffer, "XML"))
00874         input->type = INPUT_TYPE_XML;
00875       else
00876         input->type = INPUT_TYPE_JSON;
00877
00878       // Adding properties to the root XML node
00879       input->simulator = gtk_file_chooser_get_filename
00880         (GTK_FILE_CHOOSER (window->button_simulator));
00881       if (gtk_toggle_button_get_active
00882           (GTK_TOGGLE_BUTTON (window->check_evaluator)))
00883         input->evaluator = gtk_file_chooser_get_filename
00884           (GTK_FILE_CHOOSER (window->button_evaluator));
00885       else
00886         input->evaluator = NULL;
00887       if (input->type == INPUT_TYPE_XML)
00888         {
00889           input->result
00890             = (char *) xmlStrdup ((const xmlChar *)
00891                                   gtk_entry_get_text (window->entry_result));
00892           input->variables
00893             = (char *) xmlStrdup ((const xmlChar *)
00894                                   gtk_entry_get_text (window->entry_variables));
00895         }
00896       else
00897         {
00898           input->result = g_strdup (gtk_entry_get_text (window->
      entry_result));
00899           input->variables =
00900             g_strdup (gtk_entry_get_text (window->entry_variables));
00901         }
00902
00903       // Setting the algorithm
00904       switch (window_get_algorithm ())
00905         {
00906         case ALGORITHM_MONTE_CARLO:
00907           input->algorithm = ALGORITHM_MONTE_CARLO;
00908           input->nsimulations
00909             = gtk_spin_button_get_value_as_int (window->spin_simulations);
00910           input->niterations
00911             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00912           input->tolerance = gtk_spin_button_get_value (window->
      spin_tolerance);
00913           input->nbest = gtk_spin_button_get_value_as_int (window->
      spin_bests);
00914           window_save_climbing ();
00915           break;
00916         case ALGORITHM_SWEEP:
00917           input->algorithm = ALGORITHM_SWEEP;
00918           input->niterations
00919             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00920           input->tolerance = gtk_spin_button_get_value (window->
      spin_tolerance);
00921           input->nbest = gtk_spin_button_get_value_as_int (window->
      spin_bests);
00922           window_save_climbing ();
00923           break;
00924         case ALGORITHM_ORTHOGONAL:
00925           input->algorithm = ALGORITHM_ORTHOGONAL;
00926           input->niterations
00927             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00928           input->tolerance = gtk_spin_button_get_value (window->
      spin_tolerance);
00929           input->nbest = gtk_spin_button_get_value_as_int (window->
      spin_bests);
00930           window_save_climbing ();
00931           break;
00932         default:
```

```
00933           input->algorithm = ALGORITHM_GENETIC;
00934           input->nsimulations
00935             = gtk_spin_button_get_value_as_int (window->spin_population);
00936           input->niterations
00937             = gtk_spin_button_get_value_as_int (window->spin_generations);
00938           input->mutation_ratio
00939             = gtk_spin_button_get_value (window->spin_mutation);
00940           input->reproduction_ratio
00941             = gtk_spin_button_get_value (window->spin_reproduction);
00942           input->adaptation_ratio
00943             = gtk_spin_button_get_value (window->spin_adaptation);
00944           break;
00945         }
00946       input->norm = window_get_norm ();
00947       input->p = gtk_spin_button_get_value (window->spin_p);
00948       input->threshold = gtk_spin_button_get_value (window->
      spin_threshold);
00949
00950       // Saving the XML file
00951       buffer = gtk_file_chooser_get_filename (GTK_FILE_CHOOSER (dlg));
00952       input_save (buffer);
00953
00954       // Closing and freeing memory
00955       g_free (buffer);
00956       gtk_widget_destroy (GTK_WIDGET (dlg));
00957 #if DEBUG_INTERFACE
00958       fprintf (stderr, "window_save: end\n");
00959 #endif
00960       return 1;
00961     }
00962
00963   // Closing and freeing memory
00964   gtk_widget_destroy (GTK_WIDGET (dlg));
00965 #if DEBUG_INTERFACE
00966   fprintf (stderr, "window_save: end\n");
00967 #endif
00968   return 0;
00969 }
00970
00974 static void
00975 window_run ()
00976 {
00977   unsigned int i;
00978   char *msg, *msg2, buffer[64], buffer2[64];
00979 #if DEBUG_INTERFACE
00980   fprintf (stderr, "window_run: start\n");
00981 #endif
00982   if (!window_save ())
00983     {
00984 #if DEBUG_INTERFACE
00985       fprintf (stderr, "window_run: end\n");
00986 #endif
00987       return;
00988     }
00989   running_new ();
00990   while (gtk_events_pending ())
00991     gtk_main_iteration ();
00992   optimize_open ();
00993 #if DEBUG_INTERFACE
00994   fprintf (stderr, "window_run: closing running dialog\n");
00995 #endif
00996   gtk_spinner_stop (running->spinner);
00997   gtk_widget_destroy (GTK_WIDGET (running->dialog));
00998 #if DEBUG_INTERFACE
00999   fprintf (stderr, "window_run: displaying results\n");
01000 #endif
01001   snprintf (buffer, 64, "error = %.15le\n", optimize->error_old[0]);
01002   msg2 = g_strdup (buffer);
01003   for (i = 0; i < optimize->nvariables; ++i, msg2 = msg)
01004     {
01005       snprintf (buffer, 64, "%s = %s\n",
01006                 input->variable[i].name, format[input->
      variable[i].precision]);
01007       snprintf (buffer2, 64, buffer, optimize->value_old[i]);
01008       msg = g_strconcat (msg2, buffer2, NULL);
01009       g_free (msg2);
01010     }
01011   snprintf (buffer, 64, "%s = %.6lg s", _("Calculation time"),
01012             optimize->calculation_time);
01013   msg = g_strconcat (msg2, buffer, NULL);
01014   g_free (msg2);
01015   show_message (_("Best result"), msg, INFO_TYPE);
01016   g_free (msg);
01017 #if DEBUG_INTERFACE
01018   fprintf (stderr, "window_run: freeing memory\n");
01019 #endif
01020   optimize_free ();
```

```
01021 #if DEBUG_INTERFACE
01022   fprintf (stderr, "window_run: end\n");
01023 #endif
01024 }
01025
01029 static void
01030 window_help ()
01031 {
01032   char *buffer, *buffer2;
01033 #if DEBUG_INTERFACE
01034   fprintf (stderr, "window_help: start\n");
01035 #endif
01036   buffer2 = g_build_filename (window->application_directory, "..", "manuals",
01037                               _("user-manual.pdf"), NULL);
01038   buffer = g_filename_to_uri (buffer2, NULL, NULL);
01039   g_free (buffer2);
01040 #if GTK_MINOR_VERSION >= 22
01041   gtk_show_uri_on_window (window->window, buffer, GDK_CURRENT_TIME, NULL);
01042 #else
01043   gtk_show_uri (NULL, buffer, GDK_CURRENT_TIME, NULL);
01044 #endif
01045 #if DEBUG_INTERFACE
01046   fprintf (stderr, "window_help: uri=%s\n", buffer);
01047 #endif
01048   g_free (buffer);
01049 #if DEBUG_INTERFACE
01050   fprintf (stderr, "window_help: end\n");
01051 #endif
01052 }
01053
01057 static void
01058 window_about ()
01059 {
01060   static const gchar *authors[] = {
01061     "Javier Burguete Tolosa <jburguete@eead.csic.es>",
01062     "Borja Latorre Garcés <borja.latorre@csic.es>",
01063     NULL
01064   };
01065 #if DEBUG_INTERFACE
01066   fprintf (stderr, "window_about: start\n");
01067 #endif
01068   gtk_show_about_dialog
01069     (window->window,
01070      "program_name", "MPCOTool",
01071      "comments",
01072      _("The Multi-Purposes Calibration and Optimization Tool.\n"
01073        "A software to perform calibrations or optimizations of empirical "
01074        "parameters"),
01075      "authors", authors,
01076      "translator-credits",
01077      "Javier Burguete Tolosa <jburguete@eead.csic.es> "
01078      "(english, french and spanish)\n"
01079      "Uğur Çayoğlu (german)",
01080      "version", "4.0.1",
01081      "copyright", "Copyright 2012-2018 Javier Burguete Tolosa",
01082      "logo", window->logo,
01083      "website", "https://github.com/jburguete/mpcotool",
01084      "license-type", GTK_LICENSE_BSD, NULL);
01085 #if DEBUG_INTERFACE
01086   fprintf (stderr, "window_about: end\n");
01087 #endif
01088 }
01089
01093 static void
01094 window_update_climbing ()
01095 {
01096 #if DEBUG_INTERFACE
01097   fprintf (stderr, "window_update_climbing: start\n");
01098 #endif
01099   gtk_widget_show (GTK_WIDGET (window->check_climbing));
01100   if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_climbing)))
01101     {
01102       gtk_widget_show (GTK_WIDGET (window->grid_climbing));
01103       gtk_widget_show (GTK_WIDGET (window->label_step));
01104       gtk_widget_show (GTK_WIDGET (window->spin_step));
01105     }
01106   switch (window_get_climbing ())
01107     {
01108     case CLIMBING_METHOD_COORDINATES:
01109       gtk_widget_hide (GTK_WIDGET (window->label_estimates));
01110       gtk_widget_hide (GTK_WIDGET (window->spin_estimates));
01111       break;
01112     default:
01113       gtk_widget_show (GTK_WIDGET (window->label_estimates));
01114       gtk_widget_show (GTK_WIDGET (window->spin_estimates));
01115     }
01116 #if DEBUG_INTERFACE
```

```
01117   fprintf (stderr, "window_update_climbing: end\n");
01118 #endif
01119 }
01120
01124 static void
01125 window_update ()
01126 {
01127   unsigned int i;
01128 #if DEBUG_INTERFACE
01129   fprintf (stderr, "window_update: start\n");
01130 #endif
01131   gtk_widget_set_sensitive
01132     (GTK_WIDGET (window->button_evaluator),
01133      gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01134                                    (window->check_evaluator)));
01135   gtk_widget_hide (GTK_WIDGET (window->label_simulations));
01136   gtk_widget_hide (GTK_WIDGET (window->spin_simulations));
01137   gtk_widget_hide (GTK_WIDGET (window->label_iterations));
01138   gtk_widget_hide (GTK_WIDGET (window->spin_iterations));
01139   gtk_widget_hide (GTK_WIDGET (window->label_tolerance));
01140   gtk_widget_hide (GTK_WIDGET (window->spin_tolerance));
01141   gtk_widget_hide (GTK_WIDGET (window->label_bests));
01142   gtk_widget_hide (GTK_WIDGET (window->spin_bests));
01143   gtk_widget_hide (GTK_WIDGET (window->label_population));
01144   gtk_widget_hide (GTK_WIDGET (window->spin_population));
01145   gtk_widget_hide (GTK_WIDGET (window->label_generations));
01146   gtk_widget_hide (GTK_WIDGET (window->spin_generations));
01147   gtk_widget_hide (GTK_WIDGET (window->label_mutation));
01148   gtk_widget_hide (GTK_WIDGET (window->spin_mutation));
01149   gtk_widget_hide (GTK_WIDGET (window->label_reproduction));
01150   gtk_widget_hide (GTK_WIDGET (window->spin_reproduction));
01151   gtk_widget_hide (GTK_WIDGET (window->label_adaptation));
01152   gtk_widget_hide (GTK_WIDGET (window->spin_adaptation));
01153   gtk_widget_hide (GTK_WIDGET (window->label_sweeps));
01154   gtk_widget_hide (GTK_WIDGET (window->spin_sweeps));
01155   gtk_widget_hide (GTK_WIDGET (window->label_bits));
01156   gtk_widget_hide (GTK_WIDGET (window->spin_bits));
01157   gtk_widget_hide (GTK_WIDGET (window->check_climbing));
01158   gtk_widget_hide (GTK_WIDGET (window->grid_climbing));
01159   gtk_widget_hide (GTK_WIDGET (window->label_step));
01160   gtk_widget_hide (GTK_WIDGET (window->spin_step));
01161   gtk_widget_hide (GTK_WIDGET (window->label_p));
01162   gtk_widget_hide (GTK_WIDGET (window->spin_p));
01163   i = gtk_spin_button_get_value_as_int (window->spin_iterations);
01164   switch (window_get_algorithm ())
01165     {
01166     case ALGORITHM_MONTE_CARLO:
01167       gtk_widget_show (GTK_WIDGET (window->label_simulations));
01168       gtk_widget_show (GTK_WIDGET (window->spin_simulations));
01169       gtk_widget_show (GTK_WIDGET (window->label_iterations));
01170       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01171       if (i > 1)
01172         {
01173           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01174           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01175           gtk_widget_show (GTK_WIDGET (window->label_bests));
01176           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01177         }
01178       window_update_climbing ();
01179       break;
01180     case ALGORITHM_SWEEP:
01181     case ALGORITHM_ORTHOGONAL:
01182       gtk_widget_show (GTK_WIDGET (window->label_iterations));
01183       gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01184       if (i > 1)
01185         {
01186           gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01187           gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01188           gtk_widget_show (GTK_WIDGET (window->label_bests));
01189           gtk_widget_show (GTK_WIDGET (window->spin_bests));
01190         }
01191       gtk_widget_show (GTK_WIDGET (window->label_sweeps));
01192       gtk_widget_show (GTK_WIDGET (window->spin_sweeps));
01193       gtk_widget_show (GTK_WIDGET (window->check_climbing));
01194       window_update_climbing ();
01195       break;
01196     default:
01197       gtk_widget_show (GTK_WIDGET (window->label_population));
01198       gtk_widget_show (GTK_WIDGET (window->spin_population));
01199       gtk_widget_show (GTK_WIDGET (window->label_generations));
01200       gtk_widget_show (GTK_WIDGET (window->spin_generations));
01201       gtk_widget_show (GTK_WIDGET (window->label_mutation));
01202       gtk_widget_show (GTK_WIDGET (window->spin_mutation));
01203       gtk_widget_show (GTK_WIDGET (window->label_reproduction));
01204       gtk_widget_show (GTK_WIDGET (window->spin_reproduction));
01205       gtk_widget_show (GTK_WIDGET (window->label_adaptation));
01206       gtk_widget_show (GTK_WIDGET (window->spin_adaptation));
```

```
01207       gtk_widget_show (GTK_WIDGET (window->label_bits));
01208       gtk_widget_show (GTK_WIDGET (window->spin_bits));
01209     }
01210   gtk_widget_set_sensitive
01211     (GTK_WIDGET (window->button_remove_experiment),
      input->nexperiments > 1);
01212   gtk_widget_set_sensitive
01213     (GTK_WIDGET (window->button_remove_variable), input->
      nvariables > 1);
01214   for (i = 0; i < input->experiment->ninputs; ++i)
01215     {
01216       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01217       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01218       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 0);
01219       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i]), 1);
01220       g_signal_handler_block
01221         (window->check_template[i], window->id_template[i]);
01222       g_signal_handler_block (window->button_template[i], window->
      id_input[i]);
01223       gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON
01224                                     (window->check_template[i]), 1);
01225       g_signal_handler_unblock (window->button_template[i],
01226                                 window->id_input[i]);
01227       g_signal_handler_unblock (window->check_template[i],
01228                                 window->id_template[i]);
01229     }
01230   if (i > 0)
01231     {
01232       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i - 1]), 1);
01233       gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i - 1]),
01234                                 gtk_toggle_button_get_active
01235                                 GTK_TOGGLE_BUTTON (window->check_template
01236                                                    [i - 1]));
01237     }
01238   if (i < MAX_NINPUTS)
01239     {
01240       gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01241       gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01242       gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 1);
01243       gtk_widget_set_sensitive
01244         (GTK_WIDGET (window->button_template[i]),
01245          gtk_toggle_button_get_active
01246          GTK_TOGGLE_BUTTON (window->check_template[i]));
01247       g_signal_handler_block
01248         (window->check_template[i], window->id_template[i]);
01249       g_signal_handler_block (window->button_template[i], window->
      id_input[i]);
01250       gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON
01251                                     (window->check_template[i]), 0);
01252       g_signal_handler_unblock (window->button_template[i],
01253                                 window->id_input[i]);
01254       g_signal_handler_unblock (window->check_template[i],
01255                                 window->id_template[i]);
01256     }
01257   while (++i < MAX_NINPUTS)
01258     {
01259       gtk_widget_hide (GTK_WIDGET (window->check_template[i]));
01260       gtk_widget_hide (GTK_WIDGET (window->button_template[i]));
01261     }
01262   gtk_widget_set_sensitive
01263     (GTK_WIDGET (window->spin_minabs),
01264      gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_minabs)));
01265   gtk_widget_set_sensitive
01266     (GTK_WIDGET (window->spin_maxabs),
01267      gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_maxabs)));
01268   if (window_get_norm () == ERROR_NORM_P)
01269     {
01270       gtk_widget_show (GTK_WIDGET (window->label_p));
01271       gtk_widget_show (GTK_WIDGET (window->spin_p));
01272     }
01273 #if DEBUG_INTERFACE
01274   fprintf (stderr, "window_update: end\n");
01275 #endif
01276 }
01277
01281 static void
01282 window_set_algorithm ()
01283 {
01284   int i;
01285 #if DEBUG_INTERFACE
01286   fprintf (stderr, "window_set_algorithm: start\n");
01287 #endif
01288   i = window_get_algorithm ();
01289   switch (i)
01290     {
01291     case ALGORITHM_SWEEP:
01292     case ALGORITHM_ORTHOGONAL:
```

```
01293       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01294       if (i < 0)
01295         i = 0;
01296       gtk_spin_button_set_value (window->spin_sweeps,
01297                                  (gdouble) input->variable[i].
      nsweeps);
01298       break;
01299     case ALGORITHM_GENETIC:
01300       i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01301       if (i < 0)
01302         i = 0;
01303       gtk_spin_button_set_value (window->spin_bits,
01304                                  (gdouble) input->variable[i].nbits);
01305     }
01306   window_update ();
01307 #if DEBUG_INTERFACE
01308   fprintf (stderr, "window_set_algorithm: end\n");
01309 #endif
01310 }
01311
01315 static void
01316 window_set_experiment ()
01317 {
01318   unsigned int i, j;
01319   char *buffer1, *buffer2;
01320 #if DEBUG_INTERFACE
01321   fprintf (stderr, "window_set_experiment: start\n");
01322 #endif
01323   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01324   gtk_spin_button_set_value (window->spin_weight, input->
      experiment[i].weight);
01325   buffer1 = gtk_combo_box_text_get_active_text (window->combo_experiment);
01326   buffer2 = g_build_filename (input->directory, buffer1, NULL);
01327   g_free (buffer1);
01328   g_signal_handler_block
01329     (window->button_experiment, window->id_experiment_name);
01330   gtk_file_chooser_set_filename
01331     (GTK_FILE_CHOOSER (window->button_experiment), buffer2);
01332   g_signal_handler_unblock
01333     (window->button_experiment, window->id_experiment_name);
01334   g_free (buffer2);
01335   for (j = 0; j < input->experiment->ninputs; ++j)
01336     {
01337       g_signal_handler_block (window->button_template[j], window->
      id_input[j]);
01338       buffer2 =
01339         g_build_filename (input->directory, input->experiment[i].
      stencil[j],
01340                           NULL);
01341       gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01342                                      (window->button_template[j]), buffer2);
01343       g_free (buffer2);
01344       g_signal_handler_unblock
01345         (window->button_template[j], window->id_input[j]);
01346     }
01347 #if DEBUG_INTERFACE
01348   fprintf (stderr, "window_set_experiment: end\n");
01349 #endif
01350 }
01351
01355 static void
01356 window_remove_experiment ()
01357 {
01358   unsigned int i, j;
01359 #if DEBUG_INTERFACE
01360   fprintf (stderr, "window_remove_experiment: start\n");
01361 #endif
01362   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01363   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01364   gtk_combo_box_text_remove (window->combo_experiment, i);
01365   g_signal_handler_unblock (window->combo_experiment, window->
      id_experiment);
01366   experiment_free (input->experiment + i, input->
      type);
01367   --input->nexperiments;
01368   for (j = i; j < input->nexperiments; ++j)
01369     memcpy (input->experiment + j, input->experiment + j + 1,
01370             sizeof (Experiment));
01371   j = input->nexperiments - 1;
01372   if (i > j)
01373     i = j;
01374   for (j = 0; j < input->experiment->ninputs; ++j)
01375     g_signal_handler_block (window->button_template[j], window->
      id_input[j]);
01376   g_signal_handler_block
01377     (window->button_experiment, window->id_experiment_name);
```

```
01378   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01379   g_signal_handler_unblock
01380     (window->button_experiment, window->id_experiment_name);
01381   for (j = 0; j < input->experiment->ninputs; ++j)
01382     g_signal_handler_unblock (window->button_template[j], window->
      id_input[j]);
01383   window_update ();
01384 #if DEBUG_INTERFACE
01385   fprintf (stderr, "window_remove_experiment: end\n");
01386 #endif
01387 }
01388
01392 static void
01393 window_add_experiment ()
01394 {
01395   unsigned int i, j;
01396 #if DEBUG_INTERFACE
01397   fprintf (stderr, "window_add_experiment: start\n");
01398 #endif
01399   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01400   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01401   gtk_combo_box_text_insert_text
01402     (window->combo_experiment, i, input->experiment[i].
      name);
01403   g_signal_handler_unblock (window->combo_experiment, window->
      id_experiment);
01404   input->experiment = (Experiment *) g_realloc
01405     (input->experiment, (input->nexperiments + 1) * sizeof (
      Experiment));
01406   for (j = input->nexperiments - 1; j > i; --j)
01407     memcpy (input->experiment + j + 1, input->experiment + j,
01408             sizeof (Experiment));
01409   input->experiment[j + 1].weight = input->experiment[j].
      weight;
01410   input->experiment[j + 1].ninputs = input->
      experiment[j].ninputs;
01411   if (input->type == INPUT_TYPE_XML)
01412     {
01413       input->experiment[j + 1].name
01414         = (char *) xmlStrdup ((xmlChar *) input->experiment[j].
      name);
01415       for (j = 0; j < input->experiment->ninputs; ++j)
01416         input->experiment[i + 1].stencil[j]
01417           = (char *) xmlStrdup ((xmlChar *) input->experiment[i].
      stencil[j]);
01418     }
01419   else
01420     {
01421       input->experiment[j + 1].name = g_strdup (input->
      experiment[j].name);
01422       for (j = 0; j < input->experiment->ninputs; ++j)
01423         input->experiment[i + 1].stencil[j]
01424           = g_strdup (input->experiment[i].stencil[j]);
01425     }
01426   ++input->nexperiments;
01427   for (j = 0; j < input->experiment->ninputs; ++j)
01428     g_signal_handler_block (window->button_template[j], window->
      id_input[j]);
01429   g_signal_handler_block
01430     (window->button_experiment, window->id_experiment_name);
01431   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i + 1);
01432   g_signal_handler_unblock
01433     (window->button_experiment, window->id_experiment_name);
01434   for (j = 0; j < input->experiment->ninputs; ++j)
01435     g_signal_handler_unblock (window->button_template[j], window->
      id_input[j]);
01436   window_update ();
01437 #if DEBUG_INTERFACE
01438   fprintf (stderr, "window_add_experiment: end\n");
01439 #endif
01440 }
01441
01445 static void
01446 window_name_experiment ()
01447 {
01448   unsigned int i;
01449   char *buffer;
01450   GFile *file1, *file2;
01451 #if DEBUG_INTERFACE
01452   fprintf (stderr, "window_name_experiment: start\n");
01453 #endif
01454   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01455   file1
01456     = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->button_experiment));
01457   file2 = g_file_new_for_path (input->directory);
01458   buffer = g_file_get_relative_path (file2, file1);
```

```
01459   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01460   gtk_combo_box_text_remove (window->combo_experiment, i);
01461   gtk_combo_box_text_insert_text (window->combo_experiment, i, buffer);
01462   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01463   g_signal_handler_unblock (window->combo_experiment, window->
      id_experiment);
01464   g_free (buffer);
01465   g_object_unref (file2);
01466   g_object_unref (file1);
01467 #if DEBUG_INTERFACE
01468   fprintf (stderr, "window_name_experiment: end\n");
01469 #endif
01470 }
01471
01475 static void
01476 window_weight_experiment ()
01477 {
01478   unsigned int i;
01479 #if DEBUG_INTERFACE
01480   fprintf (stderr, "window_weight_experiment: start\n");
01481 #endif
01482   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01483   input->experiment[i].weight = gtk_spin_button_get_value (window->
      spin_weight);
01484 #if DEBUG_INTERFACE
01485   fprintf (stderr, "window_weight_experiment: end\n");
01486 #endif
01487 }
01488
01492 static void
01493 window_inputs_experiment ()
01494 {
01495   unsigned int j;
01496 #if DEBUG_INTERFACE
01497   fprintf (stderr, "window_inputs_experiment: start\n");
01498 #endif
01499   j = input->experiment->ninputs - 1;
01500   if (j
01501       && !gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01502                                         (window->check_template[j])))
01503     --input->experiment->ninputs;
01504   if (input->experiment->ninputs < MAX_NINPUTS
01505       && gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01506                                        (window->check_template[j])))
01507     ++input->experiment->ninputs;
01508   window_update ();
01509 #if DEBUG_INTERFACE
01510   fprintf (stderr, "window_inputs_experiment: end\n");
01511 #endif
01512 }
01513
01517 static void
01518 window_template_experiment (void *data)
01520 {
01521   unsigned int i, j;
01522   char *buffer;
01523   GFile *file1, *file2;
01524 #if DEBUG_INTERFACE
01525   fprintf (stderr, "window_template_experiment: start\n");
01526 #endif
01527   i = (size_t) data;
01528   j = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01529   file1
01530     = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->button_template[i]));
01531   file2 = g_file_new_for_path (input->directory);
01532   buffer = g_file_get_relative_path (file2, file1);
01533   if (input->type == INPUT_TYPE_XML)
01534     input->experiment[j].stencil[i] = (char *) xmlStrdup ((xmlChar *) buffer);
01535   else
01536     input->experiment[j].stencil[i] = g_strdup (buffer);
01537   g_free (buffer);
01538   g_object_unref (file2);
01539   g_object_unref (file1);
01540 #if DEBUG_INTERFACE
01541   fprintf (stderr, "window_template_experiment: end\n");
01542 #endif
01543 }
01544
01548 static void
01549 window_set_variable ()
01550 {
01551   unsigned int i;
01552 #if DEBUG_INTERFACE
01553   fprintf (stderr, "window_set_variable: start\n");
01554 #endif
01555   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
```

```
01556   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01557   gtk_entry_set_text (window->entry_variable, input->variable[i].
      name);
01558   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01559   gtk_spin_button_set_value (window->spin_min, input->variable[i].
      rangemin);
01560   gtk_spin_button_set_value (window->spin_max, input->variable[i].
      rangemax);
01561   if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
01562     {
01563       gtk_spin_button_set_value (window->spin_minabs,
01564                                  input->variable[i].rangeminabs);
01565       gtk_toggle_button_set_active
01566         (GTK_TOGGLE_BUTTON (window->check_minabs), 1);
01567     }
01568   else
01569     {
01570       gtk_spin_button_set_value (window->spin_minabs, -G_MAXDOUBLE);
01571       gtk_toggle_button_set_active
01572         (GTK_TOGGLE_BUTTON (window->check_minabs), 0);
01573     }
01574   if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
01575     {
01576       gtk_spin_button_set_value (window->spin_maxabs,
01577                                  input->variable[i].rangemaxabs);
01578       gtk_toggle_button_set_active
01579         (GTK_TOGGLE_BUTTON (window->check_maxabs), 1);
01580     }
01581   else
01582     {
01583       gtk_spin_button_set_value (window->spin_maxabs, G_MAXDOUBLE);
01584       gtk_toggle_button_set_active
01585         (GTK_TOGGLE_BUTTON (window->check_maxabs), 0);
01586     }
01587   gtk_spin_button_set_value (window->spin_precision,
01588                              input->variable[i].precision);
01589   gtk_spin_button_set_value (window->spin_steps, (gdouble) input->
      nsteps);
01590   if (input->nsteps)
01591     gtk_spin_button_set_value (window->spin_step, input->variable[i].
      step);
01592 #if DEBUG_INTERFACE
01593   fprintf (stderr, "window_set_variable: precision[%u]=%u\n", i,
01594            input->variable[i].precision);
01595 #endif
01596   switch (window_get_algorithm ())
01597     {
01598     case ALGORITHM_SWEEP:
01599     case ALGORITHM_ORTHOGONAL:
01600       gtk_spin_button_set_value (window->spin_sweeps,
01601                                  (gdouble) input->variable[i].
      nsweeps);
01602 #if DEBUG_INTERFACE
01603       fprintf (stderr, "window_set_variable: nsweeps[%u]=%u\n", i,
01604                input->variable[i].nsweeps);
01605 #endif
01606       break;
01607     case ALGORITHM_GENETIC:
01608       gtk_spin_button_set_value (window->spin_bits,
01609                                  (gdouble) input->variable[i].nbits);
01610 #if DEBUG_INTERFACE
01611       fprintf (stderr, "window_set_variable: nbits[%u]=%u\n", i,
01612                input->variable[i].nbits);
01613 #endif
01614       break;
01615     }
01616   window_update ();
01617 #if DEBUG_INTERFACE
01618   fprintf (stderr, "window_set_variable: end\n");
01619 #endif
01620 }
01621
01625 static void
01626 window_remove_variable ()
01627 {
01628   unsigned int i, j;
01629 #if DEBUG_INTERFACE
01630   fprintf (stderr, "window_remove_variable: start\n");
01631 #endif
01632   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01633   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01634   gtk_combo_box_text_remove (window->combo_variable, i);
01635   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
```

```
01636   xmlFree (input->variable[i].name);
01637   --input->nvariables;
01638   for (j = i; j < input->nvariables; ++j)
01639     memcpy (input->variable + j, input->variable + j + 1, sizeof (
      Variable));
01640   j = input->nvariables - 1;
01641   if (i > j)
01642     i = j;
01643   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01644   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01645   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01646   window_update ();
01647 #if DEBUG_INTERFACE
01648   fprintf (stderr, "window_remove_variable: end\n");
01649 #endif
01650 }
01651
01655 static void
01656 window_add_variable ()
01657 {
01658   unsigned int i, j;
01659 #if DEBUG_INTERFACE
01660   fprintf (stderr, "window_add_variable: start\n");
01661 #endif
01662   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01663   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01664   gtk_combo_box_text_insert_text (window->combo_variable, i,
01665                                   input->variable[i].name);
01666   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
01667   input->variable = (Variable *) g_realloc
01668     (input->variable, (input->nvariables + 1) * sizeof (
      Variable));
01669   for (j = input->nvariables - 1; j > i; --j)
01670     memcpy (input->variable + j + 1, input->variable + j, sizeof (
      Variable));
01671   memcpy (input->variable + j + 1, input->variable + j, sizeof (
      Variable));
01672   if (input->type == INPUT_TYPE_XML)
01673     input->variable[j + 1].name
01674       = (char *) xmlStrdup ((xmlChar *) input->variable[j].name);
01675   else
01676     input->variable[j + 1].name = g_strdup (input->
      variable[j].name);
01677   ++input->nvariables;
01678   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01679   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i + 1);
01680   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01681   window_update ();
01682 #if DEBUG_INTERFACE
01683   fprintf (stderr, "window_add_variable: end\n");
01684 #endif
01685 }
01686
01690 static void
01691 window_label_variable ()
01692 {
01693   unsigned int i;
01694   const char *buffer;
01695 #if DEBUG_INTERFACE
01696   fprintf (stderr, "window_label_variable: start\n");
01697 #endif
01698   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01699   buffer = gtk_entry_get_text (window->entry_variable);
01700   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01701   gtk_combo_box_text_remove (window->combo_variable, i);
01702   gtk_combo_box_text_insert_text (window->combo_variable, i, buffer);
01703   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01704   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
01705 #if DEBUG_INTERFACE
01706   fprintf (stderr, "window_label_variable: end\n");
01707 #endif
01708 }
01709
01713 static void
01714 window_precision_variable ()
01715 {
01716   unsigned int i;
01717 #if DEBUG_INTERFACE
01718   fprintf (stderr, "window_precision_variable: start\n");
```

```
01719 #endif
01720   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01721   input->variable[i].precision
01722     = (unsigned int) gtk_spin_button_get_value_as_int (window->spin_precision);
01723   gtk_spin_button_set_digits (window->spin_min, input->variable[i].
      precision);
01724   gtk_spin_button_set_digits (window->spin_max, input->variable[i].
      precision);
01725   gtk_spin_button_set_digits (window->spin_minabs,
01726                               input->variable[i].precision);
01727   gtk_spin_button_set_digits (window->spin_maxabs,
01728                               input->variable[i].precision);
01729 #if DEBUG_INTERFACE
01730   fprintf (stderr, "window_precision_variable: end\n");
01731 #endif
01732 }
01733
01737 static void
01738 window_rangemin_variable ()
01739 {
01740   unsigned int i;
01741 #if DEBUG_INTERFACE
01742   fprintf (stderr, "window_rangemin_variable: start\n");
01743 #endif
01744   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01745   input->variable[i].rangemin = gtk_spin_button_get_value (window->
      spin_min);
01746 #if DEBUG_INTERFACE
01747   fprintf (stderr, "window_rangemin_variable: end\n");
01748 #endif
01749 }
01750
01754 static void
01755 window_rangemax_variable ()
01756 {
01757   unsigned int i;
01758 #if DEBUG_INTERFACE
01759   fprintf (stderr, "window_rangemax_variable: start\n");
01760 #endif
01761   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01762   input->variable[i].rangemax = gtk_spin_button_get_value (window->
      spin_max);
01763 #if DEBUG_INTERFACE
01764   fprintf (stderr, "window_rangemax_variable: end\n");
01765 #endif
01766 }
01767
01771 static void
01772 window_rangeminabs_variable ()
01773 {
01774   unsigned int i;
01775 #if DEBUG_INTERFACE
01776   fprintf (stderr, "window_rangeminabs_variable: start\n");
01777 #endif
01778   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01779   input->variable[i].rangeminabs
01780     = gtk_spin_button_get_value (window->spin_minabs);
01781 #if DEBUG_INTERFACE
01782   fprintf (stderr, "window_rangeminabs_variable: end\n");
01783 #endif
01784 }
01785
01789 static void
01790 window_rangemaxabs_variable ()
01791 {
01792   unsigned int i;
01793 #if DEBUG_INTERFACE
01794   fprintf (stderr, "window_rangemaxabs_variable: start\n");
01795 #endif
01796   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01797   input->variable[i].rangemaxabs
01798     = gtk_spin_button_get_value (window->spin_maxabs);
01799 #if DEBUG_INTERFACE
01800   fprintf (stderr, "window_rangemaxabs_variable: end\n");
01801 #endif
01802 }
01803
01807 static void
01808 window_step_variable ()
01809 {
01810   unsigned int i;
01811 #if DEBUG_INTERFACE
01812   fprintf (stderr, "window_step_variable: start\n");
01813 #endif
01814   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01815   input->variable[i].step = gtk_spin_button_get_value (window->
      spin_step);
```

```
01816 #if DEBUG_INTERFACE
01817   fprintf (stderr, "window_step_variable: end\n");
01818 #endif
01819 }
01820
01824 static void
01825 window_update_variable ()
01826 {
01827   int i;
01828 #if DEBUG_INTERFACE
01829   fprintf (stderr, "window_update_variable: start\n");
01830 #endif
01831   i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01832   if (i < 0)
01833     i = 0;
01834   switch (window_get_algorithm ())
01835     {
01836     case ALGORITHM_SWEEP:
01837     case ALGORITHM_ORTHOGONAL:
01838       input->variable[i].nsweeps
01839         = gtk_spin_button_get_value_as_int (window->spin_sweeps);
01840 #if DEBUG_INTERFACE
01841       fprintf (stderr, "window_update_variable: nsweeps[%d]=%u\n", i,
01842                input->variable[i].nsweeps);
01843 #endif
01844       break;
01845     case ALGORITHM_GENETIC:
01846       input->variable[i].nbits
01847         = gtk_spin_button_get_value_as_int (window->spin_bits);
01848 #if DEBUG_INTERFACE
01849       fprintf (stderr, "window_update_variable: nbits[%d]=%u\n", i,
01850                input->variable[i].nbits);
01851 #endif
01852     }
01853 #if DEBUG_INTERFACE
01854   fprintf (stderr, "window_update_variable: end\n");
01855 #endif
01856 }
01857
01863 static int
01864 window_read (char *filename)
01865 {
01866   unsigned int i;
01867   char *buffer;
01868 #if DEBUG_INTERFACE
01869   fprintf (stderr, "window_read: start\n");
01870 #endif
01871
01872   // Reading new input file
01873   input_free ();
01874   input->result = input->variables = NULL;
01875   if (!input_open (filename))
01876     {
01877 #if DEBUG_INTERFACE
01878       fprintf (stderr, "window_read: end\n");
01879 #endif
01880       return 0;
01881     }
01882
01883   // Setting GTK+ widgets data
01884   gtk_entry_set_text (window->entry_result, input->result);
01885   gtk_entry_set_text (window->entry_variables, input->
      variables);
01886   buffer = g_build_filename (input->directory, input->
      simulator, NULL);
01887   gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01888                                  (window->button_simulator), buffer);
01889   g_free (buffer);
01890   gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON (window->check_evaluator),
01891                                 (size_t) input->evaluator);
01892   if (input->evaluator)
01893     {
01894       buffer = g_build_filename (input->directory, input->
      evaluator, NULL);
01895       gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01896                                      (window->button_evaluator), buffer);
01897       g_free (buffer);
01898     }
01899   gtk_toggle_button_set_active
01900     (GTK_TOGGLE_BUTTON (window->button_algorithm[input->
      algorithm]), TRUE);
01901   switch (input->algorithm)
01902     {
01903     case ALGORITHM_MONTE_CARLO:
01904       gtk_spin_button_set_value (window->spin_simulations,
01905                                  (gdouble) input->nsimulations);
01906       // fallthrough
```

```
01907     case ALGORITHM_SWEEP:
01908     case ALGORITHM_ORTHOGONAL:
01909       gtk_spin_button_set_value (window->spin_iterations,
01910                                  (gdouble) input->niterations);
01911       gtk_spin_button_set_value (window->spin_bests, (gdouble) input->
      nbest);
01912       gtk_spin_button_set_value (window->spin_tolerance, input->
      tolerance);
01913       gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON
01914                                     (window->check_climbing),
      input->nsteps);
01915       if (input->nsteps)
01916         {
01917           gtk_toggle_button_set_active
01918             (GTK_TOGGLE_BUTTON (window->button_climbing[input->
      climbing]),
01919              TRUE);
01920           gtk_spin_button_set_value (window->spin_steps,
01921                                      (gdouble) input->nsteps);
01922           gtk_spin_button_set_value (window->spin_relaxation,
01923                                      (gdouble) input->relaxation);
01924           switch (input->climbing)
01925             {
01926             case CLIMBING_METHOD_RANDOM:
01927               gtk_spin_button_set_value (window->spin_estimates,
01928                                          (gdouble) input->nestimates);
01929             }
01930         }
01931       break;
01932     default:
01933       gtk_spin_button_set_value (window->spin_population,
01934                                  (gdouble) input->nsimulations);
01935       gtk_spin_button_set_value (window->spin_generations,
01936                                  (gdouble) input->niterations);
01937       gtk_spin_button_set_value (window->spin_mutation, input->
      mutation_ratio);
01938       gtk_spin_button_set_value (window->spin_reproduction,
01939                                  input->reproduction_ratio);
01940       gtk_spin_button_set_value (window->spin_adaptation,
01941                                  input->adaptation_ratio);
01942     }
01943   gtk_toggle_button_set_active
01944     (GTK_TOGGLE_BUTTON (window->button_norm[input->norm]), TRUE);
01945   gtk_spin_button_set_value (window->spin_p, input->p);
01946   gtk_spin_button_set_value (window->spin_threshold, input->
      threshold);
01947   g_signal_handler_block (window->combo_experiment, window->
      id_experiment);
01948   g_signal_handler_block (window->button_experiment,
01949                           window->id_experiment_name);
01950   gtk_combo_box_text_remove_all (window->combo_experiment);
01951   for (i = 0; i < input->nexperiments; ++i)
01952     gtk_combo_box_text_append_text (window->combo_experiment,
01953                                     input->experiment[i].name);
01954   g_signal_handler_unblock
01955     (window->button_experiment, window->id_experiment_name);
01956   g_signal_handler_unblock (window->combo_experiment, window->
      id_experiment);
01957   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), 0);
01958   g_signal_handler_block (window->combo_variable, window->
      id_variable);
01959   g_signal_handler_block (window->entry_variable, window->
      id_variable_label);
01960   gtk_combo_box_text_remove_all (window->combo_variable);
01961   for (i = 0; i < input->nvariables; ++i)
01962     gtk_combo_box_text_append_text (window->combo_variable,
01963                                     input->variable[i].name);
01964   g_signal_handler_unblock (window->entry_variable, window->
      id_variable_label);
01965   g_signal_handler_unblock (window->combo_variable, window->
      id_variable);
01966   gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), 0);
01967   window_set_variable ();
01968   window_update ();
01969
01970 #if DEBUG_INTERFACE
01971   fprintf (stderr, "window_read: end\n");
01972 #endif
01973   return 1;
01974 }
01975
01979 static void
01980 window_open ()
01981 {
01982   GtkFileChooserDialog *dlg;
01983   GtkFileFilter *filter;
01984   char *buffer, *directory, *name;
```

```
01985
01986 #if DEBUG_INTERFACE
01987   fprintf (stderr, "window_open: start\n");
01988 #endif
01989
01990   // Saving a backup of the current input file
01991   directory = g_strdup (input->directory);
01992   name = g_strdup (input->name);
01993
01994   // Opening dialog
01995   dlg = (GtkFileChooserDialog *)
01996     gtk_file_chooser_dialog_new (_("Open input file"),
01997                                  window->window,
01998                                  GTK_FILE_CHOOSER_ACTION_OPEN,
01999                                  _("_Cancel"), GTK_RESPONSE_CANCEL,
02000                                  _("_OK"), GTK_RESPONSE_OK, NULL);
02001
02002   // Adding XML filter
02003   filter = (GtkFileFilter *) gtk_file_filter_new ();
02004   gtk_file_filter_set_name (filter, "XML");
02005   gtk_file_filter_add_pattern (filter, "*.xml");
02006   gtk_file_filter_add_pattern (filter, "*.XML");
02007   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02008
02009   // Adding JSON filter
02010   filter = (GtkFileFilter *) gtk_file_filter_new ();
02011   gtk_file_filter_set_name (filter, "JSON");
02012   gtk_file_filter_add_pattern (filter, "*.json");
02013   gtk_file_filter_add_pattern (filter, "*.JSON");
02014   gtk_file_filter_add_pattern (filter, "*.js");
02015   gtk_file_filter_add_pattern (filter, "*.JS");
02016   gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02017
02018   // If OK saving
02019   while (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
02020     {
02021
02022       // Traying to open the input file
02023       buffer = gtk_file_chooser_get_filename (GTK_FILE_CHOOSER (dlg));
02024       if (!window_read (buffer))
02025         {
02026 #if DEBUG_INTERFACE
02027           fprintf (stderr, "window_open: error reading input file\n");
02028 #endif
02029           g_free (buffer);
02030
02031           // Reading backup file on error
02032           buffer = g_build_filename (directory, name, NULL);
02033           input->result = input->variables = NULL;
02034           if (!input_open (buffer))
02035             {
02036
02037               // Closing on backup file reading error
02038 #if DEBUG_INTERFACE
02039               fprintf (stderr, "window_read: error reading backup file\n");
02040 #endif
02041               g_free (buffer);
02042               break;
02043             }
02044           g_free (buffer);
02045         }
02046       else
02047         {
02048           g_free (buffer);
02049           break;
02050         }
02051     }
02052
02053   // Freeing and closing
02054   g_free (name);
02055   g_free (directory);
02056   gtk_widget_destroy (GTK_WIDGET (dlg));
02057 #if DEBUG_INTERFACE
02058   fprintf (stderr, "window_open: end\n");
02059 #endif
02060 }
02061
02065 void
02066 window_new (GtkApplication * application)
02067 {
02068   unsigned int i;
02069   char *buffer, *buffer2, buffer3[64];
02070   char *label_algorithm[NALGORITHMS] = {
02071     "_Monte-Carlo", _("_Sweep"), _("_Genetic"), _("_Orthogonal")
02072   };
02073   char *tip_algorithm[NALGORITHMS] = {
02074     _("Monte-Carlo brute force algorithm"),
```

```
02075     _("Sweep brute force algorithm"),
02076     _("Genetic algorithm"),
02077     _("Orthogonal sampling brute force algorithm"),
02078   };
02079   char *label_climbing[NCLIMBINGS] = {
02080     _("_Coordinates climbing"), _("_Random climbing")
02081   };
02082   char *tip_climbing[NCLIMBINGS] = {
02083     _("Coordinates climbing estimate method"),
02084     _("Random climbing estimate method")
02085   };
02086   char *label_norm[NNORMS] = { "L2", "L", "Lp", "L1" };
02087   char *tip_norm[NNORMS] = {
02088     _("Euclidean error norm (L2)"),
02089     _("Maximum error norm (L)"),
02090     _("P error norm (Lp)"),
02091     _("Taxicab error norm (L1)")
02092   };
02093
02094 #if DEBUG_INTERFACE
02095   fprintf (stderr, "window_new: start\n");
02096 #endif
02097
02098   // Creating the window
02099   window->window = main_window
02100     = (GtkWindow *) gtk_application_window_new (application);
02101
02102   // Finish when closing the window
02103   g_signal_connect_swapped (window->window, "delete-event",
02104                             G_CALLBACK (g_application_quit),
02105                             G_APPLICATION (application));
02106
02107   // Setting the window title
02108   gtk_window_set_title (window->window, "MPCOTool");
02109
02110   // Creating the open button
02111   window->button_open = (GtkToolButton *) gtk_tool_button_new
02112     (gtk_image_new_from_icon_name ("document-open",
02113                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Open"));
02114   g_signal_connect (window->button_open, "clicked", window_open, NULL);
02115
02116   // Creating the save button
02117   window->button_save = (GtkToolButton *) gtk_tool_button_new
02118     (gtk_image_new_from_icon_name ("document-save",
02119                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Save"));
02120   g_signal_connect (window->button_save, "clicked", (GCallback)
      window_save,
02121                     NULL);
02122
02123   // Creating the run button
02124   window->button_run = (GtkToolButton *) gtk_tool_button_new
02125     (gtk_image_new_from_icon_name ("system-run",
02126                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Run"));
02127   g_signal_connect (window->button_run, "clicked", window_run, NULL);
02128
02129   // Creating the options button
02130   window->button_options = (GtkToolButton *) gtk_tool_button_new
02131     (gtk_image_new_from_icon_name ("preferences-system",
02132                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Options"));
02133   g_signal_connect (window->button_options, "clicked", options_new, NULL);
02134
02135   // Creating the help button
02136   window->button_help = (GtkToolButton *) gtk_tool_button_new
02137     (gtk_image_new_from_icon_name ("help-browser",
02138                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Help"));
02139   g_signal_connect (window->button_help, "clicked", window_help, NULL);
02140
02141   // Creating the about button
02142   window->button_about = (GtkToolButton *) gtk_tool_button_new
02143     (gtk_image_new_from_icon_name ("help-about",
02144                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("About"));
02145   g_signal_connect (window->button_about, "clicked", window_about, NULL);
02146
02147   // Creating the exit button
02148   window->button_exit = (GtkToolButton *) gtk_tool_button_new
02149     (gtk_image_new_from_icon_name ("application-exit",
02150                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Exit"));
02151   g_signal_connect_swapped (window->button_exit, "clicked",
02152                             G_CALLBACK (g_application_quit),
02153                             G_APPLICATION (application));
02154
02155   // Creating the buttons bar
02156   window->bar_buttons = (GtkToolbar *) gtk_toolbar_new ();
02157   gtk_toolbar_insert
02158     (window->bar_buttons, GTK_TOOL_ITEM (window->button_open), 0);
02159   gtk_toolbar_insert
02160     (window->bar_buttons, GTK_TOOL_ITEM (window->button_save), 1);
```

```
02161   gtk_toolbar_insert
02162     (window->bar_buttons, GTK_TOOL_ITEM (window->button_run), 2);
02163   gtk_toolbar_insert
02164     (window->bar_buttons, GTK_TOOL_ITEM (window->button_options), 3);
02165   gtk_toolbar_insert
02166     (window->bar_buttons, GTK_TOOL_ITEM (window->button_help), 4);
02167   gtk_toolbar_insert
02168     (window->bar_buttons, GTK_TOOL_ITEM (window->button_about), 5);
02169   gtk_toolbar_insert
02170     (window->bar_buttons, GTK_TOOL_ITEM (window->button_exit), 6);
02171   gtk_toolbar_set_style (window->bar_buttons, GTK_TOOLBAR_BOTH);
02172
02173   // Creating the simulator program label and entry
02174   window->label_simulator = (GtkLabel *) gtk_label_new (_("Simulator program"));
02175   window->button_simulator = (GtkFileChooserButton *)
02176     gtk_file_chooser_button_new (_("Simulator program"),
02177                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02178   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_simulator),
02179                                _("Simulator program executable file"));
02180   gtk_widget_set_hexpand (GTK_WIDGET (window->button_simulator), TRUE);
02181
02182   // Creating the evaluator program label and entry
02183   window->check_evaluator = (GtkCheckButton *)
02184     gtk_check_button_new_with_mnemonic (_("_Evaluator program"));
02185   g_signal_connect (window->check_evaluator, "toggled",
      window_update, NULL);
02186   window->button_evaluator = (GtkFileChooserButton *)
02187     gtk_file_chooser_button_new (_("Evaluator program"),
02188                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02189   gtk_widget_set_tooltip_text
02190     (GTK_WIDGET (window->button_evaluator),
02191      _("Optional evaluator program executable file"));
02192
02193   // Creating the results files labels and entries
02194   window->label_result = (GtkLabel *) gtk_label_new (_("Result file"));
02195   window->entry_result = (GtkEntry *) gtk_entry_new ();
02196   gtk_widget_set_tooltip_text
02197     (GTK_WIDGET (window->entry_result), _("Best results file"));
02198   window->label_variables = (GtkLabel *) gtk_label_new (_("Variables file"));
02199   window->entry_variables = (GtkEntry *) gtk_entry_new ();
02200   gtk_widget_set_tooltip_text
02201     (GTK_WIDGET (window->entry_variables), _("All simulated results file"));
02202
02203   // Creating the files grid and attaching widgets
02204   window->grid_files = (GtkGrid *) gtk_grid_new ();
02205   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      label_simulator),
02206                    0, 0, 1, 1);
02207   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      button_simulator),
02208                    1, 0, 1, 1);
02209   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      check_evaluator),
02210                    0, 1, 1, 1);
02211   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      button_evaluator),
02212                    1, 1, 1, 1);
02213   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      label_result),
02214                    0, 2, 1, 1);
02215   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      entry_result),
02216                    1, 2, 1, 1);
02217   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      label_variables),
02218                    0, 3, 1, 1);
02219   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
      entry_variables),
02220                    1, 3, 1, 1);
02221
02222   // Creating the algorithm properties
02223   window->label_simulations = (GtkLabel *) gtk_label_new
02224     (_("Simulations number"));
02225   window->spin_simulations
02226     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02227   gtk_widget_set_tooltip_text
02228     (GTK_WIDGET (window->spin_simulations),
02229      _("Number of simulations to perform for each iteration"));
02230   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_simulations), TRUE);
02231   window->label_iterations = (GtkLabel *)
02232     gtk_label_new (_("Iterations number"));
02233   window->spin_iterations
02234     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02235   gtk_widget_set_tooltip_text
02236     (GTK_WIDGET (window->spin_iterations), _("Number of iterations"));
02237   g_signal_connect
02238     (window->spin_iterations, "value-changed", window_update, NULL);
```

```
02239   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_iterations), TRUE);
02240   window->label_tolerance = (GtkLabel *) gtk_label_new (_("Tolerance"));
02241   window->spin_tolerance =
02242     (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02243   gtk_widget_set_tooltip_text
02244     (GTK_WIDGET (window->spin_tolerance),
02245      _("Tolerance to set the variable interval on the next iteration"));
02246   window->label_bests = (GtkLabel *) gtk_label_new (_("Bests number"));
02247   window->spin_bests
02248     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02249   gtk_widget_set_tooltip_text
02250     (GTK_WIDGET (window->spin_bests),
02251      _("Number of best simulations used to set the variable interval "
02252        "on the next iteration"));
02253   window->label_population
02254     = (GtkLabel *) gtk_label_new (_("Population number"));
02255   window->spin_population
02256     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02257   gtk_widget_set_tooltip_text
02258     (GTK_WIDGET (window->spin_population),
02259      _("Number of population for the genetic algorithm"));
02260   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_population), TRUE);
02261   window->label_generations
02262     = (GtkLabel *) gtk_label_new (_("Generations number"));
02263   window->spin_generations
02264     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02265   gtk_widget_set_tooltip_text
02266     (GTK_WIDGET (window->spin_generations),
02267      _("Number of generations for the genetic algorithm"));
02268   window->label_mutation = (GtkLabel *) gtk_label_new (_("Mutation ratio"));
02269   window->spin_mutation
02270     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02271   gtk_widget_set_tooltip_text
02272     (GTK_WIDGET (window->spin_mutation),
02273      _("Ratio of mutation for the genetic algorithm"));
02274   window->label_reproduction
02275     = (GtkLabel *) gtk_label_new (_("Reproduction ratio"));
02276   window->spin_reproduction
02277     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02278   gtk_widget_set_tooltip_text
02279     (GTK_WIDGET (window->spin_reproduction),
02280      _("Ratio of reproduction for the genetic algorithm"));
02281   window->label_adaptation = (GtkLabel *) gtk_label_new (_("Adaptation ratio"));
02282   window->spin_adaptation
02283     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02284   gtk_widget_set_tooltip_text
02285     (GTK_WIDGET (window->spin_adaptation),
02286      _("Ratio of adaptation for the genetic algorithm"));
02287   window->label_threshold = (GtkLabel *) gtk_label_new (_("Threshold"));
02288   window->spin_threshold = (GtkSpinButton *)
02289     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE,
02290                                     precision[DEFAULT_PRECISION]);
02291   gtk_widget_set_tooltip_text
02292     (GTK_WIDGET (window->spin_threshold),
02293      _("Threshold in the objective function to finish the simulations"));
02294   window->scrolled_threshold =
02295     (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02296   gtk_container_add (GTK_CONTAINER (window->scrolled_threshold),
02297                      GTK_WIDGET (window->spin_threshold));
02298 //  gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_threshold), TRUE);
02299 //  gtk_widget_set_halign (GTK_WIDGET (window->scrolled_threshold),
02300 //                         GTK_ALIGN_FILL);
02301
02302   // Creating the hill climbing method properties
02303   window->check_climbing = (GtkCheckButton *)
02304     gtk_check_button_new_with_mnemonic (_("_Hill climbing method"));
02305   g_signal_connect (window->check_climbing, "clicked",
      window_update, NULL);
02306   window->grid_climbing = (GtkGrid *) gtk_grid_new ();
02307   window->button_climbing[0] = (GtkRadioButton *)
02308     gtk_radio_button_new_with_mnemonic (NULL, label_climbing[0]);
02309   gtk_grid_attach (window->grid_climbing,
02310                    GTK_WIDGET (window->button_climbing[0]), 0, 0, 1, 1);
02311   g_signal_connect (window->button_climbing[0], "clicked",
      window_update, NULL);
02312   for (i = 0; ++i < NCLIMBINGS;)
02313     {
02314       window->button_climbing[i] = (GtkRadioButton *)
02315         gtk_radio_button_new_with_mnemonic
02316         (gtk_radio_button_get_group (window->button_climbing[0]),
02317          label_climbing[i]);
02318       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_climbing[i]),
02319                                    tip_climbing[i]);
02320       gtk_grid_attach (window->grid_climbing,
02321                        GTK_WIDGET (window->button_climbing[i]), 0, i, 1, 1);
02322       g_signal_connect (window->button_climbing[i], "clicked",
      window_update,
```

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02323                         NULL);
02324     }
02325   window->label_steps = (GtkLabel *) gtk_label_new (_("Steps number"));
02326   window->spin_steps = (GtkSpinButton *)
02327     gtk_spin_button_new_with_range (1., 1.e12, 1.);
02328   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_steps), TRUE);
02329   window->label_estimates
02330     = (GtkLabel *) gtk_label_new (_("Climbing estimates number"));
02331   window->spin_estimates = (GtkSpinButton *)
02332     gtk_spin_button_new_with_range (1., 1.e3, 1.);
02333   window->label_relaxation
02334     = (GtkLabel *) gtk_label_new (_("Relaxation parameter"));
02335   window->spin_relaxation = (GtkSpinButton *)
02336     gtk_spin_button_new_with_range (0., 2., 0.001);
02337   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_steps),
02338                    0, NCLIMBINGS, 1, 1);
02339   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_steps),
02340                    1, NCLIMBINGS, 1, 1);
02341   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_estimates),
02342                    0, NCLIMBINGS + 1, 1, 1);
02343   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_estimates),
02344                    1, NCLIMBINGS + 1, 1, 1);
02345   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_relaxation),
02346                    0, NCLIMBINGS + 2, 1, 1);
02347   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_relaxation),
02348                    1, NCLIMBINGS + 2, 1, 1);
02349
02350   // Creating the array of algorithms
02351   window->grid_algorithm = (GtkGrid *) gtk_grid_new ();
02352   window->button_algorithm[0] = (GtkRadioButton *)
02353     gtk_radio_button_new_with_mnemonic (NULL, label_algorithm[0]);
02354   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[0]),
02355                                tip_algorithm[0]);
02356   gtk_grid_attach (window->grid_algorithm,
02357                    GTK_WIDGET (window->button_algorithm[0]), 0, 0, 1, 1);
02358   g_signal_connect (window->button_algorithm[0], "clicked",
02359                     window_set_algorithm, NULL);
02360   for (i = 0; ++i < NALGORITHMS;)
02361     {
02362       window->button_algorithm[i] = (GtkRadioButton *)
02363         gtk_radio_button_new_with_mnemonic
02364         (gtk_radio_button_get_group (window->button_algorithm[0]),
02365          label_algorithm[i]);
02366       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[i]),
02367                                    tip_algorithm[i]);
02368       gtk_grid_attach (window->grid_algorithm,
02369                        GTK_WIDGET (window->button_algorithm[i]), 0, i, 1, 1);
02370       g_signal_connect (window->button_algorithm[i], "clicked",
02371                         window_set_algorithm, NULL);
02372     }
02373   gtk_grid_attach (window->grid_algorithm,
02374                    GTK_WIDGET (window->label_simulations),
02375                    0, NALGORITHMS, 1, 1);
02376   gtk_grid_attach (window->grid_algorithm,
02377                    GTK_WIDGET (window->spin_simulations), 1, NALGORITHMS, 1, 1);
02378   gtk_grid_attach (window->grid_algorithm,
02379                    GTK_WIDGET (window->label_iterations),
02380                    0, NALGORITHMS + 1, 1, 1);
02381   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      spin_iterations),
02382                    1, NALGORITHMS + 1, 1, 1);
02383   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      label_tolerance),
02384                    0, NALGORITHMS + 2, 1, 1);
02385   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      spin_tolerance),
02386                    1, NALGORITHMS + 2, 1, 1);
02387   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      label_bests),
02388                    0, NALGORITHMS + 3, 1, 1);
02389   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      spin_bests),
02390                    1, NALGORITHMS + 3, 1, 1);
02391   gtk_grid_attach (window->grid_algorithm,
02392                    GTK_WIDGET (window->label_population),
02393                    0, NALGORITHMS + 4, 1, 1);
02394   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      spin_population),
02395                    1, NALGORITHMS + 4, 1, 1);
02396   gtk_grid_attach (window->grid_algorithm,
02397                    GTK_WIDGET (window->label_generations),
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02398                    0, NALGORITHMS + 5, 1, 1);
02399   gtk_grid_attach (window->grid_algorithm,
02400                    GTK_WIDGET (window->spin_generations),
02401                    1, NALGORITHMS + 5, 1, 1);
02402   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      label_mutation),
02403                    0, NALGORITHMS + 6, 1, 1);
02404   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      spin_mutation),
02405                    1, NALGORITHMS + 6, 1, 1);
02406   gtk_grid_attach (window->grid_algorithm,
02407                    GTK_WIDGET (window->label_reproduction),
02408                    0, NALGORITHMS + 7, 1, 1);
02409   gtk_grid_attach (window->grid_algorithm,
02410                    GTK_WIDGET (window->spin_reproduction),
02411                    1, NALGORITHMS + 7, 1, 1);
02412   gtk_grid_attach (window->grid_algorithm,
02413                    GTK_WIDGET (window->label_adaptation),
02414                    0, NALGORITHMS + 8, 1, 1);
02415   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      spin_adaptation),
02416                    1, NALGORITHMS + 8, 1, 1);
02417   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      check_climbing),
02418                    0, NALGORITHMS + 9, 2, 1);
02419   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      grid_climbing),
02420                    0, NALGORITHMS + 10, 2, 1);
02421   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
      label_threshold),
02422                    0, NALGORITHMS + 11, 1, 1);
02423   gtk_grid_attach (window->grid_algorithm,
02424                    GTK_WIDGET (window->scrolled_threshold),
02425                    1, NALGORITHMS + 11, 1, 1);
02426   window->frame_algorithm = (GtkFrame *) gtk_frame_new (_("Algorithm"));
02427   gtk_container_add (GTK_CONTAINER (window->frame_algorithm),
02428                      GTK_WIDGET (window->grid_algorithm));
02429
02430   // Creating the variable widgets
02431   window->combo_variable = (GtkComboBoxText *) gtk_combo_box_text_new ();
02432   gtk_widget_set_tooltip_text
02433     (GTK_WIDGET (window->combo_variable), _("Variables selector"));
02434   window->id_variable = g_signal_connect
02435     (window->combo_variable, "changed", window_set_variable, NULL);
02436   window->button_add_variable = (GtkButton *)
02437     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02438   g_signal_connect (window->button_add_variable, "clicked",
      window_add_variable,
02439                     NULL);
02440   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_variable),
02441                                _("Add variable"));
02442   window->button_remove_variable = (GtkButton *)
02443     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02444   g_signal_connect (window->button_remove_variable, "clicked",
02445                     window_remove_variable, NULL);
02446   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_variable),
02447                                _("Remove variable"));
02448   window->label_variable = (GtkLabel *) gtk_label_new (_("Name"));
02449   window->entry_variable = (GtkEntry *) gtk_entry_new ();
02450   gtk_widget_set_tooltip_text
02451     (GTK_WIDGET (window->entry_variable), _("Variable name"));
02452   gtk_widget_set_hexpand (GTK_WIDGET (window->entry_variable), TRUE);
02453   window->id_variable_label = g_signal_connect
02454     (window->entry_variable, "changed", window_label_variable, NULL);
02455   window->label_min = (GtkLabel *) gtk_label_new (_("Minimum"));
02456   window->spin_min = (GtkSpinButton *) gtk_spin_button_new_with_range
02457     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02458   gtk_widget_set_tooltip_text
02459     (GTK_WIDGET (window->spin_min), _("Minimum initial value of the variable"));
02460   window->scrolled_min
02461     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02462   gtk_container_add (GTK_CONTAINER (window->scrolled_min),
02463                      GTK_WIDGET (window->spin_min));
02464   g_signal_connect (window->spin_min, "value-changed",
02465                     window_rangemin_variable, NULL);
02466   window->label_max = (GtkLabel *) gtk_label_new (_("Maximum"));
02467   window->spin_max = (GtkSpinButton *) gtk_spin_button_new_with_range
02468     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02469   gtk_widget_set_tooltip_text
02470     (GTK_WIDGET (window->spin_max), _("Maximum initial value of the variable"));
02471   window->scrolled_max
02472     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02473   gtk_container_add (GTK_CONTAINER (window->scrolled_max),
02474                      GTK_WIDGET (window->spin_max));
02475   g_signal_connect (window->spin_max, "value-changed",
02476                     window_rangemax_variable, NULL);
02477   window->check_minabs = (GtkCheckButton *)
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02478     gtk_check_button_new_with_mnemonic (_("_Absolute minimum"));
02479   g_signal_connect (window->check_minabs, "toggled", window_update, NULL);
02480   window->spin_minabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02481     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02482   gtk_widget_set_tooltip_text
02483     (GTK_WIDGET (window->spin_minabs),
02484      _("Minimum allowed value of the variable"));
02485   window->scrolled_minabs
02486     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02487   gtk_container_add (GTK_CONTAINER (window->scrolled_minabs),
02488                      GTK_WIDGET (window->spin_minabs));
02489   g_signal_connect (window->spin_minabs, "value-changed",
02490                     window_rangeminabs_variable, NULL);
02491   window->check_maxabs = (GtkCheckButton *)
02492     gtk_check_button_new_with_mnemonic (_("_Absolute maximum"));
02493   g_signal_connect (window->check_maxabs, "toggled", window_update, NULL);
02494   window->spin_maxabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02495     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02496   gtk_widget_set_tooltip_text
02497     (GTK_WIDGET (window->spin_maxabs),
02498      _("Maximum allowed value of the variable"));
02499   window->scrolled_maxabs
02500     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02501   gtk_container_add (GTK_CONTAINER (window->scrolled_maxabs),
02502                      GTK_WIDGET (window->spin_maxabs));
02503   g_signal_connect (window->spin_maxabs, "value-changed",
02504                     window_rangemaxabs_variable, NULL);
02505   window->label_precision = (GtkLabel *) gtk_label_new (_("Precision digits"));
02506   window->spin_precision = (GtkSpinButton *)
02507     gtk_spin_button_new_with_range (0., (gdouble) DEFAULT_PRECISION, 1.);
02508   gtk_widget_set_tooltip_text
02509     (GTK_WIDGET (window->spin_precision),
02510      _("Number of precision floating point digits\n"
02511        "0 is for integer numbers"));
02512   g_signal_connect (window->spin_precision, "value-changed",
02513                     window_precision_variable, NULL);
02514   window->label_sweeps = (GtkLabel *) gtk_label_new (_("Sweeps number"));
02515   window->spin_sweeps =
02516     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02517   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_sweeps),
02518                                _("Number of steps sweeping the variable"));
02519   g_signal_connect (window->spin_sweeps, "value-changed",
02520                     window_update_variable, NULL);
02521   window->label_bits = (GtkLabel *) gtk_label_new (_("Bits number"));
02522   window->spin_bits
02523     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
02524   gtk_widget_set_tooltip_text
02525     (GTK_WIDGET (window->spin_bits),
02526      _("Number of bits to encode the variable"));
02527   g_signal_connect
02528     (window->spin_bits, "value-changed", window_update_variable, NULL);
02529   window->label_step = (GtkLabel *) gtk_label_new (_("Step size"));
02530   window->spin_step = (GtkSpinButton *) gtk_spin_button_new_with_range
02531     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02532   gtk_widget_set_tooltip_text
02533     (GTK_WIDGET (window->spin_step),
02534      _("Initial step size for the hill climbing method"));
02535   window->scrolled_step
02536     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02537   gtk_container_add (GTK_CONTAINER (window->scrolled_step),
02538                      GTK_WIDGET (window->spin_step));
02539   g_signal_connect
02540     (window->spin_step, "value-changed", window_step_variable, NULL);
02541   window->grid_variable = (GtkGrid *) gtk_grid_new ();
02542   gtk_grid_attach (window->grid_variable,
02543                    GTK_WIDGET (window->combo_variable), 0, 0, 2, 1);
02544   gtk_grid_attach (window->grid_variable,
02545                    GTK_WIDGET (window->button_add_variable), 2, 0, 1, 1);
02546   gtk_grid_attach (window->grid_variable,
02547                    GTK_WIDGET (window->button_remove_variable), 3, 0, 1, 1);
02548   gtk_grid_attach (window->grid_variable,
02549                    GTK_WIDGET (window->label_variable), 0, 1, 1, 1);
02550   gtk_grid_attach (window->grid_variable,
02551                    GTK_WIDGET (window->entry_variable), 1, 1, 3, 1);
02552   gtk_grid_attach (window->grid_variable,
02553                    GTK_WIDGET (window->label_min), 0, 2, 1, 1);
02554   gtk_grid_attach (window->grid_variable,
02555                    GTK_WIDGET (window->scrolled_min), 1, 2, 3, 1);
02556   gtk_grid_attach (window->grid_variable,
02557                    GTK_WIDGET (window->label_max), 0, 3, 1, 1);
02558   gtk_grid_attach (window->grid_variable,
02559                    GTK_WIDGET (window->scrolled_max), 1, 3, 3, 1);
02560   gtk_grid_attach (window->grid_variable,
02561                    GTK_WIDGET (window->check_minabs), 0, 4, 1, 1);
02562   gtk_grid_attach (window->grid_variable,
02563                    GTK_WIDGET (window->scrolled_minabs), 1, 4, 3, 1);
02564   gtk_grid_attach (window->grid_variable,
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02565                    GTK_WIDGET (window->check_maxabs), 0, 5, 1, 1);
02566   gtk_grid_attach (window->grid_variable,
02567                    GTK_WIDGET (window->scrolled_maxabs), 1, 5, 3, 1);
02568   gtk_grid_attach (window->grid_variable,
02569                    GTK_WIDGET (window->label_precision), 0, 6, 1, 1);
02570   gtk_grid_attach (window->grid_variable,
02571                    GTK_WIDGET (window->spin_precision), 1, 6, 3, 1);
02572   gtk_grid_attach (window->grid_variable,
02573                    GTK_WIDGET (window->label_sweeps), 0, 7, 1, 1);
02574   gtk_grid_attach (window->grid_variable,
02575                    GTK_WIDGET (window->spin_sweeps), 1, 7, 3, 1);
02576   gtk_grid_attach (window->grid_variable,
02577                    GTK_WIDGET (window->label_bits), 0, 8, 1, 1);
02578   gtk_grid_attach (window->grid_variable,
02579                    GTK_WIDGET (window->spin_bits), 1, 8, 3, 1);
02580   gtk_grid_attach (window->grid_variable,
02581                    GTK_WIDGET (window->label_step), 0, 9, 1, 1);
02582   gtk_grid_attach (window->grid_variable,
02583                    GTK_WIDGET (window->scrolled_step), 1, 9, 3, 1);
02584   window->frame_variable = (GtkFrame *) gtk_frame_new (_("Variable"));
02585   gtk_container_add (GTK_CONTAINER (window->frame_variable),
02586                      GTK_WIDGET (window->grid_variable));
02587
02588   // Creating the experiment widgets
02589   window->combo_experiment = (GtkComboBoxText *) gtk_combo_box_text_new ();
02590   gtk_widget_set_tooltip_text (GTK_WIDGET (window->combo_experiment),
02591                                _("Experiment selector"));
02592   window->id_experiment = g_signal_connect
02593     (window->combo_experiment, "changed", window_set_experiment, NULL)
    ;
02594   window->button_add_experiment = (GtkButton *)
02595     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02596   g_signal_connect
02597     (window->button_add_experiment, "clicked",
      window_add_experiment, NULL);
02598   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_experiment),
02599                                _("Add experiment"));
02600   window->button_remove_experiment = (GtkButton *)
02601     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02602   g_signal_connect (window->button_remove_experiment, "clicked",
02603                     window_remove_experiment, NULL);
02604   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_experiment),
02605                                _("Remove experiment"));
02606   window->label_experiment
02607     = (GtkLabel *) gtk_label_new (_("Experimental data file"));
02608   window->button_experiment = (GtkFileChooserButton *)
02609     gtk_file_chooser_button_new (_("Experimental data file"),
02610                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02611   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_experiment),
02612                                _("Experimental data file"));
02613   window->id_experiment_name
02614     = g_signal_connect (window->button_experiment, "selection-changed",
02615                         window_name_experiment, NULL);
02616   gtk_widget_set_hexpand (GTK_WIDGET (window->button_experiment), TRUE);
02617   window->label_weight = (GtkLabel *) gtk_label_new (_("Weight"));
02618   window->spin_weight
02619     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02620   gtk_widget_set_tooltip_text
02621     (GTK_WIDGET (window->spin_weight),
02622      _("Weight factor to build the objective function"));
02623   g_signal_connect
02624     (window->spin_weight, "value-changed", window_weight_experiment,
      NULL);
02625   window->grid_experiment = (GtkGrid *) gtk_grid_new ();
02626   gtk_grid_attach (window->grid_experiment,
02627                    GTK_WIDGET (window->combo_experiment), 0, 0, 2, 1);
02628   gtk_grid_attach (window->grid_experiment,
02629                    GTK_WIDGET (window->button_add_experiment), 2, 0, 1, 1);
02630   gtk_grid_attach (window->grid_experiment,
02631                    GTK_WIDGET (window->button_remove_experiment), 3, 0, 1, 1);
02632   gtk_grid_attach (window->grid_experiment,
02633                    GTK_WIDGET (window->label_experiment), 0, 1, 1, 1);
02634   gtk_grid_attach (window->grid_experiment,
02635                    GTK_WIDGET (window->button_experiment), 1, 1, 3, 1);
02636   gtk_grid_attach (window->grid_experiment,
02637                    GTK_WIDGET (window->label_weight), 0, 2, 1, 1);
02638   gtk_grid_attach (window->grid_experiment,
02639                    GTK_WIDGET (window->spin_weight), 1, 2, 3, 1);
02640   for (i = 0; i < MAX_NINPUTS; ++i)
02641     {
02642       snprintf (buffer3, 64, "%s %u", _("Input template"), i + 1);
02643       window->check_template[i] = (GtkCheckButton *)
02644         gtk_check_button_new_with_label (buffer3);
02645       window->id_template[i]
02646         = g_signal_connect (window->check_template[i], "toggled",
02647                             window_inputs_experiment, NULL);
02648       gtk_grid_attach (window->grid_experiment,
```

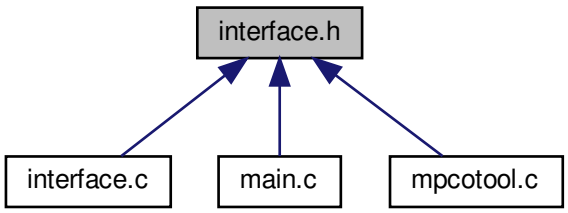
```
02649                       GTK_WIDGET (window->check_template[i]), 0, 3 + i, 1, 1);
02650       window->button_template[i] = (GtkFileChooserButton *)
02651         gtk_file_chooser_button_new (_("Input template"),
02652                                      GTK_FILE_CHOOSER_ACTION_OPEN);
02653       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_template[i]),
02654                                    _("Experimental input template file"));
02655       window->id_input[i] =
02656         g_signal_connect_swapped (window->button_template[i],
02657                                   "selection-changed",
02658                                   (GCallback) window_template_experiment,
02659                                   (void *) (size_t) i);
02660       gtk_grid_attach (window->grid_experiment,
02661                        GTK_WIDGET (window->button_template[i]), 1, 3 + i, 3, 1);
02662     }
02663   window->frame_experiment = (GtkFrame *) gtk_frame_new (_("Experiment"));
02664   gtk_container_add (GTK_CONTAINER (window->frame_experiment),
02665                      GTK_WIDGET (window->grid_experiment));
02666
02667   // Creating the error norm widgets
02668   window->frame_norm = (GtkFrame *) gtk_frame_new (_("Error norm"));
02669   window->grid_norm = (GtkGrid *) gtk_grid_new ();
02670   gtk_container_add (GTK_CONTAINER (window->frame_norm),
02671                      GTK_WIDGET (window->grid_norm));
02672   window->button_norm[0] = (GtkRadioButton *)
02673     gtk_radio_button_new_with_mnemonic (NULL, label_norm[0]);
02674   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[0]),
02675                                tip_norm[0]);
02676   gtk_grid_attach (window->grid_norm,
02677                    GTK_WIDGET (window->button_norm[0]), 0, 0, 1, 1);
02678   g_signal_connect (window->button_norm[0], "clicked", window_update, NULL);
02679   for (i = 0; ++i < NNORMS;)
02680     {
02681       window->button_norm[i] = (GtkRadioButton *)
02682         gtk_radio_button_new_with_mnemonic
02683         (gtk_radio_button_get_group (window->button_norm[0]), label_norm[i]);
02684       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[i]),
02685                                    tip_norm[i]);
02686       gtk_grid_attach (window->grid_norm,
02687                        GTK_WIDGET (window->button_norm[i]), 0, i, 1, 1);
02688       g_signal_connect (window->button_norm[i], "clicked",
      window_update, NULL);
02689     }
02690   window->label_p = (GtkLabel *) gtk_label_new (_("P parameter"));
02691   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->label_p), 1, 1, 1, 1);
02692   window->spin_p = (GtkSpinButton *)
02693     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE, 0.01);
02694   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_p),
02695                                _("P parameter for the P error norm"));
02696   window->scrolled_p =
02697     (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02698   gtk_container_add (GTK_CONTAINER (window->scrolled_p),
02699                      GTK_WIDGET (window->spin_p));
02700   gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_p), TRUE);
02701   gtk_widget_set_halign (GTK_WIDGET (window->scrolled_p), GTK_ALIGN_FILL);
02702   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->scrolled_p),
02703                    1, 2, 1, 2);
02704
02705   // Creating the grid and attaching the widgets to the grid
02706   window->grid = (GtkGrid *) gtk_grid_new ();
02707   gtk_grid_attach (window->grid, GTK_WIDGET (window->bar_buttons), 0, 0, 3, 1);
02708   gtk_grid_attach (window->grid, GTK_WIDGET (window->grid_files), 0, 1, 1, 1);
02709   gtk_grid_attach (window->grid,
02710                    GTK_WIDGET (window->frame_algorithm), 0, 2, 1, 1);
02711   gtk_grid_attach (window->grid,
02712                    GTK_WIDGET (window->frame_variable), 1, 2, 1, 1);
02713   gtk_grid_attach (window->grid,
02714                    GTK_WIDGET (window->frame_experiment), 2, 2, 1, 1);
02715   gtk_grid_attach (window->grid, GTK_WIDGET (window->frame_norm), 1, 1, 2, 1);
02716   gtk_container_add (GTK_CONTAINER (window->window), GTK_WIDGET (window->
      grid));
02717
02718   // Setting the window logo
02719   window->logo = gdk_pixbuf_new_from_xpm_data (logo);
02720   gtk_window_set_icon (window->window, window->logo);
02721
02722   // Showing the window
02723   gtk_widget_show_all (GTK_WIDGET (window->window));
02724
02725   // In GTK+ 3.16 and 3.18 the default scrolled size is wrong
02726 #if GTK_MINOR_VERSION >= 16
02727   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_min), -1, 40);
02728   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_max), -1, 40);
02729   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_minabs), -1, 40);
02730   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_maxabs), -1, 40);
02731   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_step), -1, 40);
02732   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_p), -1, 40);
02733   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_threshold), -1, 40);
```

```
02734 #endif
02735
02736   // Reading initial example
02737   input_new ();
02738   buffer2 = g_get_current_dir ();
02739   buffer = g_build_filename (buffer2, "..", "tests", "test1", INPUT_FILE, NULL);
02740   g_free (buffer2);
02741   window_read (buffer);
02742   g_free (buffer);
02743
02744 #if DEBUG_INTERFACE
02745   fprintf (stderr, "window_new: start\n");
02746 #endif
02747 }
```

4.13 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.

4.13.1 Detailed Description

Header file to define the graphical interface functions.

Authors

Javier Burguete.

Copyright

Definition in file interface.h.

4.13.2 Function Documentation

4.13.2.1 window_new()

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

Function to open the main window.

Parameters

application	GtkApplication struct.

Definition at line 2066 of file interface.c.

```
02067 {
02068   unsigned int i;
02069   char *buffer, *buffer2, buffer3[64];
02070   char *label_algorithm[NALGORITHMS] = {
02071     "_Monte-Carlo", _("_Sweep"), _("_Genetic"), _("_Orthogonal")
02072   };
02073   char *tip_algorithm[NALGORITHMS] = {
02074     _("Monte-Carlo brute force algorithm"),
02075     _("Sweep brute force algorithm"),
02076     _("Genetic algorithm"),
02077     _("Orthogonal sampling brute force algorithm"),
02078   };
02079   char *label_climbing[NCLIMBINGS] = {
02080     _("_Coordinates climbing"), _("_Random climbing")
02081   };
02082   char *tip_climbing[NCLIMBINGS] = {
02083     _("Coordinates climbing estimate method"),
```

```
02084     _("Random climbing estimate method")
02085   };
02086   char *label_norm[NNORMS] = { "L2", "L", "Lp", "L1" };
02087   char *tip_norm[NNORMS] = {
02088     _("Euclidean error norm (L2)"),
02089     _("Maximum error norm (L)"),
02090     _("P error norm (Lp)"),
02091     _("Taxicab error norm (L1)")
02092   };
02093
02094 #if DEBUG_INTERFACE
02095   fprintf (stderr, "window_new: start\n");
02096 #endif
02097
02098   // Creating the window
02099   window->window = main_window
02100     = (GtkWindow *) gtk_application_window_new (application);
02101
02102   // Finish when closing the window
02103   g_signal_connect_swapped (window->window, "delete-event",
02104                             G_CALLBACK (g_application_quit),
02105                             G_APPLICATION (application));
02106
02107   // Setting the window title
02108   gtk_window_set_title (window->window, "MPCOTool");
02109
02110   // Creating the open button
02111   window->button_open = (GtkToolButton *) gtk_tool_button_new
02112     (gtk_image_new_from_icon_name ("document-open",
02113                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Open"));
02114   g_signal_connect (window->button_open, "clicked", window_open, NULL);
02115
02116   // Creating the save button
02117   window->button_save = (GtkToolButton *) gtk_tool_button_new
02118     (gtk_image_new_from_icon_name ("document-save",
02119                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Save"));
02120   g_signal_connect (window->button_save, "clicked", (GCallback)
      window_save,
02121                     NULL);
02122
02123   // Creating the run button
02124   window->button_run = (GtkToolButton *) gtk_tool_button_new
02125     (gtk_image_new_from_icon_name ("system-run",
02126                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Run"));
02127   g_signal_connect (window->button_run, "clicked", window_run, NULL);
02128
02129   // Creating the options button
02130   window->button_options = (GtkToolButton *) gtk_tool_button_new
02131     (gtk_image_new_from_icon_name ("preferences-system",
02132                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Options"));
02133   g_signal_connect (window->button_options, "clicked",
      options_new, NULL);
02134
02135   // Creating the help button
02136   window->button_help = (GtkToolButton *) gtk_tool_button_new
02137     (gtk_image_new_from_icon_name ("help-browser",
02138                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Help"));
02139   g_signal_connect (window->button_help, "clicked", window_help, NULL);
02140
02141   // Creating the about button
02142   window->button_about = (GtkToolButton *) gtk_tool_button_new
02143     (gtk_image_new_from_icon_name ("help-about",
02144                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("About"));
02145   g_signal_connect (window->button_about, "clicked",
      window_about, NULL);
02146
02147   // Creating the exit button
02148   window->button_exit = (GtkToolButton *) gtk_tool_button_new
02149     (gtk_image_new_from_icon_name ("application-exit",
02150                                    GTK_ICON_SIZE_LARGE_TOOLBAR), _("Exit"));
02151   g_signal_connect_swapped (window->button_exit, "clicked",
02152                             G_CALLBACK (g_application_quit),
02153                             G_APPLICATION (application));
02154
02155   // Creating the buttons bar
02156   window->bar_buttons = (GtkToolbar *) gtk_toolbar_new ();
02157   gtk_toolbar_insert
02158     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_open), 0);
02159   gtk_toolbar_insert
02160     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_save), 1);
02161   gtk_toolbar_insert
02162     (window->bar_buttons, GTK_TOOL_ITEM (window->
      button_run), 2);
02163   gtk_toolbar_insert
02164     (window->bar_buttons, GTK_TOOL_ITEM (window->
```

```
button_options), 3);
02165   gtk_toolbar_insert
02166     (window->bar_buttons, GTK_TOOL_ITEM (window->
button_help), 4);
02167   gtk_toolbar_insert
02168     (window->bar_buttons, GTK_TOOL_ITEM (window->
button_about), 5);
02169   gtk_toolbar_insert
02170     (window->bar_buttons, GTK_TOOL_ITEM (window->
button_exit), 6);
02171   gtk_toolbar_set_style (window->bar_buttons, GTK_TOOLBAR_BOTH);
02172
02173   // Creating the simulator program label and entry
02174   window->label_simulator = (GtkLabel *) gtk_label_new (_("Simulator program"));
02175   window->button_simulator = (GtkFileChooserButton *)
02176     gtk_file_chooser_button_new (_("Simulator program"),
02177                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02178   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_simulator),
02179                                _("Simulator program executable file"));
02180   gtk_widget_set_hexpand (GTK_WIDGET (window->button_simulator), TRUE);
02181
02182   // Creating the evaluator program label and entry
02183   window->check_evaluator = (GtkCheckButton *)
02184     gtk_check_button_new_with_mnemonic (_("_Evaluator program"));
02185   g_signal_connect (window->check_evaluator, "toggled",
window_update, NULL);
02186   window->button_evaluator = (GtkFileChooserButton *)
02187     gtk_file_chooser_button_new (_("Evaluator program"),
02188                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02189   gtk_widget_set_tooltip_text
02190     (GTK_WIDGET (window->button_evaluator),
02191      _("Optional evaluator program executable file"));
02192
02193   // Creating the results files labels and entries
02194   window->label_result = (GtkLabel *) gtk_label_new (_("Result file"));
02195   window->entry_result = (GtkEntry *) gtk_entry_new ();
02196   gtk_widget_set_tooltip_text
02197     (GTK_WIDGET (window->entry_result), _("Best results file"));
02198   window->label_variables = (GtkLabel *) gtk_label_new (_("Variables file"));
02199   window->entry_variables = (GtkEntry *) gtk_entry_new ();
02200   gtk_widget_set_tooltip_text
02201     (GTK_WIDGET (window->entry_variables), _("All simulated results file"));
02202
02203   // Creating the files grid and attaching widgets
02204   window->grid_files = (GtkGrid *) gtk_grid_new ();
02205   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
label_simulator),
02206                    0, 0, 1, 1);
02207   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
button_simulator),
02208                    1, 0, 1, 1);
02209   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
check_evaluator),
02210                    0, 1, 1, 1);
02211   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
button_evaluator),
02212                    1, 1, 1, 1);
02213   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
label_result),
02214                    0, 2, 1, 1);
02215   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
entry_result),
02216                    1, 2, 1, 1);
02217   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
label_variables),
02218                    0, 3, 1, 1);
02219   gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
entry_variables),
02220                    1, 3, 1, 1);
02221
02222   // Creating the algorithm properties
02223   window->label_simulations = (GtkLabel *) gtk_label_new
02224     (_("Simulations number"));
02225   window->spin_simulations
02226     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02227   gtk_widget_set_tooltip_text
02228     (GTK_WIDGET (window->spin_simulations),
02229      _("Number of simulations to perform for each iteration"));
02230   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_simulations), TRUE);
02231   window->label_iterations = (GtkLabel *)
02232     gtk_label_new (_("Iterations number"));
02233   window->spin_iterations
02234     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02235   gtk_widget_set_tooltip_text
02236     (GTK_WIDGET (window->spin_iterations), _("Number of iterations"));
02237   g_signal_connect
02238     (window->spin_iterations, "value-changed",
```

```
      window_update, NULL);
02239   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_iterations), TRUE);
02240   window->label_tolerance = (GtkLabel *) gtk_label_new (_("Tolerance"));
02241   window->spin_tolerance =
02242     (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02243   gtk_widget_set_tooltip_text
02244     (GTK_WIDGET (window->spin_tolerance),
02245      _("Tolerance to set the variable interval on the next iteration"));
02246   window->label_bests = (GtkLabel *) gtk_label_new (_("Bests number"));
02247   window->spin_bests
02248     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02249   gtk_widget_set_tooltip_text
02250     (GTK_WIDGET (window->spin_bests),
02251      _("Number of best simulations used to set the variable interval "
02252        "on the next iteration"));
02253   window->label_population
02254     = (GtkLabel *) gtk_label_new (_("Population number"));
02255   window->spin_population
02256     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02257   gtk_widget_set_tooltip_text
02258     (GTK_WIDGET (window->spin_population),
02259      _("Number of population for the genetic algorithm"));
02260   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_population), TRUE);
02261   window->label_generations
02262     = (GtkLabel *) gtk_label_new (_("Generations number"));
02263   window->spin_generations
02264     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02265   gtk_widget_set_tooltip_text
02266     (GTK_WIDGET (window->spin_generations),
02267      _("Number of generations for the genetic algorithm"));
02268   window->label_mutation = (GtkLabel *) gtk_label_new (_("Mutation ratio"));
02269   window->spin_mutation
02270     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02271   gtk_widget_set_tooltip_text
02272     (GTK_WIDGET (window->spin_mutation),
02273      _("Ratio of mutation for the genetic algorithm"));
02274   window->label_reproduction
02275     = (GtkLabel *) gtk_label_new (_("Reproduction ratio"));
02276   window->spin_reproduction
02277     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02278   gtk_widget_set_tooltip_text
02279     (GTK_WIDGET (window->spin_reproduction),
02280      _("Ratio of reproduction for the genetic algorithm"));
02281   window->label_adaptation = (GtkLabel *) gtk_label_new (_("Adaptation ratio"));
02282   window->spin_adaptation
02283     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02284   gtk_widget_set_tooltip_text
02285     (GTK_WIDGET (window->spin_adaptation),
02286      _("Ratio of adaptation for the genetic algorithm"));
02287   window->label_threshold = (GtkLabel *) gtk_label_new (_("Threshold"));
02288   window->spin_threshold = (GtkSpinButton *)
02289     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE,
02290                                     precision[DEFAULT_PRECISION]);
02291   gtk_widget_set_tooltip_text
02292     (GTK_WIDGET (window->spin_threshold),
02293      _("Threshold in the objective function to finish the simulations"));
02294   window->scrolled_threshold =
02295     (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02296   gtk_container_add (GTK_CONTAINER (window->scrolled_threshold),
02297                      GTK_WIDGET (window->spin_threshold));
02298 //  gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_threshold), TRUE);
02299 //  gtk_widget_set_halign (GTK_WIDGET (window->scrolled_threshold),
02300 //                         GTK_ALIGN_FILL);
02301
02302   // Creating the hill climbing method properties
02303   window->check_climbing = (GtkCheckButton *)
02304     gtk_check_button_new_with_mnemonic (_("_Hill climbing method"));
02305   g_signal_connect (window->check_climbing, "clicked",
      window_update, NULL);
02306   window->grid_climbing = (GtkGrid *) gtk_grid_new ();
02307   window->button_climbing[0] = (GtkRadioButton *)
02308     gtk_radio_button_new_with_mnemonic (NULL, label_climbing[0]);
02309   gtk_grid_attach (window->grid_climbing,
02310                    GTK_WIDGET (window->button_climbing[0]), 0, 0, 1, 1);
02311   g_signal_connect (window->button_climbing[0], "clicked",
      window_update, NULL);
02312   for (i = 0; ++i < NCLIMBINGS;)
02313     {
02314       window->button_climbing[i] = (GtkRadioButton *)
02315         gtk_radio_button_new_with_mnemonic
02316         (gtk_radio_button_get_group (window->button_climbing[0]),
02317          label_climbing[i]);
02318       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_climbing[i]),
02319                                    tip_climbing[i]);
02320       gtk_grid_attach (window->grid_climbing,
02321                        GTK_WIDGET (window->button_climbing[i]), 0, i, 1, 1);
02322       g_signal_connect (window->button_climbing[i], "clicked",
```

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      window_update,
02323                         NULL);
02324     }
02325   window->label_steps = (GtkLabel *) gtk_label_new (_("Steps number"));
02326   window->spin_steps = (GtkSpinButton *)
02327     gtk_spin_button_new_with_range (1., 1.e12, 1.);
02328   gtk_widget_set_hexpand (GTK_WIDGET (window->spin_steps), TRUE);
02329   window->label_estimates
02330     = (GtkLabel *) gtk_label_new (_("Climbing estimates number"));
02331   window->spin_estimates = (GtkSpinButton *)
02332     gtk_spin_button_new_with_range (1., 1.e3, 1.);
02333   window->label_relaxation
02334     = (GtkLabel *) gtk_label_new (_("Relaxation parameter"));
02335   window->spin_relaxation = (GtkSpinButton *)
02336     gtk_spin_button_new_with_range (0., 2., 0.001);
02337   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_steps),
02338                    0, NCLIMBINGS, 1, 1);
02339   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_steps),
02340                    1, NCLIMBINGS, 1, 1);
02341   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_estimates),
02342                    0, NCLIMBINGS + 1, 1, 1);
02343   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_estimates),
02344                    1, NCLIMBINGS + 1, 1, 1);
02345   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      label_relaxation),
02346                    0, NCLIMBINGS + 2, 1, 1);
02347   gtk_grid_attach (window->grid_climbing, GTK_WIDGET (window->
      spin_relaxation),
02348                    1, NCLIMBINGS + 2, 1, 1);
02349
02350   // Creating the array of algorithms
02351   window->grid_algorithm = (GtkGrid *) gtk_grid_new ();
02352   window->button_algorithm[0] = (GtkRadioButton *)
02353     gtk_radio_button_new_with_mnemonic (NULL, label_algorithm[0]);
02354   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[0]),
02355                                tip_algorithm[0]);
02356   gtk_grid_attach (window->grid_algorithm,
02357                    GTK_WIDGET (window->button_algorithm[0]), 0, 0, 1, 1);
02358   g_signal_connect (window->button_algorithm[0], "clicked",
02359                     window_set_algorithm, NULL);
02360   for (i = 0; ++i < NALGORITHMS;)
02361     {
02362       window->button_algorithm[i] = (GtkRadioButton *)
02363         gtk_radio_button_new_with_mnemonic
02364         (gtk_radio_button_get_group (window->button_algorithm[0]),
02365          label_algorithm[i]);
02366       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[i]),
02367                                    tip_algorithm[i]);
02368       gtk_grid_attach (window->grid_algorithm,
02369                        GTK_WIDGET (window->button_algorithm[i]), 0, i, 1, 1);
02370       g_signal_connect (window->button_algorithm[i], "clicked",
02371                         window_set_algorithm, NULL);
02372     }
02373   gtk_grid_attach (window->grid_algorithm,
02374                    GTK_WIDGET (window->label_simulations),
02375                    0, NALGORITHMS, 1, 1);
02376   gtk_grid_attach (window->grid_algorithm,
02377                    GTK_WIDGET (window->spin_simulations), 1, NALGORITHMS, 1, 1);
02378   gtk_grid_attach (window->grid_algorithm,
02379                    GTK_WIDGET (window->label_iterations),
02380                    0, NALGORITHMS + 1, 1, 1);
02381   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_iterations),
02382                    1, NALGORITHMS + 1, 1, 1);
02383   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_tolerance),
02384                    0, NALGORITHMS + 2, 1, 1);
02385   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_tolerance),
02386                    1, NALGORITHMS + 2, 1, 1);
02387   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_bests),
02388                    0, NALGORITHMS + 3, 1, 1);
02389   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_bests),
02390                    1, NALGORITHMS + 3, 1, 1);
02391   gtk_grid_attach (window->grid_algorithm,
02392                    GTK_WIDGET (window->label_population),
02393                    0, NALGORITHMS + 4, 1, 1);
02394   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_population),
02395                    1, NALGORITHMS + 4, 1, 1);
02396   gtk_grid_attach (window->grid_algorithm,
```

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02397                   GTK_WIDGET (window->label_generations),
02398                   0, NALGORITHMS + 5, 1, 1);
02399   gtk_grid_attach (window->grid_algorithm,
02400                   GTK_WIDGET (window->spin_generations),
02401                   1, NALGORITHMS + 5, 1, 1);
02402   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_mutation),
02403                   0, NALGORITHMS + 6, 1, 1);
02404   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_mutation),
02405                   1, NALGORITHMS + 6, 1, 1);
02406   gtk_grid_attach (window->grid_algorithm,
02407                   GTK_WIDGET (window->label_reproduction),
02408                   0, NALGORITHMS + 7, 1, 1);
02409   gtk_grid_attach (window->grid_algorithm,
02410                   GTK_WIDGET (window->spin_reproduction),
02411                   1, NALGORITHMS + 7, 1, 1);
02412   gtk_grid_attach (window->grid_algorithm,
02413                   GTK_WIDGET (window->label_adaptation),
02414                   0, NALGORITHMS + 8, 1, 1);
02415   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->spin_adaptation),
02416                   1, NALGORITHMS + 8, 1, 1);
02417   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->check_climbing),
02418                   0, NALGORITHMS + 9, 2, 1);
02419   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->grid_climbing),
02420                   0, NALGORITHMS + 10, 2, 1);
02421   gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (
      window->label_threshold),
02422                   0, NALGORITHMS + 11, 1, 1);
02423   gtk_grid_attach (window->grid_algorithm,
02424                   GTK_WIDGET (window->scrolled_threshold),
02425                   1, NALGORITHMS + 11, 1, 1);
02426   window->frame_algorithm = (GtkFrame *) gtk_frame_new (_("Algorithm"));
02427   gtk_container_add (GTK_CONTAINER (window->frame_algorithm),
02428                      GTK_WIDGET (window->grid_algorithm));
02429
02430   // Creating the variable widgets
02431   window->combo_variable = (GtkComboBoxText *) gtk_combo_box_text_new ();
02432   gtk_widget_set_tooltip_text
02433     (GTK_WIDGET (window->combo_variable), _("Variables selector"));
02434   window->id_variable = g_signal_connect
02435     (window->combo_variable, "changed", window_set_variable, NULL);
02436   window->button_add_variable = (GtkButton *)
02437     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02438   g_signal_connect (window->button_add_variable, "clicked",
      window_add_variable,
02439                     NULL);
02440   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_variable),
02441                                _("Add variable"));
02442   window->button_remove_variable = (GtkButton *)
02443     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02444   g_signal_connect (window->button_remove_variable, "clicked",
02445                     window_remove_variable, NULL);
02446   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_variable),
02447                                _("Remove variable"));
02448   window->label_variable = (GtkLabel *) gtk_label_new (_("Name"));
02449   window->entry_variable = (GtkEntry *) gtk_entry_new ();
02450   gtk_widget_set_tooltip_text
02451     (GTK_WIDGET (window->entry_variable), _("Variable name"));
02452   gtk_widget_set_hexpand (GTK_WIDGET (window->entry_variable), TRUE);
02453   window->id_variable_label = g_signal_connect
02454     (window->entry_variable, "changed",
      window_label_variable, NULL);
02455   window->label_min = (GtkLabel *) gtk_label_new (_("Minimum"));
02456   window->spin_min = (GtkSpinButton *) gtk_spin_button_new_with_range
02457     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02458   gtk_widget_set_tooltip_text
02459     (GTK_WIDGET (window->spin_min), _("Minimum initial value of the variable"));
02460   window->scrolled_min
02461     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02462   gtk_container_add (GTK_CONTAINER (window->scrolled_min),
02463                      GTK_WIDGET (window->spin_min));
02464   g_signal_connect (window->spin_min, "value-changed",
02465                     window_rangemin_variable, NULL);
02466   window->label_max = (GtkLabel *) gtk_label_new (_("Maximum"));
02467   window->spin_max = (GtkSpinButton *) gtk_spin_button_new_with_range
02468     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02469   gtk_widget_set_tooltip_text
02470     (GTK_WIDGET (window->spin_max), _("Maximum initial value of the variable"));
02471   window->scrolled_max
02472     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02473   gtk_container_add (GTK_CONTAINER (window->scrolled_max),
02474                      GTK_WIDGET (window->spin_max));
02475   g_signal_connect (window->spin_max, "value-changed",
```

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02476                   window_rangemax_variable, NULL);
02477   window->check_minabs = (GtkCheckButton *)
02478     gtk_check_button_new_with_mnemonic (_("_Absolute minimum"));
02479   g_signal_connect (window->check_minabs, "toggled",
    window_update, NULL);
02480   window->spin_minabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02481     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02482   gtk_widget_set_tooltip_text
02483     (GTK_WIDGET (window->spin_minabs),
02484      _("Minimum allowed value of the variable"));
02485   window->scrolled_minabs
02486     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02487   gtk_container_add (GTK_CONTAINER (window->scrolled_minabs),
02488                      GTK_WIDGET (window->spin_minabs));
02489   g_signal_connect (window->spin_minabs, "value-changed",
02490                     window_rangeminabs_variable, NULL);
02491   window->check_maxabs = (GtkCheckButton *)
02492     gtk_check_button_new_with_mnemonic (_("_Absolute maximum"));
02493   g_signal_connect (window->check_maxabs, "toggled",
    window_update, NULL);
02494   window->spin_maxabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02495     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02496   gtk_widget_set_tooltip_text
02497     (GTK_WIDGET (window->spin_maxabs),
02498      _("Maximum allowed value of the variable"));
02499   window->scrolled_maxabs
02500     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02501   gtk_container_add (GTK_CONTAINER (window->scrolled_maxabs),
02502                      GTK_WIDGET (window->spin_maxabs));
02503   g_signal_connect (window->spin_maxabs, "value-changed",
02504                     window_rangemaxabs_variable, NULL);
02505   window->label_precision = (GtkLabel *) gtk_label_new (_("Precision digits"));
02506   window->spin_precision = (GtkSpinButton *)
02507     gtk_spin_button_new_with_range (0., (gdouble) DEFAULT_PRECISION, 1.);
02508   gtk_widget_set_tooltip_text
02509     (GTK_WIDGET (window->spin_precision),
02510      _("Number of precision floating point digits\n"
02511        "0 is for integer numbers"));
02512   g_signal_connect (window->spin_precision, "value-changed",
02513                     window_precision_variable, NULL);
02514   window->label_sweeps = (GtkLabel *) gtk_label_new (_("Sweeps number"));
02515   window->spin_sweeps =
02516     (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02517   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_sweeps),
02518                                _("Number of steps sweeping the variable"));
02519   g_signal_connect (window->spin_sweeps, "value-changed",
02520                     window_update_variable, NULL);
02521   window->label_bits = (GtkLabel *) gtk_label_new (_("Bits number"));
02522   window->spin_bits
02523     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
02524   gtk_widget_set_tooltip_text
02525     (GTK_WIDGET (window->spin_bits),
02526      _("Number of bits to encode the variable"));
02527   g_signal_connect
02528     (window->spin_bits, "value-changed", window_update_variable, NULL)
    ;
02529   window->label_step = (GtkLabel *) gtk_label_new (_("Step size"));
02530   window->spin_step = (GtkSpinButton *) gtk_spin_button_new_with_range
02531     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02532   gtk_widget_set_tooltip_text
02533     (GTK_WIDGET (window->spin_step),
02534      _("Initial step size for the hill climbing method"));
02535   window->scrolled_step
02536     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02537   gtk_container_add (GTK_CONTAINER (window->scrolled_step),
02538                      GTK_WIDGET (window->spin_step));
02539   g_signal_connect
02540     (window->spin_step, "value-changed", window_step_variable, NULL);
02541   window->grid_variable = (GtkGrid *) gtk_grid_new ();
02542   gtk_grid_attach (window->grid_variable,
02543                    GTK_WIDGET (window->combo_variable), 0, 0, 2, 1);
02544   gtk_grid_attach (window->grid_variable,
02545                    GTK_WIDGET (window->button_add_variable), 2, 0, 1, 1);
02546   gtk_grid_attach (window->grid_variable,
02547                    GTK_WIDGET (window->button_remove_variable), 3, 0, 1, 1);
02548   gtk_grid_attach (window->grid_variable,
02549                    GTK_WIDGET (window->label_variable), 0, 1, 1, 1);
02550   gtk_grid_attach (window->grid_variable,
02551                    GTK_WIDGET (window->entry_variable), 1, 1, 3, 1);
02552   gtk_grid_attach (window->grid_variable,
02553                    GTK_WIDGET (window->label_min), 0, 2, 1, 1);
02554   gtk_grid_attach (window->grid_variable,
02555                    GTK_WIDGET (window->scrolled_min), 1, 2, 3, 1);
02556   gtk_grid_attach (window->grid_variable,
02557                    GTK_WIDGET (window->label_max), 0, 3, 1, 1);
02558   gtk_grid_attach (window->grid_variable,
02559                    GTK_WIDGET (window->scrolled_max), 1, 3, 3, 1);
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02560   gtk_grid_attach (window->grid_variable,
02561                    GTK_WIDGET (window->check_minabs), 0, 4, 1, 1);
02562   gtk_grid_attach (window->grid_variable,
02563                    GTK_WIDGET (window->scrolled_minabs), 1, 4, 3, 1);
02564   gtk_grid_attach (window->grid_variable,
02565                    GTK_WIDGET (window->check_maxabs), 0, 5, 1, 1);
02566   gtk_grid_attach (window->grid_variable,
02567                    GTK_WIDGET (window->scrolled_maxabs), 1, 5, 3, 1);
02568   gtk_grid_attach (window->grid_variable,
02569                    GTK_WIDGET (window->label_precision), 0, 6, 1, 1);
02570   gtk_grid_attach (window->grid_variable,
02571                    GTK_WIDGET (window->spin_precision), 1, 6, 3, 1);
02572   gtk_grid_attach (window->grid_variable,
02573                    GTK_WIDGET (window->label_sweeps), 0, 7, 1, 1);
02574   gtk_grid_attach (window->grid_variable,
02575                    GTK_WIDGET (window->spin_sweeps), 1, 7, 3, 1);
02576   gtk_grid_attach (window->grid_variable,
02577                    GTK_WIDGET (window->label_bits), 0, 8, 1, 1);
02578   gtk_grid_attach (window->grid_variable,
02579                    GTK_WIDGET (window->spin_bits), 1, 8, 3, 1);
02580   gtk_grid_attach (window->grid_variable,
02581                    GTK_WIDGET (window->label_step), 0, 9, 1, 1);
02582   gtk_grid_attach (window->grid_variable,
02583                    GTK_WIDGET (window->scrolled_step), 1, 9, 3, 1);
02584   window->frame_variable = (GtkFrame *) gtk_frame_new (_("Variable"));
02585   gtk_container_add (GTK_CONTAINER (window->frame_variable),
02586                      GTK_WIDGET (window->grid_variable));
02587
02588   // Creating the experiment widgets
02589   window->combo_experiment = (GtkComboBoxText *) gtk_combo_box_text_new ();
02590   gtk_widget_set_tooltip_text (GTK_WIDGET (window->combo_experiment),
02591                                _("Experiment selector"));
02592   window->id_experiment = g_signal_connect
02593     (window->combo_experiment, "changed",
      window_set_experiment, NULL);
02594   window->button_add_experiment = (GtkButton *)
02595     gtk_button_new_from_icon_name ("list-add", GTK_ICON_SIZE_BUTTON);
02596   g_signal_connect
02597     (window->button_add_experiment, "clicked",
      window_add_experiment, NULL);
02598   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_experiment),
02599                                _("Add experiment"));
02600   window->button_remove_experiment = (GtkButton *)
02601     gtk_button_new_from_icon_name ("list-remove", GTK_ICON_SIZE_BUTTON);
02602   g_signal_connect (window->button_remove_experiment, "clicked",
02603                     window_remove_experiment, NULL);
02604   gtk_widget_set_tooltip_text (GTK_WIDGET (window->
      button_remove_experiment),
02605                                _("Remove experiment"));
02606   window->label_experiment
02607     = (GtkLabel *) gtk_label_new (_("Experimental data file"));
02608   window->button_experiment = (GtkFileChooserButton *)
02609     gtk_file_chooser_button_new (_("Experimental data file"),
02610                                  GTK_FILE_CHOOSER_ACTION_OPEN);
02611   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_experiment),
02612                                _("Experimental data file"));
02613   window->id_experiment_name
02614     = g_signal_connect (window->button_experiment, "selection-changed",
02615                         window_name_experiment, NULL);
02616   gtk_widget_set_hexpand (GTK_WIDGET (window->button_experiment), TRUE);
02617   window->label_weight = (GtkLabel *) gtk_label_new (_("Weight"));
02618   window->spin_weight
02619     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02620   gtk_widget_set_tooltip_text
02621     (GTK_WIDGET (window->spin_weight),
02622      _("Weight factor to build the objective function"));
02623   g_signal_connect
02624     (window->spin_weight, "value-changed",
      window_weight_experiment, NULL);
02625   window->grid_experiment = (GtkGrid *) gtk_grid_new ();
02626   gtk_grid_attach (window->grid_experiment,
02627                    GTK_WIDGET (window->combo_experiment), 0, 0, 2, 1);
02628   gtk_grid_attach (window->grid_experiment,
02629                    GTK_WIDGET (window->button_add_experiment), 2, 0, 1, 1);
02630   gtk_grid_attach (window->grid_experiment,
02631                    GTK_WIDGET (window->button_remove_experiment), 3, 0, 1, 1)
      ;
02632   gtk_grid_attach (window->grid_experiment,
02633                    GTK_WIDGET (window->label_experiment), 0, 1, 1, 1);
02634   gtk_grid_attach (window->grid_experiment,
02635                    GTK_WIDGET (window->button_experiment), 1, 1, 3, 1);
02636   gtk_grid_attach (window->grid_experiment,
02637                    GTK_WIDGET (window->label_weight), 0, 2, 1, 1);
02638   gtk_grid_attach (window->grid_experiment,
02639                    GTK_WIDGET (window->spin_weight), 1, 2, 3, 1);
02640   for (i = 0; i < MAX_NINPUTS; ++i)
02641     {
```

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02642       snprintf (buffer3, 64, "%s %u", _("Input template"), i + 1);
02643       window->check_template[i] = (GtkCheckButton *)
02644         gtk_check_button_new_with_label (buffer3);
02645       window->id_template[i]
02646         = g_signal_connect (window->check_template[i], "toggled",
02647                             window_inputs_experiment, NULL);
02648       gtk_grid_attach (window->grid_experiment,
02649                        GTK_WIDGET (window->check_template[i]), 0, 3 + i, 1, 1);
02650       window->button_template[i] = (GtkFileChooserButton *)
02651         gtk_file_chooser_button_new (_("Input template"),
02652                                      GTK_FILE_CHOOSER_ACTION_OPEN);
02653       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_template[i]),
02654                                    _("Experimental input template file"));
02655       window->id_input[i] =
02656         g_signal_connect_swapped (window->button_template[i],
02657                                   "selection-changed",
02658                                   (GCallback) window_template_experiment,
02659                                   (void *) (size_t) i);
02660       gtk_grid_attach (window->grid_experiment,
02661                        GTK_WIDGET (window->button_template[i]), 1, 3 + i, 3, 1);
02662     }
02663   window->frame_experiment = (GtkFrame *) gtk_frame_new (_("Experiment"));
02664   gtk_container_add (GTK_CONTAINER (window->frame_experiment),
02665                      GTK_WIDGET (window->grid_experiment));
02666
02667   // Creating the error norm widgets
02668   window->frame_norm = (GtkFrame *) gtk_frame_new (_("Error norm"));
02669   window->grid_norm = (GtkGrid *) gtk_grid_new ();
02670   gtk_container_add (GTK_CONTAINER (window->frame_norm),
02671                      GTK_WIDGET (window->grid_norm));
02672   window->button_norm[0] = (GtkRadioButton *)
02673     gtk_radio_button_new_with_mnemonic (NULL, label_norm[0]);
02674   gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[0]),
02675                                tip_norm[0]);
02676   gtk_grid_attach (window->grid_norm,
02677                    GTK_WIDGET (window->button_norm[0]), 0, 0, 1, 1);
02678   g_signal_connect (window->button_norm[0], "clicked",
      window_update, NULL);
02679   for (i = 0; ++i < NNORMS;)
02680     {
02681       window->button_norm[i] = (GtkRadioButton *)
02682         gtk_radio_button_new_with_mnemonic
02683         (gtk_radio_button_get_group (window->button_norm[0]), label_norm[i]);
02684       gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[i]),
02685                                    tip_norm[i]);
02686       gtk_grid_attach (window->grid_norm,
02687                        GTK_WIDGET (window->button_norm[i]), 0, i, 1, 1);
02688       g_signal_connect (window->button_norm[i], "clicked",
      window_update, NULL);
02689     }
02690   window->label_p = (GtkLabel *) gtk_label_new (_("P parameter"));
02691   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->
      label_p), 1, 1, 1, 1);
02692   window->spin_p = (GtkSpinButton *)
02693     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE, 0.01);
02694   gtk_widget_set_tooltip_text (GTK_WIDGET (window->spin_p),
02695                                _("P parameter for the P error norm"));
02696   window->scrolled_p =
02697     (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02698   gtk_container_add (GTK_CONTAINER (window->scrolled_p),
02699                      GTK_WIDGET (window->spin_p));
02700   gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_p), TRUE);
02701   gtk_widget_set_halign (GTK_WIDGET (window->scrolled_p), GTK_ALIGN_FILL);
02702   gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->
      scrolled_p),
02703                    1, 2, 1, 2);
02704
02705   // Creating the grid and attaching the widgets to the grid
02706   window->grid = (GtkGrid *) gtk_grid_new ();
02707   gtk_grid_attach (window->grid, GTK_WIDGET (window->bar_buttons), 0, 0, 3, 1);
02708   gtk_grid_attach (window->grid, GTK_WIDGET (window->grid_files), 0, 1, 1, 1);
02709   gtk_grid_attach (window->grid,
02710                    GTK_WIDGET (window->frame_algorithm), 0, 2, 1, 1);
02711   gtk_grid_attach (window->grid,
02712                    GTK_WIDGET (window->frame_variable), 1, 2, 1, 1);
02713   gtk_grid_attach (window->grid,
02714                    GTK_WIDGET (window->frame_experiment), 2, 2, 1, 1);
02715   gtk_grid_attach (window->grid, GTK_WIDGET (window->frame_norm), 1, 1, 2, 1);
02716   gtk_container_add (GTK_CONTAINER (window->window), GTK_WIDGET (
      window->grid));
02717
02718   // Setting the window logo
02719   window->logo = gdk_pixbuf_new_from_xpm_data (logo);
02720   gtk_window_set_icon (window->window, window->logo);
02721
02722   // Showing the window
02723   gtk_widget_show_all (GTK_WIDGET (window->window));
```

```
02724
02725   // In GTK+ 3.16 and 3.18 the default scrolled size is wrong
02726 #if GTK_MINOR_VERSION >= 16
02727   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_min), -1, 40);
02728   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_max), -1, 40);
02729   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_minabs), -1, 40);
02730   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_maxabs), -1, 40);
02731   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_step), -1, 40);
02732   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_p), -1, 40);
02733   gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_threshold), -1, 40);
02734 #endif
02735
02736   // Reading initial example
02737   input_new ();
02738   buffer2 = g_get_current_dir ();
02739   buffer = g_build_filename (buffer2, "..", "tests", "test1", INPUT_FILE, NULL);
02740   g_free (buffer2);
02741   window_read (buffer);
02742   g_free (buffer);
02743
02744 #if DEBUG_INTERFACE
02745   fprintf (stderr, "window_new: start\n");
02746 #endif
02747 }
```

4.14 interface.h

```
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 2012-2018, AUTHORS.
00009
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00011 are permitted provided that the following conditions are met:
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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 INTERFACE__H
00039 #define INTERFACE__H 1
00040
00041 #define MAX_LENGTH (DEFAULT_PRECISION + 8)
00042
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   GtkToolbar *bar_buttons;
00083   GtkToolButton *button_open;
00084   GtkToolButton *button_save;
00085   GtkToolButton *button_run;
00086   GtkToolButton *button_options;
00087   GtkToolButton *button_help;
00088   GtkToolButton *button_about;
00089   GtkToolButton *button_exit;
00090   GtkGrid *grid_files;
00091   GtkLabel *label_simulator;
00092   GtkFileChooserButton *button_simulator;
00094   GtkCheckButton *check_evaluator;
00095   GtkFileChooserButton *button_evaluator;
00097   GtkLabel *label_result;
00098   GtkEntry *entry_result;
00099   GtkLabel *label_variables;
00100   GtkEntry *entry_variables;
00101   GtkFrame *frame_norm;
00102   GtkGrid *grid_norm;
00103   GtkRadioButton *button_norm[NNORMS];
00105   GtkLabel *label_p;
00106   GtkSpinButton *spin_p;
00107   GtkScrolledWindow *scrolled_p;
00109   GtkFrame *frame_algorithm;
00110   GtkGrid *grid_algorithm;
00111   GtkRadioButton *button_algorithm[NALGORITHMS];
00113   GtkLabel *label_simulations;
00114   GtkSpinButton *spin_simulations;
00116   GtkLabel *label_iterations;
00117   GtkSpinButton *spin_iterations;
00119   GtkLabel *label_tolerance;
00120   GtkSpinButton *spin_tolerance;
00121   GtkLabel *label_bests;
00122   GtkSpinButton *spin_bests;
00123   GtkLabel *label_population;
00124   GtkSpinButton *spin_population;
00126   GtkLabel *label_generations;
00127   GtkSpinButton *spin_generations;
00129   GtkLabel *label_mutation;
00130   GtkSpinButton *spin_mutation;
00131   GtkLabel *label_reproduction;
00132   GtkSpinButton *spin_reproduction;
00134   GtkLabel *label_adaptation;
00135   GtkSpinButton *spin_adaptation;
00137   GtkCheckButton *check_climbing;
00139   GtkGrid *grid_climbing;
00141   GtkRadioButton *button_climbing[NCLIMBINGS];
00143   GtkLabel *label_steps;
00144   GtkSpinButton *spin_steps;
00145   GtkLabel *label_estimates;
00146   GtkSpinButton *spin_estimates;
00148   GtkLabel *label_relaxation;
00150   GtkSpinButton *spin_relaxation;
00152   GtkLabel *label_threshold;
00153   GtkSpinButton *spin_threshold;
00154   GtkScrolledWindow *scrolled_threshold;
00156   GtkFrame *frame_variable;
00157   GtkGrid *grid_variable;
00158   GtkComboBoxText *combo_variable;
00160   GtkButton *button_add_variable;
00161   GtkButton *button_remove_variable;
00162   GtkLabel *label_variable;
00163   GtkEntry *entry_variable;
00164   GtkLabel *label_min;
00165   GtkSpinButton *spin_min;
00166   GtkScrolledWindow *scrolled_min;
00167   GtkLabel *label_max;
00168   GtkSpinButton *spin_max;
00169   GtkScrolledWindow *scrolled_max;
00170   GtkCheckButton *check_minabs;
00171   GtkSpinButton *spin_minabs;
00172   GtkScrolledWindow *scrolled_minabs;
00173   GtkCheckButton *check_maxabs;
00174   GtkSpinButton *spin_maxabs;
00175   GtkScrolledWindow *scrolled_maxabs;
00176   GtkLabel *label_precision;
00177   GtkSpinButton *spin_precision;
00178   GtkLabel *label_sweeps;
00179   GtkSpinButton *spin_sweeps;
00180   GtkLabel *label_bits;
00181   GtkSpinButton *spin_bits;
00182   GtkLabel *label_step;
```

```
00183   GtkSpinButton *spin_step;
00184   GtkScrolledWindow *scrolled_step;
00185   GtkFrame *frame_experiment;
00186   GtkGrid *grid_experiment;
00187   GtkComboBoxText *combo_experiment;
00188   GtkButton *button_add_experiment;
00189   GtkButton *button_remove_experiment;
00190   GtkLabel *label_experiment;
00191   GtkFileChooserButton *button_experiment;
00193   GtkLabel *label_weight;
00194   GtkSpinButton *spin_weight;
00195   GtkCheckButton *check_template[MAX_NINPUTS];
00197   GtkFileChooserButton *button_template[MAX_NINPUTS];
00199   GdkPixbuf *logo;
00200   Experiment *experiment;
00201   Variable *variable;
00202   char *application_directory;
00203   gulong id_experiment;
00204   gulong id_experiment_name;
00205   gulong id_variable;
00206   gulong id_variable_label;
00207   gulong id_template[MAX_NINPUTS];
00209   gulong id_input[MAX_NINPUTS];
00211   unsigned int nexperiments;
00212   unsigned int nvariables;
00213 } Window;
00214
00215 // Global variables
00216 extern Window window[1];
00217
00218 // Public functions
00219 void window_new (GtkApplication * application);
00220
00221 #endif
```

4.15 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 "genetic/genetic.h"
#include "utils.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:

Functions

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

4.15.1 Detailed Description

Main source file.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file main.c.

4.16 main.c

```
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 2012-2018, AUTHORS.
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00013     1. Redistributions of source code must retain the above copyright notice,
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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.
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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 #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 #endif
00060 #include "genetic/genetic.h"
00061 #include "utils.h"
00062 #include "experiment.h"
00063 #include "variable.h"
00064 #include "input.h"
00065 #include "optimize.h"
00066 #if HAVE_GTK
00067 #include "interface.h"
00068 #endif
00069 #include "mpcotool.h"
00070
00071 int
00072 main (int argn, char **argc)
00073 {
00074 #if HAVE_GTK
00075   show_pending = process_pending;
00076 #endif
00077   return mpcotool (argn, argc);
00078 }
```

4.17 mpcotool.c File Reference

Main function 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 "genetic/genetic.h"
#include "utils.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 0

  Macro to debug main functions.

Functions

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

Variables

- GMutex mutex [1]

  GMutex struct.
- int ntasks

  Tasks number.
- unsigned int nthreads

  Threads number.

4.17.1 Detailed Description

Main function source file.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file mpcotool.c.

4.17.2 Function Documentation

4.17.2.1 mpcotool()

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

Main function.

Returns

0 on success, >0 on error.

Parameters

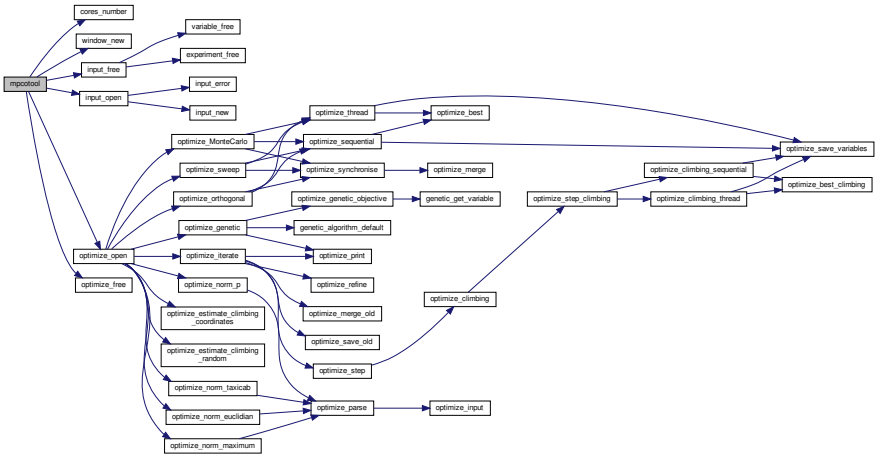
argn	Arguments number.
argc	Arguments pointer.

Definition at line 83 of file mpcotool.c.

```
00095 {
00096 #if HAVE_GTK
00097   GtkApplication *application;
00098   char *buffer;
00099 #endif
00100
00101   // Starting pseudo-random numbers generator
00102 #if DEBUG_MPCOTOOL
00103   fprintf (stderr, "mpcotool: starting pseudo-random numbers generator\n");
00104 #endif
00105   optimize->rng = gsl_rng_alloc (gsl_rng_taus2);
00106
00107   // Allowing spaces in the XML data file
00108 #if DEBUG_MPCOTOOL
00109   fprintf (stderr, "mpcotool: allowing spaces in the XML data file\n");
00110 #endif
00111   xmlKeepBlanksDefault (0);
00112
00113   // Starting MPI
00114 #if HAVE_MPI
00115 #if DEBUG_MPCOTOOL
00116   fprintf (stderr, "mpcotool: starting MPI\n");
00117 #endif
00118   MPI_Init (&argn, &argc);
00119   MPI_Comm_size (MPI_COMM_WORLD, &ntasks);
00120   MPI_Comm_rank (MPI_COMM_WORLD, &optimize->mpi_rank);
00121   printf ("rank=%d tasks=%d\n", optimize->mpi_rank, ntasks);
00122 #else
00123   ntasks = 1;
00124 #endif
00125
00126   // Resetting result and variables file names
00127 #if DEBUG_MPCOTOOL
00128   fprintf (stderr, "mpcotool: resetting result and variables file names\n");
00129 #endif
00130   input->result = input->variables = NULL;
00131
00132   // Getting threads number and pseudo-random numbers generator seed
00133   nthreads_climbing = nthreads = cores_number ();
00134   optimize->seed = DEFAULT_RANDOM_SEED;
00135
00136 #if HAVE_GTK
00137
00138   // Setting local language and international floating point numbers notation
00139   setlocale (LC_ALL, "");
00140   setlocale (LC_NUMERIC, "C");
00141   window->application_directory = g_get_current_dir ();
00142   buffer = g_build_filename (window->application_directory,
      LOCALE_DIR, NULL);
00143   bindtextdomain (PROGRAM_INTERFACE, buffer);
00144   bind_textdomain_codeset (PROGRAM_INTERFACE, "UTF-8");
00145   textdomain (PROGRAM_INTERFACE);
00146
00147   // Initing GTK+
00148   gtk_disable_setlocale ();
00149   application = gtk_application_new ("es.csic.eead.auladei.sprinkler",
00150                                      G_APPLICATION_FLAGS_NONE);
00151   g_signal_connect (application, "activate", G_CALLBACK (window_new), NULL);
00152
00153   // Opening the main window
00154   g_application_run (G_APPLICATION (application), 0, NULL);
00155
00156   // Freeing memory
00157   input_free ();
00158   g_free (buffer);
00159   gtk_widget_destroy (GTK_WIDGET (window->window));
00160   g_object_unref (application);
00161   g_free (window->application_directory);
00162
00163 #else
00164
00165   // Checking syntax
00166   if (argn < 2)
00167     {
00168       printf ("The syntax is:\n"
00169               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00170               "[variables_file]\n");
00171       return 1;
00172     }
00173
00174   // Getting threads number and pseudo-random numbers generator seed
00175 #if DEBUG_MPCOTOOL
00176   fprintf (stderr, "mpcotool: getting threads number and pseudo-random numbers "
00177            "generator seed\n");
```

```
00178 #endif
00179   if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00180     {
00181       nthreads_climbing = nthreads = atoi (argc[2]);
00182       if (!nthreads)
00183         {
00184           printf ("Bad threads number\n");
00185           return 2;
00186         }
00187       argc += 2;
00188       argn -= 2;
00189       if (argn > 2 && !strcmp (argc[1], "-seed"))
00190         {
00191           optimize->seed = atoi (argc[2]);
00192           argc += 2;
00193           argn -= 2;
00194         }
00195     }
00196   else if (argn > 2 && !strcmp (argc[1], "-seed"))
00197     {
00198       optimize->seed = atoi (argc[2]);
00199       argc += 2;
00200       argn -= 2;
00201       if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00202         {
00203           nthreads_climbing = nthreads = atoi (argc[2]);
00204           if (!nthreads)
00205             {
00206               printf ("Bad threads number\n");
00207               return 2;
00208             }
00209           argc += 2;
00210           argn -= 2;
00211         }
00212     }
00213   printf ("nthreads=%u\n", nthreads);
00214   printf ("seed=%lu\n", optimize->seed);
00215
00216   // Checking arguments
00217 #if DEBUG_MPCOTOOL
00218   fprintf (stderr, "mpcotool: checking arguments\n");
00219 #endif
00220   if (argn > 4 || argn < 2)
00221     {
00222       printf ("The syntax is:\n"
00223               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00224               "[variables_file]\n");
00225       return 1;
00226     }
00227   if (argn > 2)
00228     input->result = (char *) xmlStrdup ((xmlChar *) argc[2]);
00229   if (argn == 4)
00230     input->variables = (char *) xmlStrdup ((xmlChar *) argc[3]);
00231
00232   // Making optimization
00233 #if DEBUG_MPCOTOOL
00234   fprintf (stderr, "mpcotool: making optimization\n");
00235 #endif
00236   if (input_open (argc[1]))
00237     optimize_open ();
00238
00239   // Freeing memory
00240 #if DEBUG_MPCOTOOL
00241   fprintf (stderr, "mpcotool: freeing memory and closing\n");
00242 #endif
00243   optimize_free ();
00244
00245 #endif
00246
00247   // Closing MPI
00248 #if HAVE_MPI
00249   MPI_Finalize ();
00250 #endif
00251
00252   // Freeing memory
00253   gsl_rng_free (optimize->rng);
00254
00255   // Closing
00256   return 0;
00257 }
```

Here is the call graph for this function:



4.18 mpcotool.c

```
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 2012-2018, AUTHORS.
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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
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 #endif
00060 #include "genetic/genetic.h"
00061 #include "utils.h"
00062 #include "experiment.h"
00063 #include "variable.h"
00064 #include "input.h"
00065 #include "optimize.h"
00066 #if HAVE_GTK
00067 #include "interface.h"
00068 #endif
00069 #include "mpcotool.h"
00070
00071 #define DEBUG_MPCOTOOL 0
00072
00073 GMutex mutex[1];
00074 int ntasks;
00075 unsigned int nthreads;
00076
00082 int
00083 mpcotool (int argn
00084 #if HAVE_GTK
00085           __attribute__ ((unused))
00086 #endif
00087           ,
00089           char **argc
00090 #if HAVE_GTK
00091           __attribute__ ((unused))
00092 #endif
00094   )
00095 {
00096 #if HAVE_GTK
00097   GtkApplication *application;
00098   char *buffer;
00099 #endif
00100
00101   // Starting pseudo-random numbers generator
00102 #if DEBUG_MPCOTOOL
00103   fprintf (stderr, "mpcotool: starting pseudo-random numbers generator\n");
00104 #endif
00105   optimize->rng = gsl_rng_alloc (gsl_rng_taus2);
00106
00107   // Allowing spaces in the XML data file
00108 #if DEBUG_MPCOTOOL
00109   fprintf (stderr, "mpcotool: allowing spaces in the XML data file\n");
00110 #endif
00111   xmlKeepBlanksDefault (0);
00112
00113   // Starting MPI
00114 #if HAVE_MPI
00115 #if DEBUG_MPCOTOOL
00116   fprintf (stderr, "mpcotool: starting MPI\n");
00117 #endif
00118   MPI_Init (&argn, &argc);
00119   MPI_Comm_size (MPI_COMM_WORLD, &ntasks);
00120   MPI_Comm_rank (MPI_COMM_WORLD, &optimize->mpi_rank);
00121   printf ("rank=%d tasks=%d\n", optimize->mpi_rank, ntasks);
00122 #else
00123   ntasks = 1;
00124 #endif
00125
00126   // Resetting result and variables file names
00127 #if DEBUG_MPCOTOOL
00128   fprintf (stderr, "mpcotool: resetting result and variables file names\n");
00129 #endif
00130   input->result = input->variables = NULL;
00131
00132   // Getting threads number and pseudo-random numbers generator seed
00133   nthreads_climbing = nthreads = cores_number ();
00134   optimize->seed = DEFAULT_RANDOM_SEED;
00135
00136 #if HAVE_GTK
00137
00138   // Setting local language and international floating point numbers notation
00139   setlocale (LC_ALL, "");
00140   setlocale (LC_NUMERIC, "C");
00141   window->application_directory = g_get_current_dir ();
00142   buffer = g_build_filename (window->application_directory,
      LOCALE_DIR, NULL);
00143   bindtextdomain (PROGRAM_INTERFACE, buffer);
00144   bind_textdomain_codeset (PROGRAM_INTERFACE, "UTF-8");
00145   textdomain (PROGRAM_INTERFACE);
00146
00147   // Initing GTK+
00148   gtk_disable_setlocale ();
00149   application = gtk_application_new ("es.csic.eead.auladei.sprinkler",
00150                                      G_APPLICATION_FLAGS_NONE);
```

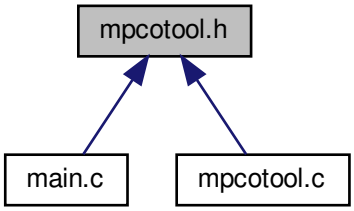
```
00151   g_signal_connect (application, "activate", G_CALLBACK (window_new), NULL);
00152
00153   // Opening the main window
00154   g_application_run (G_APPLICATION (application), 0, NULL);
00155
00156   // Freeing memory
00157   input_free ();
00158   g_free (buffer);
00159   gtk_widget_destroy (GTK_WIDGET (window->window));
00160   g_object_unref (application);
00161   g_free (window->application_directory);
00162
00163 #else
00164
00165   // Checking syntax
00166   if (argn < 2)
00167     {
00168       printf ("The syntax is:\n"
00169               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00170               "[variables_file]\n");
00171       return 1;
00172     }
00173
00174   // Getting threads number and pseudo-random numbers generator seed
00175 #if DEBUG_MPCOTOOL
00176   fprintf (stderr, "mpcotool: getting threads number and pseudo-random numbers "
00177            "generator seed\n");
00178 #endif
00179   if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00180     {
00181       nthreads_climbing = nthreads = atoi (argc[2]);
00182       if (!nthreads)
00183         {
00184           printf ("Bad threads number\n");
00185           return 2;
00186         }
00187       argc += 2;
00188       argn -= 2;
00189       if (argn > 2 && !strcmp (argc[1], "-seed"))
00190         {
00191           optimize->seed = atoi (argc[2]);
00192           argc += 2;
00193           argn -= 2;
00194         }
00195     }
00196   else if (argn > 2 && !strcmp (argc[1], "-seed"))
00197     {
00198       optimize->seed = atoi (argc[2]);
00199       argc += 2;
00200       argn -= 2;
00201       if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00202         {
00203           nthreads_climbing = nthreads = atoi (argc[2]);
00204           if (!nthreads)
00205             {
00206               printf ("Bad threads number\n");
00207               return 2;
00208             }
00209           argc += 2;
00210           argn -= 2;
00211         }
00212     }
00213   printf ("nthreads=%u\n", nthreads);
00214   printf ("seed=%lu\n", optimize->seed);
00215
00216   // Checking arguments
00217 #if DEBUG_MPCOTOOL
00218   fprintf (stderr, "mpcotool: checking arguments\n");
00219 #endif
00220   if (argn > 4 || argn < 2)
00221     {
00222       printf ("The syntax is:\n"
00223               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00224               "[variables_file]\n");
00225       return 1;
00226     }
00227   if (argn > 2)
00228     input->result = (char *) xmlStrdup ((xmlChar *) argc[2]);
00229   if (argn == 4)
00230     input->variables = (char *) xmlStrdup ((xmlChar *) argc[3]);
00231
00232   // Making optimization
00233 #if DEBUG_MPCOTOOL
00234   fprintf (stderr, "mpcotool: making optimization\n");
00235 #endif
00236   if (input_open (argc[1]))
00237     optimize_open ();
```

```
00238
00239   // Freeing memory
00240 #if DEBUG_MPCOTOOL
00241   fprintf (stderr, "mpcotool: freeing memory and closing\n");
00242 #endif
00243   optimize_free ();
00244
00245 #endif
00246
00247   // Closing MPI
00248 #if HAVE_MPI
00249   MPI_Finalize ();
00250 #endif
00251
00252   // Freeing memory
00253   gsl_rng_free (optimize->rng);
00254
00255   // Closing
00256   return 0;
00257 }
```

4.19 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)

4.19.1 Detailed Description

Main function header file.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file mpcotool.h.

4.19.2 Function Documentation

4.19.2.1 mpcotool()

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

Main function.

Returns

0 on success, >0 on error.

Parameters

argn	Arguments number.
argc	Arguments pointer.

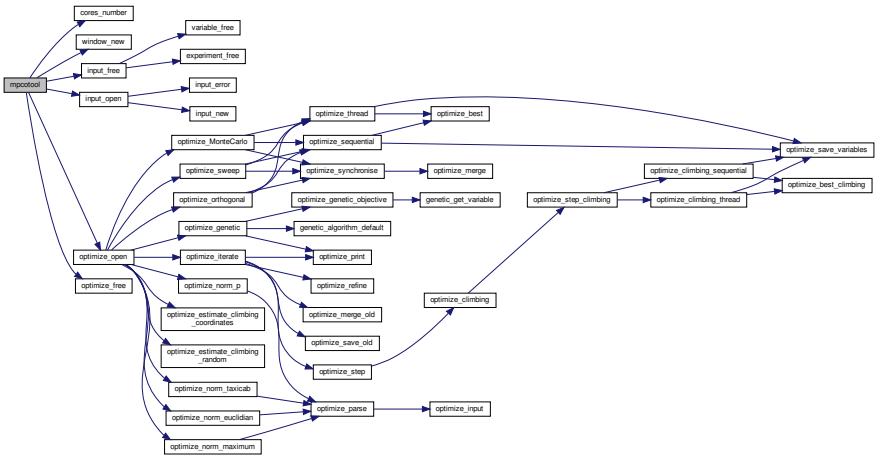
Definition at line 83 of file mpcotool.c.

```
00095 {
00096 #if HAVE_GTK
00097   GtkApplication *application;
00098   char *buffer;
00099 #endif
00100
00101   // Starting pseudo-random numbers generator
00102 #if DEBUG_MPCOTOOL
00103   fprintf (stderr, "mpcotool: starting pseudo-random numbers generator\n");
00104 #endif
00105   optimize->rng = gsl_rng_alloc (gsl_rng_taus2);
00106
00107   // Allowing spaces in the XML data file
00108 #if DEBUG_MPCOTOOL
00109   fprintf (stderr, "mpcotool: allowing spaces in the XML data file\n");
00110 #endif
00111   xmlKeepBlanksDefault (0);
00112
00113   // Starting MPI
00114 #if HAVE_MPI
00115 #if DEBUG_MPCOTOOL
00116   fprintf (stderr, "mpcotool: starting MPI\n");
00117 #endif
00118   MPI_Init (&argn, &argc);
00119   MPI_Comm_size (MPI_COMM_WORLD, &ntasks);
00120   MPI_Comm_rank (MPI_COMM_WORLD, &optimize->mpi_rank);
00121   printf ("rank=%d tasks=%d\n", optimize->mpi_rank, ntasks);
00122 #else
00123   ntasks = 1;
00124 #endif
00125
00126   // Resetting result and variables file names
00127 #if DEBUG_MPCOTOOL
00128   fprintf (stderr, "mpcotool: resetting result and variables file names\n");
00129 #endif
00130   input->result = input->variables = NULL;
00131
00132   // Getting threads number and pseudo-random numbers generator seed
00133   nthreads_climbing = nthreads = cores_number ();
00134   optimize->seed = DEFAULT_RANDOM_SEED;
00135
00136 #if HAVE_GTK
00137
00138   // Setting local language and international floating point numbers notation
```

```
00139   setlocale (LC_ALL, "");
00140   setlocale (LC_NUMERIC, "C");
00141   window->application_directory = g_get_current_dir ();
00142   buffer = g_build_filename (window->application_directory,
      LOCALE_DIR, NULL);
00143   bindtextdomain (PROGRAM_INTERFACE, buffer);
00144   bind_textdomain_codeset (PROGRAM_INTERFACE, "UTF-8");
00145   textdomain (PROGRAM_INTERFACE);
00146
00147   // Initing GTK+
00148   gtk_disable_setlocale ();
00149   application = gtk_application_new ("es.csic.eead.auladei.sprinkler",
00150                                      G_APPLICATION_FLAGS_NONE);
00151   g_signal_connect (application, "activate", G_CALLBACK (window_new), NULL);
00152
00153   // Opening the main window
00154   g_application_run (G_APPLICATION (application), 0, NULL);
00155
00156   // Freeing memory
00157   input_free ();
00158   g_free (buffer);
00159   gtk_widget_destroy (GTK_WIDGET (window->window));
00160   g_object_unref (application);
00161   g_free (window->application_directory);
00162
00163 #else
00164
00165   // Checking syntax
00166   if (argn < 2)
00167     {
00168       printf ("The syntax is:\n"
00169               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00170               "[variables_file]\n");
00171       return 1;
00172     }
00173
00174   // Getting threads number and pseudo-random numbers generator seed
00175 #if DEBUG_MPCOTOOL
00176   fprintf (stderr, "mpcotool: getting threads number and pseudo-random numbers "
00177            "generator seed\n");
00178 #endif
00179   if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00180     {
00181       nthreads_climbing = nthreads = atoi (argc[2]);
00182       if (!nthreads)
00183         {
00184           printf ("Bad threads number\n");
00185           return 2;
00186         }
00187       argc += 2;
00188       argn -= 2;
00189       if (argn > 2 && !strcmp (argc[1], "-seed"))
00190         {
00191           optimize->seed = atoi (argc[2]);
00192           argc += 2;
00193           argn -= 2;
00194         }
00195     }
00196   else if (argn > 2 && !strcmp (argc[1], "-seed"))
00197     {
00198       optimize->seed = atoi (argc[2]);
00199       argc += 2;
00200       argn -= 2;
00201       if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00202         {
00203           nthreads_climbing = nthreads = atoi (argc[2]);
00204           if (!nthreads)
00205             {
00206               printf ("Bad threads number\n");
00207               return 2;
00208             }
00209           argc += 2;
00210           argn -= 2;
00211         }
00212     }
00213   printf ("nthreads=%u\n", nthreads);
00214   printf ("seed=%lu\n", optimize->seed);
00215
00216   // Checking arguments
00217 #if DEBUG_MPCOTOOL
00218   fprintf (stderr, "mpcotool: checking arguments\n");
00219 #endif
00220   if (argn > 4 || argn < 2)
00221     {
00222       printf ("The syntax is:\n"
00223               "./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00224               "[variables_file]\n");
```

```
00225       return 1;
00226     }
00227   if (argn > 2)
00228     input->result = (char *) xmlStrdup ((xmlChar *) argc[2]);
00229   if (argn == 4)
00230     input->variables = (char *) xmlStrdup ((xmlChar *) argc[3]);
00231
00232   // Making optimization
00233 #if DEBUG_MPCOTOOL
00234   fprintf (stderr, "mpcotool: making optimization\n");
00235 #endif
00236   if (input_open (argc[1]))
00237     optimize_open ();
00238
00239   // Freeing memory
00240 #if DEBUG_MPCOTOOL
00241   fprintf (stderr, "mpcotool: freeing memory and closing\n");
00242 #endif
00243   optimize_free ();
00244
00245 #endif
00246
00247   // Closing MPI
00248 #if HAVE_MPI
00249   MPI_Finalize ();
00250 #endif
00251
00252   // Freeing memory
00253   gsl_rng_free (optimize->rng);
00254
00255   // Closing
00256   return 0;
00257 }
```

Here is the call graph for this function:



4.20 mpcotool.h

```
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 2012-2018, 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
```

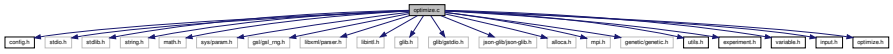
```
00016     2. Redistributions in binary form must reproduce the above copyright notice,
00017        this list of conditions and the following disclaimer in the
00018        documentation and/or other materials provided with the distribution.
00019
00020 THIS SOFTWARE IS PROVIDED BY AUTHORS ``AS IS'' 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 MPCOTOOL__H
00039 #define MPCOTOOL__H 1
00040
00041 extern int mpcotool (int argn, char **argc);
00042
00043 #endif
```

4.21 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 "genetic/genetic.h"
#include "utils.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.

4.21.1 Detailed Description

Source file to define the optimization functions.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file optimize.c.

4.21.2 Function Documentation

4.21.2.1 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 449 of file optimize.c.

```
00451 {
00452   unsigned int i, j;
00453   double e;
00454 #if DEBUG_OPTIMIZE
00455   fprintf (stderr, "optimize_best: start\n");
00456   fprintf (stderr, "optimize_best: nsaveds=%u nbest=%u\n",
00457            optimize->nsaveds, optimize->nbest);
00458 #endif
00459   if (optimize->nsaveds < optimize->nbest
00460       || value < optimize->error_best[optimize->nsaveds - 1])
00461     {
00462       if (optimize->nsaveds < optimize->nbest)
00463         ++optimize->nsaveds;
00464       optimize->error_best[optimize->nsaveds - 1] = value;
00465       optimize->simulation_best[optimize->nsaveds - 1] = simulation;
00466       for (i = optimize->nsaveds; --i;)
00467         {
00468           if (optimize->error_best[i] < optimize->
      error_best[i - 1])
00469             {
00470               j = optimize->simulation_best[i];
00471               e = optimize->error_best[i];
00472               optimize->simulation_best[i] = optimize->
      simulation_best[i - 1];
```

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

4.21.2.2 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 811 of file optimize.c.

```
00813 {
00814 #if DEBUG_OPTIMIZE
00815   fprintf (stderr, "optimize_best_climbing: start\n");
00816   fprintf (stderr,
00817            "optimize_best_climbing: simulation=%u value=%.14le best=%.14le\n",
00818            simulation, value, optimize->error_best[0]);
00819 #endif
00820   if (value < optimize->error_best[0])
00821     {
00822       optimize->error_best[0] = value;
00823       optimize->simulation_best[0] = simulation;
00824 #if DEBUG_OPTIMIZE
00825       fprintf (stderr,
00826                "optimize_best_climbing: BEST simulation=%u value=%.14le\n",
00827                simulation, value);
00828 #endif
00829     }
00830 #if DEBUG_OPTIMIZE
00831   fprintf (stderr, "optimize_best_climbing: end\n");
00832 #endif
00833 }
```

4.21.2.3 optimize_climbing()

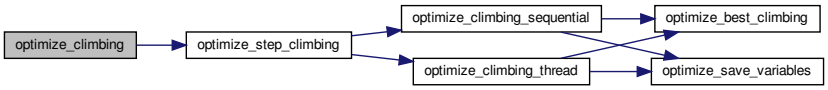
```
static void optimize_climbing ( )  [inline], [static]
```

Function to optimize with a hill climbing method.

Definition at line 1039 of file optimize.c.

```
01040 {
01041   unsigned int i, j, k, b, s, adjust;
01042 #if DEBUG_OPTIMIZE
01043   fprintf (stderr, "optimize_climbing: start\n");
01044 #endif
01045   for (i = 0; i < optimize->nvariables; ++i)
01046     optimize->climbing[i] = 0.;
01047   b = optimize->simulation_best[0] * optimize->
      nvariables;
01048   s = optimize->nsimulations;
01049   adjust = 1;
01050   for (i = 0; i < optimize->nsteps; ++i, s += optimize->
      nestimates, b = k)
01051     {
01052 #if DEBUG_OPTIMIZE
01053       fprintf (stderr, "optimize_climbing: step=%u old_best=%u\n",
01054                i, optimize->simulation_best[0]);
01055 #endif
01056       optimize_step_climbing (s);
01057       k = optimize->simulation_best[0] * optimize->
      nvariables;
01058 #if DEBUG_OPTIMIZE
01059       fprintf (stderr, "optimize_climbing: step=%u best=%u\n",
01060                i, optimize->simulation_best[0]);
01061 #endif
01062       if (k == b)
01063         {
01064           if (adjust)
01065             for (j = 0; j < optimize->nvariables; ++j)
01066               optimize->step[j] *= 0.5;
01067           for (j = 0; j < optimize->nvariables; ++j)
01068             optimize->climbing[j] = 0.;
01069           adjust = 1;
01070         }
01071       else
01072         {
01073           for (j = 0; j < optimize->nvariables; ++j)
01074             {
01075 #if DEBUG_OPTIMIZE
01076               fprintf (stderr,
01077                        "optimize_climbing: best%u=%.14le old%u=%.14le\n",
01078                        j, optimize->value[k + j], j, optimize->
      value[b + j]);
01079 #endif
01080               optimize->climbing[j]
01081                 = (1. - optimize->relaxation) * optimize->
      climbing[j]
01082                 + optimize->relaxation
01083                 * (optimize->value[k + j] - optimize->value[b + j]);
01084 #if DEBUG_OPTIMIZE
01085               fprintf (stderr, "optimize_climbing: climbing%u=%.14le\n",
01086                        j, optimize->climbing[j]);
01087 #endif
01088             }
01089           adjust = 0;
01090         }
01091     }
01092 #if DEBUG_OPTIMIZE
01093   fprintf (stderr, "optimize_climbing: end\n");
01094 #endif
01095 }
```

Here is the call graph for this function:



4.21.2.4 optimize_climbing_sequential()

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

Function to estimate the hill climbing sequentially.

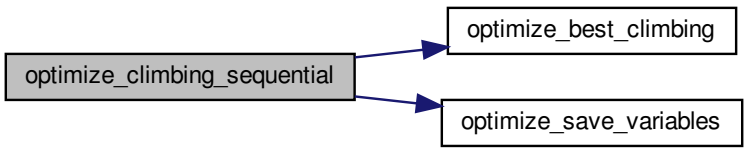
Parameters

simulation	Simulation number.

Definition at line 839 of file optimize.c.

```
00840 {
00841   double e;
00842   unsigned int i, j;
00843 #if DEBUG_OPTIMIZE
00844   fprintf (stderr, "optimize_climbing_sequential: start\n");
00845   fprintf (stderr, "optimize_climbing_sequential: nstart_climbing=%u "
00846            "nend_climbing=%u\n",
00847            optimize->nstart_climbing, optimize->
      nend_climbing);
00848 #endif
00849   for (i = optimize->nstart_climbing; i < optimize->nend_climbing; ++i)
00850     {
00851       j = simulation + i;
00852       e = optimize_norm (j);
00853       optimize_best_climbing (j, e);
00854       optimize_save_variables (j, e);
00855       if (e < optimize->threshold)
00856         {
00857           optimize->stop = 1;
00858           break;
00859         }
00860 #if DEBUG_OPTIMIZE
00861       fprintf (stderr, "optimize_climbing_sequential: i=%u e=%lg\n", i, e);
00862 #endif
00863     }
00864 #if DEBUG_OPTIMIZE
00865   fprintf (stderr, "optimize_climbing_sequential: end\n");
00866 #endif
00867 }
```

Here is the call graph for this function:



4.21.2.5 optimize_climbing_thread()

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

Function to estimate the hill climbing on a thread.

Returns

NULL

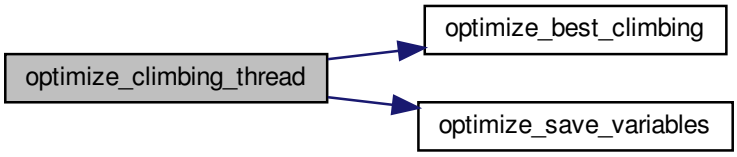
Parameters

data	Function data.

Definition at line 875 of file optimize.c.

```
00876 {
00877   unsigned int i, thread;
00878   double e;
00879 #if DEBUG_OPTIMIZE
00880   fprintf (stderr, "optimize_climbing_thread: start\n");
00881 #endif
00882   thread = data->thread;
00883 #if DEBUG_OPTIMIZE
00884   fprintf (stderr, "optimize_climbing_thread: thread=%u start=%u end=%u\n",
00885            thread,
00886            optimize->thread_climbing[thread],
00887            optimize->thread_climbing[thread + 1]);
00888 #endif
00889   for (i = optimize->thread_climbing[thread];
00890        i < optimize->thread_climbing[thread + 1]; ++i)
00891     {
00892       e = optimize_norm (i);
00893       g_mutex_lock (mutex);
00894       optimize_best_climbing (i, e);
00895       optimize_save_variables (i, e);
00896       if (e < optimize->threshold)
00897         optimize->stop = 1;
00898       g_mutex_unlock (mutex);
00899       if (optimize->stop)
00900         break;
00901 #if DEBUG_OPTIMIZE
00902       fprintf (stderr, "optimize_climbing_thread: i=%u e=%lg\n", i, e);
00903 #endif
00904     }
00905 #if DEBUG_OPTIMIZE
00906   fprintf (stderr, "optimize_climbing_thread: end\n");
00907 #endif
00908   g_thread_exit (NULL);
00909   return NULL;
00910 }
```

Here is the call graph for this function:



4.21.2.6 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 940 of file optimize.c.

```
00944 {
00945   double x;
00946 #if DEBUG_OPTIMIZE
00947   fprintf (stderr, "optimize_estimate_climbing_coordinates: start\n");
00948 #endif
00949   x = optimize->climbing[variable];
00950   if (estimate >= (2 * variable) && estimate < (2 * variable + 2))
00951     {
00952       if (estimate & 1)
00953         x += optimize->step[variable];
00954       else
00955         x -= optimize->step[variable];
00956     }
00957 #if DEBUG_OPTIMIZE
00958   fprintf (stderr,
00959            "optimize_estimate_climbing_coordinates: climbing%u=%lg\n",
00960            variable, x);
00961   fprintf (stderr, "optimize_estimate_climbing_coordinates: end\n");
00962 #endif
00963   return x;
00964 }
```

4.21.2.7 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 916 of file optimize.c.

```
00921 {
00922   double x;
00923 #if DEBUG_OPTIMIZE
00924   fprintf (stderr, "optimize_estimate_climbing_random: start\n");
00925 #endif
00926   x = optimize->climbing[variable]
00927     + (1. - 2. * gsl_rng_uniform (optimize->rng)) * optimize->
      step[variable];
00928 #if DEBUG_OPTIMIZE
00929   fprintf (stderr, "optimize_estimate_climbing_random: climbing%u=%lg\n",
00930            variable, x);
00931   fprintf (stderr, "optimize_estimate_climbing_random: end\n");
00932 #endif
00933   return x;
00934 }
```

4.21.2.8 optimize_free()

```
void optimize_free ( )
```

Function to free the memory used by the Optimize struct.

Definition at line 1396 of file optimize.c.

```
01397 {
01398   unsigned int i, j;
01399 #if DEBUG_OPTIMIZE
01400   fprintf (stderr, "optimize_free: start\n");
01401 #endif
01402   for (j = 0; j < optimize->ninputs; ++j)
01403     {
01404       for (i = 0; i < optimize->nexperiments; ++i)
01405         g_mapped_file_unref (optimize->file[j][i]);
01406       g_free (optimize->file[j]);
01407     }
01408   g_free (optimize->error_old);
01409   g_free (optimize->value_old);
01410   g_free (optimize->value);
01411   g_free (optimize->genetic_variable);
01412 #if DEBUG_OPTIMIZE
01413   fprintf (stderr, "optimize_free: end\n");
01414 #endif
01415 }
```

4.21.2.9 optimize_genetic()

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

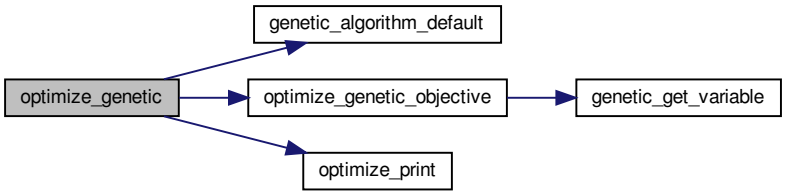
Function to optimize with the genetic algorithm.

Definition at line 1136 of file optimize.c.

```
01137 {
01138   double *best_variable = NULL;
01139   char *best_genome = NULL;
01140   double best_objective = 0.;
01141 #if DEBUG_OPTIMIZE
01142   fprintf (stderr, "optimize_genetic: start\n");
01143   fprintf (stderr, "optimize_genetic: ntasks=%u nthreads=%u\n", ntasks,
01144            nthreads);
01145   fprintf (stderr,
01146            "optimize_genetic: nvariables=%u population=%u generations=%u\n",
01147            optimize->nvariables, optimize->
      nsimulations, optimize->niterations);
01148   fprintf (stderr,
01149            "optimize_genetic: mutation=%lg reproduction=%lg adaptation=%lg\n",
01150            optimize->mutation_ratio, optimize->
      reproduction_ratio,
01151            optimize->adaptation_ratio);
01152 #endif
01153   genetic_algorithm_default (optimize->nvariables,
01154                              optimize->genetic_variable,
01155                              optimize->nsimulations,
01156                              optimize->niterations,
01157                              optimize->mutation_ratio,
01158                              optimize->reproduction_ratio,
01159                              optimize->adaptation_ratio,
01160                              optimize->seed,
01161                              optimize->threshold,
01162                              &optimize_genetic_objective,
01163                              &best_genome, &best_variable, &best_objective);
01164 #if DEBUG_OPTIMIZE
01165   fprintf (stderr, "optimize_genetic: the best\n");
01166 #endif
01167   optimize->error_old = (double *) g_malloc (sizeof (double));
01168   optimize->value_old
```

```
01169     = (double *) g_malloc (optimize->nvariables * sizeof (double));
01170   optimize->error_old[0] = best_objective;
01171   memcpy (optimize->value_old, best_variable,
01172           optimize->nvariables * sizeof (double));
01173   g_free (best_genome);
01174   g_free (best_variable);
01175   optimize_print ();
01176 #if DEBUG_OPTIMIZE
01177   fprintf (stderr, "optimize_genetic: end\n");
01178 #endif
01179 }
```

Here is the call graph for this function:



4.21.2.10 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

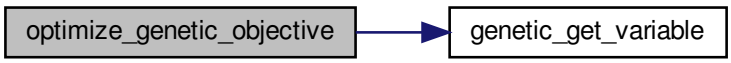
entity	entity data.

Definition at line 1103 of file optimize.c.

```
01104 {
01105   unsigned int j;
01106   double objective;
01107   char buffer[64];
01108 #if DEBUG_OPTIMIZE
01109   fprintf (stderr, "optimize_genetic_objective: start\n");
01110 #endif
01111   for (j = 0; j < optimize->nvariables; ++j)
01112     {
01113       optimize->value[entity->id * optimize->nvariables + j]
01114         = genetic_get_variable (entity, optimize->genetic_variable + j);
01115     }
01116   objective = optimize_norm (entity->id);
```

```
01117   g_mutex_lock (mutex);
01118   for (j = 0; j < optimize->nvariables; ++j)
01119     {
01120       snprintf (buffer, 64, "%s ", format[optimize->precision[j]]);
01121       fprintf (optimize->file_variables, buffer,
01122                genetic_get_variable (entity, optimize->genetic_variable + j));
01123     }
01124   fprintf (optimize->file_variables, "%.14le\n", objective);
01125   g_mutex_unlock (mutex);
01126 #if DEBUG_OPTIMIZE
01127   fprintf (stderr, "optimize_genetic_objective: end\n");
01128 #endif
01129   return objective;
01130 }
```

Here is the call graph for this function:



4.21.2.11 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 94 of file optimize.c.

```
00097 {
00098   char buffer[32], value[32];
00099   GRegex *regex;
00100   FILE *file;
00101   char *buffer2, *buffer3 = NULL, *content;
00102   gsize length;
00103   unsigned int i;
00104
00105 #if DEBUG_OPTIMIZE
00106   fprintf (stderr, "optimize_input: start\n");
00107 #endif
00108
00109   // Checking the file
00110   if (!stencil)
00111     goto optimize_input_end;
```

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

4.21.2.12 optimize_iterate()

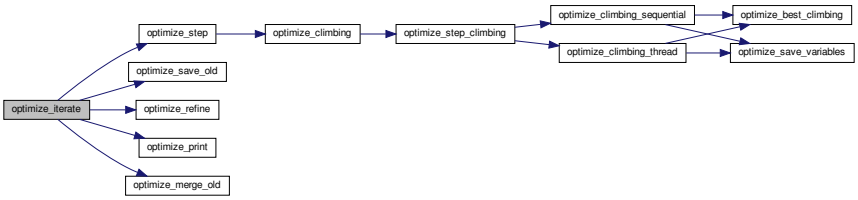
```
static void optimize_iterate ( )  [inline], [static]
```

Function to iterate the algorithm.

Definition at line 1366 of file optimize.c.

```
01367 {
01368   unsigned int i;
01369 #if DEBUG_OPTIMIZE
01370   fprintf (stderr, "optimize_iterate: start\n");
01371 #endif
01372   optimize->error_old = (double *) g_malloc (optimize->
      nbest * sizeof (double));
01373   optimize->value_old =
01374     (double *) g_malloc (optimize->nbest * optimize->
      nvariables *
01375                          sizeof (double));
01376   optimize_step ();
01377   optimize_save_old ();
01378   optimize_refine ();
01379   optimize_print ();
01380   for (i = 1; i < optimize->niterations && !optimize->
      stop; ++i)
01381     {
01382       optimize_step ();
01383       optimize_merge_old ();
01384       optimize_refine ();
01385       optimize_print ();
01386     }
01387 #if DEBUG_OPTIMIZE
01388   fprintf (stderr, "optimize_iterate: end\n");
01389 #endif
01390 }
```

Here is the call graph for this function:



4.21.2.13 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 562 of file optimize.c.

```
00567 {
00568   unsigned int i, j, k, s[optimize->nbest];
```

```
00569   double e[optimize->nbest];
00570 #if DEBUG_OPTIMIZE
00571   fprintf (stderr, "optimize_merge: start\n");
00572 #endif
00573   i = j = k = 0;
00574   do
00575     {
00576       if (i == optimize->nsaveds)
00577         {
00578           s[k] = simulation_best[j];
00579           e[k] = error_best[j];
00580           ++j;
00581           ++k;
00582           if (j == nsaveds)
00583             break;
00584         }
00585       else if (j == nsaveds)
00586         {
00587           s[k] = optimize->simulation_best[i];
00588           e[k] = optimize->error_best[i];
00589           ++i;
00590           ++k;
00591           if (i == optimize->nsaveds)
00592             break;
00593         }
00594       else if (optimize->error_best[i] > error_best[j])
00595         {
00596           s[k] = simulation_best[j];
00597           e[k] = error_best[j];
00598           ++j;
00599           ++k;
00600         }
00601       else
00602         {
00603           s[k] = optimize->simulation_best[i];
00604           e[k] = optimize->error_best[i];
00605           ++i;
00606           ++k;
00607         }
00608     }
00609   while (k < optimize->nbest);
00610   optimize->nsaveds = k;
00611   memcpy (optimize->simulation_best, s, k * sizeof (unsigned int));
00612   memcpy (optimize->error_best, e, k * sizeof (double));
00613 #if DEBUG_OPTIMIZE
00614   fprintf (stderr, "optimize_merge: end\n");
00615 #endif
00616 }
```

4.21.2.14 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 1217 of file optimize.c.

```
01218 {
01219   unsigned int i, j, k;
01220   double v[optimize->nbest * optimize->nvariables], e[
      optimize->nbest],
01221     *enew, *eold;
01222 #if DEBUG_OPTIMIZE
01223   fprintf (stderr, "optimize_merge_old: start\n");
01224 #endif
01225   enew = optimize->error_best;
01226   eold = optimize->error_old;
01227   i = j = k = 0;
01228   do
01229     {
01230       if (*enew < *eold)
01231         {
01232           memcpy (v + k * optimize->nvariables,
01233                   optimize->value
01234                   + optimize->simulation_best[i] *
```

```
      optimize->nvariables,
01235                 optimize->nvariables * sizeof (double));
01236           e[k] = *enew;
01237           ++k;
01238           ++enew;
01239           ++i;
01240         }
01241       else
01242         {
01243           memcpy (v + k * optimize->nvariables,
01244                   optimize->value_old + j * optimize->
      nvariables,
01245                   optimize->nvariables * sizeof (double));
01246           e[k] = *eold;
01247           ++k;
01248           ++eold;
01249           ++j;
01250         }
01251     }
01252   while (k < optimize->nbest);
01253   memcpy (optimize->value_old, v, k * optimize->
      nvariables * sizeof (double));
01254   memcpy (optimize->error_old, e, k * sizeof (double));
01255 #if DEBUG_OPTIMIZE
01256   fprintf (stderr, "optimize_merge_old: end\n");
01257 #endif
01258 }
```

4.21.2.15 optimize_MonteCarlo()

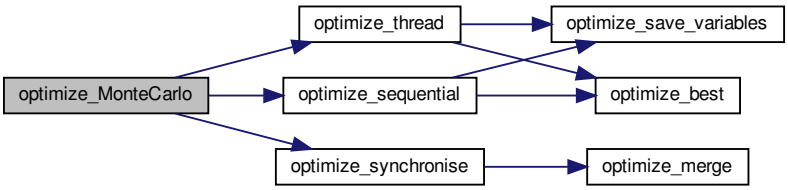
```
static void optimize_MonteCarlo ( )  [static]
```

Function to optimize with the Monte-Carlo algorithm.

Definition at line 720 of file optimize.c.

```
00721 {
00722   unsigned int i, j;
00723   GThread *thread[nthreads];
00724   ParallelData data[nthreads];
00725 #if DEBUG_OPTIMIZE
00726   fprintf (stderr, "optimize_MonteCarlo: start\n");
00727 #endif
00728   for (i = 0; i < optimize->nsimulations; ++i)
00729     for (j = 0; j < optimize->nvariables; ++j)
00730       optimize->value[i * optimize->nvariables + j]
00731         = optimize->rangemin[j] + gsl_rng_uniform (optimize->
      rng)
00732         * (optimize->rangemax[j] - optimize->rangemin[j]);
00733   optimize->nsaveds = 0;
00734   if (nthreads <= 1)
00735     optimize_sequential ();
00736   else
00737     {
00738       for (i = 0; i < nthreads; ++i)
00739         {
00740           data[i].thread = i;
00741           thread[i]
00742             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00743         }
00744       for (i = 0; i < nthreads; ++i)
00745         g_thread_join (thread[i]);
00746     }
00747 #if HAVE_MPI
00748   // Communicating tasks results
00749   optimize_synchronise ();
00750 #endif
00751 #if DEBUG_OPTIMIZE
00752   fprintf (stderr, "optimize_MonteCarlo: end\n");
00753 #endif
00754 }
```

Here is the call graph for this function:



4.21.2.16 optimize_norm_euclidian()

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

Function to calculate the Euclidian error norm.

Returns

Euclidian error norm.

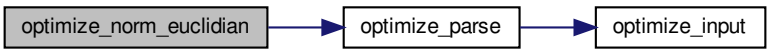
Parameters

simulation	simulation number.

Definition at line 297 of file optimize.c.

```
00298 {
00299   double e, ei;
00300   unsigned int i;
00301 #if DEBUG_OPTIMIZE
00302   fprintf (stderr, "optimize_norm_euclidian: start\n");
00303 #endif
00304   e = 0.;
00305   for (i = 0; i < optimize->nexperiments; ++i)
00306     {
00307       ei = optimize_parse (simulation, i);
00308       e += ei * ei;
00309     }
00310   e = sqrt (e);
00311 #if DEBUG_OPTIMIZE
00312   fprintf (stderr, "optimize_norm_euclidian: error=%lg\n", e);
00313   fprintf (stderr, "optimize_norm_euclidian: end\n");
00314 #endif
00315   return e;
00316 }
```

Here is the call graph for this function:



4.21.2.17 optimize_norm_maximum()

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

Function to calculate the maximum error norm.

Returns

Maximum error norm.

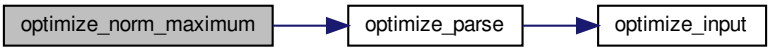
Parameters

simulation	simulation number.

Definition at line 324 of file optimize.c.

```
00325 {
00326   double e, ei;
00327   unsigned int i;
00328 #if DEBUG_OPTIMIZE
00329   fprintf (stderr, "optimize_norm_maximum: start\n");
00330 #endif
00331   e = 0.;
00332   for (i = 0; i < optimize->nexperiments; ++i)
00333     {
00334       ei = fabs (optimize_parse (simulation, i));
00335       e = fmax (e, ei);
00336     }
00337 #if DEBUG_OPTIMIZE
00338   fprintf (stderr, "optimize_norm_maximum: error=%lg\n", e);
00339   fprintf (stderr, "optimize_norm_maximum: end\n");
00340 #endif
00341   return e;
00342 }
```

Here is the call graph for this function:



4.21.2.18 optimize_norm_p()

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

Function to calculate the P error norm.

Returns

P error norm.

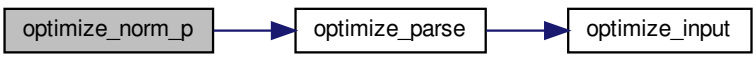
Parameters

simulation	simulation number.

Definition at line 350 of file optimize.c.

```
00351 {
00352   double e, ei;
00353   unsigned int i;
00354 #if DEBUG_OPTIMIZE
00355   fprintf (stderr, "optimize_norm_p: start\n");
00356 #endif
00357   e = 0.;
00358   for (i = 0; i < optimize->nexperiments; ++i)
00359     {
00360       ei = fabs (optimize_parse (simulation, i));
00361       e += pow (ei, optimize->p);
00362     }
00363   e = pow (e, 1. / optimize->p);
00364 #if DEBUG_OPTIMIZE
00365   fprintf (stderr, "optimize_norm_p: error=%lg\n", e);
00366   fprintf (stderr, "optimize_norm_p: end\n");
00367 #endif
00368   return e;
00369 }
```

Here is the call graph for this function:



4.21.2.19 optimize_norm_taxicab()

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

Function to calculate the taxicab error norm.

Returns

Taxicab error norm.

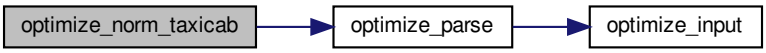
Parameters

simulation	simulation number.

Definition at line 377 of file optimize.c.

```
00378 {
00379   double e;
00380   unsigned int i;
00381 #if DEBUG_OPTIMIZE
00382   fprintf (stderr, "optimize_norm_taxicab: start\n");
00383 #endif
00384   e = 0.;
00385   for (i = 0; i < optimize->nexperiments; ++i)
00386     e += fabs (optimize_parse (simulation, i));
00387 #if DEBUG_OPTIMIZE
00388   fprintf (stderr, "optimize_norm_taxicab: error=%lg\n", e);
00389   fprintf (stderr, "optimize_norm_taxicab: end\n");
00390 #endif
00391   return e;
00392 }
```

Here is the call graph for this function:



4.21.2.20 optimize_open()

```
void optimize_open ( )
```

Function to open and perform a optimization.

Definition at line 1421 of file optimize.c.

```
01422 {
01423   GTimeZone *tz;
01424   GDateTime *t0, *t;
01425   unsigned int i, j;
01426
01427 #if DEBUG_OPTIMIZE
01428   char *buffer;
01429   fprintf (stderr, "optimize_open: start\n");
01430 #endif
01431
01432   // Getting initial time
01433 #if DEBUG_OPTIMIZE
01434   fprintf (stderr, "optimize_open: getting initial time\n");
01435 #endif
01436   tz = g_time_zone_new_utc ();
01437   t0 = g_date_time_new_now (tz);
01438
01439   // Obtaining and initing the pseudo-random numbers generator seed
01440 #if DEBUG_OPTIMIZE
01441   fprintf (stderr, "optimize_open: getting initial seed\n");
01442 #endif
01443   if (optimize->seed == DEFAULT_RANDOM_SEED)
```

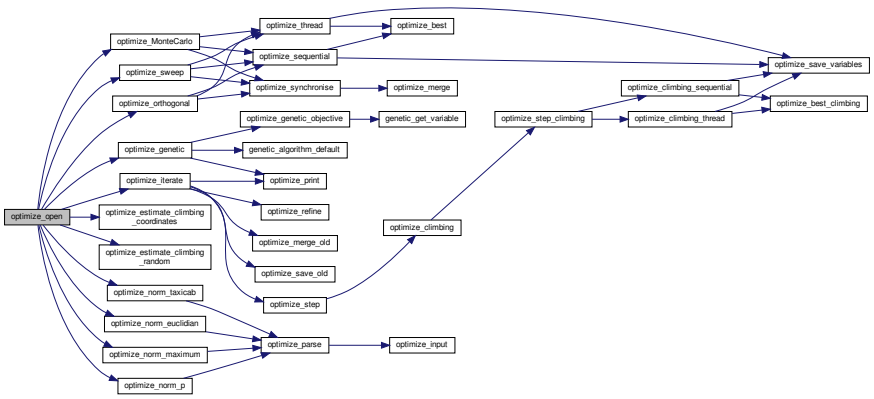
```
01444     optimize->seed = input->seed;
01445   gsl_rng_set (optimize->rng, optimize->seed);
01446
01447   // Replacing the working directory
01448 #if DEBUG_OPTIMIZE
01449   fprintf (stderr, "optimize_open: replacing the working directory\n");
01450 #endif
01451   g_chdir (input->directory);
01452
01453   // Getting results file names
01454   optimize->result = input->result;
01455   optimize->variables = input->variables;
01456
01457   // Obtaining the simulator file
01458   optimize->simulator = input->simulator;
01459
01460   // Obtaining the evaluator file
01461   optimize->evaluator = input->evaluator;
01462
01463   // Reading the algorithm
01464   optimize->algorithm = input->algorithm;
01465   switch (optimize->algorithm)
01466     {
01467     case ALGORITHM_MONTE_CARLO:
01468       optimize_algorithm = optimize_MonteCarlo;
01469       break;
01470     case ALGORITHM_SWEEP:
01471       optimize_algorithm = optimize_sweep;
01472       break;
01473     case ALGORITHM_ORTHOGONAL:
01474       optimize_algorithm = optimize_orthogonal;
01475       break;
01476     default:
01477       optimize_algorithm = optimize_genetic;
01478       optimize->mutation_ratio = input->
      mutation_ratio;
01479       optimize->reproduction_ratio = input->
      reproduction_ratio;
01480       optimize->adaptation_ratio = input->
      adaptation_ratio;
01481     }
01482   optimize->nvariables = input->nvariables;
01483   optimize->nsimulations = input->nsimulations;
01484   optimize->niterations = input->niterations;
01485   optimize->nbest = input->nbest;
01486   optimize->tolerance = input->tolerance;
01487   optimize->nsteps = input->nsteps;
01488   optimize->nestimates = 0;
01489   optimize->threshold = input->threshold;
01490   optimize->stop = 0;
01491   if (input->nsteps)
01492     {
01493       optimize->relaxation = input->relaxation;
01494       switch (input->climbing)
01495         {
01496         case CLIMBING_METHOD_COORDINATES:
01497           optimize->nestimates = 2 * optimize->
      nvariables;
01498           optimize_estimate_climbing =
      optimize_estimate_climbing_coordinates;
01499           break;
01500         default:
01501           optimize->nestimates = input->nestimates;
01502           optimize_estimate_climbing =
      optimize_estimate_climbing_random;
01503         }
01504     }
01505
01506 #if DEBUG_OPTIMIZE
01507   fprintf (stderr, "optimize_open: nbest=%u\n", optimize->nbest);
01508 #endif
01509   optimize->simulation_best
01510     = (unsigned int *) alloca (optimize->nbest * sizeof (unsigned int));
01511   optimize->error_best = (double *) alloca (optimize->
      nbest * sizeof (double));
01512
01513   // Reading the experimental data
01514 #if DEBUG_OPTIMIZE
01515   buffer = g_get_current_dir ();
01516   fprintf (stderr, "optimize_open: current directory=%s\n", buffer);
01517   g_free (buffer);
01518 #endif
01519   optimize->nexperiments = input->nexperiments;
01520   optimize->ninputs = input->experiment->ninputs;
01521   optimize->experiment
01522     = (char **) alloca (input->nexperiments * sizeof (char *));
01523   optimize->weight = (double *) alloca (input->nexperiments * sizeof (double
```

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

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

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

Here is the call graph for this function:



4.21.2.21 optimize_orthogonal()

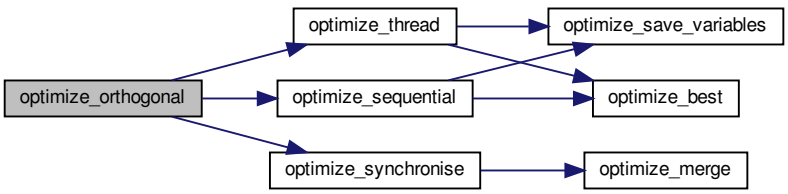
```
static void optimize_orthogonal ( )  [static]
```

Function to optimize with the orthogonal sampling algorithm.

Definition at line 760 of file optimize.c.

```
00761 {
00762   unsigned int i, j, k, l;
00763   double e;
00764   GThread *thread[nthreads];
00765   ParallelData data[nthreads];
00766 #if DEBUG_OPTIMIZE
00767   fprintf (stderr, "optimize_orthogonal: start\n");
00768 #endif
00769   for (i = 0; i < optimize->nsimulations; ++i)
00770     {
00771       k = i;
00772       for (j = 0; j < optimize->nvariables; ++j)
00773         {
00774           l = k % optimize->nsweeps[j];
00775           k /= optimize->nsweeps[j];
00776           e = optimize->rangemin[j];
00777           if (optimize->nsweeps[j] > 1)
00778             e += (l + gsl_rng_uniform (optimize->rng))
00779               * (optimize->rangemax[j] - optimize->
    rangemin[j])
00780               / optimize->nsweeps[j];
00781           optimize->value[i * optimize->nvariables + j] = e;
00782         }
00783     }
00784   optimize->nsaveds = 0;
00785   if (nthreads <= 1)
00786     optimize_sequential ();
00787   else
00788     {
00789       for (i = 0; i < nthreads; ++i)
00790         {
00791           data[i].thread = i;
00792           thread[i]
00793             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00794         }
00795       for (i = 0; i < nthreads; ++i)
00796         g_thread_join (thread[i]);
00797     }
00798 #if HAVE_MPI
00799   // Communicating tasks results
00800   optimize_synchronise ();
00801 #endif
00802 #if DEBUG_OPTIMIZE
00803   fprintf (stderr, "optimize_orthogonal: end\n");
00804 #endif
00805 }
```

Here is the call graph for this function:



4.21.2.22 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 183 of file optimize.c.

```
00185 {
00186   unsigned int i;
00187   double e;
00188   char buffer[512], input[MAX_NINPUTS][32], output[32], result[32], *buffer2,
00189     *buffer3, *buffer4;
00190   FILE *file_result;
00191
00192 #if DEBUG_OPTIMIZE
00193   fprintf (stderr, "optimize_parse: start\n");
00194   fprintf (stderr, "optimize_parse: simulation=%u experiment=%u\n",
00195            simulation, experiment);
00196 #endif
00197
00198   // Opening input files
00199   for (i = 0; i < optimize->ninputs; ++i)
00200     {
00201       snprintf (&input[i][0], 32, "input-%u-%u-%u", i, simulation, experiment);
00202 #if DEBUG_OPTIMIZE
00203       fprintf (stderr, "optimize_parse: i=%u input=%s\n", i, &input[i][0]);
00204 #endif
00205       optimize_input (simulation, &input[i][0], optimize->
      file[i][experiment]);
00206     }
00207   for (; i < MAX_NINPUTS; ++i)
00208     strcpy (&input[i][0], "");
00209 #if DEBUG_OPTIMIZE
00210   fprintf (stderr, "optimize_parse: parsing end\n");
00211 #endif
00212
00213   // Performing the simulation
00214   snprintf (output, 32, "output-%u-%u", simulation, experiment);
00215   buffer2 = g_path_get_dirname (optimize->simulator);
00216   buffer3 = g_path_get_basename (optimize->simulator);
00217   buffer4 = g_build_filename (buffer2, buffer3, NULL);
00218   snprintf (buffer, 512, "\"%s\" %s %s %s %s %s %s %s %s %s",
00219             buffer4, input[0], input[1], input[2], input[3], input[4],
00220             input[5], input[6], input[7], output);
00221   g_free (buffer4);
00222   g_free (buffer3);
00223   g_free (buffer2);
00224 #if DEBUG_OPTIMIZE
00225   fprintf (stderr, "optimize_parse: %s\n", buffer);
00226 #endif
00227     if (system (buffer) == -1)
00228       error_message = buffer;
00229
00230   // Checking the objective value function
00231   if (optimize->evaluator)
00232     {
00233       snprintf (result, 32, "result-%u-%u", simulation, experiment);
00234       buffer2 = g_path_get_dirname (optimize->evaluator);
00235       buffer3 = g_path_get_basename (optimize->evaluator);
00236       buffer4 = g_build_filename (buffer2, buffer3, NULL);
```

```
00237       snprintf (buffer, 512, "\"%s\" %s %s %s",
00238                 buffer4, output, optimize->experiment[experiment], result);
00239       g_free (buffer4);
00240       g_free (buffer3);
00241       g_free (buffer2);
00242 #if DEBUG_OPTIMIZE
00243       fprintf (stderr, "optimize_parse: %s\n", buffer);
00244       fprintf (stderr, "optimize_parse: result=%s\n", result);
00245 #endif
00246         if (system (buffer) == -1)
00247           error_message = buffer;
00248       file_result = g_fopen (result, "r");
00249       e = atof (fgets (buffer, 512, file_result));
00250       fclose (file_result);
00251     }
00252   else
00253     {
00254 #if DEBUG_OPTIMIZE
00255       fprintf (stderr, "optimize_parse: output=%s\n", output);
00256 #endif
00257       strcpy (result, "");
00258       file_result = g_fopen (output, "r");
00259       e = atof (fgets (buffer, 512, file_result));
00260       fclose (file_result);
00261     }
00262
00263   // Removing files
00264 #if !DEBUG_OPTIMIZE
00265   for (i = 0; i < optimize->ninputs; ++i)
00266     {
00267       if (optimize->file[i][0])
00268         {
00269           snprintf (buffer, 512, RM " %s", &input[i][0]);
00270             if (system (buffer) == -1)
00271               error_message = buffer;
00272         }
00273     }
00274   snprintf (buffer, 512, RM " %s %s", output, result);
00275     if (system (buffer) == -1)
00276       error_message = buffer;
00277 #endif
00278
00279   // Processing pending events
00280   if (show_pending)
00281     show_pending ();
00282
00283 #if DEBUG_OPTIMIZE
00284   fprintf (stderr, "optimize_parse: end\n");
00285 #endif
00286
00287   // Returning the objective function
00288   return e * optimize->weight[experiment];
00289 }
```

Here is the call graph for this function:

4.21.2.23 optimize_print()

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

Function to print the results.

Definition at line 398 of file optimize.c.

```
00399 {
00400   unsigned int i;
00401   char buffer[512];
00402 #if HAVE_MPI
00403   if (optimize->mpi_rank)
00404     return;
00405 #endif
00406   printf ("%s\n", _("Best result"));
00407   fprintf (optimize->file_result, "%s\n", _("Best result"));
00408   printf ("error = %.15le\n", optimize->error_old[0]);
00409   fprintf (optimize->file_result, "error = %.15le\n",
      optimize->error_old[0]);
00410   for (i = 0; i < optimize->nvariables; ++i)
00411     {
00412       snprintf (buffer, 512, "%s = %s\n",
00413                 optimize->label[i], format[optimize->
      precision[i]]);
00414       printf (buffer, optimize->value_old[i]);
00415       fprintf (optimize->file_result, buffer, optimize->
      value_old[i]);
00416     }
00417   fflush (optimize->file_result);
00418 }
```

4.21.2.24 optimize_refine()

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

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

Definition at line 1265 of file optimize.c.

```
01266 {
01267   unsigned int i, j;
01268   double d;
01269 #if HAVE_MPI
01270   MPI_Status mpi_stat;
01271 #endif
01272 #if DEBUG_OPTIMIZE
01273   fprintf (stderr, "optimize_refine: start\n");
01274 #endif
01275 #if HAVE_MPI
01276   if (!optimize->mpi_rank)
01277     {
01278 #endif
01279       for (j = 0; j < optimize->nvariables; ++j)
01280         {
01281           optimize->rangemin[j] = optimize->rangemax[j]
01282             = optimize->value_old[j];
01283         }
01284       for (i = 0; ++i < optimize->nbest;)
01285         {
01286           for (j = 0; j < optimize->nvariables; ++j)
01287             {
01288               optimize->rangemin[j]
01289                 = fmin (optimize->rangemin[j],
01290                         optimize->value_old[i * optimize->
      nvariables + j]);
01291               optimize->rangemax[j]
01292                 = fmax (optimize->rangemax[j],
01293                         optimize->value_old[i * optimize->
      nvariables + j]);
01294             }
01295         }
01296       for (j = 0; j < optimize->nvariables; ++j)
01297         {
01298           d = optimize->tolerance
01299             * (optimize->rangemax[j] - optimize->
      rangemin[j]);
01300           switch (optimize->algorithm)
01301             {
01302             case ALGORITHM_MONTE_CARLO:
01303               d *= 0.5;
01304               break;
01305             default:
```

```
01306               if (optimize->nsweeps[j] > 1)
01307                 d /= optimize->nsweeps[j] - 1;
01308               else
01309                 d = 0.;
01310             }
01311           optimize->rangemin[j] -= d;
01312           optimize->rangemin[j]
01313             = fmax (optimize->rangemin[j], optimize->
      rangeminabs[j]);
01314           optimize->rangemax[j] += d;
01315           optimize->rangemax[j]
01316             = fmin (optimize->rangemax[j], optimize->
      rangemaxabs[j]);
01317           printf ("%s min=%lg max=%lg\n", optimize->label[j],
01318                   optimize->rangemin[j], optimize->
      rangemax[j]);
01319           fprintf (optimize->file_result, "%s min=%lg max=%lg\n",
01320                    optimize->label[j], optimize->rangemin[j],
01321                    optimize->rangemax[j]);
01322         }
01323 #if HAVE_MPI
01324       for (i = 1; (int) i < ntasks; ++i)
01325         {
01326           MPI_Send (optimize->rangemin, optimize->
      nvariables, MPI_DOUBLE, i,
01327                     1, MPI_COMM_WORLD);
01328           MPI_Send (optimize->rangemax, optimize->
      nvariables, MPI_DOUBLE, i,
01329                     1, MPI_COMM_WORLD);
01330         }
01331     }
01332   else
01333     {
01334       MPI_Recv (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, 0,
      1,
01335                 MPI_COMM_WORLD, &mpi_stat);
01336       MPI_Recv (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, 0,
      1,
01337                 MPI_COMM_WORLD, &mpi_stat);
01338     }
01339 #endif
01340 #if DEBUG_OPTIMIZE
01341   fprintf (stderr, "optimize_refine: end\n");
01342 #endif
01343 }
```

4.21.2.25 optimize_save_old()

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

Function to save the best results on iterative methods.

Definition at line 1185 of file optimize.c.

```
01186 {
01187   unsigned int i, j;
01188 #if DEBUG_OPTIMIZE
01189   fprintf (stderr, "optimize_save_old: start\n");
01190   fprintf (stderr, "optimize_save_old: nsaveds=%u\n", optimize->nsaveds);
01191 #endif
01192   memcpy (optimize->error_old, optimize->error_best,
01193           optimize->nbest * sizeof (double));
01194   for (i = 0; i < optimize->nbest; ++i)
01195     {
01196       j = optimize->simulation_best[i];
01197 #if DEBUG_OPTIMIZE
01198       fprintf (stderr, "optimize_save_old: i=%u j=%u\n", i, j);
01199 #endif
01200       memcpy (optimize->value_old + i * optimize->
      nvariables,
01201               optimize->value + j * optimize->nvariables,
01202               optimize->nvariables * sizeof (double));
01203     }
01204 #if DEBUG_OPTIMIZE
01205   for (i = 0; i < optimize->nvariables; ++i)
01206     fprintf (stderr, "optimize_save_old: best variable %u=%lg\n",
01207              i, optimize->value_old[i]);
01208   fprintf (stderr, "optimize_save_old: end\n");
01209 #endif
01210 }
```

4.21.2.26 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 424 of file optimize.c.

```
00426 {
00427   unsigned int i;
00428   char buffer[64];
00429 #if DEBUG_OPTIMIZE
00430   fprintf (stderr, "optimize_save_variables: start\n");
00431 #endif
00432   for (i = 0; i < optimize->nvariables; ++i)
00433     {
00434       snprintf (buffer, 64, "%s ", format[optimize->precision[i]]);
00435       fprintf (optimize->file_variables, buffer,
00436                optimize->value[simulation * optimize->
      nvariables + i]);
00437     }
00438   fprintf (optimize->file_variables, "%.14le\n", error);
00439   fflush (optimize->file_variables);
00440 #if DEBUG_OPTIMIZE
00441   fprintf (stderr, "optimize_save_variables: end\n");
00442 #endif
00443 }
```

4.21.2.27 optimize_sequential()

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

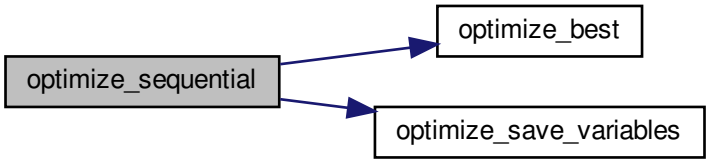
Function to optimize sequentially.

Definition at line 490 of file optimize.c.

```
00491 {
00492   unsigned int i;
00493   double e;
00494 #if DEBUG_OPTIMIZE
00495   fprintf (stderr, "optimize_sequential: start\n");
00496   fprintf (stderr, "optimize_sequential: nstart=%u nend=%u\n",
00497            optimize->nstart, optimize->nend);
00498 #endif
00499   for (i = optimize->nstart; i < optimize->nend; ++i)
00500     {
00501       e = optimize_norm (i);
00502       optimize_best (i, e);
00503       optimize_save_variables (i, e);
00504       if (e < optimize->threshold)
00505         {
00506           optimize->stop = 1;
```

```
00507           break;
00508         }
00509 #if DEBUG_OPTIMIZE
00510       fprintf (stderr, "optimize_sequential: i=%u e=%lg\n", i, e);
00511 #endif
00512     }
00513 #if DEBUG_OPTIMIZE
00514   fprintf (stderr, "optimize_sequential: end\n");
00515 #endif
00516 }
```

Here is the call graph for this function:



4.21.2.28 optimize_step()

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

Function to do a step of the iterative algorithm.

Definition at line 1349 of file optimize.c.

```
01350 {
01351 #if DEBUG_OPTIMIZE
01352   fprintf (stderr, "optimize_step: start\n");
01353 #endif
01354   optimize_algorithm ();
01355   if (optimize->nsteps)
01356     optimize_climbing ();
01357 #if DEBUG_OPTIMIZE
01358   fprintf (stderr, "optimize_step: end\n");
01359 #endif
01360 }
```

Here is the call graph for this function:

4.21.2.29 optimize_step_climbing()

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

Function to do a step of the hill climbing method.

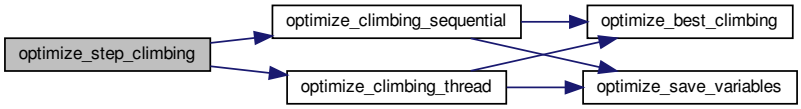
Parameters

simulation	Simulation number.

Definition at line 970 of file optimize.c.

```
00971 {
00972   GThread *thread[nthreads_climbing];
00973   ParallelData data[nthreads_climbing];
00974   unsigned int i, j, k, b;
00975 #if DEBUG_OPTIMIZE
00976   fprintf (stderr, "optimize_step_climbing: start\n");
00977 #endif
00978   for (i = 0; i < optimize->nestimates; ++i)
00979     {
00980       k = (simulation + i) * optimize->nvariables;
00981       b = optimize->simulation_best[0] * optimize->
      nvariables;
00982 #if DEBUG_OPTIMIZE
00983       fprintf (stderr, "optimize_step_climbing: simulation=%u best=%u\n",
00984                simulation + i, optimize->simulation_best[0]);
00985 #endif
00986       for (j = 0; j < optimize->nvariables; ++j, ++k, ++b)
00987         {
00988 #if DEBUG_OPTIMIZE
00989           fprintf (stderr,
00990                    "optimize_step_climbing: estimate=%u best%u=%.14le\n",
00991                    i, j, optimize->value[b]);
00992 #endif
00993           optimize->value[k]
00994             = optimize->value[b] + optimize_estimate_climbing (j, i)
      ;
00995           optimize->value[k] = fmin (fmax (optimize->value[k],
00996                                            optimize->rangeminabs[j]),
00997                                      optimize->rangemaxabs[j]);
00998 #if DEBUG_OPTIMIZE
00999           fprintf (stderr,
01000                    "optimize_step_climbing: estimate=%u variable%u=%.14le\n",
01001                    i, j, optimize->value[k]);
01002 #endif
01003         }
01004     }
01005   if (nthreads_climbing == 1)
01006     optimize_climbing_sequential (simulation);
01007   else
01008     {
01009       for (i = 0; i <= nthreads_climbing; ++i)
01010         {
01011           optimize->thread_climbing[i]
01012             = simulation + optimize->nstart_climbing
01013             + i * (optimize->nend_climbing - optimize->
      nstart_climbing)
01014               / nthreads_climbing;
01015 #if DEBUG_OPTIMIZE
01016           fprintf (stderr,
01017                    "optimize_step_climbing: i=%u thread_climbing=%u\n",
01018                    i, optimize->thread_climbing[i]);
01019 #endif
01020         }
01021       for (i = 0; i < nthreads_climbing; ++i)
01022         {
01023           data[i].thread = i;
01024           thread[i] = g_thread_new
01025             (NULL, (GThreadFunc) optimize_climbing_thread, &data[i]);
01026         }
01027       for (i = 0; i < nthreads_climbing; ++i)
01028         g_thread_join (thread[i]);
01029     }
01030 #if DEBUG_OPTIMIZE
01031   fprintf (stderr, "optimize_step_climbing: end\n");
01032 #endif
01033 }
```

Here is the call graph for this function:



4.21.2.30 optimize_sweep()

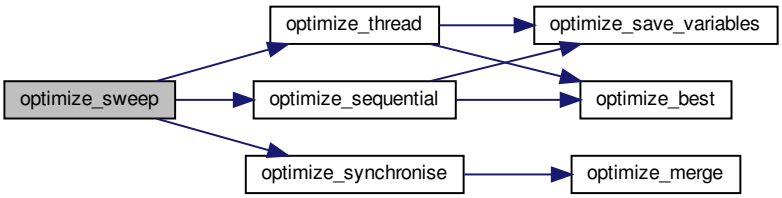
```
static void optimize_sweep ( )  [static]
```

Function to optimize with the sweep algorithm.

Definition at line 670 of file optimize.c.

```
00671 {
00672   unsigned int i, j, k, l;
00673   double e;
00674   GThread *thread[nthreads];
00675   ParallelData data[nthreads];
00676 #if DEBUG_OPTIMIZE
00677   fprintf (stderr, "optimize_sweep: start\n");
00678 #endif
00679   for (i = 0; i < optimize->nsimulations; ++i)
00680     {
00681       k = i;
00682       for (j = 0; j < optimize->nvariables; ++j)
00683         {
00684           l = k % optimize->nsweeps[j];
00685           k /= optimize->nsweeps[j];
00686           e = optimize->rangemin[j];
00687           if (optimize->nsweeps[j] > 1)
00688             e += l * (optimize->rangemax[j] - optimize->
    rangemin[j])
00689                / (optimize->nsweeps[j] - 1);
00690           optimize->value[i * optimize->nvariables + j] = e;
00691         }
00692     }
00693   optimize->nsaveds = 0;
00694   if (nthreads <= 1)
00695     optimize_sequential ();
00696   else
00697     {
00698       for (i = 0; i < nthreads; ++i)
00699         {
00700           data[i].thread = i;
00701           thread[i]
00702             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00703         }
00704       for (i = 0; i < nthreads; ++i)
00705         g_thread_join (thread[i]);
00706     }
00707 #if HAVE_MPI
00708   // Communicating tasks results
00709   optimize_synchronise ();
00710 #endif
00711 #if DEBUG_OPTIMIZE
00712   fprintf (stderr, "optimize_sweep: end\n");
00713 #endif
00714 }
```

Here is the call graph for this function:



4.21.2.31 optimize_synchronise()

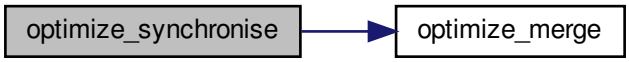
```
static void optimize_synchronise ( )  [static]
```

Function to synchronise the optimization results of MPI tasks.

Definition at line 623 of file optimize.c.

```
00624 {
00625   unsigned int i, nsaveds, simulation_best[optimize->nbest], stop;
00626   double error_best[optimize->nbest];
00627   MPI_Status mpi_stat;
00628 #if DEBUG_OPTIMIZE
00629   fprintf (stderr, "optimize_synchronise: start\n");
00630 #endif
00631   if (optimize->mpi_rank == 0)
00632     {
00633       for (i = 1; (int) i < ntasks; ++i)
00634         {
00635           MPI_Recv (&nsaveds, 1, MPI_INT, i, 1, MPI_COMM_WORLD, &mpi_stat);
00636           MPI_Recv (simulation_best, nsaveds, MPI_INT, i, 1,
00637                     MPI_COMM_WORLD, &mpi_stat);
00638           MPI_Recv (error_best, nsaveds, MPI_DOUBLE, i, 1,
00639                     MPI_COMM_WORLD, &mpi_stat);
00640           optimize_merge (nsaveds, simulation_best, error_best);
00641           MPI_Recv (&stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD, &mpi_stat);
00642           if (stop)
00643             optimize->stop = 1;
00644         }
00645       for (i = 1; (int) i < ntasks; ++i)
00646         MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD);
00647     }
00648   else
00649     {
00650       MPI_Send (&optimize->nsaveds, 1, MPI_INT, 0, 1, MPI_COMM_WORLD);
00651       MPI_Send (optimize->simulation_best, optimize->
      nsaveds, MPI_INT, 0, 1,
00652                 MPI_COMM_WORLD);
00653       MPI_Send (optimize->error_best, optimize->
      nsaveds, MPI_DOUBLE, 0, 1,
00654                 MPI_COMM_WORLD);
00655       MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD);
00656       MPI_Recv (&stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD, &mpi_stat);
00657       if (stop)
00658         optimize->stop = 1;
00659     }
00660 #if DEBUG_OPTIMIZE
00661   fprintf (stderr, "optimize_synchronise: end\n");
00662 #endif
00663 }
```

Here is the call graph for this function:



4.21.2.32 optimize_thread()

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

Function to optimize on a thread.

Returns

NULL.

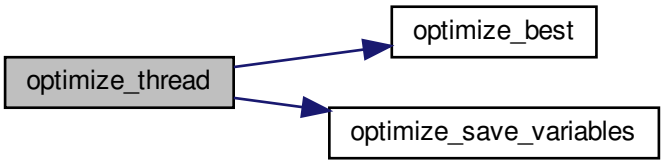
Parameters

data	Function data.

Definition at line 524 of file optimize.c.

```
00525 {
00526   unsigned int i, thread;
00527   double e;
00528 #if DEBUG_OPTIMIZE
00529   fprintf (stderr, "optimize_thread: start\n");
00530 #endif
00531   thread = data->thread;
00532 #if DEBUG_OPTIMIZE
00533   fprintf (stderr, "optimize_thread: thread=%u start=%u end=%u\n", thread,
00534            optimize->thread[thread], optimize->thread[thread + 1]);
00535 #endif
00536   for (i = optimize->thread[thread]; i < optimize->thread[thread + 1]; ++i)
00537     {
00538       e = optimize_norm (i);
00539       g_mutex_lock (mutex);
00540       optimize_best (i, e);
00541       optimize_save_variables (i, e);
00542       if (e < optimize->threshold)
00543         optimize->stop = 1;
00544       g_mutex_unlock (mutex);
00545       if (optimize->stop)
00546         break;
00547 #if DEBUG_OPTIMIZE
00548       fprintf (stderr, "optimize_thread: i=%u e=%lg\n", i, e);
00549 #endif
00550     }
00551 #if DEBUG_OPTIMIZE
00552   fprintf (stderr, "optimize_thread: end\n");
00553 #endif
00554   g_thread_exit (NULL);
00555   return NULL;
00556 }
```

Here is the call graph for this function:



4.22 optimize.c

```
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 2012-2018, 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 <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 "genetic/genetic.h"
00060 #include "utils.h"
00061 #include "experiment.h"
00062 #include "variable.h"
00063 #include "input.h"
```

```
00064 #include "optimize.h"
00065
00066 #define DEBUG_OPTIMIZE 0
00067
00068
00072 #ifdef G_OS_WIN32
00073 #define RM "del"
00074 #else
00075 #define RM "rm"
00076 #endif
00077
00078 Optimize optimize[1];
00079 unsigned int nthreads_climbing;
00081
00082 static void (*optimize_algorithm) ();
00084 static double (*optimize_estimate_climbing) (unsigned int variable,
00085                                               unsigned int estimate);
00087 static double (*optimize_norm) (unsigned int simulation);
00089
00093 static inline void
00094 optimize_input (unsigned int simulation,
00095                 char *input,
00096                 GMappedFile * stencil)
00097 {
00098   char buffer[32], value[32];
00099   GRegex *regex;
00100   FILE *file;
00101   char *buffer2, *buffer3 = NULL, *content;
00102   gsize length;
00103   unsigned int i;
00104
00105 #if DEBUG_OPTIMIZE
00106   fprintf (stderr, "optimize_input: start\n");
00107 #endif
00108
00109   // Checking the file
00110   if (!stencil)
00111     goto optimize_input_end;
00112
00113   // Opening stencil
00114   content = g_mapped_file_get_contents (stencil);
00115   length = g_mapped_file_get_length (stencil);
00116 #if DEBUG_OPTIMIZE
00117   fprintf (stderr, "optimize_input: length=%lu\ncontent:\n%s", length, content);
00118 #endif
00119   file = g_fopen (input, "w");
00120
00121   // Parsing stencil
00122   for (i = 0; i < optimize->nvariables; ++i)
00123     {
00124 #if DEBUG_OPTIMIZE
00125       fprintf (stderr, "optimize_input: variable=%u\n", i);
00126 #endif
00127       snprintf (buffer, 32, "@variable%u@", i + 1);
00128       regex = g_regex_new (buffer, (GRegexCompileFlags) 0, (GRegexMatchFlags) 0,
00129                            NULL);
00130       if (i == 0)
00131         {
00132           buffer2 = g_regex_replace_literal (regex, content, length, 0,
00133                                              optimize->label[i],
00134                                              (GRegexMatchFlags) 0, NULL);
00135 #if DEBUG_OPTIMIZE
00136           fprintf (stderr, "optimize_input: buffer2\n%s", buffer2);
00137 #endif
00138         }
00139       else
00140         {
00141           length = strlen (buffer3);
00142           buffer2 = g_regex_replace_literal (regex, buffer3, length, 0,
00143                                              optimize->label[i],
00144                                              (GRegexMatchFlags) 0, NULL);
00145           g_free (buffer3);
00146         }
00147       g_regex_unref (regex);
00148       length = strlen (buffer2);
00149       snprintf (buffer, 32, "@value%u@", i + 1);
00150       regex = g_regex_new (buffer, (GRegexCompileFlags) 0, (GRegexMatchFlags) 0,
00151                            NULL);
00152       snprintf (value, 32, format[optimize->precision[i]],
00153                 optimize->value[simulation * optimize->nvariables + i]);
00154
00155 #if DEBUG_OPTIMIZE
00156       fprintf (stderr, "optimize_input: value=%s\n", value);
00157 #endif
00158       buffer3 = g_regex_replace_literal (regex, buffer2, length, 0, value,
00159                                          (GRegexMatchFlags) 0, NULL);
00160       g_free (buffer2);
```

```
00161       g_regex_unref (regex);
00162     }
00163
00164   // Saving input file
00165   fwrite (buffer3, strlen (buffer3), sizeof (char), file);
00166   g_free (buffer3);
00167   fclose (file);
00168
00169 optimize_input_end:
00170 #if DEBUG_OPTIMIZE
00171   fprintf (stderr, "optimize_input: end\n");
00172 #endif
00173   return;
00174 }
00175
00182 static double
00183 optimize_parse (unsigned int simulation,
00184                 unsigned int experiment)
00185 {
00186   unsigned int i;
00187   double e;
00188   char buffer[512], input[MAX_NINPUTS][32], output[32], result[32], *buffer2,
00189     *buffer3, *buffer4;
00190   FILE *file_result;
00191
00192 #if DEBUG_OPTIMIZE
00193   fprintf (stderr, "optimize_parse: start\n");
00194   fprintf (stderr, "optimize_parse: simulation=%u experiment=%u\n",
00195            simulation, experiment);
00196 #endif
00197
00198   // Opening input files
00199   for (i = 0; i < optimize->ninputs; ++i)
00200     {
00201       snprintf (&input[i][0], 32, "input-%u-%u-%u", i, simulation, experiment);
00202 #if DEBUG_OPTIMIZE
00203       fprintf (stderr, "optimize_parse: i=%u input=%s\n", i, &input[i][0]);
00204 #endif
00205       optimize_input (simulation, &input[i][0], optimize->file[i][experiment]);
00206     }
00207   for (; i < MAX_NINPUTS; ++i)
00208     strcpy (&input[i][0], "");
00209 #if DEBUG_OPTIMIZE
00210   fprintf (stderr, "optimize_parse: parsing end\n");
00211 #endif
00212
00213   // Performing the simulation
00214   snprintf (output, 32, "output-%u-%u", simulation, experiment);
00215   buffer2 = g_path_get_dirname (optimize->simulator);
00216   buffer3 = g_path_get_basename (optimize->simulator);
00217   buffer4 = g_build_filename (buffer2, buffer3, NULL);
00218   snprintf (buffer, 512, "\"%s\" %s %s %s %s %s %s %s %s %s",
00219             buffer4, input[0], input[1], input[2], input[3], input[4],
00220             input[5], input[6], input[7], output);
00221   g_free (buffer4);
00222   g_free (buffer3);
00223   g_free (buffer2);
00224 #if DEBUG_OPTIMIZE
00225   fprintf (stderr, "optimize_parse: %s\n", buffer);
00226 #endif
00227     if (system (buffer) == -1)
00228       error_message = buffer;
00229
00230   // Checking the objective value function
00231   if (optimize->evaluator)
00232     {
00233       snprintf (result, 32, "result-%u-%u", simulation, experiment);
00234       buffer2 = g_path_get_dirname (optimize->evaluator);
00235       buffer3 = g_path_get_basename (optimize->evaluator);
00236       buffer4 = g_build_filename (buffer2, buffer3, NULL);
00237       snprintf (buffer, 512, "\"%s\" %s %s %s",
00238                 buffer4, output, optimize->experiment[experiment], result);
00239       g_free (buffer4);
00240       g_free (buffer3);
00241       g_free (buffer2);
00242 #if DEBUG_OPTIMIZE
00243       fprintf (stderr, "optimize_parse: %s\n", buffer);
00244       fprintf (stderr, "optimize_parse: result=%s\n", result);
00245 #endif
00246         if (system (buffer) == -1)
00247           error_message = buffer;
00248       file_result = g_fopen (result, "r");
00249       e = atof (fgets (buffer, 512, file_result));
00250       fclose (file_result);
00251     }
00252   else
00253     {
```

```
00254 #if DEBUG_OPTIMIZE
00255       fprintf (stderr, "optimize_parse: output=%s\n", output);
00256 #endif
00257       strcpy (result, "");
00258       file_result = g_fopen (output, "r");
00259       e = atof (fgets (buffer, 512, file_result));
00260       fclose (file_result);
00261     }
00262
00263   // Removing files
00264 #if !DEBUG_OPTIMIZE
00265   for (i = 0; i < optimize->ninputs; ++i)
00266     {
00267       if (optimize->file[i][0])
00268         {
00269           snprintf (buffer, 512, RM " %s", &input[i][0]);
00270             if (system (buffer) == -1)
00271               error_message = buffer;
00272         }
00273     }
00274   snprintf (buffer, 512, RM " %s %s", output, result);
00275     if (system (buffer) == -1)
00276       error_message = buffer;
00277 #endif
00278
00279   // Processing pending events
00280   if (show_pending)
00281     show_pending ();
00282
00283 #if DEBUG_OPTIMIZE
00284   fprintf (stderr, "optimize_parse: end\n");
00285 #endif
00286
00287   // Returning the objective function
00288   return e * optimize->weight[experiment];
00289 }
00290
00296 static double
00297 optimize_norm_euclidian (unsigned int simulation)
00298 {
00299   double e, ei;
00300   unsigned int i;
00301 #if DEBUG_OPTIMIZE
00302   fprintf (stderr, "optimize_norm_euclidian: start\n");
00303 #endif
00304   e = 0.;
00305   for (i = 0; i < optimize->nexperiments; ++i)
00306     {
00307       ei = optimize_parse (simulation, i);
00308       e += ei * ei;
00309     }
00310   e = sqrt (e);
00311 #if DEBUG_OPTIMIZE
00312   fprintf (stderr, "optimize_norm_euclidian: error=%lg\n", e);
00313   fprintf (stderr, "optimize_norm_euclidian: end\n");
00314 #endif
00315   return e;
00316 }
00317
00323 static double
00324 optimize_norm_maximum (unsigned int simulation)
00325 {
00326   double e, ei;
00327   unsigned int i;
00328 #if DEBUG_OPTIMIZE
00329   fprintf (stderr, "optimize_norm_maximum: start\n");
00330 #endif
00331   e = 0.;
00332   for (i = 0; i < optimize->nexperiments; ++i)
00333     {
00334       ei = fabs (optimize_parse (simulation, i));
00335       e = fmax (e, ei);
00336     }
00337 #if DEBUG_OPTIMIZE
00338   fprintf (stderr, "optimize_norm_maximum: error=%lg\n", e);
00339   fprintf (stderr, "optimize_norm_maximum: end\n");
00340 #endif
00341   return e;
00342 }
00343
00349 static double
00350 optimize_norm_p (unsigned int simulation)
00351 {
00352   double e, ei;
00353   unsigned int i;
00354 #if DEBUG_OPTIMIZE
00355   fprintf (stderr, "optimize_norm_p: start\n");
```

```
00356 #endif
00357   e = 0.;
00358   for (i = 0; i < optimize->nexperiments; ++i)
00359     {
00360       ei = fabs (optimize_parse (simulation, i));
00361       e += pow (ei, optimize->p);
00362     }
00363   e = pow (e, 1. / optimize->p);
00364 #if DEBUG_OPTIMIZE
00365   fprintf (stderr, "optimize_norm_p: error=%lg\n", e);
00366   fprintf (stderr, "optimize_norm_p: end\n");
00367 #endif
00368   return e;
00369 }
00370
00376 static double
00377 optimize_norm_taxicab (unsigned int simulation)
00378 {
00379   double e;
00380   unsigned int i;
00381 #if DEBUG_OPTIMIZE
00382   fprintf (stderr, "optimize_norm_taxicab: start\n");
00383 #endif
00384   e = 0.;
00385   for (i = 0; i < optimize->nexperiments; ++i)
00386     e += fabs (optimize_parse (simulation, i));
00387 #if DEBUG_OPTIMIZE
00388   fprintf (stderr, "optimize_norm_taxicab: error=%lg\n", e);
00389   fprintf (stderr, "optimize_norm_taxicab: end\n");
00390 #endif
00391   return e;
00392 }
00393
00397 static void
00398 optimize_print ()
00399 {
00400   unsigned int i;
00401   char buffer[512];
00402 #if HAVE_MPI
00403   if (optimize->mpi_rank)
00404     return;
00405 #endif
00406   printf ("%s\n", _("Best result"));
00407   fprintf (optimize->file_result, "%s\n", _("Best result"));
00408   printf ("error = %.15le\n", optimize->error_old[0]);
00409   fprintf (optimize->file_result, "error = %.15le\n", optimize->
      error_old[0]);
00410   for (i = 0; i < optimize->nvariables; ++i)
00411     {
00412       snprintf (buffer, 512, "%s = %s\n",
00413                 optimize->label[i], format[optimize->precision[i]]);
00414       printf (buffer, optimize->value_old[i]);
00415       fprintf (optimize->file_result, buffer, optimize->value_old[i]);
00416     }
00417   fflush (optimize->file_result);
00418 }
00419
00423 static void
00424 optimize_save_variables (unsigned int simulation,
00425                          double error)
00426 {
00427   unsigned int i;
00428   char buffer[64];
00429 #if DEBUG_OPTIMIZE
00430   fprintf (stderr, "optimize_save_variables: start\n");
00431 #endif
00432   for (i = 0; i < optimize->nvariables; ++i)
00433     {
00434       snprintf (buffer, 64, "%s ", format[optimize->precision[i]]);
00435       fprintf (optimize->file_variables, buffer,
00436                optimize->value[simulation * optimize->nvariables + i]);
00437     }
00438   fprintf (optimize->file_variables, "%.14le\n", error);
00439   fflush (optimize->file_variables);
00440 #if DEBUG_OPTIMIZE
00441   fprintf (stderr, "optimize_save_variables: end\n");
00442 #endif
00443 }
00444
00448 static void
00449 optimize_best (unsigned int simulation,
00450                double value)
00451 {
00452   unsigned int i, j;
00453   double e;
00454 #if DEBUG_OPTIMIZE
00455   fprintf (stderr, "optimize_best: start\n");
```

```
00456   fprintf (stderr, "optimize_best: nsaveds=%u nbest=%u\n",
00457            optimize->nsaveds, optimize->nbest);
00458 #endif
00459   if (optimize->nsaveds < optimize->nbest
00460       || value < optimize->error_best[optimize->nsaveds - 1])
00461     {
00462       if (optimize->nsaveds < optimize->nbest)
00463         ++optimize->nsaveds;
00464       optimize->error_best[optimize->nsaveds - 1] = value;
00465       optimize->simulation_best[optimize->nsaveds - 1] = simulation;
00466       for (i = optimize->nsaveds; --i;)
00467         {
00468           if (optimize->error_best[i] < optimize->error_best[i - 1])
00469             {
00470               j = optimize->simulation_best[i];
00471               e = optimize->error_best[i];
00472               optimize->simulation_best[i] = optimize->
      simulation_best[i - 1];
00473               optimize->error_best[i] = optimize->error_best[i - 1];
00474               optimize->simulation_best[i - 1] = j;
00475               optimize->error_best[i - 1] = e;
00476             }
00477           else
00478             break;
00479         }
00480     }
00481 #if DEBUG_OPTIMIZE
00482   fprintf (stderr, "optimize_best: end\n");
00483 #endif
00484 }
00485
00489 static void
00490 optimize_sequential ()
00491 {
00492   unsigned int i;
00493   double e;
00494 #if DEBUG_OPTIMIZE
00495   fprintf (stderr, "optimize_sequential: start\n");
00496   fprintf (stderr, "optimize_sequential: nstart=%u nend=%u\n",
00497            optimize->nstart, optimize->nend);
00498 #endif
00499   for (i = optimize->nstart; i < optimize->nend; ++i)
00500     {
00501       e = optimize_norm (i);
00502       optimize_best (i, e);
00503       optimize_save_variables (i, e);
00504       if (e < optimize->threshold)
00505         {
00506           optimize->stop = 1;
00507           break;
00508         }
00509 #if DEBUG_OPTIMIZE
00510       fprintf (stderr, "optimize_sequential: i=%u e=%lg\n", i, e);
00511 #endif
00512     }
00513 #if DEBUG_OPTIMIZE
00514   fprintf (stderr, "optimize_sequential: end\n");
00515 #endif
00516 }
00517
00523 static void *
00524 optimize_thread (ParallelData * data)
00525 {
00526   unsigned int i, thread;
00527   double e;
00528 #if DEBUG_OPTIMIZE
00529   fprintf (stderr, "optimize_thread: start\n");
00530 #endif
00531   thread = data->thread;
00532 #if DEBUG_OPTIMIZE
00533   fprintf (stderr, "optimize_thread: thread=%u start=%u end=%u\n", thread,
00534            optimize->thread[thread], optimize->thread[thread + 1]);
00535 #endif
00536   for (i = optimize->thread[thread]; i < optimize->thread[thread + 1]; ++i)
00537     {
00538       e = optimize_norm (i);
00539       g_mutex_lock (mutex);
00540       optimize_best (i, e);
00541       optimize_save_variables (i, e);
00542       if (e < optimize->threshold)
00543         optimize->stop = 1;
00544       g_mutex_unlock (mutex);
00545       if (optimize->stop)
00546         break;
00547 #if DEBUG_OPTIMIZE
00548       fprintf (stderr, "optimize_thread: i=%u e=%lg\n", i, e);
00549 #endif
```

```
00550     }
00551 #if DEBUG_OPTIMIZE
00552   fprintf (stderr, "optimize_thread: end\n");
00553 #endif
00554   g_thread_exit (NULL);
00555   return NULL;
00556 }
00557
00561 static inline void
00562 optimize_merge (unsigned int nsaveds,
00563                 unsigned int *simulation_best,
00565                 double *error_best)
00567 {
00568   unsigned int i, j, k, s[optimize->nbest];
00569   double e[optimize->nbest];
00570 #if DEBUG_OPTIMIZE
00571   fprintf (stderr, "optimize_merge: start\n");
00572 #endif
00573   i = j = k = 0;
00574   do
00575     {
00576       if (i == optimize->nsaveds)
00577         {
00578           s[k] = simulation_best[j];
00579           e[k] = error_best[j];
00580           ++j;
00581           ++k;
00582           if (j == nsaveds)
00583             break;
00584         }
00585       else if (j == nsaveds)
00586         {
00587           s[k] = optimize->simulation_best[i];
00588           e[k] = optimize->error_best[i];
00589           ++i;
00590           ++k;
00591           if (i == optimize->nsaveds)
00592             break;
00593         }
00594       else if (optimize->error_best[i] > error_best[j])
00595         {
00596           s[k] = simulation_best[j];
00597           e[k] = error_best[j];
00598           ++j;
00599           ++k;
00600         }
00601       else
00602         {
00603           s[k] = optimize->simulation_best[i];
00604           e[k] = optimize->error_best[i];
00605           ++i;
00606           ++k;
00607         }
00608     }
00609   while (k < optimize->nbest);
00610   optimize->nsaveds = k;
00611   memcpy (optimize->simulation_best, s, k * sizeof (unsigned int));
00612   memcpy (optimize->error_best, e, k * sizeof (double));
00613 #if DEBUG_OPTIMIZE
00614   fprintf (stderr, "optimize_merge: end\n");
00615 #endif
00616 }
00617
00621 #if HAVE_MPI
00622 static void
00623 optimize_synchronise ()
00624 {
00625   unsigned int i, nsaveds, simulation_best[optimize->nbest], stop;
00626   double error_best[optimize->nbest];
00627   MPI_Status mpi_stat;
00628 #if DEBUG_OPTIMIZE
00629   fprintf (stderr, "optimize_synchronise: start\n");
00630 #endif
00631   if (optimize->mpi_rank == 0)
00632     {
00633       for (i = 1; (int) i < ntasks; ++i)
00634         {
00635           MPI_Recv (&nsaveds, 1, MPI_INT, i, 1, MPI_COMM_WORLD, &mpi_stat);
00636           MPI_Recv (simulation_best, nsaveds, MPI_INT, i, 1,
00637                     MPI_COMM_WORLD, &mpi_stat);
00638           MPI_Recv (error_best, nsaveds, MPI_DOUBLE, i, 1,
00639                     MPI_COMM_WORLD, &mpi_stat);
00640           optimize_merge (nsaveds, simulation_best, error_best);
00641           MPI_Recv (&stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD, &mpi_stat);
00642           if (stop)
00643             optimize->stop = 1;
00644         }
```

```
00645       for (i = 1; (int) i < ntasks; ++i)
00646         MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD);
00647     }
00648   else
00649     {
00650       MPI_Send (&optimize->nsaveds, 1, MPI_INT, 0, 1, MPI_COMM_WORLD);
00651       MPI_Send (optimize->simulation_best, optimize->nsaveds, MPI_INT, 0, 1,
00652                 MPI_COMM_WORLD);
00653       MPI_Send (optimize->error_best, optimize->nsaveds, MPI_DOUBLE, 0, 1,
00654                 MPI_COMM_WORLD);
00655       MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD);
00656       MPI_Recv (&stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD, &mpi_stat);
00657       if (stop)
00658         optimize->stop = 1;
00659     }
00660 #if DEBUG_OPTIMIZE
00661   fprintf (stderr, "optimize_synchronise: end\n");
00662 #endif
00663 }
00664 #endif
00665
00669 static void
00670 optimize_sweep ()
00671 {
00672   unsigned int i, j, k, l;
00673   double e;
00674   GThread *thread[nthreads];
00675   ParallelData data[nthreads];
00676 #if DEBUG_OPTIMIZE
00677   fprintf (stderr, "optimize_sweep: start\n");
00678 #endif
00679   for (i = 0; i < optimize->nsimulations; ++i)
00680     {
00681       k = i;
00682       for (j = 0; j < optimize->nvariables; ++j)
00683         {
00684           l = k % optimize->nsweeps[j];
00685           k /= optimize->nsweeps[j];
00686           e = optimize->rangemin[j];
00687           if (optimize->nsweeps[j] > 1)
00688             e += l * (optimize->rangemax[j] - optimize->rangemin[j])
00689               / (optimize->nsweeps[j] - 1);
00690           optimize->value[i * optimize->nvariables + j] = e;
00691         }
00692     }
00693   optimize->nsaveds = 0;
00694   if (nthreads <= 1)
00695     optimize_sequential ();
00696   else
00697     {
00698       for (i = 0; i < nthreads; ++i)
00699         {
00700           data[i].thread = i;
00701           thread[i]
00702             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00703         }
00704       for (i = 0; i < nthreads; ++i)
00705         g_thread_join (thread[i]);
00706     }
00707 #if HAVE_MPI
00708   // Communicating tasks results
00709   optimize_synchronise ();
00710 #endif
00711 #if DEBUG_OPTIMIZE
00712   fprintf (stderr, "optimize_sweep: end\n");
00713 #endif
00714 }
00715
00719 static void
00720 optimize_MonteCarlo ()
00721 {
00722   unsigned int i, j;
00723   GThread *thread[nthreads];
00724   ParallelData data[nthreads];
00725 #if DEBUG_OPTIMIZE
00726   fprintf (stderr, "optimize_MonteCarlo: start\n");
00727 #endif
00728   for (i = 0; i < optimize->nsimulations; ++i)
00729     for (j = 0; j < optimize->nvariables; ++j)
00730       optimize->value[i * optimize->nvariables + j]
00731         = optimize->rangemin[j] + gsl_rng_uniform (optimize->rng)
00732         * (optimize->rangemax[j] - optimize->rangemin[j]);
00733   optimize->nsaveds = 0;
00734   if (nthreads <= 1)
00735     optimize_sequential ();
00736   else
00737     {
```

```
00738       for (i = 0; i < nthreads; ++i)
00739         {
00740           data[i].thread = i;
00741           thread[i]
00742             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00743         }
00744       for (i = 0; i < nthreads; ++i)
00745         g_thread_join (thread[i]);
00746     }
00747 #if HAVE_MPI
00748   // Communicating tasks results
00749   optimize_synchronise ();
00750 #endif
00751 #if DEBUG_OPTIMIZE
00752   fprintf (stderr, "optimize_MonteCarlo: end\n");
00753 #endif
00754 }
00755
00759 static void
00760 optimize_orthogonal ()
00761 {
00762   unsigned int i, j, k, l;
00763   double e;
00764   GThread *thread[nthreads];
00765   ParallelData data[nthreads];
00766 #if DEBUG_OPTIMIZE
00767   fprintf (stderr, "optimize_orthogonal: start\n");
00768 #endif
00769   for (i = 0; i < optimize->nsimulations; ++i)
00770     {
00771       k = i;
00772       for (j = 0; j < optimize->nvariables; ++j)
00773         {
00774           l = k % optimize->nsweeps[j];
00775           k /= optimize->nsweeps[j];
00776           e = optimize->rangemin[j];
00777           if (optimize->nsweeps[j] > 1)
00778             e += (l + gsl_rng_uniform (optimize->rng))
00779               * (optimize->rangemax[j] - optimize->rangemin[j])
00780               / optimize->nsweeps[j];
00781           optimize->value[i * optimize->nvariables + j] = e;
00782         }
00783     }
00784   optimize->nsaveds = 0;
00785   if (nthreads <= 1)
00786     optimize_sequential ();
00787   else
00788     {
00789       for (i = 0; i < nthreads; ++i)
00790         {
00791           data[i].thread = i;
00792           thread[i]
00793             = g_thread_new (NULL, (GThreadFunc) optimize_thread, &data[i]);
00794         }
00795       for (i = 0; i < nthreads; ++i)
00796         g_thread_join (thread[i]);
00797     }
00798 #if HAVE_MPI
00799   // Communicating tasks results
00800   optimize_synchronise ();
00801 #endif
00802 #if DEBUG_OPTIMIZE
00803   fprintf (stderr, "optimize_orthogonal: end\n");
00804 #endif
00805 }
00806
00810 static void
00811 optimize_best_climbing (unsigned int simulation,
00812                         double value)
00813 {
00814 #if DEBUG_OPTIMIZE
00815   fprintf (stderr, "optimize_best_climbing: start\n");
00816   fprintf (stderr,
00817            "optimize_best_climbing: simulation=%u value=%.14le best=%.14le\n",
00818            simulation, value, optimize->error_best[0]);
00819 #endif
00820   if (value < optimize->error_best[0])
00821     {
00822       optimize->error_best[0] = value;
00823       optimize->simulation_best[0] = simulation;
00824 #if DEBUG_OPTIMIZE
00825       fprintf (stderr,
00826                "optimize_best_climbing: BEST simulation=%u value=%.14le\n",
00827                simulation, value);
00828 #endif
00829     }
00830 #if DEBUG_OPTIMIZE
```

```
00831   fprintf (stderr, "optimize_best_climbing: end\n");
00832 #endif
00833 }
00834
00838 static inline void
00839 optimize_climbing_sequential (unsigned int simulation)
00840 {
00841   double e;
00842   unsigned int i, j;
00843 #if DEBUG_OPTIMIZE
00844   fprintf (stderr, "optimize_climbing_sequential: start\n");
00845   fprintf (stderr, "optimize_climbing_sequential: nstart_climbing=%u "
00846            "nend_climbing=%u\n",
00847            optimize->nstart_climbing, optimize->nend_climbing);
00848 #endif
00849   for (i = optimize->nstart_climbing; i < optimize->nend_climbing; ++i)
00850     {
00851       j = simulation + i;
00852       e = optimize_norm (j);
00853       optimize_best_climbing (j, e);
00854       optimize_save_variables (j, e);
00855       if (e < optimize->threshold)
00856         {
00857           optimize->stop = 1;
00858           break;
00859         }
00860 #if DEBUG_OPTIMIZE
00861       fprintf (stderr, "optimize_climbing_sequential: i=%u e=%lg\n", i, e);
00862 #endif
00863     }
00864 #if DEBUG_OPTIMIZE
00865   fprintf (stderr, "optimize_climbing_sequential: end\n");
00866 #endif
00867 }
00868
00874 static void *
00875 optimize_climbing_thread (ParallelData * data)
00876 {
00877   unsigned int i, thread;
00878   double e;
00879 #if DEBUG_OPTIMIZE
00880   fprintf (stderr, "optimize_climbing_thread: start\n");
00881 #endif
00882   thread = data->thread;
00883 #if DEBUG_OPTIMIZE
00884   fprintf (stderr, "optimize_climbing_thread: thread=%u start=%u end=%u\n",
00885            thread,
00886            optimize->thread_climbing[thread],
00887            optimize->thread_climbing[thread + 1]);
00888 #endif
00889   for (i = optimize->thread_climbing[thread];
00890        i < optimize->thread_climbing[thread + 1]; ++i)
00891     {
00892       e = optimize_norm (i);
00893       g_mutex_lock (mutex);
00894       optimize_best_climbing (i, e);
00895       optimize_save_variables (i, e);
00896       if (e < optimize->threshold)
00897         optimize->stop = 1;
00898       g_mutex_unlock (mutex);
00899       if (optimize->stop)
00900         break;
00901 #if DEBUG_OPTIMIZE
00902       fprintf (stderr, "optimize_climbing_thread: i=%u e=%lg\n", i, e);
00903 #endif
00904     }
00905 #if DEBUG_OPTIMIZE
00906   fprintf (stderr, "optimize_climbing_thread: end\n");
00907 #endif
00908   g_thread_exit (NULL);
00909   return NULL;
00910 }
00911
00915 static double
00916 optimize_estimate_climbing_random (unsigned int variable,
00918                                    unsigned int estimate
00919                                    __attribute__ ((unused)))
00921 {
00922   double x;
00923 #if DEBUG_OPTIMIZE
00924   fprintf (stderr, "optimize_estimate_climbing_random: start\n");
00925 #endif
00926   x = optimize->climbing[variable]
00927     + (1. - 2. * gsl_rng_uniform (optimize->rng)) * optimize->step[variable];
00928 #if DEBUG_OPTIMIZE
00929   fprintf (stderr, "optimize_estimate_climbing_random: climbing%u=%lg\n",
00930            variable, x);
```

```
00931   fprintf (stderr, "optimize_estimate_climbing_random: end\n");
00932 #endif
00933   return x;
00934 }
00935
00939 static double
00940 optimize_estimate_climbing_coordinates (unsigned int variable,
00942                                         unsigned int estimate)
00944 {
00945   double x;
00946 #if DEBUG_OPTIMIZE
00947   fprintf (stderr, "optimize_estimate_climbing_coordinates: start\n");
00948 #endif
00949   x = optimize->climbing[variable];
00950   if (estimate >= (2 * variable) && estimate < (2 * variable + 2))
00951     {
00952       if (estimate & 1)
00953         x += optimize->step[variable];
00954       else
00955         x -= optimize->step[variable];
00956     }
00957 #if DEBUG_OPTIMIZE
00958   fprintf (stderr,
00959            "optimize_estimate_climbing_coordinates: climbing%u=%lg\n",
00960            variable, x);
00961   fprintf (stderr, "optimize_estimate_climbing_coordinates: end\n");
00962 #endif
00963   return x;
00964 }
00965
00969 static inline void
00970 optimize_step_climbing (unsigned int simulation)
00971 {
00972   GThread *thread[nthreads_climbing];
00973   ParallelData data[nthreads_climbing];
00974   unsigned int i, j, k, b;
00975 #if DEBUG_OPTIMIZE
00976   fprintf (stderr, "optimize_step_climbing: start\n");
00977 #endif
00978   for (i = 0; i < optimize->nestimates; ++i)
00979     {
00980       k = (simulation + i) * optimize->nvariables;
00981       b = optimize->simulation_best[0] * optimize->nvariables;
00982 #if DEBUG_OPTIMIZE
00983       fprintf (stderr, "optimize_step_climbing: simulation=%u best=%u\n",
00984                simulation + i, optimize->simulation_best[0]);
00985 #endif
00986       for (j = 0; j < optimize->nvariables; ++j, ++k, ++b)
00987         {
00988 #if DEBUG_OPTIMIZE
00989           fprintf (stderr,
00990                    "optimize_step_climbing: estimate=%u best%u=%.14le\n",
00991                    i, j, optimize->value[b]);
00992 #endif
00993           optimize->value[k]
00994             = optimize->value[b] + optimize_estimate_climbing (j, i);
00995           optimize->value[k] = fmin (fmax (optimize->value[k],
00996                                            optimize->rangeminabs[j]),
00997                                      optimize->rangemaxabs[j]);
00998 #if DEBUG_OPTIMIZE
00999           fprintf (stderr,
01000                    "optimize_step_climbing: estimate=%u variable%u=%.14le\n",
01001                    i, j, optimize->value[k]);
01002 #endif
01003         }
01004     }
01005   if (nthreads_climbing == 1)
01006     optimize_climbing_sequential (simulation);
01007   else
01008     {
01009       for (i = 0; i <= nthreads_climbing; ++i)
01010         {
01011           optimize->thread_climbing[i]
01012             = simulation + optimize->nstart_climbing
01013             + i * (optimize->nend_climbing - optimize->
      nstart_climbing)
01014             / nthreads_climbing;
01015 #if DEBUG_OPTIMIZE
01016           fprintf (stderr,
01017                    "optimize_step_climbing: i=%u thread_climbing=%u\n",
01018                    i, optimize->thread_climbing[i]);
01019 #endif
01020         }
01021       for (i = 0; i < nthreads_climbing; ++i)
01022         {
01023           data[i].thread = i;
01024           thread[i] = g_thread_new
```

```
01025             (NULL, (GThreadFunc) optimize_climbing_thread, &data[i]);
01026         }
01027       for (i = 0; i < nthreads_climbing; ++i)
01028         g_thread_join (thread[i]);
01029     }
01030 #if DEBUG_OPTIMIZE
01031   fprintf (stderr, "optimize_step_climbing: end\n");
01032 #endif
01033 }
01034
01038 static inline void
01039 optimize_climbing ()
01040 {
01041   unsigned int i, j, k, b, s, adjust;
01042 #if DEBUG_OPTIMIZE
01043   fprintf (stderr, "optimize_climbing: start\n");
01044 #endif
01045   for (i = 0; i < optimize->nvariables; ++i)
01046     optimize->climbing[i] = 0.;
01047   b = optimize->simulation_best[0] * optimize->nvariables;
01048   s = optimize->nsimulations;
01049   adjust = 1;
01050   for (i = 0; i < optimize->nsteps; ++i, s += optimize->nestimates, b = k)
01051     {
01052 #if DEBUG_OPTIMIZE
01053       fprintf (stderr, "optimize_climbing: step=%u old_best=%u\n",
01054                i, optimize->simulation_best[0]);
01055 #endif
01056       optimize_step_climbing (s);
01057       k = optimize->simulation_best[0] * optimize->nvariables;
01058 #if DEBUG_OPTIMIZE
01059       fprintf (stderr, "optimize_climbing: step=%u best=%u\n",
01060                i, optimize->simulation_best[0]);
01061 #endif
01062       if (k == b)
01063         {
01064           if (adjust)
01065             for (j = 0; j < optimize->nvariables; ++j)
01066               optimize->step[j] *= 0.5;
01067           for (j = 0; j < optimize->nvariables; ++j)
01068             optimize->climbing[j] = 0.;
01069           adjust = 1;
01070         }
01071       else
01072         {
01073           for (j = 0; j < optimize->nvariables; ++j)
01074             {
01075 #if DEBUG_OPTIMIZE
01076               fprintf (stderr,
01077                        "optimize_climbing: best%u=%.14le old%u=%.14le\n",
01078                        j, optimize->value[k + j], j, optimize->value[b + j]);
01079 #endif
01080               optimize->climbing[j]
01081                 = (1. - optimize->relaxation) * optimize->climbing[j]
01082                 + optimize->relaxation
01083                 * (optimize->value[k + j] - optimize->value[b + j]);
01084 #if DEBUG_OPTIMIZE
01085               fprintf (stderr, "optimize_climbing: climbing%u=%.14le\n",
01086                        j, optimize->climbing[j]);
01087 #endif
01088             }
01089           adjust = 0;
01090         }
01091     }
01092 #if DEBUG_OPTIMIZE
01093   fprintf (stderr, "optimize_climbing: end\n");
01094 #endif
01095 }
01096
01102 static double
01103 optimize_genetic_objective (Entity * entity)
01104 {
01105   unsigned int j;
01106   double objective;
01107   char buffer[64];
01108 #if DEBUG_OPTIMIZE
01109   fprintf (stderr, "optimize_genetic_objective: start\n");
01110 #endif
01111   for (j = 0; j < optimize->nvariables; ++j)
01112     {
01113       optimize->value[entity->id * optimize->nvariables + j]
01114         = genetic_get_variable (entity, optimize->genetic_variable + j);
01115     }
01116   objective = optimize_norm (entity->id);
01117   g_mutex_lock (mutex);
01118   for (j = 0; j < optimize->nvariables; ++j)
01119     {
```

```
01120       snprintf (buffer, 64, "%s ", format[optimize->precision[j]]);
01121       fprintf (optimize->file_variables, buffer,
01122                genetic_get_variable (entity, optimize->genetic_variable + j));
01123     }
01124   fprintf (optimize->file_variables, "%.14le\n", objective);
01125   g_mutex_unlock (mutex);
01126 #if DEBUG_OPTIMIZE
01127   fprintf (stderr, "optimize_genetic_objective: end\n");
01128 #endif
01129   return objective;
01130 }
01131
01135 static void
01136 optimize_genetic ()
01137 {
01138   double *best_variable = NULL;
01139   char *best_genome = NULL;
01140   double best_objective = 0.;
01141 #if DEBUG_OPTIMIZE
01142   fprintf (stderr, "optimize_genetic: start\n");
01143   fprintf (stderr, "optimize_genetic: ntasks=%u nthreads=%u\n", ntasks,
01144            nthreads);
01145   fprintf (stderr,
01146            "optimize_genetic: nvariables=%u population=%u generations=%u\n",
01147            optimize->nvariables, optimize->nsimulations, optimize->
      niterations);
01148   fprintf (stderr,
01149            "optimize_genetic: mutation=%lg reproduction=%lg adaptation=%lg\n",
01150            optimize->mutation_ratio, optimize->reproduction_ratio,
01151            optimize->adaptation_ratio);
01152 #endif
01153   genetic_algorithm_default (optimize->nvariables,
01154                              optimize->genetic_variable,
01155                              optimize->nsimulations,
01156                              optimize->niterations,
01157                              optimize->mutation_ratio,
01158                              optimize->reproduction_ratio,
01159                              optimize->adaptation_ratio,
01160                              optimize->seed,
01161                              optimize->threshold,
01162                              &optimize_genetic_objective,
01163                              &best_genome, &best_variable, &best_objective);
01164 #if DEBUG_OPTIMIZE
01165   fprintf (stderr, "optimize_genetic: the best\n");
01166 #endif
01167   optimize->error_old = (double *) g_malloc (sizeof (double));
01168   optimize->value_old
01169     = (double *) g_malloc (optimize->nvariables * sizeof (double));
01170   optimize->error_old[0] = best_objective;
01171   memcpy (optimize->value_old, best_variable,
01172           optimize->nvariables * sizeof (double));
01173   g_free (best_genome);
01174   g_free (best_variable);
01175   optimize_print ();
01176 #if DEBUG_OPTIMIZE
01177   fprintf (stderr, "optimize_genetic: end\n");
01178 #endif
01179 }
01180
01184 static inline void
01185 optimize_save_old ()
01186 {
01187   unsigned int i, j;
01188 #if DEBUG_OPTIMIZE
01189   fprintf (stderr, "optimize_save_old: start\n");
01190   fprintf (stderr, "optimize_save_old: nsaveds=%u\n", optimize->nsaveds);
01191 #endif
01192   memcpy (optimize->error_old, optimize->error_best,
01193           optimize->nbest * sizeof (double));
01194   for (i = 0; i < optimize->nbest; ++i)
01195     {
01196       j = optimize->simulation_best[i];
01197 #if DEBUG_OPTIMIZE
01198       fprintf (stderr, "optimize_save_old: i=%u j=%u\n", i, j);
01199 #endif
01200       memcpy (optimize->value_old + i * optimize->nvariables,
01201               optimize->value + j * optimize->nvariables,
01202               optimize->nvariables * sizeof (double));
01203     }
01204 #if DEBUG_OPTIMIZE
01205   for (i = 0; i < optimize->nvariables; ++i)
01206     fprintf (stderr, "optimize_save_old: best variable %u=%lg\n",
01207              i, optimize->value_old[i]);
01208   fprintf (stderr, "optimize_save_old: end\n");
01209 #endif
01210 }
01211
```

```
01216 static inline void
01217 optimize_merge_old ()
01218 {
01219   unsigned int i, j, k;
01220   double v[optimize->nbest * optimize->nvariables], e[optimize->
      nbest],
01221     *enew, *eold;
01222 #if DEBUG_OPTIMIZE
01223   fprintf (stderr, "optimize_merge_old: start\n");
01224 #endif
01225   enew = optimize->error_best;
01226   eold = optimize->error_old;
01227   i = j = k = 0;
01228   do
01229     {
01230       if (*enew < *eold)
01231         {
01232           memcpy (v + k * optimize->nvariables,
01233                   optimize->value
01234                   + optimize->simulation_best[i] * optimize->
      nvariables,
01235                   optimize->nvariables * sizeof (double));
01236           e[k] = *enew;
01237           ++k;
01238           ++enew;
01239           ++i;
01240         }
01241       else
01242         {
01243           memcpy (v + k * optimize->nvariables,
01244                   optimize->value_old + j * optimize->nvariables,
01245                   optimize->nvariables * sizeof (double));
01246           e[k] = *eold;
01247           ++k;
01248           ++eold;
01249           ++j;
01250         }
01251     }
01252   while (k < optimize->nbest);
01253   memcpy (optimize->value_old, v, k * optimize->nvariables * sizeof (double));
01254   memcpy (optimize->error_old, e, k * sizeof (double));
01255 #if DEBUG_OPTIMIZE
01256   fprintf (stderr, "optimize_merge_old: end\n");
01257 #endif
01258 }
01259
01264 static inline void
01265 optimize_refine ()
01266 {
01267   unsigned int i, j;
01268   double d;
01269 #if HAVE_MPI
01270   MPI_Status mpi_stat;
01271 #endif
01272 #if DEBUG_OPTIMIZE
01273   fprintf (stderr, "optimize_refine: start\n");
01274 #endif
01275 #if HAVE_MPI
01276   if (!optimize->mpi_rank)
01277     {
01278 #endif
01279       for (j = 0; j < optimize->nvariables; ++j)
01280         {
01281           optimize->rangemin[j] = optimize->rangemax[j]
01282             = optimize->value_old[j];
01283         }
01284       for (i = 0; ++i < optimize->nbest;)
01285         {
01286           for (j = 0; j < optimize->nvariables; ++j)
01287             {
01288               optimize->rangemin[j]
01289                 = fmin (optimize->rangemin[j],
01290                         optimize->value_old[i * optimize->nvariables + j]);
01291               optimize->rangemax[j]
01292                 = fmax (optimize->rangemax[j],
01293                         optimize->value_old[i * optimize->nvariables + j]);
01294             }
01295         }
01296       for (j = 0; j < optimize->nvariables; ++j)
01297         {
01298           d = optimize->tolerance
01299             * (optimize->rangemax[j] - optimize->rangemin[j]);
01300           switch (optimize->algorithm)
01301             {
01302             case ALGORITHM_MONTE_CARLO:
01303               d *= 0.5;
01304               break;
```

```
01305             default:
01306               if (optimize->nsweeps[j] > 1)
01307                 d /= optimize->nsweeps[j] - 1;
01308               else
01309                 d = 0.;
01310             }
01311           optimize->rangemin[j] -= d;
01312           optimize->rangemin[j]
01313             = fmax (optimize->rangemin[j], optimize->rangeminabs[j]);
01314           optimize->rangemax[j] += d;
01315           optimize->rangemax[j]
01316             = fmin (optimize->rangemax[j], optimize->rangemaxabs[j]);
01317           printf ("%s min=%lg max=%lg\n", optimize->label[j],
01318                   optimize->rangemin[j], optimize->rangemax[j]);
01319           fprintf (optimize->file_result, "%s min=%lg max=%lg\n",
01320                    optimize->label[j], optimize->rangemin[j],
01321                    optimize->rangemax[j]);
01322         }
01323 #if HAVE_MPI
01324       for (i = 1; (int) i < ntasks; ++i)
01325         {
01326           MPI_Send (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, i,
01327                     1, MPI_COMM_WORLD);
01328           MPI_Send (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, i,
01329                     1, MPI_COMM_WORLD);
01330         }
01331     }
01332   else
01333     {
01334       MPI_Recv (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, 0, 1,
01335                 MPI_COMM_WORLD, &mpi_stat);
01336       MPI_Recv (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, 0, 1,
01337                 MPI_COMM_WORLD, &mpi_stat);
01338     }
01339 #endif
01340 #if DEBUG_OPTIMIZE
01341   fprintf (stderr, "optimize_refine: end\n");
01342 #endif
01343 }
01344
01348 static void
01349 optimize_step ()
01350 {
01351 #if DEBUG_OPTIMIZE
01352   fprintf (stderr, "optimize_step: start\n");
01353 #endif
01354   optimize_algorithm ();
01355   if (optimize->nsteps)
01356     optimize_climbing ();
01357 #if DEBUG_OPTIMIZE
01358   fprintf (stderr, "optimize_step: end\n");
01359 #endif
01360 }
01361
01365 static inline void
01366 optimize_iterate ()
01367 {
01368   unsigned int i;
01369 #if DEBUG_OPTIMIZE
01370   fprintf (stderr, "optimize_iterate: start\n");
01371 #endif
01372   optimize->error_old = (double *) g_malloc (optimize->nbest * sizeof (double));
01373   optimize->value_old =
01374     (double *) g_malloc (optimize->nbest * optimize->nvariables *
01375                          sizeof (double));
01376   optimize_step ();
01377   optimize_save_old ();
01378   optimize_refine ();
01379   optimize_print ();
01380   for (i = 1; i < optimize->niterations && !optimize->stop; ++i)
01381     {
01382       optimize_step ();
01383       optimize_merge_old ();
01384       optimize_refine ();
01385       optimize_print ();
01386     }
01387 #if DEBUG_OPTIMIZE
01388   fprintf (stderr, "optimize_iterate: end\n");
01389 #endif
01390 }
01391
01395 void
01396 optimize_free ()
01397 {
01398   unsigned int i, j;
01399 #if DEBUG_OPTIMIZE
01400   fprintf (stderr, "optimize_free: start\n");
```

```
01401 #endif
01402   for (j = 0; j < optimize->ninputs; ++j)
01403     {
01404       for (i = 0; i < optimize->nexperiments; ++i)
01405         g_mapped_file_unref (optimize->file[j][i]);
01406       g_free (optimize->file[j]);
01407     }
01408   g_free (optimize->error_old);
01409   g_free (optimize->value_old);
01410   g_free (optimize->value);
01411   g_free (optimize->genetic_variable);
01412 #if DEBUG_OPTIMIZE
01413   fprintf (stderr, "optimize_free: end\n");
01414 #endif
01415 }
01416
01420 void
01421 optimize_open ()
01422 {
01423   GTimeZone *tz;
01424   GDateTime *t0, *t;
01425   unsigned int i, j;
01426
01427 #if DEBUG_OPTIMIZE
01428   char *buffer;
01429   fprintf (stderr, "optimize_open: start\n");
01430 #endif
01431
01432   // Getting initial time
01433 #if DEBUG_OPTIMIZE
01434   fprintf (stderr, "optimize_open: getting initial time\n");
01435 #endif
01436   tz = g_time_zone_new_utc ();
01437   t0 = g_date_time_new_now (tz);
01438
01439   // Obtaining and initing the pseudo-random numbers generator seed
01440 #if DEBUG_OPTIMIZE
01441   fprintf (stderr, "optimize_open: getting initial seed\n");
01442 #endif
01443   if (optimize->seed == DEFAULT_RANDOM_SEED)
01444     optimize->seed = input->seed;
01445   gsl_rng_set (optimize->rng, optimize->seed);
01446
01447   // Replacing the working directory
01448 #if DEBUG_OPTIMIZE
01449   fprintf (stderr, "optimize_open: replacing the working directory\n");
01450 #endif
01451   g_chdir (input->directory);
01452
01453   // Getting results file names
01454   optimize->result = input->result;
01455   optimize->variables = input->variables;
01456
01457   // Obtaining the simulator file
01458   optimize->simulator = input->simulator;
01459
01460   // Obtaining the evaluator file
01461   optimize->evaluator = input->evaluator;
01462
01463   // Reading the algorithm
01464   optimize->algorithm = input->algorithm;
01465   switch (optimize->algorithm)
01466     {
01467     case ALGORITHM_MONTE_CARLO:
01468       optimize_algorithm = optimize_MonteCarlo;
01469       break;
01470     case ALGORITHM_SWEEP:
01471       optimize_algorithm = optimize_sweep;
01472       break;
01473     case ALGORITHM_ORTHOGONAL:
01474       optimize_algorithm = optimize_orthogonal;
01475       break;
01476     default:
01477       optimize_algorithm = optimize_genetic;
01478       optimize->mutation_ratio = input->mutation_ratio;
01479       optimize->reproduction_ratio = input->
      reproduction_ratio;
01480       optimize->adaptation_ratio = input->adaptation_ratio;
01481     }
01482   optimize->nvariables = input->nvariables;
01483   optimize->nsimulations = input->nsimulations;
01484   optimize->niterations = input->niterations;
01485   optimize->nbest = input->nbest;
01486   optimize->tolerance = input->tolerance;
01487   optimize->nsteps = input->nsteps;
01488   optimize->nestimates = 0;
01489   optimize->threshold = input->threshold;
```

```
01490   optimize->stop = 0;
01491   if (input->nsteps)
01492     {
01493       optimize->relaxation = input->relaxation;
01494       switch (input->climbing)
01495         {
01496         case CLIMBING_METHOD_COORDINATES:
01497           optimize->nestimates = 2 * optimize->nvariables;
01498           optimize_estimate_climbing =
      optimize_estimate_climbing_coordinates;
01499           break;
01500         default:
01501           optimize->nestimates = input->nestimates;
01502           optimize_estimate_climbing =
      optimize_estimate_climbing_random;
01503         }
01504     }
01505
01506 #if DEBUG_OPTIMIZE
01507   fprintf (stderr, "optimize_open: nbest=%u\n", optimize->nbest);
01508 #endif
01509   optimize->simulation_best
01510     = (unsigned int *) alloca (optimize->nbest * sizeof (unsigned int));
01511   optimize->error_best = (double *) alloca (optimize->nbest * sizeof (double));
01512
01513   // Reading the experimental data
01514 #if DEBUG_OPTIMIZE
01515   buffer = g_get_current_dir ();
01516   fprintf (stderr, "optimize_open: current directory=%s\n", buffer);
01517   g_free (buffer);
01518 #endif
01519   optimize->nexperiments = input->nexperiments;
01520   optimize->ninputs = input->experiment->ninputs;
01521   optimize->experiment
01522     = (char **) alloca (input->nexperiments * sizeof (char *));
01523   optimize->weight = (double *) alloca (input->nexperiments * sizeof (double));
01524   for (i = 0; i < input->experiment->ninputs; ++i)
01525     optimize->file[i] = (GMappedFile **)
01526       g_malloc (input->nexperiments * sizeof (GMappedFile *));
01527   for (i = 0; i < input->nexperiments; ++i)
01528     {
01529 #if DEBUG_OPTIMIZE
01530       fprintf (stderr, "optimize_open: i=%u\n", i);
01531 #endif
01532       optimize->experiment[i] = input->experiment[i].
      name;
01533       optimize->weight[i] = input->experiment[i].weight;
01534 #if DEBUG_OPTIMIZE
01535       fprintf (stderr, "optimize_open: experiment=%s weight=%lg\n",
01536                optimize->experiment[i], optimize->weight[i]);
01537 #endif
01538       for (j = 0; j < input->experiment->ninputs; ++j)
01539         {
01540 #if DEBUG_OPTIMIZE
01541           fprintf (stderr, "optimize_open: stencil%u\n", j + 1);
01542 #endif
01543           optimize->file[j][i]
01544             = g_mapped_file_new (input->experiment[i].stencil[j], 0, NULL);
01545         }
01546     }
01547
01548   // Reading the variables data
01549 #if DEBUG_OPTIMIZE
01550   fprintf (stderr, "optimize_open: reading variables\n");
01551 #endif
01552   optimize->label = (char **) alloca (input->nvariables * sizeof (char *));
01553   j = input->nvariables * sizeof (double);
01554   optimize->rangemin = (double *) alloca (j);
01555   optimize->rangeminabs = (double *) alloca (j);
01556   optimize->rangemax = (double *) alloca (j);
01557   optimize->rangemaxabs = (double *) alloca (j);
01558   optimize->step = (double *) alloca (j);
01559   j = input->nvariables * sizeof (unsigned int);
01560   optimize->precision = (unsigned int *) alloca (j);
01561   optimize->nsweeps = (unsigned int *) alloca (j);
01562   optimize->nbits = (unsigned int *) alloca (j);
01563   for (i = 0; i < input->nvariables; ++i)
01564     {
01565       optimize->label[i] = input->variable[i].name;
01566       optimize->rangemin[i] = input->variable[i].rangemin;
01567       optimize->rangeminabs[i] = input->variable[i].
      rangeminabs;
01568       optimize->rangemax[i] = input->variable[i].rangemax;
01569       optimize->rangemaxabs[i] = input->variable[i].
      rangemaxabs;
01570       optimize->precision[i] = input->variable[i].
      precision;
```

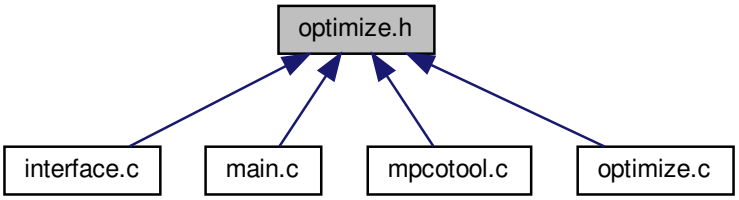
```
01571       optimize->step[i] = input->variable[i].step;
01572       optimize->nsweeps[i] = input->variable[i].nsweeps;
01573       optimize->nbits[i] = input->variable[i].nbits;
01574     }
01575   if (input->algorithm == ALGORITHM_SWEEP
01576       || input->algorithm == ALGORITHM_ORTHOGONAL)
01577     {
01578       optimize->nsimulations = 1;
01579       for (i = 0; i < input->nvariables; ++i)
01580         {
01581           optimize->nsimulations *= optimize->nsweeps[i];
01582 #if DEBUG_OPTIMIZE
01583           fprintf (stderr, "optimize_open: nsweeps=%u nsimulations=%u\n",
01584                    optimize->nsweeps[i], optimize->nsimulations);
01585 #endif
01586         }
01587     }
01588   if (optimize->nsteps)
01589     optimize->climbing
01590       = (double *) alloca (optimize->nvariables * sizeof (double));
01591
01592   // Setting error norm
01593   switch (input->norm)
01594     {
01595     case ERROR_NORM_EUCLIDIAN:
01596       optimize_norm = optimize_norm_euclidian;
01597       break;
01598     case ERROR_NORM_MAXIMUM:
01599       optimize_norm = optimize_norm_maximum;
01600       break;
01601     case ERROR_NORM_P:
01602       optimize_norm = optimize_norm_p;
01603       optimize->p = input->p;
01604       break;
01605     default:
01606       optimize_norm = optimize_norm_taxicab;
01607     }
01608
01609   // Allocating values
01610 #if DEBUG_OPTIMIZE
01611   fprintf (stderr, "optimize_open: allocating variables\n");
01612   fprintf (stderr, "optimize_open: nvariables=%u algorithm=%u\n",
01613            optimize->nvariables, optimize->algorithm);
01614 #endif
01615   optimize->genetic_variable = NULL;
01616   if (optimize->algorithm == ALGORITHM_GENETIC)
01617     {
01618       optimize->genetic_variable = (GeneticVariable *)
01619         g_malloc (optimize->nvariables * sizeof (GeneticVariable));
01620       for (i = 0; i < optimize->nvariables; ++i)
01621         {
01622 #if DEBUG_OPTIMIZE
01623           fprintf (stderr, "optimize_open: i=%u min=%lg max=%lg nbits=%u\n",
01624                    i, optimize->rangemin[i], optimize->rangemax[i],
01625                    optimize->nbits[i]);
01626 #endif
01627           optimize->genetic_variable[i].minimum = optimize->
    rangemin[i];
01628           optimize->genetic_variable[i].maximum = optimize->
    rangemax[i];
01629           optimize->genetic_variable[i].nbits = optimize->nbits[i];
01630         }
01631     }
01632 #if DEBUG_OPTIMIZE
01633   fprintf (stderr, "optimize_open: nvariables=%u nsimulations=%u\n",
01634            optimize->nvariables, optimize->nsimulations);
01635 #endif
01636   optimize->value = (double *)
01637     g_malloc ((optimize->nsimulations
01638                + optimize->nestimates * optimize->nsteps)
01639               * optimize->nvariables * sizeof (double));
01640
01641   // Calculating simulations to perform for each task
01642 #if HAVE_MPI
01643 #if DEBUG_OPTIMIZE
01644   fprintf (stderr, "optimize_open: rank=%u ntasks=%u\n",
01645            optimize->mpi_rank, ntasks);
01646 #endif
01647   optimize->nstart = optimize->mpi_rank * optimize->nsimulations /
    ntasks;
01648   optimize->nend = (1 + optimize->mpi_rank) * optimize->nsimulations /
    ntasks;
01649   if (optimize->nsteps)
01650     {
01651       optimize->nstart_climbing
01652         = optimize->mpi_rank * optimize->nestimates / ntasks;
01653       optimize->nend_climbing
```

```
01654         = (1 + optimize->mpi_rank) * optimize->nestimates /
      ntasks;
01655     }
01656 #else
01657   optimize->nstart = 0;
01658   optimize->nend = optimize->nsimulations;
01659   if (optimize->nsteps)
01660     {
01661       optimize->nstart_climbing = 0;
01662       optimize->nend_climbing = optimize->nestimates;
01663     }
01664 #endif
01665 #if DEBUG_OPTIMIZE
01666   fprintf (stderr, "optimize_open: nstart=%u nend=%u\n", optimize->nstart,
01667            optimize->nend);
01668 #endif
01669
01670   // Calculating simulations to perform for each thread
01671   optimize->thread
01672     = (unsigned int *) alloca ((1 + nthreads) * sizeof (unsigned int));
01673   for (i = 0; i <= nthreads; ++i)
01674     {
01675       optimize->thread[i] = optimize->nstart
01676         + i * (optimize->nend - optimize->nstart) / nthreads;
01677 #if DEBUG_OPTIMIZE
01678       fprintf (stderr, "optimize_open: i=%u thread=%u\n", i,
01679                optimize->thread[i]);
01680 #endif
01681     }
01682   if (optimize->nsteps)
01683     optimize->thread_climbing = (unsigned int *)
01684       alloca ((1 + nthreads_climbing) * sizeof (unsigned int));
01685
01686   // Opening result files
01687   optimize->file_result = g_fopen (optimize->result, "w");
01688   optimize->file_variables = g_fopen (optimize->variables, "w");
01689
01690   // Performing the algorithm
01691   switch (optimize->algorithm)
01692     {
01693       // Genetic algorithm
01694     case ALGORITHM_GENETIC:
01695       optimize_genetic ();
01696       break;
01697
01698       // Iterative algorithm
01699     default:
01700       optimize_iterate ();
01701     }
01702
01703   // Getting calculation time
01704   t = g_date_time_new_now (tz);
01705   optimize->calculation_time = 0.000001 * g_date_time_difference (t, t0);
01706   g_date_time_unref (t);
01707   g_date_time_unref (t0);
01708   g_time_zone_unref (tz);
01709   printf ("%s = %.6lg s\n", _("Calculation time"), optimize->calculation_time);
01710   fprintf (optimize->file_result, "%s = %.6lg s\n",
01711            _("Calculation time"), optimize->calculation_time);
01712
01713   // Closing result files
01714   fclose (optimize->file_variables);
01715   fclose (optimize->file_result);
01716
01717 #if DEBUG_OPTIMIZE
01718   fprintf (stderr, "optimize_open: end\n");
01719 #endif
01720 }
```

4.23 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

  Tasks number.
- unsigned int nthreads

  Threads number.
- unsigned int nthreads_climbing

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

  GMutex struct.
- Optimize optimize [1]

  Optimization data.

4.23.1 Detailed Description

Header file to define the optimization functions.

Authors

Javier Burguete.

Copyright

Definition in file optimize.h.

4.23.2 Function Documentation

4.23.2.1 optimize_free()

```
void optimize_free ( )
```

Function to free the memory used by the Optimize struct.

Definition at line 1396 of file optimize.c.

```
01397 {
01398   unsigned int i, j;
01399 #if DEBUG_OPTIMIZE
01400   fprintf (stderr, "optimize_free: start\n");
01401 #endif
01402   for (j = 0; j < optimize->ninputs; ++j)
01403     {
01404       for (i = 0; i < optimize->nexperiments; ++i)
01405         g_mapped_file_unref (optimize->file[j][i]);
01406       g_free (optimize->file[j]);
01407     }
01408   g_free (optimize->error_old);
01409   g_free (optimize->value_old);
01410   g_free (optimize->value);
01411   g_free (optimize->genetic_variable);
01412 #if DEBUG_OPTIMIZE
01413   fprintf (stderr, "optimize_free: end\n");
01414 #endif
01415 }
```

4.23.2.2 optimize_open()

```
void optimize_open ( )
```

Function to open and perform a optimization.

Definition at line 1421 of file optimize.c.

```
01422 {
01423   GTimeZone *tz;
01424   GDateTime *t0, *t;
01425   unsigned int i, j;
01426
01427 #if DEBUG_OPTIMIZE
01428   char *buffer;
01429   fprintf (stderr, "optimize_open: start\n");
01430 #endif
01431
01432   // Getting initial time
01433 #if DEBUG_OPTIMIZE
01434   fprintf (stderr, "optimize_open: getting initial time\n");
01435 #endif
01436   tz = g_time_zone_new_utc ();
01437   t0 = g_date_time_new_now (tz);
01438
01439   // Obtaining and initing the pseudo-random numbers generator seed
01440 #if DEBUG_OPTIMIZE
01441   fprintf (stderr, "optimize_open: getting initial seed\n");
01442 #endif
01443   if (optimize->seed == DEFAULT_RANDOM_SEED)
01444     optimize->seed = input->seed;
01445   gsl_rng_set (optimize->rng, optimize->seed);
01446
```

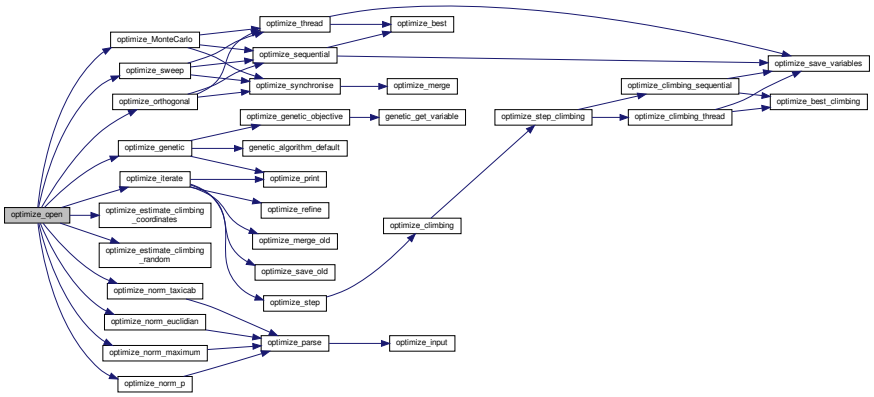
```
01447   // Replacing the working directory
01448 #if DEBUG_OPTIMIZE
01449   fprintf (stderr, "optimize_open: replacing the working directory\n");
01450 #endif
01451   g_chdir (input->directory);
01452
01453   // Getting results file names
01454   optimize->result = input->result;
01455   optimize->variables = input->variables;
01456
01457   // Obtaining the simulator file
01458   optimize->simulator = input->simulator;
01459
01460   // Obtaining the evaluator file
01461   optimize->evaluator = input->evaluator;
01462
01463   // Reading the algorithm
01464   optimize->algorithm = input->algorithm;
01465   switch (optimize->algorithm)
01466     {
01467     case ALGORITHM_MONTE_CARLO:
01468       optimize_algorithm = optimize_MonteCarlo;
01469       break;
01470     case ALGORITHM_SWEEP:
01471       optimize_algorithm = optimize_sweep;
01472       break;
01473     case ALGORITHM_ORTHOGONAL:
01474       optimize_algorithm = optimize_orthogonal;
01475       break;
01476     default:
01477       optimize_algorithm = optimize_genetic;
01478       optimize->mutation_ratio = input->
      mutation_ratio;
01479       optimize->reproduction_ratio = input->
      reproduction_ratio;
01480       optimize->adaptation_ratio = input->
      adaptation_ratio;
01481     }
01482   optimize->nvariables = input->nvariables;
01483   optimize->nsimulations = input->nsimulations;
01484   optimize->niterations = input->niterations;
01485   optimize->nbest = input->nbest;
01486   optimize->tolerance = input->tolerance;
01487   optimize->nsteps = input->nsteps;
01488   optimize->nestimates = 0;
01489   optimize->threshold = input->threshold;
01490   optimize->stop = 0;
01491   if (input->nsteps)
01492     {
01493       optimize->relaxation = input->relaxation;
01494       switch (input->climbing)
01495         {
01496         case CLIMBING_METHOD_COORDINATES:
01497           optimize->nestimates = 2 * optimize->
      nvariables;
01498           optimize_estimate_climbing =
      optimize_estimate_climbing_coordinates;
01499           break;
01500         default:
01501           optimize->nestimates = input->nestimates;
01502           optimize_estimate_climbing =
      optimize_estimate_climbing_random;
01503         }
01504     }
01505
01506 #if DEBUG_OPTIMIZE
01507   fprintf (stderr, "optimize_open: nbest=%u\n", optimize->nbest);
01508 #endif
01509   optimize->simulation_best
01510     = (unsigned int *) alloca (optimize->nbest * sizeof (unsigned int));
01511   optimize->error_best = (double *) alloca (optimize->
      nbest * sizeof (double));
01512
01513   // Reading the experimental data
01514 #if DEBUG_OPTIMIZE
01515   buffer = g_get_current_dir ();
01516   fprintf (stderr, "optimize_open: current directory=%s\n", buffer);
01517   g_free (buffer);
01518 #endif
01519   optimize->nexperiments = input->nexperiments;
01520   optimize->ninputs = input->experiment->ninputs;
01521   optimize->experiment
01522     = (char **) alloca (input->nexperiments * sizeof (char *));
01523   optimize->weight = (double *) alloca (input->nexperiments * sizeof (double
      ));
01524   for (i = 0; i < input->experiment->ninputs; ++i)
01525     optimize->file[i] = (GMappedFile **)
```

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

```
01602       optimize_norm = optimize_norm_p;
01603       optimize->p = input->p;
01604       break;
01605     default:
01606       optimize_norm = optimize_norm_taxicab;
01607     }
01608
01609   // Allocating values
01610 #if DEBUG_OPTIMIZE
01611   fprintf (stderr, "optimize_open: allocating variables\n");
01612   fprintf (stderr, "optimize_open: nvariables=%u algorithm=%u\n",
01613            optimize->nvariables, optimize->algorithm);
01614 #endif
01615   optimize->genetic_variable = NULL;
01616   if (optimize->algorithm == ALGORITHM_GENETIC)
01617     {
01618       optimize->genetic_variable = (GeneticVariable *)
01619         g_malloc (optimize->nvariables * sizeof (
      GeneticVariable));
01620       for (i = 0; i < optimize->nvariables; ++i)
01621         {
01622 #if DEBUG_OPTIMIZE
01623           fprintf (stderr, "optimize_open: i=%u min=%lg max=%lg nbits=%u\n",
01624                    i, optimize->rangemin[i], optimize->
      rangemax[i],
01625                    optimize->nbits[i]);
01626 #endif
01627           optimize->genetic_variable[i].minimum =
      optimize->rangemin[i];
01628           optimize->genetic_variable[i].maximum =
      optimize->rangemax[i];
01629           optimize->genetic_variable[i].nbits = optimize->
      nbits[i];
01630         }
01631     }
01632 #if DEBUG_OPTIMIZE
01633   fprintf (stderr, "optimize_open: nvariables=%u nsimulations=%u\n",
01634            optimize->nvariables, optimize->
      nsimulations);
01635 #endif
01636   optimize->value = (double *)
01637     g_malloc ((optimize->nsimulations
01638                + optimize->nestimates * optimize->
      nsteps)
01639               * optimize->nvariables * sizeof (double));
01640
01641   // Calculating simulations to perform for each task
01642 #if HAVE_MPI
01643 #if DEBUG_OPTIMIZE
01644   fprintf (stderr, "optimize_open: rank=%u ntasks=%u\n",
01645            optimize->mpi_rank, ntasks);
01646 #endif
01647   optimize->nstart = optimize->mpi_rank * optimize->
      nsimulations / ntasks;
01648   optimize->nend = (1 + optimize->mpi_rank) *
      optimize->nsimulations / ntasks;
01649   if (optimize->nsteps)
01650     {
01651       optimize->nstart_climbing
01652         = optimize->mpi_rank * optimize->nestimates /
      ntasks;
01653       optimize->nend_climbing
01654         = (1 + optimize->mpi_rank) * optimize->
      nestimates / ntasks;
01655     }
01656 #else
01657   optimize->nstart = 0;
01658   optimize->nend = optimize->nsimulations;
01659   if (optimize->nsteps)
01660     {
01661       optimize->nstart_climbing = 0;
01662       optimize->nend_climbing = optimize->
      nestimates;
01663     }
01664 #endif
01665 #if DEBUG_OPTIMIZE
01666   fprintf (stderr, "optimize_open: nstart=%u nend=%u\n", optimize->
      nstart,
01667            optimize->nend);
01668 #endif
01669
01670   // Calculating simulations to perform for each thread
01671   optimize->thread
01672     = (unsigned int *) alloca ((1 + nthreads) * sizeof (unsigned int));
01673   for (i = 0; i <= nthreads; ++i)
01674     {
01675       optimize->thread[i] = optimize->nstart
```

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

Here is the call graph for this function:



4.24 optimize.h

```
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 2012-2018, AUTHORS.
00009
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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 #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
```

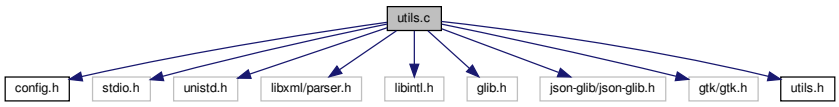
```
00113   int mpi_rank;
00114 #endif
00115 } Optimize;
00116
00121 typedef struct
00122 {
00123   unsigned int thread;
00124 } ParallelData;
00125
00126 // Global variables
00127 extern int ntasks;
00128 extern unsigned int nthreads;
00129 extern unsigned int nthreads_climbing;
00130 extern GMutex mutex[1];
00131 extern Optimize optimize[1];
00132
00133 // Public functions
00134 void optimize_free ();
00135 void optimize_open ();
00136
00137 #endif
```

4.25 utils.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 "utils.h"
```

Include dependency graph for utils.c:



Functions

- void show_message (char *title, char *msg, int type)
- void show_error (char *msg)
- int xml_node_get_int (xmlNode *node, const xmlChar *prop, int *error_code)
- unsigned int xml_node_get_uint (xmlNode *node, const xmlChar *prop, int *error_code)
- unsigned int xml_node_get_uint_with_default (xmlNode *node, const xmlChar *prop, unsigned int default_value, int *error_code)
- double xml_node_get_float (xmlNode *node, const xmlChar *prop, int *error_code)
- double xml_node_get_float_with_default (xmlNode *node, const xmlChar *prop, double default_value, int *error_code)
- void xml_node_set_int (xmlNode *node, const xmlChar *prop, int value)
- void xml_node_set_uint (xmlNode *node, const xmlChar *prop, unsigned int value)
- void xml_node_set_float (xmlNode *node, const xmlChar *prop, double value)
- int json_object_get_int (JsonObject *object, const char *prop, int *error_code)

- unsigned int json_object_get_uint (JsonObject *object, const char *prop, int *error_code)
- unsigned int json_object_get_uint_with_default (JsonObject *object, const char *prop, unsigned int default_value, int *error_code)
- double json_object_get_float (JsonObject *object, const char *prop, int *error_code)
- double json_object_get_float_with_default (JsonObject *object, const char *prop, double default_value, int *error_code)
- void json_object_set_int (JsonObject *object, const char *prop, int value)
- void json_object_set_uint (JsonObject *object, const char *prop, unsigned int value)
- void json_object_set_float (JsonObject *object, const char *prop, double value)
- int cores_number ()
- void process_pending ()
- unsigned int gtk_array_get_active (GtkRadioButton *array[], unsigned int n)

Variables

- GtkWindow * main_window

  Main GtkWindow.
- char * error_message

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

  Pointer to the function to show pending events.

4.25.1 Detailed Description

Source file to define some useful functions.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file utils.c.

4.25.2 Function Documentation

4.25.2.1 cores_number()

```
int cores_number ( )
```

Function to obtain the cores number.

Returns

Cores number.

Definition at line 440 of file utils.c.

```
00441 {
00442 #ifdef G_OS_WIN32
00443   SYSTEM_INFO sysinfo;
00444   GetSystemInfo (&sysinfo);
00445   return sysinfo.dwNumberOfProcessors;
00446 #else
00447   return (int) sysconf (_SC_NPROCESSORS_ONLN);
00448 #endif
00449 }
```

4.25.2.2 gtk_array_get_active()

```
unsigned int gtk_array_get_active (
             GtkRadioButton * array[],
             unsigned int n )
```

Function to get the active GtkRadioButton.

Returns

Active GtkRadioButton.

Parameters

array	Array of GtkRadioButtons.
n	Number of GtkRadioButtons.

Definition at line 469 of file utils.c.

```
00471 {
00472   unsigned int i;
00473   for (i = 0; i < n; ++i)
00474     if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (array[i])))
00475       break;
00476   return i;
00477 }
```

4.25.2.3 json_object_get_float()

```
double json_object_get_float (
            JsonObject * object,
            const char * prop,
            int * error_code )
```

Function to get a floating point number of a JSON object property.

Returns

Floating point number value.

Parameters

object	JSON object.
prop	JSON property.
error_code	Error code.

Definition at line 350 of file utils.c.

```
00353 {
00354   const char *buffer;
00355   double x = 0.;
00356   buffer = json_object_get_string_member (object, prop);
00357   if (!buffer)
00358     *error_code = 1;
00359   else
00360     {
00361       if (sscanf (buffer, "%lf", &x) != 1)
00362         *error_code = 2;
00363       else
00364         *error_code = 0;
00365     }
00366   return x;
00367 }
```

4.25.2.4 json_object_get_float_with_default()

```
double json_object_get_float_with_default (
            JsonObject * object,
            const char * prop,
            double default_value,
            int * error_code )
```

Function to get a floating point number of a JSON object property with a default value.

Returns

Floating point number value.

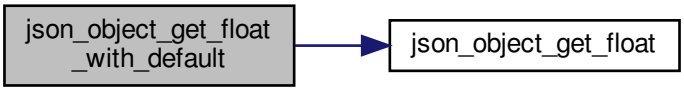
Parameters

object	JSON object.
prop	JSON property.
default_value	default value.
error_code	Error code.

Definition at line 376 of file utils.c.

```
00382 {
00383   double x;
00384   if (json_object_get_member (object, prop))
00385     x = json_object_get_float (object, prop, error_code);
00386   else
00387     {
00388       x = default_value;
00389       *error_code = 0;
00390     }
00391   return x;
00392 }
```

Here is the call graph for this function:



4.25.2.5 json_object_get_int()

```
int json_object_get_int (
              JsonObject * object,
              const char * prop,
              int * error_code )
```

Function to get an integer number of a JSON object property.

Returns

Integer number value.

Parameters

object	JSON object.
prop	JSON property.
error_code	Error code.

Definition at line 276 of file utils.c.

```
00279 {
00280   const char *buffer;
00281   int i = 0;
00282   buffer = json_object_get_string_member (object, prop);
00283   if (!buffer)
```

```
00284     *error_code = 1;
00285   else
00286     {
00287       if (sscanf (buffer, "%d", &i) != 1)
00288         *error_code = 2;
00289       else
00290         *error_code = 0;
00291     }
00292   return i;
00293 }
```

4.25.2.6 json_object_get_uint()

```
unsigned int json_object_get_uint (
              JsonObject * object,
              const char * prop,
              int * error_code )
```

Function to get an unsigned integer number of a JSON object property.

Returns

Unsigned integer number value.

Parameters

object	JSON object.
prop	JSON property.
error_code	Error code.

Definition at line 301 of file utils.c.

```
00304 {
00305   const char *buffer;
00306   unsigned int i = 0;
00307   buffer = json_object_get_string_member (object, prop);
00308   if (!buffer)
00309     *error_code = 1;
00310   else
00311     {
00312       if (sscanf (buffer, "%u", &i) != 1)
00313         *error_code = 2;
00314       else
00315         *error_code = 0;
00316     }
00317   return i;
00318 }
```

4.25.2.7 json_object_get_uint_with_default()

```
unsigned int json_object_get_uint_with_default (
              JsonObject * object,
              const char * prop,
              unsigned int default_value,
              int * error_code )
```

Function to get an unsigned integer number of a JSON object property with a default value.

Returns

Unsigned integer number value.

Parameters

object	JSON object.
prop	JSON property.
default_value	default value.
error_code	Error code.

Definition at line 327 of file utils.c.

```
00332 {
00333   unsigned int i;
00334   if (json_object_get_member (object, prop))
00335     i = json_object_get_uint (object, prop, error_code);
00336   else
00337     {
00338       i = default_value;
00339       *error_code = 0;
00340     }
00341   return i;
00342 }
```

Here is the call graph for this function:

4.25.2.8 json_object_set_float()

```
void json_object_set_float (
            JsonObject * object,
            const char * prop,
            double value )
```

Function to set a floating point number in a JSON object property.

Parameters

object	JSON object.
prop	JSON property.
value	Floating point number value.

Definition at line 425 of file utils.c.

```
00428 {
00429   char buffer[64];
00430   snprintf (buffer, 64, "%.14lg", value);
00431   json_object_set_string_member (object, prop, buffer);
00432 }
```

4.25.2.9 json_object_set_int()

```
void json_object_set_int (
              JsonObject * object,
              const char * prop,
              int value )
```

Function to set an integer number in a JSON object property.

Parameters

object	JSON object.
prop	JSON property.
value	Integer number value.

Definition at line 398 of file utils.c.

```
00401 {
00402   char buffer[64];
00403   snprintf (buffer, 64, "%d", value);
00404   json_object_set_string_member (object, prop, buffer);
00405 }
```

4.25.2.10 json_object_set_uint()

```
void json_object_set_uint (
              JsonObject * object,
              const char * prop,
              unsigned int value )
```

Function to set an unsigned integer number in a JSON object property.

Parameters

object	JSON object.
prop	JSON property.
value	Unsigned integer number value.

Definition at line 411 of file utils.c.

```
00415 {
00416   char buffer[64];
00417   snprintf (buffer, 64, "%u", value);
00418   json_object_set_string_member (object, prop, buffer);
00419 }
```

4.25.2.11 process_pending()

```
void process_pending ( )
```

Function to process events on long computation.

Definition at line 457 of file utils.c.

```
00458 {
00459   while (gtk_events_pending ())
00460     gtk_main_iteration ();
00461 }
```

4.25.2.12 show_error()

```
void show_error (
            char * msg )
```

Function to show a dialog with an error message.

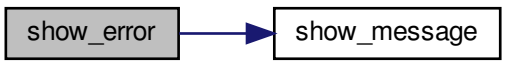
Parameters

msg	Error message.

Definition at line 101 of file utils.c.

```
00102 {
00103   show_message (_("ERROR!"), msg, ERROR_TYPE);
00104 }
```

Here is the call graph for this function:



4.25.2.13 show_message()

```
void show_message (
            char * title,
            char * msg,
            int type )
```

Function to show a dialog with a message.

Parameters

title	Title.
msg	Message.
type	Message type.

Definition at line 66 of file utils.c.

```
00074 {
00075 #if HAVE_GTK
00076   GtkMessageDialog *dlg;
00077
00078   // Creating the dialog
00079   dlg = (GtkMessageDialog *)
00080     gtk_message_dialog_new (main_window, GTK_DIALOG_MODAL,
00081                             (GtkMessageType) type, GTK_BUTTONS_OK, "%s", msg);
00082
00083   // Setting the dialog title
00084   gtk_window_set_title (GTK_WINDOW (dlg), title);
00085
00086   // Showing the dialog and waiting response
00087   gtk_dialog_run (GTK_DIALOG (dlg));
00088
00089   // Closing and freeing memory
00090   gtk_widget_destroy (GTK_WIDGET (dlg));
00091
00092 #else
00093   printf ("%s: %s\n", title, msg);
00094 #endif
00095 }
```

4.25.2.14 xml_node_get_float()

```
double xml_node_get_float (
            xmlNode * node,
            const xmlChar * prop,
            int * error_code )
```

Function to get a floating point number of a XML node property.

Returns

Floating point number value.

Parameters

node	XML node.
prop	XML property.
error_code	Error code.

Definition at line 188 of file utils.c.

```
00191 {
00192   double x = 0.;
00193   xmlChar *buffer;
00194   buffer = xmlGetProp (node, prop);
00195   if (!buffer)
00196     *error_code = 1;
00197   else
00198     {
00199       if (sscanf ((char *) buffer, "%lf", &x) != 1)
00200         *error_code = 2;
00201       else
00202         *error_code = 0;
00203       xmlFree (buffer);
00204     }
00205   return x;
00206 }
```

4.25.2.15 xml_node_get_float_with_default()

```
double xml_node_get_float_with_default (
            xmlNode * node,
            const xmlChar * prop,
            double default_value,
            int * error_code )
```

Function to get a floating point number of a XML node property with a default value.

Returns

Floating point number value.

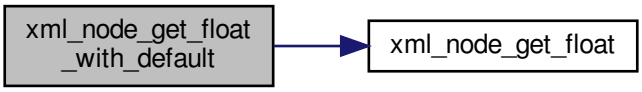
Parameters

node	XML node.
prop	XML property.
default_value	default value.
error_code	Error code.

Definition at line 215 of file utils.c.

```
00219 {
00220   double x;
00221   if (xmlHasProp (node, prop))
00222     x = xml_node_get_float (node, prop, error_code);
00223   else
00224     {
00225       x = default_value;
00226       *error_code = 0;
00227     }
00228   return x;
00229 }
```

Here is the call graph for this function:



4.25.2.16 xml_node_get_int()

```
int xml_node_get_int (
              xmlNode * node,
              const xmlChar * prop,
              int * error_code )
```

Function to get an integer number of a XML node property.

Returns

Integer number value.

Parameters

node	XML node.
prop	XML property.
error_code	Error code.

Definition at line 112 of file utils.c.

```
00115 {
00116   int i = 0;
00117   xmlChar *buffer;
00118   buffer = xmlGetProp (node, prop);
00119   if (!buffer)
00120     *error_code = 1;
00121   else
00122     {
00123       if (sscanf ((char *) buffer, "%d", &i) != 1)
00124         *error_code = 2;
00125       else
00126         *error_code = 0;
00127       xmlFree (buffer);
00128     }
00129   return i;
00130 }
```

4.25.2.17 xml_node_get_uint()

```
unsigned int xml_node_get_uint (
             xmlNode * node,
             const xmlChar * prop,
             int * error_code )
```

Function to get an unsigned integer number of a XML node property.

Returns

Unsigned integer number value.

Parameters

node	XML node.
prop	XML property.
error_code	Error code.

Definition at line 138 of file utils.c.

```
00141 {
00142   unsigned int i = 0;
00143   xmlChar *buffer;
00144   buffer = xmlGetProp (node, prop);
00145   if (!buffer)
00146     *error_code = 1;
00147   else
00148     {
00149       if (sscanf ((char *) buffer, "%u", &i) != 1)
00150         *error_code = 2;
00151       else
00152         *error_code = 0;
00153       xmlFree (buffer);
00154     }
00155   return i;
00156 }
```

4.25.2.18 xml_node_get_uint_with_default()

```
unsigned int xml_node_get_uint_with_default (
             xmlNode * node,
             const xmlChar * prop,
             unsigned int default_value,
             int * error_code )
```

Function to get an unsigned integer number of a XML node property with a default value.

Returns

Unsigned integer number value.

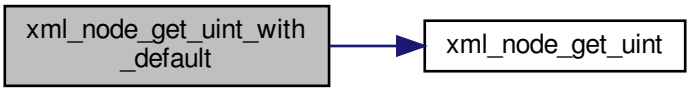
Parameters

node	XML node.
prop	XML property.
default_value	default value.
error_code	Error code.

Definition at line 165 of file utils.c.

```
00170 {
00171   unsigned int i;
00172   if (xmlHasProp (node, prop))
00173     i = xml_node_get_uint (node, prop, error_code);
00174   else
00175     {
00176       i = default_value;
00177       *error_code = 0;
00178     }
00179   return i;
00180 }
```

Here is the call graph for this function:



4.25.2.19 xml_node_set_float()

```
void xml_node_set_float (
              xmlNode * node,
              const xmlChar * prop,
              double value )
```

Function to set a floating point number in a XML node property.

Parameters

node	XML node.
prop	XML property.
value	Floating point number value.

Definition at line 261 of file utils.c.

```
00264 {
```

```
00265   xmlChar buffer[64];
00266   snprintf ((char *) buffer, 64, "%.14lg", value);
00267   xmlSetProp (node, prop, buffer);
00268 }
```

4.25.2.20 xml_node_set_int()

```
void xml_node_set_int (
             xmlNode * node,
             const xmlChar * prop,
             int value )
```

Function to set an integer number in a XML node property.

Parameters

node	XML node.
prop	XML property.
value	Integer number value.

Definition at line 235 of file utils.c.

```
00238 {
00239   xmlChar buffer[64];
00240   snprintf ((char *) buffer, 64, "%d", value);
00241   xmlSetProp (node, prop, buffer);
00242 }
```

4.25.2.21 xml_node_set_uint()

```
void xml_node_set_uint (
             xmlNode * node,
             const xmlChar * prop,
             unsigned int value )
```

Function to set an unsigned integer number in a XML node property.

Parameters

node	XML node.
prop	XML property.
value	Unsigned integer number value.

Definition at line 248 of file utils.c.

```
00251 {
00252   xmlChar buffer[64];
```

```
00253   snprintf ((char *) buffer, 64, "%u", value);
00254   xmlSetProp (node, prop, buffer);
00255 }
```

4.26 utils.c

```
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 2012-2018, AUTHORS.
00009
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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 "utils.h"
00053
00054 #if HAVE_GTK
00055 GtkWindow *main_window;
00056 #endif
00057
00058 char *error_message;
00059 void (*show_pending) () = NULL;
00061
00065 void
00066 show_message (char *title,
00067               char *msg,
00068               int type
00069 #if !HAVE_GTK
00070               __attribute__ ((unused))
00071 #endif
00073   )
00074 {
00075 #if HAVE_GTK
00076   GtkMessageDialog *dlg;
00077
00078   // Creating the dialog
00079   dlg = (GtkMessageDialog *)
00080     gtk_message_dialog_new (main_window, GTK_DIALOG_MODAL,
00081                             (GtkMessageType) type, GTK_BUTTONS_OK, "%s", msg);
00082
00083   // Setting the dialog title
00084   gtk_window_set_title (GTK_WINDOW (dlg), title);
00085
00086   // Showing the dialog and waiting response
00087   gtk_dialog_run (GTK_DIALOG (dlg));
```

```
00088
00089   // Closing and freeing memory
00090   gtk_widget_destroy (GTK_WIDGET (dlg));
00091
00092 #else
00093   printf ("%s: %s\n", title, msg);
00094 #endif
00095 }
00096
00100 void
00101 show_error (char *msg)
00102 {
00103   show_message (_("ERROR!"), msg, ERROR_TYPE);
00104 }
00105
00111 int
00112 xml_node_get_int (xmlNode * node,
00113                   const xmlChar * prop,
00114                   int *error_code)
00115 {
00116   int i = 0;
00117   xmlChar *buffer;
00118   buffer = xmlGetProp (node, prop);
00119   if (!buffer)
00120     *error_code = 1;
00121   else
00122     {
00123       if (sscanf ((char *) buffer, "%d", &i) != 1)
00124         *error_code = 2;
00125       else
00126         *error_code = 0;
00127       xmlFree (buffer);
00128     }
00129   return i;
00130 }
00131
00137 unsigned int
00138 xml_node_get_uint (xmlNode * node,
00139                    const xmlChar * prop,
00140                    int *error_code)
00141 {
00142   unsigned int i = 0;
00143   xmlChar *buffer;
00144   buffer = xmlGetProp (node, prop);
00145   if (!buffer)
00146     *error_code = 1;
00147   else
00148     {
00149       if (sscanf ((char *) buffer, "%u", &i) != 1)
00150         *error_code = 2;
00151       else
00152         *error_code = 0;
00153       xmlFree (buffer);
00154     }
00155   return i;
00156 }
00157
00164 unsigned int
00165 xml_node_get_uint_with_default (xmlNode * node,
00166                                 const xmlChar * prop,
00167                                 unsigned int default_value,
00169                                 int *error_code)
00170 {
00171   unsigned int i;
00172   if (xmlHasProp (node, prop))
00173     i = xml_node_get_uint (node, prop, error_code);
00174   else
00175     {
00176       i = default_value;
00177       *error_code = 0;
00178     }
00179   return i;
00180 }
00181
00187 double
00188 xml_node_get_float (xmlNode * node,
00189                     const xmlChar * prop,
00190                     int *error_code)
00191 {
00192   double x = 0.;
00193   xmlChar *buffer;
00194   buffer = xmlGetProp (node, prop);
00195   if (!buffer)
00196     *error_code = 1;
00197   else
00198     {
00199       if (sscanf ((char *) buffer, "%lf", &x) != 1)
```

```
00200         *error_code = 2;
00201       else
00202         *error_code = 0;
00203       xmlFree (buffer);
00204     }
00205   return x;
00206 }
00207
00214 double
00215 xml_node_get_float_with_default (xmlNode * node,
00216                                  const xmlChar * prop,
00217                                  double default_value,
00218                                  int *error_code)
00219 {
00220   double x;
00221   if (xmlHasProp (node, prop))
00222     x = xml_node_get_float (node, prop, error_code);
00223   else
00224     {
00225       x = default_value;
00226       *error_code = 0;
00227     }
00228   return x;
00229 }
00230
00234 void
00235 xml_node_set_int (xmlNode * node,
00236                   const xmlChar * prop,
00237                   int value)
00238 {
00239   xmlChar buffer[64];
00240   snprintf ((char *) buffer, 64, "%d", value);
00241   xmlSetProp (node, prop, buffer);
00242 }
00243
00247 void
00248 xml_node_set_uint (xmlNode * node,
00249                    const xmlChar * prop,
00250                    unsigned int value)
00251 {
00252   xmlChar buffer[64];
00253   snprintf ((char *) buffer, 64, "%u", value);
00254   xmlSetProp (node, prop, buffer);
00255 }
00256
00260 void
00261 xml_node_set_float (xmlNode * node,
00262                     const xmlChar * prop,
00263                     double value)
00264 {
00265   xmlChar buffer[64];
00266   snprintf ((char *) buffer, 64, "%.14lg", value);
00267   xmlSetProp (node, prop, buffer);
00268 }
00269
00275 int
00276 json_object_get_int (JsonObject * object,
00277                      const char *prop,
00278                      int *error_code)
00279 {
00280   const char *buffer;
00281   int i = 0;
00282   buffer = json_object_get_string_member (object, prop);
00283   if (!buffer)
00284     *error_code = 1;
00285   else
00286     {
00287       if (sscanf (buffer, "%d", &i) != 1)
00288         *error_code = 2;
00289       else
00290         *error_code = 0;
00291     }
00292   return i;
00293 }
00294
00300 unsigned int
00301 json_object_get_uint (JsonObject * object,
00302                       const char *prop,
00303                       int *error_code)
00304 {
00305   const char *buffer;
00306   unsigned int i = 0;
00307   buffer = json_object_get_string_member (object, prop);
00308   if (!buffer)
00309     *error_code = 1;
00310   else
00311     {
```

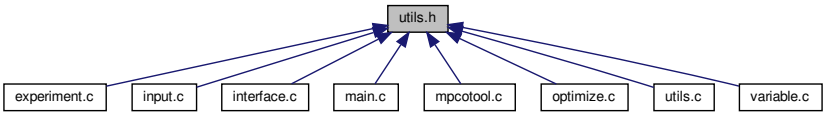
```
00312       if (sscanf (buffer, "%u", &i) != 1)
00313         *error_code = 2;
00314       else
00315         *error_code = 0;
00316     }
00317   return i;
00318 }
00319
00326 unsigned int
00327 json_object_get_uint_with_default (JsonObject * object,
00328                                    const char *prop,
00329                                    unsigned int default_value,
00331                                    int *error_code)
00332 {
00333   unsigned int i;
00334   if (json_object_get_member (object, prop))
00335     i = json_object_get_uint (object, prop, error_code);
00336   else
00337     {
00338       i = default_value;
00339       *error_code = 0;
00340     }
00341   return i;
00342 }
00343
00349 double
00350 json_object_get_float (JsonObject * object,
00351                        const char *prop,
00352                        int *error_code)
00353 {
00354   const char *buffer;
00355   double x = 0.;
00356   buffer = json_object_get_string_member (object, prop);
00357   if (!buffer)
00358     *error_code = 1;
00359   else
00360     {
00361       if (sscanf (buffer, "%lf", &x) != 1)
00362         *error_code = 2;
00363       else
00364         *error_code = 0;
00365     }
00366   return x;
00367 }
00368
00375 double
00376 json_object_get_float_with_default (JsonObject * object,
00378                                     const char *prop,
00379                                     double default_value,
00381                                     int *error_code)
00382 {
00383   double x;
00384   if (json_object_get_member (object, prop))
00385     x = json_object_get_float (object, prop, error_code);
00386   else
00387     {
00388       x = default_value;
00389       *error_code = 0;
00390     }
00391   return x;
00392 }
00393
00397 void
00398 json_object_set_int (JsonObject * object,
00399                      const char *prop,
00400                      int value)
00401 {
00402   char buffer[64];
00403   snprintf (buffer, 64, "%d", value);
00404   json_object_set_string_member (object, prop, buffer);
00405 }
00406
00410 void
00411 json_object_set_uint (JsonObject * object,
00412                       const char *prop,
00413                       unsigned int value)
00415 {
00416   char buffer[64];
00417   snprintf (buffer, 64, "%u", value);
00418   json_object_set_string_member (object, prop, buffer);
00419 }
00420
00424 void
00425 json_object_set_float (JsonObject * object,
00426                        const char *prop,
00427                        double value)
00428 {
```

```
00429   char buffer[64];
00430   snprintf (buffer, 64, "%.14lg", value);
00431   json_object_set_string_member (object, prop, buffer);
00432 }
00433
00439 int
00440 cores_number ()
00441 {
00442 #ifdef G_OS_WIN32
00443   SYSTEM_INFO sysinfo;
00444   GetSystemInfo (&sysinfo);
00445   return sysinfo.dwNumberOfProcessors;
00446 #else
00447   return (int) sysconf (_SC_NPROCESSORS_ONLN);
00448 #endif
00449 }
00450
00451 #if HAVE_GTK
00452
00456 void
00457 process_pending ()
00458 {
00459   while (gtk_events_pending ())
00460     gtk_main_iteration ();
00461 }
00462
00468 unsigned int
00469 gtk_array_get_active (GtkRadioButton * array[],
00470                       unsigned int n)
00471 {
00472   unsigned int i;
00473   for (i = 0; i < n; ++i)
00474     if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (array[i])))
00475       break;
00476   return i;
00477 }
00478
00479 #endif
```

4.27 utils.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.

Functions

- void show_message (char *title, char *msg, int type)
- void show_error (char *msg)
- int xml_node_get_int (xmlNode *node, const xmlChar *prop, int *error_code)
- unsigned int xml_node_get_uint (xmlNode *node, const xmlChar *prop, int *error_code)
- unsigned int xml_node_get_uint_with_default (xmlNode *node, const xmlChar *prop, unsigned int default_value, int *error_code)
- double xml_node_get_float (xmlNode *node, const xmlChar *prop, int *error_code)
- double xml_node_get_float_with_default (xmlNode *node, const xmlChar *prop, double default_value, int *error_code)
- void xml_node_set_int (xmlNode *node, const xmlChar *prop, int value)
- void xml_node_set_uint (xmlNode *node, const xmlChar *prop, unsigned int value)
- void xml_node_set_float (xmlNode *node, const xmlChar *prop, double value)
- int json_object_get_int (JsonObject *object, const char *prop, int *error_code)
- unsigned int json_object_get_uint (JsonObject *object, const char *prop, int *error_code)
- unsigned int json_object_get_uint_with_default (JsonObject *object, const char *prop, unsigned int default_value, int *error_code)
- double json_object_get_float (JsonObject *object, const char *prop, int *error_code)
- double json_object_get_float_with_default (JsonObject *object, const char *prop, double default_value, int *error_code)
- void json_object_set_int (JsonObject *object, const char *prop, int value)
- void json_object_set_uint (JsonObject *object, const char *prop, unsigned int value)
- void json_object_set_float (JsonObject *object, const char *prop, double value)
- int cores_number ()
- void process_pending ()
- unsigned int gtk_array_get_active (GtkRadioButton *array[ ], unsigned int n)

Variables

- GtkWindow * main_window

  Main GtkWindow.
- char * error_message

  Error message.
- void(* show_pending)()

  Pointer to the function to show pending events.

4.27.1 Detailed Description

Header file to define some useful functions.

Authors

Javier Burguete.

Copyright

Definition in file utils.h.

4.27.2 Function Documentation

4.27.2.1 cores_number()

```
int cores_number ( )
```

Function to obtain the cores number.

Returns

Cores number.

Definition at line 440 of file utils.c.

```
00441 {
00442 #ifdef G_OS_WIN32
00443   SYSTEM_INFO sysinfo;
00444   GetSystemInfo (&sysinfo);
00445   return sysinfo.dwNumberOfProcessors;
00446 #else
00447   return (int) sysconf (_SC_NPROCESSORS_ONLN);
00448 #endif
00449 }
```

4.27.2.2 gtk_array_get_active()

```
unsigned int gtk_array_get_active (
             GtkRadioButton * array[],
             unsigned int n )
```

Function to get the active GtkRadioButton.

Returns

Active GtkRadioButton.

Parameters

array	Array of GtkRadioButtons.
n	Number of GtkRadioButtons.

Definition at line 469 of file utils.c.

```
00471 {
00472   unsigned int i;
00473   for (i = 0; i < n; ++i)
00474     if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (array[i])))
00475       break;
00476   return i;
00477 }
```

4.27.2.3 json_object_get_float()

```
double json_object_get_float (
            JsonObject * object,
            const char * prop,
            int * error_code )
```

Function to get a floating point number of a JSON object property.

Returns

Floating point number value.

Parameters

object	JSON object.
prop	JSON property.
error_code	Error code.

Definition at line 350 of file utils.c.

```
00353 {
00354   const char *buffer;
00355   double x = 0.;
00356   buffer = json_object_get_string_member (object, prop);
00357   if (!buffer)
00358     *error_code = 1;
00359   else
00360     {
00361       if (sscanf (buffer, "%lf", &x) != 1)
00362         *error_code = 2;
00363       else
00364         *error_code = 0;
00365     }
00366   return x;
00367 }
```

4.27.2.4 json_object_get_float_with_default()

```
double json_object_get_float_with_default (
            JsonObject * object,
            const char * prop,
            double default_value,
            int * error_code )
```

Function to get a floating point number of a JSON object property with a default value.

Returns

Floating point number value.

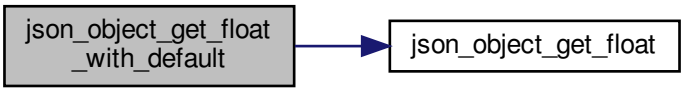
Parameters

object	JSON object.
prop	JSON property.
default_value	default value.
error_code	Error code.

Definition at line 376 of file utils.c.

```
00382 {
00383   double x;
00384   if (json_object_get_member (object, prop))
00385     x = json_object_get_float (object, prop, error_code);
00386   else
00387     {
00388       x = default_value;
00389       *error_code = 0;
00390     }
00391   return x;
00392 }
```

Here is the call graph for this function:



4.27.2.5 json_object_get_int()

```
int json_object_get_int (
            JsonObject * object,
            const char * prop,
            int * error_code )
```

Function to get an integer number of a JSON object property.

Returns

Integer number value.

Parameters

object	JSON object.
prop	JSON property.
error_code	Error code.

Definition at line 276 of file utils.c.

```
00279 {
00280   const char *buffer;
00281   int i = 0;
00282   buffer = json_object_get_string_member (object, prop);
00283   if (!buffer)
00284     *error_code = 1;
00285   else
00286     {
00287       if (sscanf (buffer, "%d", &i) != 1)
00288         *error_code = 2;
00289       else
00290         *error_code = 0;
00291     }
00292   return i;
00293 }
```

4.27.2.6 json_object_get_uint()

```
unsigned int json_object_get_uint (
              JsonObject * object,
              const char * prop,
              int * error_code )
```

Function to get an unsigned integer number of a JSON object property.

Returns

Unsigned integer number value.

Parameters

object	JSON object.
prop	JSON property.
error_code	Error code.

Definition at line 301 of file utils.c.

```
00304 {
00305   const char *buffer;
00306   unsigned int i = 0;
00307   buffer = json_object_get_string_member (object, prop);
00308   if (!buffer)
00309     *error_code = 1;
00310   else
00311     {
00312       if (sscanf (buffer, "%u", &i) != 1)
00313         *error_code = 2;
00314       else
00315         *error_code = 0;
00316     }
00317   return i;
00318 }
```

4.27.2.7 json_object_get_uint_with_default()

```
unsigned int json_object_get_uint_with_default (
             JsonObject * object,
             const char * prop,
             unsigned int default_value,
             int * error_code )
```

Function to get an unsigned integer number of a JSON object property with a default value.

Returns

Unsigned integer number value.

Parameters

object	JSON object.
prop	JSON property.
default_value	default value.
error_code	Error code.

Definition at line 327 of file utils.c.

```
00332 {
00333   unsigned int i;
00334   if (json_object_get_member (object, prop))
00335     i = json_object_get_uint (object, prop, error_code);
00336   else
00337     {
00338       i = default_value;
00339       *error_code = 0;
00340     }
00341   return i;
00342 }
```

Here is the call graph for this function:

4.27.2.8 json_object_set_float()

```
void json_object_set_float (
             JsonObject * object,
             const char * prop,
             double value )
```

Function to set a floating point number in a JSON object property.

Parameters

object	JSON object.
prop	JSON property.
value	Floating point number value.

Definition at line 425 of file utils.c.

```
00428 {
00429   char buffer[64];
00430   snprintf (buffer, 64, "%.14lg", value);
00431   json_object_set_string_member (object, prop, buffer);
00432 }
```

4.27.2.9 json_object_set_int()

```
void json_object_set_int (
              JsonObject * object,
              const char * prop,
              int value )
```

Function to set an integer number in a JSON object property.

Parameters

object	JSON object.
prop	JSON property.
value	Integer number value.

Definition at line 398 of file utils.c.

```
00401 {
00402   char buffer[64];
00403   snprintf (buffer, 64, "%d", value);
00404   json_object_set_string_member (object, prop, buffer);
00405 }
```

4.27.2.10 json_object_set_uint()

```
void json_object_set_uint (
              JsonObject * object,
              const char * prop,
              unsigned int value )
```

Function to set an unsigned integer number in a JSON object property.

Parameters

object	JSON object.
prop	JSON property.
value	Unsigned integer number value.

Definition at line 411 of file utils.c.

```
00415 {
00416   char buffer[64];
00417   snprintf (buffer, 64, "%u", value);
00418   json_object_set_string_member (object, prop, buffer);
00419 }
```

4.27.2.11 process_pending()

```
void process_pending ( )
```

Function to process events on long computation.

Definition at line 457 of file utils.c.

```
00458 {
00459   while (gtk_events_pending ())
00460     gtk_main_iteration ();
00461 }
```

4.27.2.12 show_error()

```
void show_error (
             char * msg )
```

Function to show a dialog with an error message.

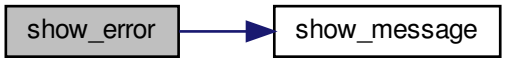
Parameters

msg	Error message.

Definition at line 101 of file utils.c.

```
00102 {
00103   show_message (_("ERROR!"), msg, ERROR_TYPE);
00104 }
```

Here is the call graph for this function:



4.27.2.13 show_message()

```
void show_message (
            char * title,
            char * msg,
            int type )
```

Function to show a dialog with a message.

Parameters

title	Title.
msg	Message.
type	Message type.

Definition at line 66 of file utils.c.

```
00074 {
00075 #if HAVE_GTK
00076   GtkMessageDialog *dlg;
00077
00078   // Creating the dialog
00079   dlg = (GtkMessageDialog *)
00080     gtk_message_dialog_new (main_window, GTK_DIALOG_MODAL,
00081                             (GtkMessageType) type, GTK_BUTTONS_OK, "%s", msg);
00082
00083   // Setting the dialog title
00084   gtk_window_set_title (GTK_WINDOW (dlg), title);
00085
00086   // Showing the dialog and waiting response
00087   gtk_dialog_run (GTK_DIALOG (dlg));
00088
00089   // Closing and freeing memory
00090   gtk_widget_destroy (GTK_WIDGET (dlg));
00091
00092 #else
00093   printf ("%s: %s\n", title, msg);
00094 #endif
00095 }
```

4.27.2.14 xml_node_get_float()

```
double xml_node_get_float (
            xmlNode * node,
            const xmlChar * prop,
            int * error_code )
```

Function to get a floating point number of a XML node property.

Returns

Floating point number value.

Parameters

node	XML node.
prop	XML property.
error_code	Error code.

Definition at line 188 of file utils.c.

```
00191 {
00192   double x = 0.;
00193   xmlChar *buffer;
00194   buffer = xmlGetProp (node, prop);
00195   if (!buffer)
00196     *error_code = 1;
00197   else
00198     {
00199       if (sscanf ((char *) buffer, "%lf", &x) != 1)
00200         *error_code = 2;
00201       else
00202         *error_code = 0;
00203       xmlFree (buffer);
00204     }
00205   return x;
00206 }
```

4.27.2.15 xml_node_get_float_with_default()

```
double xml_node_get_float_with_default (
            xmlNode * node,
            const xmlChar * prop,
            double default_value,
            int * error_code )
```

Function to get a floating point number of a XML node property with a default value.

Returns

Floating point number value.

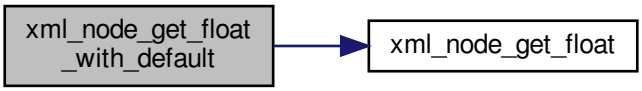
Parameters

node	XML node.
prop	XML property.
default_value	default value.
error_code	Error code.

Definition at line 215 of file utils.c.

```
00219 {
00220   double x;
00221   if (xmlHasProp (node, prop))
00222     x = xml_node_get_float (node, prop, error_code);
00223   else
00224     {
00225       x = default_value;
00226       *error_code = 0;
00227     }
00228   return x;
00229 }
```

Here is the call graph for this function:



4.27.2.16 xml_node_get_int()

```
int xml_node_get_int (
              xmlNode * node,
              const xmlChar * prop,
              int * error_code )
```

Function to get an integer number of a XML node property.

Returns

Integer number value.

Parameters

node	XML node.
prop	XML property.
error_code	Error code.

Definition at line 112 of file utils.c.

```
00115 {
00116   int i = 0;
00117   xmlChar *buffer;
00118   buffer = xmlGetProp (node, prop);
00119   if (!buffer)
00120     *error_code = 1;
00121   else
00122     {
00123       if (sscanf ((char *) buffer, "%d", &i) != 1)
00124         *error_code = 2;
00125       else
00126         *error_code = 0;
00127       xmlFree (buffer);
00128     }
00129   return i;
00130 }
```

4.27.2.17 xml_node_get_uint()

```
unsigned int xml_node_get_uint (
              xmlNode * node,
              const xmlChar * prop,
              int * error_code )
```

Function to get an unsigned integer number of a XML node property.

Returns

Unsigned integer number value.

Parameters

node	XML node.
prop	XML property.
error_code	Error code.

Definition at line 138 of file utils.c.

```
00141 {
00142   unsigned int i = 0;
00143   xmlChar *buffer;
00144   buffer = xmlGetProp (node, prop);
00145   if (!buffer)
00146     *error_code = 1;
00147   else
00148     {
00149       if (sscanf ((char *) buffer, "%u", &i) != 1)
00150         *error_code = 2;
00151       else
00152         *error_code = 0;
00153       xmlFree (buffer);
00154     }
00155   return i;
00156 }
```

4.27.2.18 xml_node_get_uint_with_default()

```
unsigned int xml_node_get_uint_with_default (
              xmlNode * node,
              const xmlChar * prop,
              unsigned int default_value,
              int * error_code )
```

Function to get an unsigned integer number of a XML node property with a default value.

Returns

Unsigned integer number value.

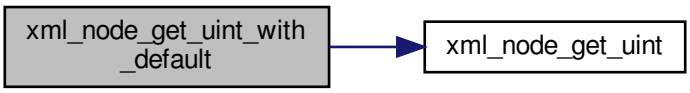
Parameters

node	XML node.
prop	XML property.
default_value	default value.
error_code	Error code.

Definition at line 165 of file utils.c.

```
00170 {
00171   unsigned int i;
00172   if (xmlHasProp (node, prop))
00173     i = xml_node_get_uint (node, prop, error_code);
00174   else
00175     {
00176       i = default_value;
00177       *error_code = 0;
00178     }
00179   return i;
00180 }
```

Here is the call graph for this function:



4.27.2.19 xml_node_set_float()

```
void xml_node_set_float (
              xmlNode * node,
              const xmlChar * prop,
              double value )
```

Function to set a floating point number in a XML node property.

Parameters

node	XML node.
prop	XML property.
value	Floating point number value.

Definition at line 261 of file utils.c.

```
00264 {
00265   xmlChar buffer[64];
00266   snprintf ((char *) buffer, 64, "%.14lg", value);
00267   xmlSetProp (node, prop, buffer);
00268 }
```

4.27.2.20 xml_node_set_int()

```
void xml_node_set_int (
              xmlNode * node,
              const xmlChar * prop,
              int value )
```

Function to set an integer number in a XML node property.

Parameters

node	XML node.
prop	XML property.
value	Integer number value.

Definition at line 235 of file utils.c.

```
00238 {
00239   xmlChar buffer[64];
00240   snprintf ((char *) buffer, 64, "%d", value);
00241   xmlSetProp (node, prop, buffer);
00242 }
```

4.27.2.21 xml_node_set_uint()

```
void xml_node_set_uint (
              xmlNode * node,
              const xmlChar * prop,
              unsigned int value )
```

Function to set an unsigned integer number in a XML node property.

Parameters

node	XML node.
prop	XML property.
value	Unsigned integer number value.

Definition at line 248 of file utils.c.

```
00251 {
00252   xmlChar buffer[64];
00253   snprintf ((char *) buffer, 64, "%u", value);
00254   xmlSetProp (node, prop, buffer);
00255 }
```

4.28 utils.h

```
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 2012-2018, 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 UTILS__H
00039 #define UTILS__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 #else
00052 #define ERROR_TYPE 0
00053 #define INFO_TYPE 0
00054 #endif
00055
00056 extern char *error_message;
00057 extern void (*show_pending) ();
00058
00059 // Public functions
00060 void show_message (char *title, char *msg, int type);
00061 void show_error (char *msg);
00062 int xml_node_get_int (xmlNode * node, const xmlChar * prop, int *error_code);
00063 unsigned int xml_node_get_uint (xmlNode * node, const xmlChar * prop,
00064                                 int *error_code);
00065 unsigned int xml_node_get_uint_with_default (xmlNode * node,
00066                                              const xmlChar * prop,
00067                                              unsigned int default_value,
00068                                              int *error_code);
00069 double xml_node_get_float (xmlNode * node, const xmlChar * prop,
00070                            int *error_code);
00071 double xml_node_get_float_with_default (xmlNode * node, const xmlChar * prop
```

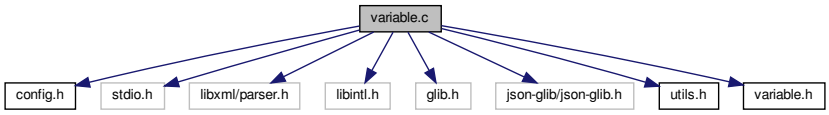
```
    ,
00072                                     double default_value, int *error_code);
00073 void xml_node_set_int (xmlNode * node, const xmlChar * prop, int value);
00074 void xml_node_set_uint (xmlNode * node, const xmlChar * prop,
00075                         unsigned int value);
00076 void xml_node_set_float (xmlNode * node, const xmlChar * prop, double value);
00077 int json_object_get_int (JsonObject * object, const char *prop,
00078                          int *error_code);
00079 unsigned int json_object_get_uint (JsonObject * object, const char *prop,
00080                                    int *error_code);
00081 unsigned int json_object_get_uint_with_default (JsonObject * object,
00082                                                 const char *prop,
00083                                                 unsigned int default_value,
00084                                                 int *error_code);
00085 double json_object_get_float (JsonObject * object, const char *prop,
00086                               int *error_code);
00087 double json_object_get_float_with_default (JsonObject * object,
00088                                            const char *prop,
00089                                            double default_value,
00090                                            int *error_code);
00091 void json_object_set_int (JsonObject * object, const char *prop, int value);
00092 void json_object_set_uint (JsonObject * object, const char *prop,
00093                            unsigned int value);
00094 void json_object_set_float (JsonObject * object, const char *prop,
00095                             double value);
00096 int cores_number ();
00097 #if HAVE_GTK
00098 void process_pending ();
00099 unsigned int gtk_array_get_active (GtkRadioButton * array[], unsigned int n);
00100 #endif
00101
00102 #endif
```

4.29 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 "utils.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.

4.29.1 Detailed Description

Source file to define the variable data.

Authors

Javier Burguete and Borja Latorre.

Copyright

Definition in file variable.c.

4.29.2 Function Documentation

4.29.2.1 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 85 of file variable.c.

```
00089 {
00090   char buffer[64];
00091   if (!variable->name)
00092     snprintf (buffer, 64, "%s: %s", _("Variable"), message);
00093   else
00094     snprintf (buffer, 64, "%s %s: %s", _("Variable"), variable->name, message);
00095   error_message = g_strdup (buffer);
00096 }
```

4.29.2.2 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 64 of file variable.c.

```
00068 {
00069 #if DEBUG_VARIABLE
00070   fprintf (stderr, "variable_free: start\n");
00071 #endif
00072   if (type == INPUT_TYPE_XML)
00073     xmlFree (variable->name);
00074   else
00075     g_free (variable->name);
00076 #if DEBUG_VARIABLE
00077   fprintf (stderr, "variable_free: end\n");
00078 #endif
00079 }
```

4.29.2.3 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.

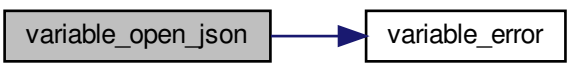
Definition at line 264 of file variable.c.

```
00269 {
```

```
00270   JsonObject *object;
00271   const char *label;
00272   int error_code;
00273 #if DEBUG_VARIABLE
00274   fprintf (stderr, "variable_open_json: start\n");
00275 #endif
00276   object = json_node_get_object (node);
00277   label = json_object_get_string_member (object, LABEL_NAME);
00278   if (!label)
00279     {
00280       variable_error (variable, _("no name"));
00281       goto exit_on_error;
00282     }
00283   variable->name = g_strdup (label);
00284   if (json_object_get_member (object, LABEL_MINIMUM))
00285     {
00286       variable->rangemin
00287         = json_object_get_float (object, LABEL_MINIMUM, &error_code);
00288       if (error_code)
00289         {
00290           variable_error (variable, _("bad minimum"));
00291           goto exit_on_error;
00292         }
00293       variable->rangeminabs
00294         = json_object_get_float_with_default (object,
    LABEL_ABSOLUTE_MINIMUM,
00295                                               -G_MAXDOUBLE, &error_code);
00296       if (error_code)
00297         {
00298           variable_error (variable, _("bad absolute minimum"));
00299           goto exit_on_error;
00300         }
00301       if (variable->rangemin < variable->rangeminabs)
00302         {
00303           variable_error (variable, _("minimum range not allowed"));
00304           goto exit_on_error;
00305         }
00306     }
00307   else
00308     {
00309       variable_error (variable, _("no minimum range"));
00310       goto exit_on_error;
00311     }
00312   if (json_object_get_member (object, LABEL_MAXIMUM))
00313     {
00314       variable->rangemax
00315         = json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00316       if (error_code)
00317         {
00318           variable_error (variable, _("bad maximum"));
00319           goto exit_on_error;
00320         }
00321       variable->rangemaxabs
00322         = json_object_get_float_with_default (object,
    LABEL_ABSOLUTE_MAXIMUM,
00323                                               G_MAXDOUBLE, &error_code);
00324       if (error_code)
00325         {
00326           variable_error (variable, _("bad absolute maximum"));
00327           goto exit_on_error;
00328         }
00329       if (variable->rangemax > variable->rangemaxabs)
00330         {
00331           variable_error (variable, _("maximum range not allowed"));
00332           goto exit_on_error;
00333         }
00334       if (variable->rangemax < variable->rangemin)
00335         {
00336           variable_error (variable, _("bad range"));
00337           goto exit_on_error;
00338         }
00339     }
00340   else
00341     {
00342       variable_error (variable, _("no maximum range"));
00343       goto exit_on_error;
00344     }
00345   variable->precision
00346     = json_object_get_uint_with_default (object,
    LABEL_PRECISION,
00347                                          DEFAULT_PRECISION, &error_code);
00348   if (error_code || variable->precision >= NPRECISIONS)
00349     {
00350       variable_error (variable, _("bad precision"));
00351       goto exit_on_error;
00352     }
00353   if (algorithm == ALGORITHM_SWEEP || algorithm ==
```

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

Here is the call graph for this function:



4.29.2.4 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.

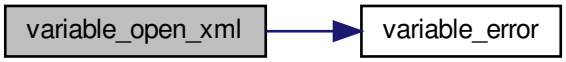
Definition at line 104 of file variable.c.

```
00109 {
00110   int error_code;
00111 
00112 #if DEBUG_VARIABLE
00113   fprintf (stderr, "variable_open_xml: start\n");
00114 #endif
00115 
00116   variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00117   if (!variable->name)
00118     {
00119       variable_error (variable, _("no name"));
00120       goto exit_on_error;
00121     }
00122   if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00123     {
00124       variable->rangemin
00125         = xml_node_get_float (node, (const xmlChar *) LABEL_MINIMUM,
00126                               &error_code);
00127       if (error_code)
00128         {
00129           variable_error (variable, _("bad minimum"));
00130           goto exit_on_error;
00131         }
00132       variable->rangeminabs = xml_node_get_float_with_default
00133         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, -G_MAXDOUBLE,
00134          &error_code);
00135       if (error_code)
00136         {
00137           variable_error (variable, _("bad absolute minimum"));
00138           goto exit_on_error;
00139         }
00140       if (variable->rangemin < variable->rangeminabs)
00141         {
00142           variable_error (variable, _("minimum range not allowed"));
00143           goto exit_on_error;
00144         }
00145     }
00146   else
00147     {
00148       variable_error (variable, _("no minimum range"));
00149       goto exit_on_error;
00150     }
00151   if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00152     {
00153       variable->rangemax
00154         = xml_node_get_float (node, (const xmlChar *) LABEL_MAXIMUM,
00155                               &error_code);
```

```
00156       if (error_code)
00157         {
00158           variable_error (variable, _("bad maximum"));
00159           goto exit_on_error;
00160         }
00161       variable->rangemaxabs = xml_node_get_float_with_default
00162         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, G_MAXDOUBLE,
00163          &error_code);
00164       if (error_code)
00165         {
00166           variable_error (variable, _("bad absolute maximum"));
00167           goto exit_on_error;
00168         }
00169       if (variable->rangemax > variable->rangemaxabs)
00170         {
00171           variable_error (variable, _("maximum range not allowed"));
00172           goto exit_on_error;
00173         }
00174       if (variable->rangemax < variable->rangemin)
00175         {
00176           variable_error (variable, _("bad range"));
00177           goto exit_on_error;
00178         }
00179     }
00180   else
00181     {
00182       variable_error (variable, _("no maximum range"));
00183       goto exit_on_error;
00184     }
00185   variable->precision
00186     = xml_node_get_uint_with_default (node, (const xmlChar *)
    LABEL_PRECISION,
00187                                       DEFAULT_PRECISION, &error_code);
00188   if (error_code || variable->precision >= NPRECISIONS)
00189     {
00190       variable_error (variable, _("bad precision"));
00191       goto exit_on_error;
00192     }
00193   if (algorithm == ALGORITHM_SWEEP || algorithm ==
    ALGORITHM_ORTHOGONAL)
00194     {
00195       if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00196         {
00197           variable->nsweeps
00198             = xml_node_get_uint (node, (const xmlChar *) LABEL_NSWEEPS,
00199                                  &error_code);
00200           if (error_code || !variable->nsweeps)
00201             {
00202               variable_error (variable, _("bad sweeps"));
00203               goto exit_on_error;
00204             }
00205         }
00206       else
00207         {
00208           variable_error (variable, _("no sweeps number"));
00209           goto exit_on_error;
00210         }
00211 #if DEBUG_VARIABLE
00212       fprintf (stderr, "variable_open_xml: nsweeps=%u\n", variable->nsweeps);
00213 #endif
00214     }
00215   if (algorithm == ALGORITHM_GENETIC)
00216     {
00217       // Obtaining bits representing each variable
00218       if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00219         {
00220           variable->nbits
00221             = xml_node_get_uint (node, (const xmlChar *) LABEL_NBITS,
00222                                  &error_code);
00223           if (error_code || !variable->nbits)
00224             {
00225               variable_error (variable, _("invalid bits number"));
00226               goto exit_on_error;
00227             }
00228         }
00229       else
00230         {
00231           variable_error (variable, _("no bits number"));
00232           goto exit_on_error;
00233         }
00234     }
00235   else if (nsteps)
00236     {
00237       variable->step
00238         = xml_node_get_float (node, (const xmlChar *)
    LABEL_STEP, &error_code);
00239       if (error_code || variable->step < 0.)
```

```
00240         {
00241           variable_error (variable, _("bad step size"));
00242           goto exit_on_error;
00243         }
00244     }
00245
00246 #if DEBUG_VARIABLE
00247   fprintf (stderr, "variable_open_xml: end\n");
00248 #endif
00249   return 1;
00250 exit_on_error:
00251   variable_free (variable, INPUT_TYPE_XML);
00252 #if DEBUG_VARIABLE
00253   fprintf (stderr, "variable_open_xml: end\n");
00254 #endif
00255   return 0;
00256 }
```

Here is the call graph for this function:



4.29.3 Variable Documentation

4.29.3.1 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 50 of file variable.c.

4.29.3.2 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 55 of file variable.c.

4.30 variable.c

```
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 2012-2018, 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 "utils.h"
00046 #include "variable.h"
00047
00048 #define DEBUG_VARIABLE 0
00049
00050 const char *format[NPRECISIONS] = {
00051   "%.0lf", "%.1lf", "%.2lf", "%.3lf", "%.4lf", "%.5lf", "%.6lf", "%.7lf",
00052   "%.8lf", "%.9lf", "%.10lf", "%.11lf", "%.12lf", "%.13lf", "%.14lf"
00053 };
00054
00055 const double precision[NPRECISIONS] = {
00056   1., 0.1, 0.01, 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, 1e-10, 1e-11,
00057   1e-12, 1e-13, 1e-14
00058 };
00059
00063 void
00064 variable_free (Variable * variable,
00066                unsigned int type)
00068 {
00069 #if DEBUG_VARIABLE
00070   fprintf (stderr, "variable_free: start\n");
00071 #endif
00072   if (type == INPUT_TYPE_XML)
00073     xmlFree (variable->name);
00074   else
00075     g_free (variable->name);
00076 #if DEBUG_VARIABLE
00077   fprintf (stderr, "variable_free: end\n");
00078 #endif
00079 }
00080
00084 void
00085 variable_error (Variable * variable,
00087                 char *message)
00089 {
00090   char buffer[64];
00091   if (!variable->name)
00092     snprintf (buffer, 64, "%s: %s", _("Variable"), message);
00093   else
00094     snprintf (buffer, 64, "%s %s: %s", _("Variable"), variable->name, message);
00095   error_message = g_strdup (buffer);
00096 }
00097
00103 int
00104 variable_open_xml (Variable * variable,
00105                    xmlNode * node,
```

```
00106                   unsigned int algorithm,
00107                   unsigned int nsteps)
00109 {
00110   int error_code;
00111
00112 #if DEBUG_VARIABLE
00113   fprintf (stderr, "variable_open_xml: start\n");
00114 #endif
00115
00116   variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00117   if (!variable->name)
00118     {
00119       variable_error (variable, _("no name"));
00120       goto exit_on_error;
00121     }
00122   if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00123     {
00124       variable->rangemin
00125         = xml_node_get_float (node, (const xmlChar *) LABEL_MINIMUM,
00126                               &error_code);
00127       if (error_code)
00128         {
00129           variable_error (variable, _("bad minimum"));
00130           goto exit_on_error;
00131         }
00132       variable->rangeminabs = xml_node_get_float_with_default
00133         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, -G_MAXDOUBLE,
00134          &error_code);
00135       if (error_code)
00136         {
00137           variable_error (variable, _("bad absolute minimum"));
00138           goto exit_on_error;
00139         }
00140       if (variable->rangemin < variable->rangeminabs)
00141         {
00142           variable_error (variable, _("minimum range not allowed"));
00143           goto exit_on_error;
00144         }
00145     }
00146   else
00147     {
00148       variable_error (variable, _("no minimum range"));
00149       goto exit_on_error;
00150     }
00151   if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00152     {
00153       variable->rangemax
00154         = xml_node_get_float (node, (const xmlChar *) LABEL_MAXIMUM,
00155                               &error_code);
00156       if (error_code)
00157         {
00158           variable_error (variable, _("bad maximum"));
00159           goto exit_on_error;
00160         }
00161       variable->rangemaxabs = xml_node_get_float_with_default
00162         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, G_MAXDOUBLE,
00163          &error_code);
00164       if (error_code)
00165         {
00166           variable_error (variable, _("bad absolute maximum"));
00167           goto exit_on_error;
00168         }
00169       if (variable->rangemax > variable->rangemaxabs)
00170         {
00171           variable_error (variable, _("maximum range not allowed"));
00172           goto exit_on_error;
00173         }
00174       if (variable->rangemax < variable->rangemin)
00175         {
00176           variable_error (variable, _("bad range"));
00177           goto exit_on_error;
00178         }
00179     }
00180   else
00181     {
00182       variable_error (variable, _("no maximum range"));
00183       goto exit_on_error;
00184     }
00185   variable->precision
00186     = xml_node_get_uint_with_default (node, (const xmlChar *)
      LABEL_PRECISION,
00187                                       DEFAULT_PRECISION, &error_code);
00188   if (error_code || variable->precision >= NPRECISIONS)
00189     {
00190       variable_error (variable, _("bad precision"));
00191       goto exit_on_error;
00192     }
```

```
00193   if (algorithm == ALGORITHM_SWEEP || algorithm ==
      ALGORITHM_ORTHOGONAL)
00194     {
00195       if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00196         {
00197           variable->nsweeps
00198             = xml_node_get_uint (node, (const xmlChar *) LABEL_NSWEEPS,
00199                                  &error_code);
00200           if (error_code || !variable->nsweeps)
00201             {
00202               variable_error (variable, _("bad sweeps"));
00203               goto exit_on_error;
00204             }
00205         }
00206       else
00207         {
00208           variable_error (variable, _("no sweeps number"));
00209           goto exit_on_error;
00210         }
00211 #if DEBUG_VARIABLE
00212       fprintf (stderr, "variable_open_xml: nsweeps=%u\n", variable->nsweeps);
00213 #endif
00214     }
00215   if (algorithm == ALGORITHM_GENETIC)
00216     {
00217       // Obtaining bits representing each variable
00218       if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00219         {
00220           variable->nbits
00221             = xml_node_get_uint (node, (const xmlChar *) LABEL_NBITS,
00222                                  &error_code);
00223           if (error_code || !variable->nbits)
00224             {
00225               variable_error (variable, _("invalid bits number"));
00226               goto exit_on_error;
00227             }
00228         }
00229       else
00230         {
00231           variable_error (variable, _("no bits number"));
00232           goto exit_on_error;
00233         }
00234     }
00235   else if (nsteps)
00236     {
00237       variable->step
00238         = xml_node_get_float (node, (const xmlChar *)
      LABEL_STEP, &error_code);
00239       if (error_code || variable->step < 0.)
00240         {
00241           variable_error (variable, _("bad step size"));
00242           goto exit_on_error;
00243         }
00244     }
00245
00246 #if DEBUG_VARIABLE
00247   fprintf (stderr, "variable_open_xml: end\n");
00248 #endif
00249   return 1;
00250 exit_on_error:
00251   variable_free (variable, INPUT_TYPE_XML);
00252 #if DEBUG_VARIABLE
00253   fprintf (stderr, "variable_open_xml: end\n");
00254 #endif
00255   return 0;
00256 }
00257
00263 int
00264 variable_open_json (Variable * variable,
00265                     JsonNode * node,
00266                     unsigned int algorithm,
00267                     unsigned int nsteps)
00269 {
00270   JsonObject *object;
00271   const char *label;
00272   int error_code;
00273 #if DEBUG_VARIABLE
00274   fprintf (stderr, "variable_open_json: start\n");
00275 #endif
00276   object = json_node_get_object (node);
00277   label = json_object_get_string_member (object, LABEL_NAME);
00278   if (!label)
00279     {
00280       variable_error (variable, _("no name"));
00281       goto exit_on_error;
00282     }
00283   variable->name = g_strdup (label);
```

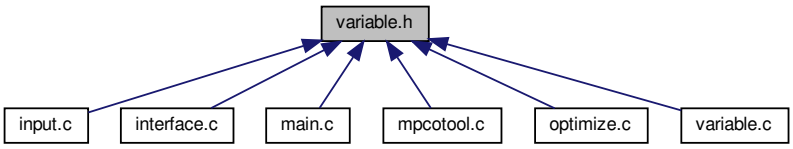
```
00284   if (json_object_get_member (object, LABEL_MINIMUM))
00285     {
00286       variable->rangemin
00287         = json_object_get_float (object, LABEL_MINIMUM, &error_code);
00288       if (error_code)
00289         {
00290           variable_error (variable, _("bad minimum"));
00291           goto exit_on_error;
00292         }
00293       variable->rangeminabs
00294         = json_object_get_float_with_default (object,
      LABEL_ABSOLUTE_MINIMUM,
00295                                               -G_MAXDOUBLE, &error_code);
00296       if (error_code)
00297         {
00298           variable_error (variable, _("bad absolute minimum"));
00299           goto exit_on_error;
00300         }
00301       if (variable->rangemin < variable->rangeminabs)
00302         {
00303           variable_error (variable, _("minimum range not allowed"));
00304           goto exit_on_error;
00305         }
00306     }
00307   else
00308     {
00309       variable_error (variable, _("no minimum range"));
00310       goto exit_on_error;
00311     }
00312   if (json_object_get_member (object, LABEL_MAXIMUM))
00313     {
00314       variable->rangemax
00315         = json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00316       if (error_code)
00317         {
00318           variable_error (variable, _("bad maximum"));
00319           goto exit_on_error;
00320         }
00321       variable->rangemaxabs
00322         = json_object_get_float_with_default (object,
      LABEL_ABSOLUTE_MAXIMUM,
00323                                               G_MAXDOUBLE, &error_code);
00324       if (error_code)
00325         {
00326           variable_error (variable, _("bad absolute maximum"));
00327           goto exit_on_error;
00328         }
00329       if (variable->rangemax > variable->rangemaxabs)
00330         {
00331           variable_error (variable, _("maximum range not allowed"));
00332           goto exit_on_error;
00333         }
00334       if (variable->rangemax < variable->rangemin)
00335         {
00336           variable_error (variable, _("bad range"));
00337           goto exit_on_error;
00338         }
00339     }
00340   else
00341     {
00342       variable_error (variable, _("no maximum range"));
00343       goto exit_on_error;
00344     }
00345   variable->precision
00346     = json_object_get_uint_with_default (object,
      LABEL_PRECISION,
00347                                          DEFAULT_PRECISION, &error_code);
00348   if (error_code || variable->precision >= NPRECISIONS)
00349     {
00350       variable_error (variable, _("bad precision"));
00351       goto exit_on_error;
00352     }
00353   if (algorithm == ALGORITHM_SWEEP || algorithm ==
      ALGORITHM_ORTHOGONAL)
00354     {
00355       if (json_object_get_member (object, LABEL_NSWEEPS))
00356         {
00357           variable->nsweeps
00358             = json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00359           if (error_code || !variable->nsweeps)
00360             {
00361               variable_error (variable, _("bad sweeps"));
00362               goto exit_on_error;
00363             }
00364         }
00365       else
00366         {
```

```
00367           variable_error (variable, _("no sweeps number"));
00368           goto exit_on_error;
00369         }
00370 #if DEBUG_VARIABLE
00371       fprintf (stderr, "variable_open_json: nsweeps=%u\n", variable->nsweeps);
00372 #endif
00373     }
00374   if (algorithm == ALGORITHM_GENETIC)
00375     {
00376       // Obtaining bits representing each variable
00377       if (json_object_get_member (object, LABEL_NBITS))
00378         {
00379           variable->nbits
00380             = json_object_get_uint (object, LABEL_NBITS, &error_code);
00381           if (error_code || !variable->nbits)
00382             {
00383               variable_error (variable, _("invalid bits number"));
00384               goto exit_on_error;
00385             }
00386         }
00387       else
00388         {
00389           variable_error (variable, _("no bits number"));
00390           goto exit_on_error;
00391         }
00392     }
00393   else if (nsteps)
00394     {
00395       variable->step = json_object_get_float (object,
    LABEL_STEP, &error_code);
00396       if (error_code || variable->step < 0.)
00397         {
00398           variable_error (variable, _("bad step size"));
00399           goto exit_on_error;
00400         }
00401     }
00402
00403 #if DEBUG_VARIABLE
00404   fprintf (stderr, "variable_open_json: end\n");
00405 #endif
00406   return 1;
00407 exit_on_error:
00408   variable_free (variable, INPUT_TYPE_JSON);
00409 #if DEBUG_VARIABLE
00410   fprintf (stderr, "variable_open_json: end\n");
00411 #endif
00412   return 0;
00413 }
```

4.31 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.

4.31.1 Detailed Description

Header file to define the variable data.

Authors

Javier Burguete.

Copyright

Definition in file variable.h.

4.31.2 Enumeration Type Documentation

4.31.2.1 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 };
```

4.31.3 Function Documentation

4.31.3.1 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 85 of file variable.c.

```
00089 {
00090   char buffer[64];
00091   if (!variable->name)
00092     snprintf (buffer, 64, "%s: %s", _("Variable"), message);
00093   else
00094     snprintf (buffer, 64, "%s %s: %s", _("Variable"), variable->name, message);
00095   error_message = g_strdup (buffer);
00096 }
```

4.31.3.2 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 64 of file variable.c.

```
00068 {
00069 #if DEBUG_VARIABLE
00070   fprintf (stderr, "variable_free: start\n");
00071 #endif
00072   if (type == INPUT_TYPE_XML)
00073     xmlFree (variable->name);
00074   else
00075     g_free (variable->name);
00076 #if DEBUG_VARIABLE
00077   fprintf (stderr, "variable_free: end\n");
00078 #endif
00079 }
```

4.31.3.3 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.

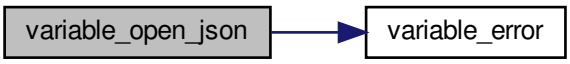
Definition at line 264 of file variable.c.

```
00269 {
00270   JsonObject *object;
00271   const char *label;
00272   int error_code;
00273 #if DEBUG_VARIABLE
00274   fprintf (stderr, "variable_open_json: start\n");
00275 #endif
00276   object = json_node_get_object (node);
00277   label = json_object_get_string_member (object, LABEL_NAME);
00278   if (!label)
00279     {
00280       variable_error (variable, _("no name"));
00281       goto exit_on_error;
```

```
00282     }
00283   variable->name = g_strdup (label);
00284   if (json_object_get_member (object, LABEL_MINIMUM))
00285     {
00286       variable->rangemin
00287         = json_object_get_float (object, LABEL_MINIMUM, &error_code);
00288       if (error_code)
00289         {
00290           variable_error (variable, _("bad minimum"));
00291           goto exit_on_error;
00292         }
00293       variable->rangeminabs
00294         = json_object_get_float_with_default (object,
      LABEL_ABSOLUTE_MINIMUM,
00295                                               -G_MAXDOUBLE, &error_code);
00296       if (error_code)
00297         {
00298           variable_error (variable, _("bad absolute minimum"));
00299           goto exit_on_error;
00300         }
00301       if (variable->rangemin < variable->rangeminabs)
00302         {
00303           variable_error (variable, _("minimum range not allowed"));
00304           goto exit_on_error;
00305         }
00306     }
00307   else
00308     {
00309       variable_error (variable, _("no minimum range"));
00310       goto exit_on_error;
00311     }
00312   if (json_object_get_member (object, LABEL_MAXIMUM))
00313     {
00314       variable->rangemax
00315         = json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00316       if (error_code)
00317         {
00318           variable_error (variable, _("bad maximum"));
00319           goto exit_on_error;
00320         }
00321       variable->rangemaxabs
00322         = json_object_get_float_with_default (object,
      LABEL_ABSOLUTE_MAXIMUM,
00323                                               G_MAXDOUBLE, &error_code);
00324       if (error_code)
00325         {
00326           variable_error (variable, _("bad absolute maximum"));
00327           goto exit_on_error;
00328         }
00329       if (variable->rangemax > variable->rangemaxabs)
00330         {
00331           variable_error (variable, _("maximum range not allowed"));
00332           goto exit_on_error;
00333         }
00334       if (variable->rangemax < variable->rangemin)
00335         {
00336           variable_error (variable, _("bad range"));
00337           goto exit_on_error;
00338         }
00339     }
00340   else
00341     {
00342       variable_error (variable, _("no maximum range"));
00343       goto exit_on_error;
00344     }
00345   variable->precision
00346     = json_object_get_uint_with_default (object,
      LABEL_PRECISION,
00347                                          DEFAULT_PRECISION, &error_code);
00348   if (error_code || variable->precision >= NPRECISIONS)
00349     {
00350       variable_error (variable, _("bad precision"));
00351       goto exit_on_error;
00352     }
00353   if (algorithm == ALGORITHM_SWEEP || algorithm ==
      ALGORITHM_ORTHOGONAL)
00354     {
00355       if (json_object_get_member (object, LABEL_NSWEEPS))
00356         {
00357           variable->nsweeps
00358             = json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00359           if (error_code || !variable->nsweeps)
00360             {
00361               variable_error (variable, _("bad sweeps"));
00362               goto exit_on_error;
00363             }
00364         }
```

```
00365       else
00366         {
00367           variable_error (variable, _("no sweeps number"));
00368           goto exit_on_error;
00369         }
00370 #if DEBUG_VARIABLE
00371       fprintf (stderr, "variable_open_json: nsweeps=%u\n", variable->nsweeps);
00372 #endif
00373     }
00374   if (algorithm == ALGORITHM_GENETIC)
00375     {
00376       // Obtaining bits representing each variable
00377       if (json_object_get_member (object, LABEL_NBITS))
00378         {
00379           variable->nbits
00380             = json_object_get_uint (object, LABEL_NBITS, &error_code);
00381           if (error_code || !variable->nbits)
00382             {
00383               variable_error (variable, _("invalid bits number"));
00384               goto exit_on_error;
00385             }
00386         }
00387       else
00388         {
00389           variable_error (variable, _("no bits number"));
00390           goto exit_on_error;
00391         }
00392     }
00393   else if (nsteps)
00394     {
00395       variable->step = json_object_get_float (object,
     LABEL_STEP, &error_code);
00396       if (error_code || variable->step < 0.)
00397         {
00398           variable_error (variable, _("bad step size"));
00399           goto exit_on_error;
00400         }
00401     }
00402
00403 #if DEBUG_VARIABLE
00404   fprintf (stderr, "variable_open_json: end\n");
00405 #endif
00406   return 1;
00407 exit_on_error:
00408   variable_free (variable, INPUT_TYPE_JSON);
00409 #if DEBUG_VARIABLE
00410   fprintf (stderr, "variable_open_json: end\n");
00411 #endif
00412   return 0;
00413 }
```

Here is the call graph for this function:



4.31.3.4 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

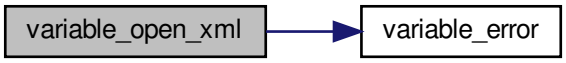
variable	Variable struct.
node	XML node.
algorithm	Algorithm type.
nsteps	Number of steps to do the hill climbing method.

Definition at line 104 of file variable.c.

```
00109 {
00110   int error_code;
00111 
00112 #if DEBUG_VARIABLE
00113   fprintf (stderr, "variable_open_xml: start\n");
00114 #endif
00115 
00116   variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00117   if (!variable->name)
00118     {
00119       variable_error (variable, _("no name"));
00120       goto exit_on_error;
00121     }
00122   if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00123     {
00124       variable->rangemin
00125         = xml_node_get_float (node, (const xmlChar *) LABEL_MINIMUM,
00126                               &error_code);
00127       if (error_code)
00128         {
00129           variable_error (variable, _("bad minimum"));
00130           goto exit_on_error;
00131         }
00132       variable->rangeminabs = xml_node_get_float_with_default
00133         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, -G_MAXDOUBLE,
00134          &error_code);
00135       if (error_code)
00136         {
00137           variable_error (variable, _("bad absolute minimum"));
00138           goto exit_on_error;
00139         }
00140       if (variable->rangemin < variable->rangeminabs)
00141         {
00142           variable_error (variable, _("minimum range not allowed"));
00143           goto exit_on_error;
00144         }
00145     }
00146   else
00147     {
00148       variable_error (variable, _("no minimum range"));
00149       goto exit_on_error;
00150     }
00151   if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00152     {
00153       variable->rangemax
00154         = xml_node_get_float (node, (const xmlChar *) LABEL_MAXIMUM,
00155                               &error_code);
00156       if (error_code)
00157         {
00158           variable_error (variable, _("bad maximum"));
00159           goto exit_on_error;
00160         }
00161       variable->rangemaxabs = xml_node_get_float_with_default
00162         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, G_MAXDOUBLE,
00163          &error_code);
00164       if (error_code)
00165         {
00166           variable_error (variable, _("bad absolute maximum"));
00167           goto exit_on_error;
00168         }
00169       if (variable->rangemax > variable->rangemaxabs)
00170         {
00171           variable_error (variable, _("maximum range not allowed"));
00172           goto exit_on_error;
```

```
00173         }
00174       if (variable->rangemax < variable->rangemin)
00175         {
00176           variable_error (variable, _("bad range"));
00177           goto exit_on_error;
00178         }
00179     }
00180   else
00181     {
00182       variable_error (variable, _("no maximum range"));
00183       goto exit_on_error;
00184     }
00185   variable->precision
00186     = xml_node_get_uint_with_default (node, (const xmlChar *)
      LABEL_PRECISION,
00187                                       DEFAULT_PRECISION, &error_code);
00188   if (error_code || variable->precision >= NPRECISIONS)
00189     {
00190       variable_error (variable, _("bad precision"));
00191       goto exit_on_error;
00192     }
00193   if (algorithm == ALGORITHM_SWEEP || algorithm ==
      ALGORITHM_ORTHOGONAL)
00194     {
00195       if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00196         {
00197           variable->nsweeps
00198             = xml_node_get_uint (node, (const xmlChar *) LABEL_NSWEEPS,
00199                                  &error_code);
00200           if (error_code || !variable->nsweeps)
00201             {
00202               variable_error (variable, _("bad sweeps"));
00203               goto exit_on_error;
00204             }
00205         }
00206       else
00207         {
00208           variable_error (variable, _("no sweeps number"));
00209           goto exit_on_error;
00210         }
00211 #if DEBUG_VARIABLE
00212       fprintf (stderr, "variable_open_xml: nsweeps=%u\n", variable->nsweeps);
00213 #endif
00214     }
00215   if (algorithm == ALGORITHM_GENETIC)
00216     {
00217       // Obtaining bits representing each variable
00218       if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00219         {
00220           variable->nbits
00221             = xml_node_get_uint (node, (const xmlChar *) LABEL_NBITS,
00222                                  &error_code);
00223           if (error_code || !variable->nbits)
00224             {
00225               variable_error (variable, _("invalid bits number"));
00226               goto exit_on_error;
00227             }
00228         }
00229       else
00230         {
00231           variable_error (variable, _("no bits number"));
00232           goto exit_on_error;
00233         }
00234     }
00235   else if (nsteps)
00236     {
00237       variable->step
00238         = xml_node_get_float (node, (const xmlChar *)
      LABEL_STEP, &error_code);
00239       if (error_code || variable->step < 0.)
00240         {
00241           variable_error (variable, _("bad step size"));
00242           goto exit_on_error;
00243         }
00244     }
00245
00246 #if DEBUG_VARIABLE
00247   fprintf (stderr, "variable_open_xml: end\n");
00248 #endif
00249   return 1;
00250 exit_on_error:
00251   variable_free (variable, INPUT_TYPE_XML);
00252 #if DEBUG_VARIABLE
00253   fprintf (stderr, "variable_open_xml: end\n");
00254 #endif
00255   return 0;
00256 }
```

Here is the call graph for this function:



4.32 variable.h

```
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 2012-2018, 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 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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