

MPCOTool

3.0.0

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# Chapter 1

## MPCOTool

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

### VERSIONS

- 3.0.0: Stable and recommended version.
- 3.1.0: Developing version to do new features.

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### TOOLS AND LIBRARIES REQUIRED TO BUILD THE EXECUTABLE

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

## OPTIONAL TOOLS AND LIBRARIES

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

## FILES

The source code has to have the following files:

- 3.0.0/configure.ac: configure generator.
- 3.0.0/Makefile.in: Makefile generator.
- 3.0.0/config.h.in: config header generator.
- 3.0.0/mpcotool.c: main source code.
- 3.0.0/mpcotool.h: main header code.
- 3.0.0/interface.h: interface header code.
- 3.0.0/build: script to build all.
- 3.0.0/logo.png: logo figure.
- 3.0.0/Doxyfile: configuration file to generate doxygen documentation.
- TODO: tasks to do.
- [README.md](#): this file.
- license.md: license file.
- tests/testX/\*: several tests to check the program working.
- locales/\*/LC\_MESSAGES/mpcotool.po: translation files.
- manuals/\*.eps: manual figures in EPS format.
- manuals/\*.png: manual figures in PNG format.
- manuals/\*.tex: documentation source files.
- applications/\*/\*: several practical application cases.
- check\_errors/\*.xml: several mistaken files to check error handling.

## BUILDING INSTRUCTIONS

This software has been built and tested in the following operative systems. Probably, it can be built in other systems, distributions, or versions but it has not been tested.

Debian 8 (Linux, kFreeBSD or Hurd)

DragonFly BSD 4.2

Dyson Illumos

Linux Mint DE 2

NetBSD 7.0

OpenSUSE Linux 13

Ubuntu Linux 12, 14, and 15

1. Download the latest `genetic` doing on a terminal:

```
$ git clone https://github.com/jburguete/genetic.git
```

2. Download this repository:

```
$ git clone https://github.com/jburguete/mpcotoool.git
```

3. Link the latest genetic version to genetic:

```
$ cd mpcotoool/3.0.0
```

```
$ ln -s ../../genetic/2.0.1 genetic
```

4. Build doing on a terminal:

```
$ ./build
```

OpenBSD 5.8

1. Select adequate versions:

```
$ export AUTOCONF_VERSION=2.69 AUTOMAKE_VERSION=1.15
```

2. Then, in a terminal, follow steps 1 to 4 of the previous Debian 8 section.

Microsoft Windows 7 (with MSYS2)

Microsoft Windows 8.1 (with MSYS2)

1. Install `MSYS2` and the required libraries and utilities. You can follow detailed instructions in `install-unix`
2. Then, in a MSYS2 terminal, follow steps 1 to 4 of the previous Debian 8 section.
3. Optional Windows binary package can be built doing in the terminal:

```
$ make windist
```

Fedora Linux 23

1. In order to use OpenMPI compilation do in a terminal (in 64 bits version):

```
$ export PATH=$PATH:/usr/lib64/openmpi/bin
```

2. Then, follow steps 1 to 4 of the previous Debian 8 section.

FreeBSD 10.2

1. In order to build in FreeBSD, due to a wrong error in default gcc version, do in a terminal:

```
$ export CC=gcc5 (or CC=clang)
```

2. Then, follow steps 1 to 4 of the previous Debian 8 section.

Building no-GUI version on servers

On servers or clusters, where no-GUI with MPI parallelization is desirable, replace the 4th step of the previous Debian 8 section by:

```
$ ./build_without_gui
```

## MAKING MANUALS INSTRUCTIONS

On UNIX type systems you need `texlive` installed. On Windows systems you need `MiKTeX`. In order to compile the manuals you can type on a terminal:

```
$ make manuals
```

## MAKING TESTS INSTRUCTIONS

In order to build the tests follow the next instructions:

1. Link some tests that needs genetic library doing in a terminal (assuming that you are in the directory `mpcotool/3.0.0`):

```
$ cd ../tests/test2
$ ln -s ../../genetic/2.0.1 genetic
$ cd ../test3
$ ln -s ../../genetic/2.0.1 genetic
$ cd ../test4
$ ln -s ../../genetic/2.0.1 genetic
```

2. Build all tests doing in the same terminal:

```
$ cd ../3.0.0
$ make tests
```

## USER INSTRUCTIONS

Optional arguments are typed in square brackets.

- Command line in sequential mode (where X is the number of threads to execute and S is a seed for the pseudo-random numbers generator):

```
$ ./mpcotoolbin [-nthreads X] [-seed S] input_file.xml [result_file] [variables_file]
```

- Command line in parallelized mode (where X is the number of threads to open for every node and S is a seed for the pseudo-random numbers generator):

```
$ mpirun [MPI options] ./mpcotoolbin [-nthreads X] [-seed S] input_file.xml [result_file] [variables_file]
```

- The syntax of the simulator has to be:

```
$ ./simulator_name input_file_1 [input_file_2] [input_file_3] [input_file_4] output_file
```

- The syntax of the program to evaluate the objective function has to be (where the first data in the results file has to be the objective function value):

```
$ ./evaluator_name simulated_file data_file results_file
```

- On UNIX type systems the GUI application can be open doing on a terminal:

```
$ ./mpcotool
```

## INPUT FILE FORMAT

The format of the main input file is as:

```
“<?xml version="1.0"?> <optimize simulator="simulator_name" evaluator="evaluator_name" algorithm="algorithm_name" nsimulations="simulations_number" iterations="iterations_number" tolerance="tolerance_value" nbest="best_number" npopulation="population_number" ngenerations="generations_number" mutation="mutation_ratio" reproduction="reproduction_ratio" adaptation="adaptation_ratio" direction="direction_search_type" nsteps="steps_number" relaxation="relaxation_parameter" nestimates="estimates_number" threshold="threshold_parameter" norm="norm_type" p="p_parameter" seed="random_seed" result_file="result_file" variables_file="variables_file">
<experiment name="data_file_1" template1="template_1_1" template2="template_1_2" ... weight="weight_1"/> ...
<experiment name="data_file_N" template1="template_N_1" template2="template_N_2" ... weight="weight_N"/>
<variable name="variable_1" minimum="min_value" maximum="max_value" precision="precision_digits" sweeps="sweeps_number" nbits="bits_number" step="step_size"> ...
<variable name="variable_M" minimum="min_value" maximum="max_value" precision="precision_digits" sweeps="sweeps_number" nbits="bits_number" step="step_size">
</optimize> “
```

with:

- **simulator**: simulator executable file name.
- **evaluator**: optional. When needed is the evaluator executable file name.
- **seed**: optional. Seed of the pseudo-random numbers generator (default value is 7007).
- **result\_file**: optional. It is the name of the optime result file (default name is "result").
- **variables\_file**: optional. It is the name of all simulated variables file (default name is "variables").
- **precision**: optional, defined for each variable. Number of precision digits to evaluate the variable. 0 apply for integer numbers (default value is 14).
- **weight**: optional, defined for each experiment. Multiplies the objective value obtained for each experiment in the final objective function value (default value is 1).
- **threshold**: optional, to stop the simulations if objective function value less than the threshold is obtained (default value is 0).
- **algorithm**: optimization algorithm type.
- **norm**: error norm type.

Implemented algorithms are:

- **sweep**: Sweep brute force algorithm. It requires for each variable:
  - *sweeps*: number of sweeps to generate for each variable in every experiment.

The total number of simulations to run is:

$$(\text{number of experiments}) \times (\text{variable 1 number of sweeps}) \times \dots \times (\text{variable n number of sweeps}) \times (\text{number of iterations})$$
- **Monte-Carlo**: Monte-Carlo brute force algorithm. It requires on calibrate:
  - *nsimulations*: number of simulations to run in every experiment.

The total number of simulations to run is:

$$(\text{number of experiments}) \times (\text{number of simulations}) \times (\text{number of iterations})$$
- Both brute force algorithms can be iterated to improve convergence by using the following parameters:
  - *nbest*: number of best simulations to calculate convergence interval on next iteration (default 1).
  - *tolerance*: tolerance parameter to increase convergence interval (default 0).

- *iterations*: number of iterations (default 1).  
It multiplies the total number of simulations:  
x (number of iterations)
- Moreover, both brute force algorithms can be coupled with a direction search method by using:
  - *direction*: method to estimate the optimal direction. Two options are currently available:
    - \* *coordinates*: coordinates descent method.  
It increases the total number of simulations by:  
(number of experiments) x (number of iterations) x (number of steps) x 2 x (number of variables)
    - \* *random*: random method. It requires:
    - \* *nestimates*: number of random checks to estimate the optimal direction.  
It increases the total number of simulations by:  
(number of experiments) x (number of iterations) x (number of steps) x (number of estimates)

Both methods require also:

- *nsteps*: number of steps to perform the direction search method,
- *relaxation*: relaxation parameter,

and for each variable:

- *step*: initial step size for the direction search method.

- **genetic**: Genetic algorithm. It requires the following parameters:

- *npopulation*: number of population.
- *ngenerations*: number of generations.
- *mutation*: mutation ratio.
- *reproduction*: reproduction ratio.
- *adaptation*: adaptation ratio.

and for each variable:

- *nbits*: number of bits to encode each variable.

The total number of simulations to run is:

(number of experiments) x (npopulation) x [1 + (ngenerations - 1) x (mutation + reproduction + adaptation)]

Implemented error norms are:

- **euclidian**: Euclidian norm.
- **maximum**: maximum norm.
- **p**: p-norm. It requires the parameter:
  - *p*: p exponent.
- **taxicab**: Taxicab norm.

Alternatively, the input file can be also written in JSON format as:

```
“json { "simulator": "simulator_name", "evaluator": "evaluator_name", "algorithm": "algorithm_type", "nsimulations": "simulations_number", "iterations": "iterations_number", "tolerance": "tolerance_value", "nbest": "best_number", "npopulation": "population_number", "ngenerations": "generations_number", "mutation": "mutation_ratio", "reproduction": "reproduction_ratio", "adaptation": "adaptation_ratio", "direction": "direction_search_type", "nsteps": "steps_number", "relaxation": "relaxation_parameter", "nestimates": "estimates_number", "threshold": "threshold_parameter", "norm": "norm_type", "p": "p_parameter", "seed": "random_seed", "result_file": "result_file", "variables_file": "variables_file", "experiments": [ { "name": "data_file_1", "template1": "template_1_1", "template2": "template_1_2", ... "weight": "weight_1", }, ... { "name": "data_file_N", "template1": "template_N_1", "template2": "template_N_2", ... "weight": "weight_N", } ], "variables": [ {
```

```
"name": "variable_1",
"minimum": "min_value",
"maximum": "max_value",
"precision": "precision_digits",
"sweeps": "sweeps_number",
"nbits": "bits_number",
"step": "step_size",
```

```
}, ... { "name": "variable_M", "minimum": "min_value", "maximum": "max_value", "precision": "precision_digits",
"sweeps": "sweeps_number", "nbits": "bits_number", "step": "step_size", } ] } "
```

## SOME EXAMPLES OF INPUT FILES

### Example 1

- The simulator program name is: *pivot*
- The syntax is:

```
$ ./pivot input_file output_file
```

- The program to evaluate the objective function is: *compare*
- The syntax is:

```
$ ./compare simulated_file data_file result_file
```

- The calibration is performed with a *sweep brute force algorithm*.
- The experimental data files are:

```
27-48.txt
42.txt
52.txt
100.txt
```

- Templates to get input files to simulator for each experiment are:

```
template1.js
template2.js
template3.js
template4.js
```

- The variables to calibrate, ranges, precision and sweeps number to perform are:

```
alpha1, [179.70, 180.20], 2, 5
alpha2, [179.30, 179.60], 2, 5
random, [0.00, 0.20], 2, 5
boot-time, [0.0, 3.0], 1, 5
```

- Then, the number of simulations to run is:  $4 \times 5 \times 5 \times 5 = 2500$ .
- The input file is:

```
"<?xml version="1.0"?> <optimize simulator="pivot" evaluator="compare" algorithm="sweep"> <experiment
name="27-48.txt" template1="template1.js"> <experiment name="42.txt" template1="template2.js"> <experiment
name="52.txt" template1="template3.js"> <experiment name="100.txt" template1="template4.js"> <variable
name="alpha1" minimum="179.70" maximum="180.20" precision="2" nsweeps="5"> <variable name="alpha2"
minimum="179.30" maximum="179.60" precision="2" nsweeps="5"> <variable name="random" minimum="0.00"
maximum="0.20" precision="2" nsweeps="5"> <variable name="boot-time" minimum="0.0" maximum="3.0"
precision="1" nsweeps="5"> </optimize> "
```

- A template file as *template1.js*:

```
""json { "towers" : [ { "length" : 50.11, "velocity" : 0.02738, "@variable1@" : @, "@variable2@" : @, "@variable3@" : @, "@variable4@" : @ }, { "length" : 50.11, "velocity" : 0.02824, "@variable1@" : @, "@variable2@" : @, "@variable3@" : @, "@variable4@" : @ }, { "length" : 50.11, "velocity" : 0.03008, "@variable1@" : @, "@variable2@" : @, "@variable3@" : @, "@variable4@" : @ }, { "length" : 50.11, "velocity" : 0.03753, "@variable1@" : @, "@variable2@" : @, "@variable3@" : @, "@variable4@" : @ } ], "cycle-time" : 71.0, "plot-time" : 1.0, "comp-time-step": 0.1, "active-percent" : 27.48 } ""
```

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

```
""json { "towers" : [ { "length" : 50.11, "velocity" : 0.02738, "alpha1" : 179.95, "alpha2" : 179.45, "random" : 0.10, "boot-time" : 1.5 }, { "length" : 50.11, "velocity" : 0.02824, "alpha1" : 179.95, "alpha2" : 179.45, "random" : 0.10, "boot-time" : 1.5 }, { "length" : 50.11, "velocity" : 0.03008, "alpha1" : 179.95, "alpha2" : 179.45, "random" : 0.10, "boot-time" : 1.5 }, { "length" : 50.11, "velocity" : 0.03753, "alpha1" : 179.95, "alpha2" : 179.45, "random" : 0.10, "boot-time" : 1.5 } ], "cycle-time" : 71.0, "plot-time" : 1.0, "comp-time-step": 0.1, "active-percent" : 27.48 } ""
```



## Chapter 2

# Data Structure Index

### 2.1 Data Structures

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## Chapter 3

# File Index

### 3.1 File List

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## Chapter 4

# Data Structure Documentation

### 4.1 Experiment Struct Reference

Struct to define the experiment data.

```
#include <experiment.h>
```

#### Data Fields

- char \* [name](#)  
*File name.*
- char \* [template](#) [[MAX\\_NINPUTS](#)]  
*Array of template names of input files.*
- double [weight](#)  
*Objective function weight.*
- unsigned int [ninputs](#)  
*Number of input files to the simulator.*

#### 4.1.1 Detailed Description

Struct to define the experiment data.

Definition at line [45](#) of file [experiment.h](#).

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

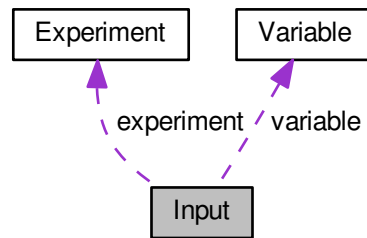
- [experiment.h](#)

### 4.2 Input Struct Reference

Struct to define the optimization input file.

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

Collaboration diagram for Input:



## Data Fields

- [Experiment](#) \* [experiment](#)  
*Array or experiments.*
- [Variable](#) \* [variable](#)  
*Array of variables.*
- char \* [result](#)  
*Name of the result file.*
- char \* [variables](#)  
*Name of the variables file.*
- char \* [simulator](#)  
*Name of the simulator program.*
- char \* [evaluator](#)  
*Name of the program to evaluate the objective function.*
- char \* [directory](#)  
*Working directory.*
- char \* [name](#)  
*[Input](#) data file name.*
- double [tolerance](#)  
*Algorithm tolerance.*
- double [mutation\\_ratio](#)  
*Mutation probability.*
- double [reproduction\\_ratio](#)  
*Reproduction probability.*
- double [adaptation\\_ratio](#)  
*Adaptation probability.*
- double [relaxation](#)  
*Relaxation parameter.*
- double [p](#)  
*Exponent of the P error norm.*
- double [threshold](#)  
*Threshold to finish the optimization.*
- unsigned long int [seed](#)  
*Seed of the pseudo-random numbers generator.*
- unsigned int [nvariables](#)

- Variables number.*
- unsigned int [nexperiments](#)
- Experiments number.*
- unsigned int [nsimulations](#)
- Simulations number per experiment.*
- unsigned int [algorithm](#)
- Algorithm type.*
- unsigned int [nsteps](#)
- Number of steps to do the direction search method.*
- unsigned int [direction](#)
- Method to estimate the direction search.*
- unsigned int [nestimates](#)
- Number of simulations to estimate the direction search.*
- unsigned int [niterations](#)
- Number of algorithm iterations.*
- unsigned int [nbest](#)
- Number of best simulations.*
- unsigned int [norm](#)
- Error norm type.*
- unsigned int [type](#)
- Type of input file.*

#### 4.2.1 Detailed Description

Struct to define the optimization input file.

Definition at line 71 of file [input.h](#).

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

- [input.h](#)

## 4.3 Optimize Struct Reference

Struct to define the optimization ation data.

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

### 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 direction search method step sizes.*

  - double \* [direction](#)

*Vector of direction search 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\\_direction](#)
  - 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 direction search method.*

  - unsigned int [nestimates](#)
- Number of simulations to estimate the direction.*

  - 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\\_direction](#)
- Beginning simulation number of the task for the direction search method.*

  - unsigned int [nend\\_direction](#)
- Ending simulation number of the task for the direction search method.*

  - unsigned int [niterations](#)
- Number of algorithm iterations.*

  - unsigned int [nbest](#)
- Number of best simulations.*

  - unsigned int [nsaveds](#)
- Number of saved simulations.*

  - unsigned int [stop](#)
- To stop the simulations.*

  - int [mpi\\_rank](#)
- Number of MPI task.*

#### 4.3.1 Detailed Description

Struct to define the optimization ation data.

Definition at line [45](#) of file [optimize.h](#).

### 4.3.2 Field Documentation

#### 4.3.2.1 unsigned int\* Optimize::thread\_direction

Array of simulation numbers to calculate on the thread for the direction search method.

Definition at line 80 of file [optimize.h](#).

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

- [optimize.h](#)

## 4.4 Options Struct Reference

Struct to define the options dialog.

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

### Data Fields

- GtkDialog \* [dialog](#)  
*Main GtkDialog.*
- GtkGrid \* [grid](#)  
*Main GtkGrid.*
- GtkLabel \* [label\\_seed](#)  
*Pseudo-random numbers generator seed GtkLabel.*
- GtkSpinButton \* [spin\\_seed](#)  
*Pseudo-random numbers generator seed GtkSpinButton.*
- GtkLabel \* [label\\_threads](#)  
*Threads number GtkLabel.*
- GtkSpinButton \* [spin\\_threads](#)  
*Threads number GtkSpinButton.*
- GtkLabel \* [label\\_direction](#)  
*Direction threads number GtkLabel.*
- GtkSpinButton \* [spin\\_direction](#)  
*Direction threads number GtkSpinButton.*

#### 4.4.1 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](#)

## 4.5 ParallelData Struct Reference

Struct to pass to the GThreads parallelized function.

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

## Data Fields

- unsigned int [thread](#)  
*Thread number.*

### 4.5.1 Detailed Description

Struct to pass to the GThreads parallelized function.

Definition at line [122](#) of file [optimize.h](#).

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

- [optimize.h](#)

## 4.6 Running Struct Reference

Struct to define the running dialog.

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

## Data Fields

- GtkWidget \* [dialog](#)  
*Main GtkWidget.*
- GtkWidget \* [label](#)  
*Label GtkWidget.*
- GtkWidget \* [spinner](#)  
*Animation GtkWidget.*
- GtkWidget \* [grid](#)  
*Grid GtkWidget.*

### 4.6.1 Detailed Description

Struct to define the running dialog.

Definition at line [67](#) of file [interface.h](#).

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

- [interface.h](#)

## 4.7 Variable Struct Reference

Struct to define the variable data.

```
#include <variable.h>
```

## Data Fields

- char \* [name](#)  
*Variable name.*
- double [rangemin](#)

- double [rangemax](#)  
*Minimum variable value.*
- double [rangeminabs](#)  
*Maximum variable value.*
- double [rangemaxabs](#)  
*Absolute minimum variable value.*
- double [step](#)  
*Absolute maximum variable value.*
- unsigned int [precision](#)  
*Direction search method step size.*
- unsigned int [nsweeps](#)  
*Variable precision.*
- unsigned int [nbits](#)  
*Sweeps of the sweep algorithm.*
- unsigned int [nbits](#)  
*Bits number of the genetic algorithm.*

#### 4.7.1 Detailed Description

Struct to define the variable data.

Definition at line 56 of file [variable.h](#).

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

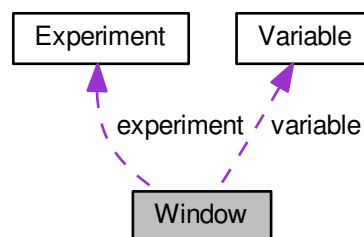
- [variable.h](#)

### 4.8 Window Struct Reference

Struct to define the main window.

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

Collaboration diagram for Window:



#### Data Fields

- GtkWidget \* [window](#)  
*Main GtkWidget.*

- 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\\_direction](#)  
*GtkCheckButton to check running the direction search method.*
- GtkGrid \* [grid\\_direction](#)  
*GtkGrid to pack the direction search method widgets.*
- GtkRadioButton \* [button\\_direction](#) [NDIRECTIONS]  
*GtkRadioButtons array to set the direction estimate 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.*
- GtkWidget \* [spin\\_precision](#)  
*Precision digits GtkWidget.*
- GtkWidget \* [label\\_sweeps](#)  
*Sweeps number GtkWidget.*
- GtkWidget \* [spin\\_sweeps](#)  
*Sweeps number GtkWidget.*
- GtkWidget \* [label\\_bits](#)  
*Bits number GtkWidget.*
- GtkWidget \* [spin\\_bits](#)  
*Bits number GtkWidget.*
- GtkWidget \* [label\\_step](#)  
*GtkLabel to set the step.*
- GtkWidget \* [spin\\_step](#)  
*GtkWidget to set the step.*
- GtkWidget \* [scrolled\\_step](#)  
*step GtkWidget.*
- GtkWidget \* [frame\\_experiment](#)  
*Experiment GtkWidget.*
- GtkWidget \* [grid\\_experiment](#)  
*Experiment GtkWidget.*
- GtkWidget \* [combo\\_experiment](#)  
*Experiment GtkWidgetEntry.*
- GtkWidget \* [button\\_add\\_experiment](#)  
*GtkWidget to add a experiment.*
- GtkWidget \* [button\\_remove\\_experiment](#)  
*GtkWidget to remove a experiment.*
- GtkWidget \* [label\\_experiment](#)  
*Experiment GtkWidget.*
- GtkWidget \* [button\\_experiment](#)  
*GtkFileChooserButton to set the experimental data file.*
- GtkWidget \* [label\\_weight](#)  
*Weight GtkWidget.*
- GtkWidget \* [spin\\_weight](#)  
*Weight GtkWidget.*
- GtkWidget \* [check\\_template](#) [MAX\_NINPUTS]  
*Array of GtkWidgetButtons to set the input templates.*
- GtkWidget \* [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.*

#### 4.8.1 Detailed Description

Struct to define the main window.

Definition at line 79 of file [interface.h](#).

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

- [interface.h](#)



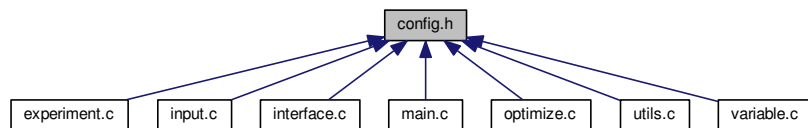
## Chapter 5

# File Documentation

### 5.1 config.h File Reference

Configuration header file.

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



### Macros

- `#define MAX_NINPUTS 8`  
*Maximum number of input files in the simulator program.*
- `#define NALGORITHMS 3`  
*Number of stochastic algorithms.*
- `#define NDIRECTIONS 2`  
*Number of direction 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\_OPTIMIZE "optimize"  
*optimize label.*
- #define LABEL\_COORDINATES "coordinates"  
*coordinates label.*
- #define LABEL\_DIRECTION "direction"  
*direction 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\_P "p"  
*p label.*
- #define LABEL\_PRECISION "precision"  
*precision label.*
- #define LABEL\_RANDOM "random"  
*random label.*
- #define LABEL\_RELAXATION "relaxation"  
*relaxation label.*
- #define LABEL\_REPRODUCTION "reproduction"  
*reproduction label.*
- #define LABEL\_RESULT\_FILE "result\_file"  
*result\_file label.*
- #define LABEL\_SIMULATOR "simulator"  
*simulator label.*
- #define LABEL\_SEED "seed"  
*seed label.*
- #define LABEL\_STEP "step"  
*step label.*
- #define LABEL\_SWEEP "sweep"  
*sweep label.*
- #define LABEL\_TAXICAB "taxicab"  
*taxicab label.*
- #define LABEL\_TEMPLATE1 "template1"  
*template1 label.*
- #define LABEL\_TEMPLATE2 "template2"  
*template2 label.*
- #define LABEL\_TEMPLATE3 "template3"  
*template3 label.*
- #define LABEL\_TEMPLATE4 "template4"  
*template4 label.*
- #define LABEL\_TEMPLATE5 "template5"  
*template5 label.*
- #define LABEL\_TEMPLATE6 "template6"  
*template6 label.*
- #define LABEL\_TEMPLATE7 "template7"  
*template7 label.*
- #define LABEL\_TEMPLATE8 "template8"  
*template8 label.*
- #define LABEL\_THRESHOLD "threshold"  
*threshold label.*
- #define LABEL\_TOLERANCE "tolerance"  
*tolerance label.*
- #define LABEL\_VARIABLE "variable"  
*variable label.*
- #define LABEL\_VARIABLES "variables"  
*variables label.*
- #define LABEL\_VARIABLES\_FILE "variables\_file"  
*variables label.*
- #define LABEL\_WEIGHT "weight"  
*weight label.*

## Enumerations

- enum `INPUT_TYPE` { `INPUT_TYPE_XML` = 0, `INPUT_TYPE_JSON` = 1 }
- Enum to define the input file types.*

### 5.1.1 Detailed Description

Configuration header file.

#### Authors

Javier Burguete and Borja Latorre.

#### Copyright

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Definition in file [config.h](#).

### 5.1.2 Enumeration Type Documentation

#### 5.1.2.1 enum `INPUT_TYPE`

Enum to define the input file types.

#### Enumerator

- `INPUT_TYPE_XML`** XML input file.
- `INPUT_TYPE_JSON`** JSON input file.

Definition at line 125 of file [config.h](#).

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

## 5.2 config.h

```
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 2012-2016, AUTHORS.
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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,
```

```

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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
00033 #ifndef CONFIG__H
00040 #define CONFIG__H 1
00041
00042 // Array sizes
00043
00044 #define MAX_NINPUTS 8
00045 #define NALGORITHMS 3
00047 #define NDIRECTIONS 2
00048 #define NNORMS 4
00049 #define NPRECISIONS 15
00050
00051 // Default choices
00052
00053 #define DEFAULT_PRECISION (NPRECISIONS - 1)
00054 #define DEFAULT_RANDOM_SEED 7007
00055 #define DEFAULT_RELAXATION 1.
00056
00057 // Interface labels
00058
00059 #define LOCALE_DIR "locales"
00060 #define PROGRAM_INTERFACE "mpcotool"
00061
00062 // Labels
00063
00064 #define LABEL_ABSOLUTE_MINIMUM "absolute_minimum"
00065 #define LABEL_ABSOLUTE_MAXIMUM "absolute_maximum"
00067 #define LABEL_ADAPTATION "adaptation"
00069 #define LABEL_ALGORITHM "algorithm"
00070 #define LABEL_OPTIMIZE "optimize"
00071 #define LABEL_COORDINATES "coordinates"
00072 #define LABEL_DIRECTION "direction"
00073 #define LABEL_EUCLIDIAN "euclidian"
00074 #define LABEL_EVALUATOR "evaluator"
00075 #define LABEL_EXPERIMENT "experiment"
00076 #define LABEL_EXPERIMENTS "experiments"
00077 #define LABEL_GENETIC "genetic"
00078 #define LABEL_MINIMUM "minimum"
00079 #define LABEL_MAXIMUM "maximum"
00080 #define LABEL_MONTE_CARLO "Monte-Carlo"
00081 #define LABEL_MUTATION "mutation"
00082 #define LABEL_NAME "name"
00083 #define LABEL_NBEST "nbest"
00084 #define LABEL_NBITS "nbits"
00085 #define LABEL_NESTIMATES "nestimates"
00086 #define LABEL_NGENERATIONS "ngenerations"
00087 #define LABEL_NITERATIONS "niterations"
00088 #define LABEL_NORM "norm"
00089 #define LABEL_NPOPULATION "npopulation"
00090 #define LABEL_NSIMULATIONS "nsimulations"
00091 #define LABEL_NSTEPS "nsteps"
00092 #define LABEL_NSWEEPS "nsweeps"
00093 #define LABEL_P "p"
00094 #define LABEL_PRECISION "precision"
00095 #define LABEL_RANDOM "random"
00096 #define LABEL_RELAXATION "relaxation"
00097 #define LABEL_REPRODUCTION "reproduction"
00098 #define LABEL_RESULT_FILE "result_file"
00099 #define LABEL_SIMULATOR "simulator"
00100 #define LABEL_SEED "seed"
00101 #define LABEL_STEP "step"
00102 #define LABEL_SWEEP "sweep"
00103 #define LABEL_TAXICAB "taxicab"
00104 #define LABEL_TEMPLATE1 "template1"
00105 #define LABEL_TEMPLATE2 "template2"
00106 #define LABEL_TEMPLATE3 "template3"
00107 #define LABEL_TEMPLATE4 "template4"
00108 #define LABEL_TEMPLATE5 "template5"
00109 #define LABEL_TEMPLATE6 "template6"
00110 #define LABEL_TEMPLATE7 "template7"
00111 #define LABEL_TEMPLATE8 "template8"
00112 #define LABEL_THRESHOLD "threshold"
00113 #define LABEL_TOLERANCE "tolerance"
00114 #define LABEL_VARIABLE "variable"
00115 #define LABEL_VARIABLES "variables"
00116 #define LABEL_VARIABLES_FILE "variables_file"
00117 #define LABEL_WEIGHT "weight"
00118
00119 // Enumerations
00120
00125 enum INPUT_TYPE

```

```

00126 {
00127     INPUT_TYPE_XML = 0,
00128     INPUT_TYPE_JSON = 1
00129 };
00130
00131 #endif

```

## 5.3 experiment.c File Reference

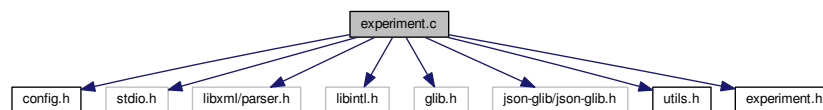
Source file to define the experiment data.

```

#include "config.h"
#include <stdio.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <json-glib/json-glib.h>
#include "utils.h"
#include "experiment.h"

```

Include dependency graph for experiment.c:



## Macros

- `#define _GNU_SOURCE`
- `#define DEBUG_EXPERIMENT 0`  
*Macro to debug experiment functions.*

## Functions

- void `experiment_new` (`Experiment *experiment`)  
*Function to create a new `Experiment` struct.*
- void `experiment_free` (`Experiment *experiment`, unsigned int type)  
*Function to free the memory of an `Experiment` struct.*
- void `experiment_error` (`Experiment *experiment`, char \*message)  
*Function to print a message error opening an `Experiment` struct.*
- int `experiment_open_xml` (`Experiment *experiment`, xmlNode \*node, unsigned int ninputs)  
*Function to open the `Experiment` struct on a XML node.*
- int `experiment_open_json` (`Experiment *experiment`, JsonNode \*node, unsigned int ninputs)  
*Function to open the `Experiment` struct on a XML node.*

## Variables

- const char \* `template` [`MAX_NINPUTS`]  
*Array of xmlChar strings with template labels.*



### 5.3.1 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](#).

### 5.3.2 Function Documentation

#### 5.3.2.1 void experiment\_error ( Experiment \* *experiment*, char \* *message* )

Function to print a message error opening an [Experiment](#) struct.

##### Parameters

<i>experiment</i>	<a href="#">Experiment</a> struct.
<i>message</i>	Error message.

Definition at line 121 of file [experiment.c](#).

```

00122 {
00123     char buffer[64];
00124     if (!experiment->name)
00125         snprintf (buffer, 64, "%s: %s", gettext ("Experiment"), message);
00126     else
00127         snprintf (buffer, 64, "%s %s: %s", gettext ("Experiment"), experiment->name,
00128                 message);
00129     error_message = g_strdup (buffer);
00130 }
```

#### 5.3.2.2 void experiment\_free ( Experiment \* *experiment*, unsigned int *type* )

Function to free the memory of an [Experiment](#) struct.

##### Parameters

<i>experiment</i>	<a href="#">Experiment</a> struct.
<i>type</i>	Type of input file.

Definition at line 88 of file [experiment.c](#).

```

00089 {
00090     unsigned int i;
00091     #if DEBUG_EXPERIMENT
00092         fprintf (stderr, "experiment_free: start\n");
00093     #endif
00094     if (type == INPUT_TYPE_XML)
00095     {
00096         for (i = 0; i < experiment->ninputs; ++i)
00097             xmlFree (experiment->template[i]);
00098         xmlFree (experiment->name);
00099     }
00100     else
00101     {
00102         for (i = 0; i < experiment->ninputs; ++i)
00103             g_free (experiment->template[i]);
00104         g_free (experiment->name);
00105     }
00106     experiment->ninputs = 0;
00107     #if DEBUG_EXPERIMENT
00108         fprintf (stderr, "experiment_free: end\n");
00109     #endif
00110 }
```

### 5.3.2.3 void experiment\_new ( Experiment \* experiment )

Function to create a new [Experiment](#) struct.

#### Parameters

<i>experiment</i>	<a href="#">Experiment</a> struct.
-------------------	------------------------------------

Definition at line 64 of file [experiment.c](#).

```

00065 {
00066     unsigned int i;
00067     #if DEBUG_EXPERIMENT
00068         fprintf (stderr, "experiment_new: start\n");
00069     #endif
00070     experiment->name = NULL;
00071     experiment->ninputs = 0;
00072     for (i = 0; i < MAX_NINPUTS; ++i)
00073         experiment->template[i] = NULL;
00074     #if DEBUG_EXPERIMENT
00075         fprintf (stderr, "input_new: end\n");
00076     #endif
00077 }
```

### 5.3.2.4 int experiment\_open\_json ( Experiment \* experiment, JsonNode \* node, unsigned int ninputs )

Function to open the [Experiment](#) struct on a XML node.

#### Parameters

<i>experiment</i>	<a href="#">Experiment</a> struct.
<i>node</i>	JSON node.
<i>ninputs</i>	Number of the simulator input files.

#### Returns

1 on success, 0 on error.

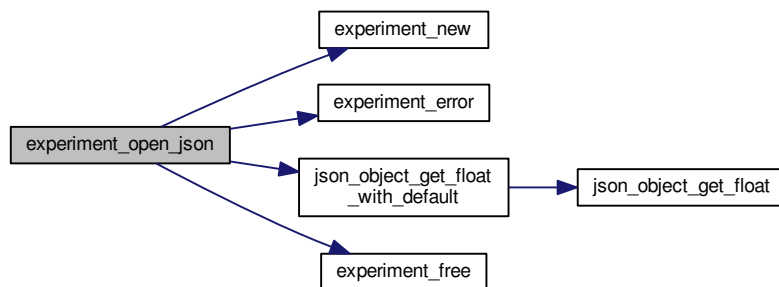
Definition at line 252 of file [experiment.c](#).

```

00254 {
00255     char buffer[64];
00256     JsonObject *object;
00257     const char *name;
00258     int error_code;
00259     unsigned int i;
00260
00261     #if DEBUG_EXPERIMENT
00262         fprintf (stderr, "experiment_open_json: start\n");
00263     #endif
00264
00265     // Resetting experiment data
00266     experiment_new (experiment);
00267
00268     // Getting JSON object
00269     object = json_node_get_object (node);
00270
00271     // Reading the experimental data
00272     name = json_object_get_string_member (object, LABEL_NAME);
00273     if (!name)
00274     {
00275         experiment_error (experiment, gettext ("no data file name"));
00276         goto exit_on_error;
00277     }
00278     experiment->name = g_strdup (name);
00279     #if DEBUG_EXPERIMENT
00280         fprintf (stderr, "experiment_open_json: name=%s\n", experiment->name);
00281     #endif
00282     experiment->weight
00283     = json_object_get_float_with_default (object,
00284     LABEL_WEIGHT, 1.,
00285     &error_code);
00286     if (error_code)
00287     {
```

```
00287     experiment_error (experiment, gettext ("bad weight"));
00288     goto exit_on_error;
00289 }
00290 #if DEBUG_EXPERIMENT
00291 fprintf (stderr, "experiment_open_json: weight=%lg\n", experiment->weight);
00292 #endif
00293 name = json_object_get_string_member (object, template[0]);
00294 if (name)
00295 {
00296     #if DEBUG_EXPERIMENT
00297     fprintf (stderr, "experiment_open_json: experiment=%s template1=%s\n",
00298             name, template[0]);
00299     #endif
00300     ++experiment->ninputs;
00301 }
00302 else
00303 {
00304     experiment_error (experiment, gettext ("no template"));
00305     goto exit_on_error;
00306 }
00307 experiment->template[0] = g_strdup (name);
00308 for (i = 1; i < MAX_NINPUTS; ++i)
00309 {
00310     #if DEBUG_EXPERIMENT
00311     fprintf (stderr, "experiment_open_json: template%u\n", i + 1);
00312     #endif
00313     if (json_object_get_member (object, template[i]))
00314     {
00315         if (ninputs && ninputs <= i)
00316         {
00317             experiment_error (experiment, gettext ("bad templates number"));
00318             goto exit_on_error;
00319         }
00320         name = json_object_get_string_member (object, template[i]);
00321         #if DEBUG_EXPERIMENT
00322         fprintf (stderr,
00323                 "experiment_open_json: experiment=%s template%u=%s\n",
00324                 experiment->nexperiments, name, template[i]);
00325         #endif
00326         experiment->template[i] = g_strdup (name);
00327         ++experiment->ninputs;
00328     }
00329     else if (ninputs && ninputs > i)
00330     {
00331         snprintf (buffer, 64, "%s%u", gettext ("no template"), i + 1);
00332         experiment_error (experiment, buffer);
00333         goto exit_on_error;
00334     }
00335     else
00336         break;
00337 }
00338
00339 #if DEBUG_EXPERIMENT
00340 fprintf (stderr, "experiment_open_json: end\n");
00341 #endif
00342 return 1;
00343
00344 exit_on_error:
00345     experiment_free (experiment, INPUT_TYPE_JSON);
00346     #if DEBUG_EXPERIMENT
00347     fprintf (stderr, "experiment_open_json: end\n");
00348     #endif
00349     return 0;
00350 }
```

Here is the call graph for this function:



### 5.3.2.5 int experiment\_open\_xml ( Experiment \* *experiment*, xmlNode \* *node*, unsigned int *ninputs* )

Function to open the [Experiment](#) struct on a XML node.

#### Parameters

<i>experiment</i>	<a href="#">Experiment</a> struct.
<i>node</i>	XML node.
<i>ninputs</i>	Number of the simulator input files.

#### Returns

1 on success, 0 on error.

Definition at line 145 of file [experiment.c](#).

```

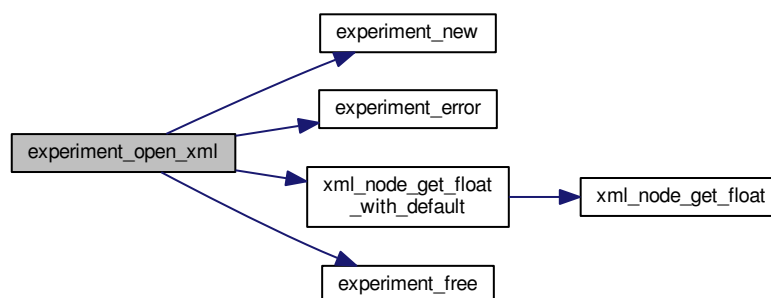
00147 {
00148     char buffer[64];
00149     int error_code;
00150     unsigned int i;
00151
00152     #if DEBUG_EXPERIMENT
00153         fprintf (stderr, "experiment_open_xml: start\n");
00154     #endif
00155
00156     // Resetting experiment data
00157     experiment_new (experiment);
00158
00159     // Reading the experimental data
00160     experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00161     if (!experiment->name)
00162     {
00163         experiment_error (experiment, gettext ("no data file name"));
00164         goto exit_on_error;
00165     }
00166     #if DEBUG_EXPERIMENT
00167         fprintf (stderr, "experiment_open_xml: name=%s\n", experiment->name);
00168     #endif
00169     experiment->weight
00170     = xml_node_get_float_with_default (node, (const xmlChar *)
    LABEL_WEIGHT, 1.,
00171                                     &error_code);
00172     if (error_code)
00173     {
00174         experiment_error (experiment, gettext ("bad weight"));
00175         goto exit_on_error;
00176     }
00177     #if DEBUG_EXPERIMENT
00178         fprintf (stderr, "experiment_open_xml: weight=%lg\n", experiment->weight);
00179     #endif
00180     experiment->template[0]
  
```

```

00181     = (char *) xmlGetProp (node, (const xmlChar *) template[0]);
00182     if (experiment->template[0])
00183     {
00184     #if DEBUG_EXPERIMENT
00185         fprintf (stderr, "experiment_open_xml: experiment=%s template1=%s\n",
00186                 experiment->name, template[0]);
00187     #endif
00188         ++experiment->ninputs;
00189     }
00190     else
00191     {
00192         experiment_error (experiment, gettext ("no template"));
00193         goto exit_on_error;
00194     }
00195     for (i = 1; i < MAX_NINPUTS; ++i)
00196     {
00197     #if DEBUG_EXPERIMENT
00198         fprintf (stderr, "experiment_open_xml: template%u\n", i + 1);
00199     #endif
00200         if (xmlHasProp (node, (const xmlChar *) template[i]))
00201         {
00202             if (ninputs && ninputs <= i)
00203             {
00204                 experiment_error (experiment, gettext ("bad templates number"));
00205                 goto exit_on_error;
00206             }
00207             experiment->template[i]
00208                 = (char *) xmlGetProp (node, (const xmlChar *) template[i]);
00209     #if DEBUG_EXPERIMENT
00210             fprintf (stderr, "experiment_open_xml: experiment=%s template%u=%s\n",
00211                     experiment->name, experiment->template[i]);
00212     #endif
00213             ++experiment->ninputs;
00214         }
00215     }
00216     else if (ninputs && ninputs > i)
00217     {
00218         snprintf (buffer, 64, "%s%u", gettext ("no template"), i + 1);
00219         experiment_error (experiment, buffer);
00220         goto exit_on_error;
00221     }
00222     else
00223         break;
00224 }
00225
00226 #if DEBUG_EXPERIMENT
00227 fprintf (stderr, "experiment_open_xml: end\n");
00228 #endif
00229 return 1;
00230
00231 exit_on_error:
00232 experiment_free (experiment, INPUT_TYPE_XML);
00233 #if DEBUG_EXPERIMENT
00234 fprintf (stderr, "experiment_open_xml: end\n");
00235 #endif
00236 return 0;
00237 }

```

Here is the call graph for this function:



### 5.3.3 Variable Documentation

#### 5.3.3.1 `const char* template[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 template labels.

Definition at line 50 of file [experiment.c](#).

## 5.4 `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 Burquete and Borja Latorre.
00007
00008 Copyright 2012-2016, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
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00013     1. Redistributions of source code must retain the above copyright notice,
00014        this list of conditions and the following disclaimer.
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
00032 #define _GNU_SOURCE
00033 #include "config.h"
00034 #include <stdio.h>
00035 #include <libxml/parser.h>
00036 #include <libintl.h>
00037 #include <glib.h>
00038 #include <json-glib/json-glib.h>
00039 #include "utils.h"
00040 #include "experiment.h"
00041
00042 #define DEBUG_EXPERIMENT 0
00043
00044 const char *template[MAX_NINPUTS] = {
00045     LABEL_TEMPLATE1, LABEL_TEMPLATE2,
00046     LABEL_TEMPLATE3, LABEL_TEMPLATE4,
00047     LABEL_TEMPLATE5, LABEL_TEMPLATE6,
00048     LABEL_TEMPLATE7, LABEL_TEMPLATE8
00049 };
00050
00051 void
00052 experiment_new (Experiment * experiment)
00053 {
00054     unsigned int i;
00055     #if DEBUG_EXPERIMENT
00056     fprintf (stderr, "experiment_new: start\n");
00057     #endif
00058     experiment->name = NULL;
00059     experiment->ninputs = 0;
```

```

00072     for (i = 0; i < MAX_NINPUTS; ++i)
00073         experiment->template[i] = NULL;
00074 #if DEBUG_EXPERIMENT
00075     fprintf (stderr, "input_new: end\n");
00076 #endif
00077 }
00078
00079 void
00080 experiment_free (Experiment * experiment, unsigned int type)
00081 {
00082     unsigned int i;
00083 #if DEBUG_EXPERIMENT
00084     fprintf (stderr, "experiment_free: start\n");
00085 #endif
00086     if (type == INPUT_TYPE_XML)
00087     {
00088         for (i = 0; i < experiment->ninputs; ++i)
00089             xmlFree (experiment->template[i]);
00090         xmlFree (experiment->name);
00091     }
00092     else
00093     {
00094         for (i = 0; i < experiment->ninputs; ++i)
00095             g_free (experiment->template[i]);
00096         g_free (experiment->name);
00097     }
00098     experiment->ninputs = 0;
00099 #if DEBUG_EXPERIMENT
00100     fprintf (stderr, "experiment_free: end\n");
00101 #endif
00102 }
00103
00104 void
00105 experiment_error (Experiment * experiment, char *message)
00106 {
00107     char buffer[64];
00108     if (!experiment->name)
00109         snprintf (buffer, 64, "%s: %s", gettext ("Experiment"), message);
00110     else
00111         snprintf (buffer, 64, "%s %s: %s", gettext ("Experiment"), experiment->name,
00112                 message);
00113     error_message = g_strdup (buffer);
00114 }
00115
00116 int
00117 experiment_open_xml (Experiment * experiment, xmlNode * node,
00118                     unsigned int ninputs)
00119 {
00120     char buffer[64];
00121     int error_code;
00122     unsigned int i;
00123 #if DEBUG_EXPERIMENT
00124     fprintf (stderr, "experiment_open_xml: start\n");
00125 #endif
00126     // Resetting experiment data
00127     experiment_new (experiment);
00128     // Reading the experimental data
00129     experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00130     if (!experiment->name)
00131     {
00132         experiment_error (experiment, gettext ("no data file name"));
00133         goto exit_on_error;
00134     }
00135 #if DEBUG_EXPERIMENT
00136     fprintf (stderr, "experiment_open_xml: name=%s\n", experiment->name);
00137 #endif
00138     experiment->weight
00139         = xml_node_get_float_with_default (node, (const xmlChar *)
00140         LABEL_WEIGHT, 1.,
00141         &error_code);
00142     if (error_code)
00143     {
00144         experiment_error (experiment, gettext ("bad weight"));
00145         goto exit_on_error;
00146     }
00147 #if DEBUG_EXPERIMENT
00148     fprintf (stderr, "experiment_open_xml: weight=%lg\n", experiment->weight);
00149 #endif
00150     experiment->template[0]
00151         = (char *) xmlGetProp (node, (const xmlChar *) template[0]);
00152     if (experiment->template[0])
00153     {
00154         #if DEBUG_EXPERIMENT
00155             fprintf (stderr, "experiment_open_xml: experiment=%s template1=%s\n",

```

```

00186         experiment->name, template[0]);
00187 #endif
00188     ++experiment->ninputs;
00189 }
00190 else
00191 {
00192     experiment_error (experiment, gettext ("no template"));
00193     goto exit_on_error;
00194 }
00195 for (i = 1; i < MAX_NINPUTS; ++i)
00196 {
00197     #if DEBUG_EXPERIMENT
00198     fprintf (stderr, "experiment_open_xml: template%u\n", i + 1);
00199     #endif
00200     if (xmlHasProp (node, (const xmlChar *) template[i]))
00201     {
00202         if (ninputs && ninputs <= i)
00203         {
00204             experiment_error (experiment, gettext ("bad templates number"));
00205             goto exit_on_error;
00206         }
00207         experiment->template[i]
00208             = (char *) xmlGetProp (node, (const xmlChar *) template[i]);
00209     #if DEBUG_EXPERIMENT
00210     fprintf (stderr, "experiment_open_xml: experiment=%s template%u=%s\n",
00211             experiment->nexperiments, experiment->name,
00212             experiment->template[i]);
00213     #endif
00214     ++experiment->ninputs;
00215 }
00216 else if (ninputs && ninputs > i)
00217 {
00218     snprintf (buffer, 64, "%s%u", gettext ("no template"), i + 1);
00219     experiment_error (experiment, buffer);
00220     goto exit_on_error;
00221 }
00222 else
00223     break;
00224 }
00225
00226 #if DEBUG_EXPERIMENT
00227 fprintf (stderr, "experiment_open_xml: end\n");
00228 #endif
00229 return 1;
00230
00231 exit_on_error:
00232     experiment_free (experiment, INPUT_TYPE_XML);
00233     #if DEBUG_EXPERIMENT
00234     fprintf (stderr, "experiment_open_xml: end\n");
00235     #endif
00236     return 0;
00237 }
00238
00251 int
00252 experiment_open_json (Experiment * experiment, JsonNode * node,
00253                      unsigned int ninputs)
00254 {
00255     char buffer[64];
00256     JsonObject *object;
00257     const char *name;
00258     int error_code;
00259     unsigned int i;
00260
00261     #if DEBUG_EXPERIMENT
00262     fprintf (stderr, "experiment_open_json: start\n");
00263     #endif
00264
00265     // Resetting experiment data
00266     experiment_new (experiment);
00267
00268     // Getting JSON object
00269     object = json_node_get_object (node);
00270
00271     // Reading the experimental data
00272     name = json_object_get_string_member (object, LABEL_NAME);
00273     if (!name)
00274     {
00275         experiment_error (experiment, gettext ("no data file name"));
00276         goto exit_on_error;
00277     }
00278     experiment->name = g_strdup (name);
00279     #if DEBUG_EXPERIMENT
00280     fprintf (stderr, "experiment_open_json: name=%s\n", experiment->name);
00281     #endif
00282     experiment->weight
00283         = json_object_get_float_with_default (object,
00284         LABEL_WEIGHT, 1.,

```



```

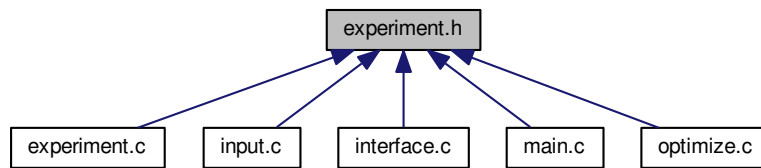
00284                                     &error_code);
00285     if (error_code)
00286     {
00287         experiment_error (experiment, gettext ("bad weight"));
00288         goto exit_on_error;
00289     }
00290 #if DEBUG_EXPERIMENT
00291     fprintf (stderr, "experiment_open_json: weight=%lg\n", experiment->weight);
00292 #endif
00293     name = json_object_get_string_member (object, template[0]);
00294     if (name)
00295     {
00296 #if DEBUG_EXPERIMENT
00297         fprintf (stderr, "experiment_open_json: experiment=%s template1=%s\n",
00298                 name, template[0]);
00299 #endif
00300         ++experiment->ninputs;
00301     }
00302     else
00303     {
00304         experiment_error (experiment, gettext ("no template"));
00305         goto exit_on_error;
00306     }
00307     experiment->template[0] = g_strdup (name);
00308     for (i = 1; i < MAX_NINPUTS; ++i)
00309     {
00310 #if DEBUG_EXPERIMENT
00311         fprintf (stderr, "experiment_open_json: template%u\n", i + 1);
00312 #endif
00313         if (json_object_get_member (object, template[i]))
00314         {
00315             if (ninputs && ninputs <= i)
00316             {
00317                 experiment_error (experiment, gettext ("bad templates number"));
00318                 goto exit_on_error;
00319             }
00320             name = json_object_get_string_member (object, template[i]);
00321 #if DEBUG_EXPERIMENT
00322             fprintf (stderr,
00323                     "experiment_open_json: experiment=%s template%u=%s\n",
00324                     experiment->nexperiments, name, template[i]);
00325 #endif
00326             experiment->template[i] = g_strdup (name);
00327             ++experiment->ninputs;
00328         }
00329         else if (ninputs && ninputs > i)
00330         {
00331             snprintf (buffer, 64, "%s%u", gettext ("no template"), i + 1);
00332             experiment_error (experiment, buffer);
00333             goto exit_on_error;
00334         }
00335         else
00336             break;
00337     }
00338
00339 #if DEBUG_EXPERIMENT
00340     fprintf (stderr, "experiment_open_json: end\n");
00341 #endif
00342     return 1;
00343
00344 exit_on_error:
00345     experiment_free (experiment, INPUT_TYPE_JSON);
00346 #if DEBUG_EXPERIMENT
00347     fprintf (stderr, "experiment_open_json: end\n");
00348 #endif
00349     return 0;
00350 }

```

## 5.5 experiment.h File Reference

Header file to define the experiment data.

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



## Data Structures

- struct [Experiment](#)  
*Struct to define the experiment data.*

## Functions

- void [experiment\\_new](#) ([Experiment](#) \*experiment)  
*Function to create a new [Experiment](#) struct.*
- void [experiment\\_free](#) ([Experiment](#) \*experiment, unsigned int type)  
*Function to free the memory of an [Experiment](#) struct.*
- void [experiment\\_error](#) ([Experiment](#) \*experiment, char \*message)  
*Function to print a message error opening an [Experiment](#) struct.*
- int [experiment\\_open\\_xml](#) ([Experiment](#) \*experiment, xmlNode \*node, unsigned int ninputs)  
*Function to open the [Experiment](#) struct on a XML node.*
- int [experiment\\_open\\_json](#) ([Experiment](#) \*experiment, JsonNode \*node, unsigned int ninputs)  
*Function to open the [Experiment](#) struct on a XML node.*

## Variables

- const char \* [template](#) [[MAX\\_NINPUTS](#)]  
*Array of xmlChar strings with template labels.*

### 5.5.1 Detailed Description

Header file to define the experiment data.

#### Authors

Javier Burguete.

#### Copyright

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Definition in file [experiment.h](#).

## 5.5.2 Function Documentation

### 5.5.2.1 void experiment\_error ( Experiment \* *experiment*, char \* *message* )

Function to print a message error opening an [Experiment](#) struct.

## Parameters

<i>experiment</i>	Experiment struct.
<i>message</i>	Error message.

Definition at line 121 of file [experiment.c](#).

```

00122 {
00123     char buffer[64];
00124     if (!experiment->name)
00125         snprintf (buffer, 64, "%s: %s", gettext ("Experiment"), message);
00126     else
00127         snprintf (buffer, 64, "%s %s: %s", gettext ("Experiment"), experiment->name,
00128                 message);
00129     error_message = g_strdup (buffer);
00130 }
```

### 5.5.2.2 void experiment\_free ( Experiment \* *experiment*, unsigned int *type* )

Function to free the memory of an [Experiment](#) struct.

## Parameters

<i>experiment</i>	Experiment struct.
<i>type</i>	Type of input file.

Definition at line 88 of file [experiment.c](#).

```

00089 {
00090     unsigned int i;
00091     #if DEBUG_EXPERIMENT
00092         fprintf (stderr, "experiment_free: start\n");
00093     #endif
00094     if (type == INPUT_TYPE_XML)
00095     {
00096         for (i = 0; i < experiment->ninputs; ++i)
00097             xmlFree (experiment->template[i]);
00098         xmlFree (experiment->name);
00099     }
00100     else
00101     {
00102         for (i = 0; i < experiment->ninputs; ++i)
00103             g_free (experiment->template[i]);
00104         g_free (experiment->name);
00105     }
00106     experiment->ninputs = 0;
00107     #if DEBUG_EXPERIMENT
00108         fprintf (stderr, "experiment_free: end\n");
00109     #endif
00110 }
```

### 5.5.2.3 void experiment\_new ( Experiment \* *experiment* )

Function to create a new [Experiment](#) struct.

## Parameters

<i>experiment</i>	Experiment struct.
-------------------	--------------------

Definition at line 64 of file [experiment.c](#).

```

00065 {
00066     unsigned int i;
00067     #if DEBUG_EXPERIMENT
00068         fprintf (stderr, "experiment_new: start\n");
00069     #endif
00070     experiment->name = NULL;
00071     experiment->ninputs = 0;
00072     for (i = 0; i < MAX_NINPUTS; ++i)
00073         experiment->template[i] = NULL;
00074     #if DEBUG_EXPERIMENT
00075         fprintf (stderr, "input_new: end\n");
00076     #endif
00077 }
```

### 5.5.2.4 int experiment\_open\_json ( Experiment \* *experiment*, JsonNode \* *node*, unsigned int *ninputs* )

Function to open the [Experiment](#) struct on a XML node.

#### Parameters

<i>experiment</i>	<a href="#">Experiment</a> struct.
<i>node</i>	JSON node.
<i>ninputs</i>	Number of the simulator input files.

#### Returns

1 on success, 0 on error.

Definition at line 252 of file [experiment.c](#).

```

00254 {
00255     char buffer[64];
00256     JsonObject *object;
00257     const char *name;
00258     int error_code;
00259     unsigned int i;
00260
00261     #if DEBUG_EXPERIMENT
00262     fprintf (stderr, "experiment_open_json: start\n");
00263     #endif
00264
00265     // Resetting experiment data
00266     experiment_new (experiment);
00267
00268     // Getting JSON object
00269     object = json_node_get_object (node);
00270
00271     // Reading the experimental data
00272     name = json_object_get_string_member (object, LABEL_NAME);
00273     if (!name)
00274     {
00275         experiment_error (experiment, gettext ("no data file name"));
00276         goto exit_on_error;
00277     }
00278     experiment->name = g_strdup (name);
00279     #if DEBUG_EXPERIMENT
00280     fprintf (stderr, "experiment_open_json: name=%s\n", experiment->name);
00281     #endif
00282     experiment->weight
00283     = json_object_get_float_with_default (object,
00284     LABEL_WEIGHT, 1.,
00285     &error_code);
00286     if (error_code)
00287     {
00288         experiment_error (experiment, gettext ("bad weight"));
00289         goto exit_on_error;
00290     }
00291     #if DEBUG_EXPERIMENT
00292     fprintf (stderr, "experiment_open_json: weight=%lg\n", experiment->weight);
00293     #endif
00294     name = json_object_get_string_member (object, template[0]);
00295     if (name)
00296     {
00297         #if DEBUG_EXPERIMENT
00298         fprintf (stderr, "experiment_open_json: experiment=%s template1=%s\n",
00299         name, template[0]);
00300         #endif
00301         ++experiment->ninputs;
00302     }
00303     else
00304     {
00305         experiment_error (experiment, gettext ("no template"));
00306         goto exit_on_error;
00307     }
00308     experiment->template[0] = g_strdup (name);
00309     for (i = 1; i < MAX_NINPUTS; ++i)
00310     {
00311         #if DEBUG_EXPERIMENT
00312         fprintf (stderr, "experiment_open_json: template%u\n", i + 1);
00313         #endif
00314         if (json_object_get_member (object, template[i]))
00315         {
00316             if (ninputs && ninputs <= i)

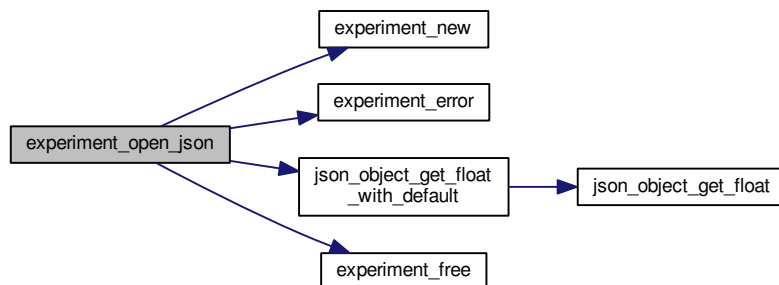
```

```

00317         experiment_error (experiment, gettext ("bad templates number"));
00318         goto exit_on_error;
00319     }
00320     name = json_object_get_string_member (object, template[i]);
00321     #if DEBUG_EXPERIMENT
00322     fprintf (stderr,
00323             "experiment_open_json: experiment=%s template%u=%s\n",
00324             experiment->nexperiments, name, template[i]);
00325     #endif
00326     experiment->template[i] = g_strdup (name);
00327     ++experiment->ninputs;
00328 }
00329 else if (ninputs && ninputs > i)
00330 {
00331     snprintf (buffer, 64, "%s%u", gettext ("no template"), i + 1);
00332     experiment_error (experiment, buffer);
00333     goto exit_on_error;
00334 }
00335 else
00336     break;
00337 }
00338
00339 #if DEBUG_EXPERIMENT
00340 fprintf (stderr, "experiment_open_json: end\n");
00341 #endif
00342 return 1;
00343
00344 exit_on_error:
00345     experiment_free (experiment, INPUT_TYPE_JSON);
00346     #if DEBUG_EXPERIMENT
00347     fprintf (stderr, "experiment_open_json: end\n");
00348     #endif
00349     return 0;
00350 }

```

Here is the call graph for this function:



#### 5.5.2.5 int experiment\_open\_xml ( Experiment \* experiment, xmlNode \* node, unsigned int ninputs )

Function to open the `Experiment` struct on a XML node.

##### Parameters

<i>experiment</i>	<code>Experiment</code> struct.
<i>node</i>	XML node.
<i>ninputs</i>	Number of the simulator input files.

##### Returns

1 on success, 0 on error.

Definition at line 145 of file `experiment.c`.

```

00147 {
00148     char buffer[64];
00149     int error_code;
00150     unsigned int i;
00151
00152     #if DEBUG_EXPERIMENT
00153         fprintf (stderr, "experiment_open_xml: start\n");
00154     #endif
00155
00156     // Resetting experiment data
00157     experiment_new (experiment);
00158
00159     // Reading the experimental data
00160     experiment->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00161     if (!experiment->name)
00162     {
00163         experiment_error (experiment, gettext ("no data file name"));
00164         goto exit_on_error;
00165     }
00166     #if DEBUG_EXPERIMENT
00167         fprintf (stderr, "experiment_open_xml: name=%s\n", experiment->name);
00168     #endif
00169     experiment->weight
00170     = xml_node_get_float_with_default (node, (const xmlChar *)
00171     LABEL_WEIGHT, 1.,
00172     &error_code);
00173     if (error_code)
00174     {
00175         experiment_error (experiment, gettext ("bad weight"));
00176         goto exit_on_error;
00177     }
00178     #if DEBUG_EXPERIMENT
00179         fprintf (stderr, "experiment_open_xml: weight=%lg\n", experiment->weight);
00180     #endif
00181     experiment->template[0]
00182     = (char *) xmlGetProp (node, (const xmlChar *) template[0]);
00183     if (experiment->template[0])
00184     {
00185         #if DEBUG_EXPERIMENT
00186             fprintf (stderr, "experiment_open_xml: experiment=%s template1=%s\n",
00187             experiment->name, template[0]);
00188         #endif
00189         ++experiment->ninputs;
00190     }
00191     else
00192     {
00193         experiment_error (experiment, gettext ("no template"));
00194         goto exit_on_error;
00195     }
00196     for (i = 1; i < MAX_NINPUTS; ++i)
00197     {
00198         #if DEBUG_EXPERIMENT
00199             fprintf (stderr, "experiment_open_xml: template%u\n", i + 1);
00200         #endif
00201         if (xmlHasProp (node, (const xmlChar *) template[i]))
00202         {
00203             if (ninputs && ninputs <= i)
00204             {
00205                 experiment_error (experiment, gettext ("bad templates number"));
00206                 goto exit_on_error;
00207             }
00208             experiment->template[i]
00209             = (char *) xmlGetProp (node, (const xmlChar *) template[i]);
00210             #if DEBUG_EXPERIMENT
00211                 fprintf (stderr, "experiment_open_xml: experiment=%s template%u=%s\n",
00212                 experiment->name, experiment->nexperiments,
00213                 experiment->template[i]);
00214             #endif
00215             ++experiment->ninputs;
00216         }
00217         else if (ninputs && ninputs > i)
00218         {
00219             snprintf (buffer, 64, "%s%u", gettext ("no template"), i + 1);
00220             experiment_error (experiment, buffer);
00221             goto exit_on_error;
00222         }
00223         else
00224             break;
00225     }
00226     #if DEBUG_EXPERIMENT
00227         fprintf (stderr, "experiment_open_xml: end\n");
00228     #endif
00229     return 1;
00230
00231 exit_on_error:
00232     experiment_free (experiment, INPUT_TYPE_XML);

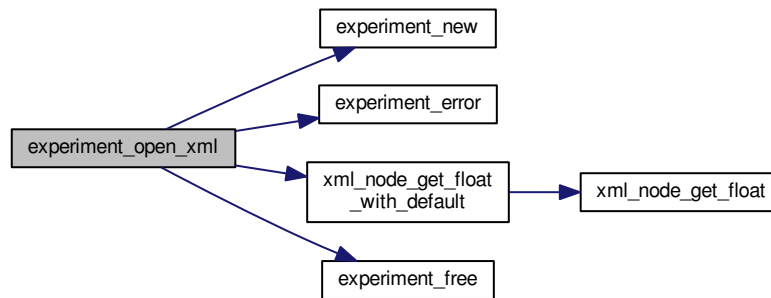
```

```

00233 #if DEBUG_EXPERIMENT
00234     fprintf(stderr, "experiment_open_xml: end\n");
00235 #endif
00236     return 0;
00237 }

```

Here is the call graph for this function:



## 5.6 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 Burquete and Borja Latorre.
00007
00008 Copyright 2012-2016, 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
00032 #ifndef EXPERIMENT__H
00033 #define EXPERIMENT__H 1
00034
00035 typedef struct
00036 {
00037     char *name;
00038     char *template[MAX_NINPUTS];
00039     double weight;
00040     unsigned int ninputs;
00041 } Experiment;
00042
00043 extern const char *template[MAX_NINPUTS];
00044
00045 // Public functions
00046 void experiment_new (Experiment * experiment);
00047 void experiment_free (Experiment * experiment, unsigned int type);
00048 void experiment_error (Experiment * experiment, char *message);

```



```

00059 int experiment_open_xml (Experiment * experiment, xmlNode * node,
00060                             unsigned int ninputs);
00061 int experiment_open_json (Experiment * experiment, JsonNode * node,
00062                             unsigned int ninputs);
00063
00064 #endif

```

## 5.7 input.c File Reference

Source file to define the input functions.

```

#include "config.h"
#include <stdio.h>
#include <string.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <glib/gstdio.h>
#include <json-glib/json-glib.h>
#include "utils.h"
#include "experiment.h"
#include "variable.h"
#include "input.h"

```

Include dependency graph for input.c:



### Macros

- `#define _GNU_SOURCE`
- `#define DEBUG_INPUT 0`  
Macro to debug input functions.

### Functions

- void `input_new` ()  
Function to create a new *Input* struct.
- void `input_free` ()  
Function to free the memory of the input file data.
- void `input_error` (char \*message)  
Function to print an error message opening an *Input* struct.
- int `input_open_xml` (xmlDoc \*doc)  
Function to open the input file in XML format.
- int `input_open_json` (JsonParser \*parser)  
Function to open the input file in JSON format.
- int `input_open` (char \*filename)  
Function to open the input file.

## Variables

- [Input input](#) [1]  
*Global [Input](#) struct to set the input data.*
- `const char * result\_name = "result"`  
*Name of the result file.*
- `const char * variables\_name = "variables"`  
*Name of the variables file.*

### 5.7.1 Detailed Description

Source file to define the input functions.

#### Authors

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Definition in file [input.c](#).

### 5.7.2 Function Documentation

#### 5.7.2.1 void input\_error ( char \* *message* )

Function to print an error message opening an [Input](#) struct.

##### Parameters

<i>message</i>	Error message.
----------------	----------------

Definition at line [124](#) of file [input.c](#).

```
00125 {
00126     char buffer[64];
00127     snprintf (buffer, 64, "%s: %s\n", gettext ("Input"), message);
00128     error\_message = g_strdup (buffer);
00129 }
```

#### 5.7.2.2 int input\_open ( char \* *filename* )

Function to open the input file.

##### Parameters

<i>filename</i>	<a href="#">Input</a> data file name.
-----------------	---------------------------------------

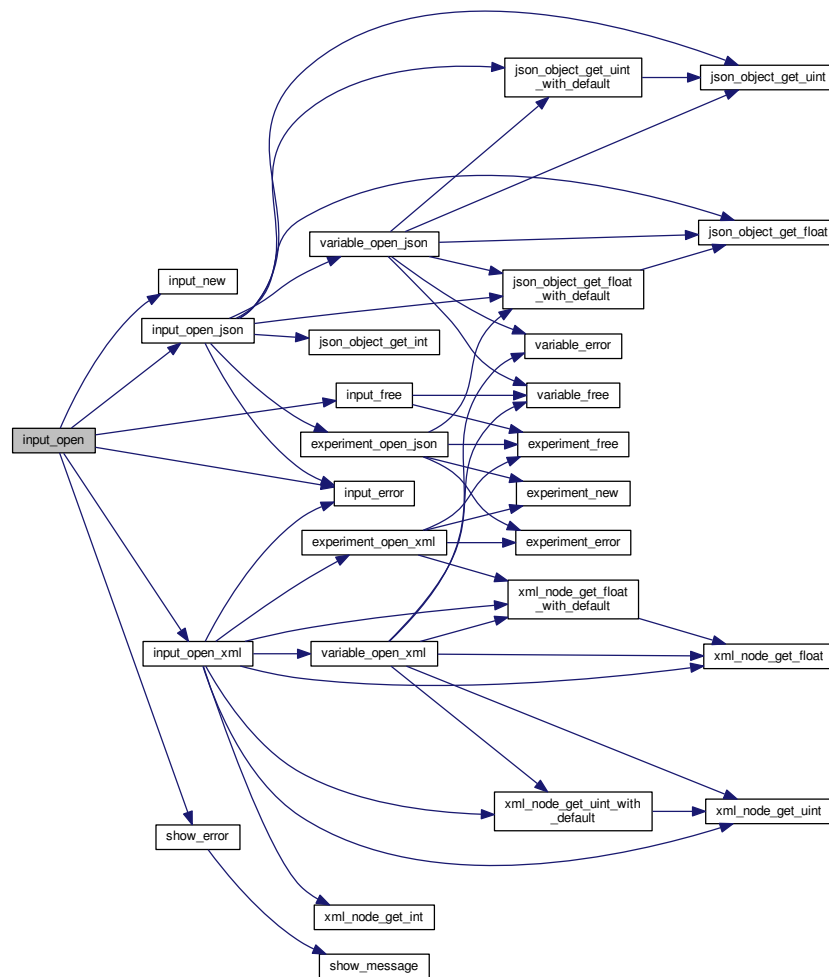
##### Returns

1\_on\_success, 0\_on\_error.

Definition at line [947](#) of file [input.c](#).

```
00948 {
00949     xmlDoc *doc;
00950     JsonParser *parser;
00951
00952     #if DEBUG_INPUT
00953     fprintf (stderr, "input_open: start\n");
00954     #endif
00955
00956     // Resetting input data
00957     input_new ();
00958
00959     // Opening input file
00960     #if DEBUG_INPUT
00961     fprintf (stderr, "input_open: opening the input file %s\n", filename);
00962     fprintf (stderr, "input_open: trying XML format\n");
00963     #endif
00964     doc = xmlParseFile (filename);
00965     if (!doc)
00966     {
00967         #if DEBUG_INPUT
00968         fprintf (stderr, "input_open: trying JSON format\n");
00969         #endif
00970         parser = json_parser_new ();
00971         if (!json_parser_load_from_file (parser, filename, NULL))
00972         {
00973             input_error (gettext ("Unable to parse the input file"));
00974             goto exit_on_error;
00975         }
00976         if (!input_open_json (parser))
00977             goto exit_on_error;
00978     }
00979     else if (!input_open_xml (doc))
00980         goto exit_on_error;
00981
00982     // Getting the working directory
00983     input->directory = g_path_get_dirname (filename);
00984     input->name = g_path_get_basename (filename);
00985
00986     #if DEBUG_INPUT
00987     fprintf (stderr, "input_open: end\n");
00988     #endif
00989     return 1;
00990
00991 exit_on_error:
00992     show_error (error_message);
00993     g_free (error_message);
00994     input_free ();
00995     #if DEBUG_INPUT
00996     fprintf (stderr, "input_open: end\n");
00997     #endif
00998     return 0;
00999 }
```

Here is the call graph for this function:



### 5.7.2.3 int input\_open\_json ( JsonParser \* parser )

Function to open the input file in JSON format.

#### Parameters

<i>parser</i>	JsonParser struct.
---------------	--------------------

#### Returns

1\_on\_success, 0\_on\_error.

Definition at line 557 of file [input.c](#).

```

00558 {
00559     JsonNode *node, *child;
00560     JsonObject *object;
00561     JsonArray *array;
00562     const char *buffer;
00563     int error_code;
00564     unsigned int i, n;
00565
```

```

00566 #if DEBUG_INPUT
00567     fprintf (stderr, "input_open_json: start\n");
00568 #endif
00569
00570     // Resetting input data
00571     input->type = INPUT_TYPE_JSON;
00572
00573     // Getting the root node
00574 #if DEBUG_INPUT
00575     fprintf (stderr, "input_open_json: getting the root node\n");
00576 #endif
00577     node = json_parser_get_root (parser);
00578     object = json_node_get_object (node);
00579
00580     // Getting result and variables file names
00581     if (!input->result)
00582     {
00583         buffer = json_object_get_string_member (object, LABEL_RESULT_FILE);
00584         if (!buffer)
00585             buffer = result_name;
00586         input->result = g_strdup (buffer);
00587     }
00588     else
00589         input->result = g_strdup (result_name);
00590     if (!input->variables)
00591     {
00592         buffer = json_object_get_string_member (object, LABEL_VARIABLES_FILE);
00593         if (!buffer)
00594             buffer = variables_name;
00595         input->variables = g_strdup (buffer);
00596     }
00597     else
00598         input->variables = g_strdup (variables_name);
00599
00600     // Opening simulator program name
00601     buffer = json_object_get_string_member (object, LABEL_SIMULATOR);
00602     if (!buffer)
00603     {
00604         input_error (gettext ("Bad simulator program"));
00605         goto exit_on_error;
00606     }
00607     input->simulator = g_strdup (buffer);
00608
00609     // Opening evaluator program name
00610     buffer = json_object_get_string_member (object, LABEL_EVALUATOR);
00611     if (buffer)
00612         input->evaluator = g_strdup (buffer);
00613
00614     // Obtaining pseudo-random numbers generator seed
00615     input->seed
00616     = json_object_get_uint_with_default (object,
00617     LABEL_SEED,
00618     DEFAULT_RANDOM_SEED, &error_code);
00619     if (error_code)
00620     {
00621         input_error (gettext ("Bad pseudo-random numbers generator seed"));
00622         goto exit_on_error;
00623     }
00624
00625     // Opening algorithm
00626     buffer = json_object_get_string_member (object, LABEL_ALGORITHM);
00627     if (!strcmp (buffer, LABEL_MONTE_CARLO))
00628     {
00629         input->algorithm = ALGORITHM_MONTE_CARLO;
00630
00631         // Obtaining simulations number
00632         input->nsimulations
00633         = json_object_get_int (object, LABEL_NSIMULATIONS, &error_code
00634     );
00635     if (error_code)
00636     {
00637         input_error (gettext ("Bad simulations number"));
00638         goto exit_on_error;
00639     }
00640     else if (!strcmp (buffer, LABEL_SWEEP))
00641         input->algorithm = ALGORITHM_SWEEP;
00642     else if (!strcmp (buffer, LABEL_GENETIC))
00643     {
00644         input->algorithm = ALGORITHM_GENETIC;
00645
00646         // Obtaining population
00647         if (json_object_get_member (object, LABEL_NPOPULATION))
00648         {
00649             input->nsimulations
00650             = json_object_get_uint (object,
00651     LABEL_NPOPULATION, &error_code);

```

```

00650         if (error_code || input->nsimulations < 3)
00651         {
00652             input_error (gettext ("Invalid population number"));
00653             goto exit_on_error;
00654         }
00655     }
00656     else
00657     {
00658         input_error (gettext ("No population number"));
00659         goto exit_on_error;
00660     }
00661
00662     // Obtaining generations
00663     if (json_object_get_member (object, LABEL_NGENERATIONS))
00664     {
00665         input->niterations
00666         = json_object_get_uint (object,
00667 LABEL_NGENERATIONS, &error_code);
00668         if (error_code || !input->niterations)
00669         {
00670             input_error (gettext ("Invalid generations number"));
00671             goto exit_on_error;
00672         }
00673     }
00674     else
00675     {
00676         input_error (gettext ("No generations number"));
00677         goto exit_on_error;
00678     }
00679
00680     // Obtaining mutation probability
00681     if (json_object_get_member (object, LABEL_MUTATION))
00682     {
00683         input->mutation_ratio
00684         = json_object_get_float (object, LABEL_MUTATION, &error_code
00685 );
00686         if (error_code || input->mutation_ratio < 0.
00687             || input->mutation_ratio >= 1.)
00688         {
00689             input_error (gettext ("Invalid mutation probability"));
00690             goto exit_on_error;
00691         }
00692     }
00693     else
00694     {
00695         input_error (gettext ("No mutation probability"));
00696         goto exit_on_error;
00697     }
00698
00699     // Obtaining reproduction probability
00700     if (json_object_get_member (object, LABEL_REPRODUCTION))
00701     {
00702         input->reproduction_ratio
00703         = json_object_get_float (object,
00704 LABEL_REPRODUCTION, &error_code);
00705         if (error_code || input->reproduction_ratio < 0.
00706             || input->reproduction_ratio >= 1.0)
00707         {
00708             input_error (gettext ("Invalid reproduction probability"));
00709             goto exit_on_error;
00710         }
00711     }
00712     else
00713     {
00714         input_error (gettext ("No reproduction probability"));
00715         goto exit_on_error;
00716     }
00717
00718     // Obtaining adaptation probability
00719     if (json_object_get_member (object, LABEL_ADAPTATION))
00720     {
00721         input->adaptation_ratio
00722         = json_object_get_float (object,
00723 LABEL_ADAPTATION, &error_code);
00724         if (error_code || input->adaptation_ratio < 0.
00725             || input->adaptation_ratio >= 1.)
00726         {
00727             input_error (gettext ("Invalid adaptation probability"));
00728             goto exit_on_error;
00729         }
00730     }
00731     else
00732     {
00733         input_error (gettext ("No adaptation probability"));
00734         goto exit_on_error;
00735     }

```

```

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

```

```

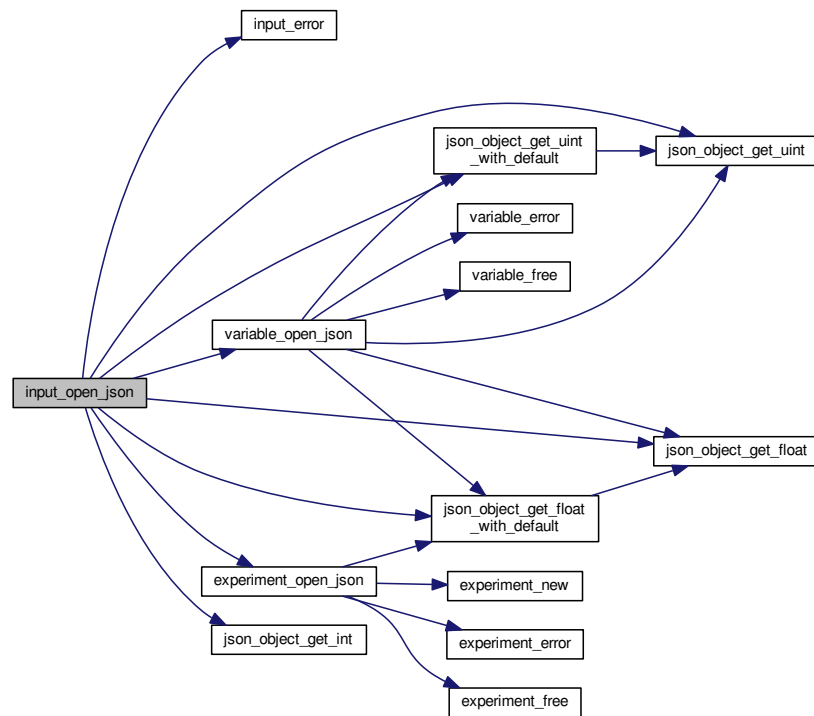
00814         goto exit_on_error;
00815     }
00816     input->relaxation
00817     = json_object_get_float_with_default (object,
00818     LABEL_RELAXATION,
00819     DEFAULT_RELAXATION,
00820     &error_code);
00821     if (error_code || input->relaxation < 0. || input->
00822     relaxation > 2.)
00823     {
00824         input_error (gettext ("Invalid relaxation parameter"));
00825         goto exit_on_error;
00826     }
00827     else
00828     {
00829         input->nsteps = 0;
00830     }
00831     // Obtaining the threshold
00832     input->threshold
00833     = json_object_get_float_with_default (object,
00834     LABEL_THRESHOLD, 0.,
00835     &error_code);
00836     if (error_code)
00837     {
00838         input_error (gettext ("Invalid threshold"));
00839         goto exit_on_error;
00840     }
00841     // Reading the experimental data
00842     array = json_object_get_array_member (object, LABEL_EXPERIMENTS);
00843     n = json_array_get_length (array);
00844     input->experiment = (Experiment *) g_malloc (n * sizeof (
00845     Experiment));
00846     for (i = 0; i < n; ++i)
00847     {
00848         #if DEBUG_INPUT
00849         fprintf (stderr, "input_open_json: nexperiments=%u\n",
00850         input->nexperiments);
00851         #endif
00852         child = json_array_get_element (array, i);
00853         if (!input->nexperiments)
00854         {
00855             if (!experiment_open_json (input->experiment, child, 0))
00856             {
00857                 goto exit_on_error;
00858             }
00859             else
00860             {
00861                 if (!experiment_open_json (input->experiment +
00862                 input->nexperiments,
00863                 child, input->experiment->
00864                 ninputs))
00865                 {
00866                     goto exit_on_error;
00867                 }
00868                 ++input->nexperiments;
00869             }
00870             #if DEBUG_INPUT
00871             fprintf (stderr, "input_open_json: nexperiments=%u\n",
00872             input->nexperiments);
00873             #endif
00874             if (!input->nexperiments)
00875             {
00876                 input_error (gettext ("No optimization experiments"));
00877                 goto exit_on_error;
00878             }
00879             // Reading the variables data
00880             array = json_object_get_array_member (object, LABEL_VARIABLES);
00881             n = json_array_get_length (array);
00882             input->variable = (Variable *) g_malloc (n * sizeof (
00883             Variable));
00884             for (i = 0; i < n; ++i)
00885             {
00886                 #if DEBUG_INPUT
00887                 fprintf (stderr, "input_open_json: nvariables=%u\n", input->
00888                 nvariables);
00889                 #endif
00890                 child = json_array_get_element (array, i);
00891                 if (!variable_open_json (input->variable +
00892                 input->nvariables, child,
00893                 input->algorithm, input->
00894                 nsteps))
00895                 {
00896                     goto exit_on_error;
00897                 }
00898                 ++input->nvariables;
00899             }
00900             if (!input->nvariables)
00901             {
00902                 input_error (gettext ("No optimization variables"));
00903             }

```



```
00891     goto exit_on_error;
00892 }
00893
00894 // Obtaining the error norm
00895 if (json_object_get_member (object, LABEL_NORM))
00896 {
00897     buffer = json_object_get_string_member (object, LABEL_NORM);
00898     if (!strcmp (buffer, LABEL_EUCLIDIAN))
00899         input->norm = ERROR_NORM_EUCLIDIAN;
00900     else if (!strcmp (buffer, LABEL_MAXIMUM))
00901         input->norm = ERROR_NORM_MAXIMUM;
00902     else if (!strcmp (buffer, LABEL_P))
00903     {
00904         input->norm = ERROR_NORM_P;
00905         input->p = json_object_get_float (object,
00906 LABEL_P, &error_code);
00907         if (!error_code)
00908         {
00909             input_error (gettext ("Bad P parameter"));
00910             goto exit_on_error;
00911         }
00912     }
00913     else if (!strcmp (buffer, LABEL_TAXICAB))
00914         input->norm = ERROR_NORM_TAXICAB;
00915     else
00916     {
00917         input_error (gettext ("Unknown error norm"));
00918         goto exit_on_error;
00919     }
00920 }
00921 else
00922     input->norm = ERROR_NORM_EUCLIDIAN;
00923
00924 // Closing the JSON document
00925 g_object_unref (parser);
00926
00927 #if DEBUG_INPUT
00928 fprintf (stderr, "input_open_json: end\n");
00929 #endif
00930 return 1;
00931
00932 exit_on_error:
00933 g_object_unref (parser);
00934 #if DEBUG_INPUT
00935 fprintf (stderr, "input_open_json: end\n");
00936 #endif
00937 return 0;
00938 }
```

Here is the call graph for this function:



#### 5.7.2.4 int input\_open\_xml ( xmlDoc \* doc )

Function to open the input file in XML format.

##### Parameters

<i>doc</i>	xmlDoc struct.
------------	----------------

##### Returns

1\_on\_success, 0\_on\_error.

Definition at line 139 of file [input.c](#).

```

00140 {
00141     char buffer2[64];
00142     xmlNode *node, *child;
00143     xmlChar *buffer;
00144     int error_code;
00145     unsigned int i;
00146
00147     #if DEBUG_INPUT
00148         fprintf (stderr, "input_open_xml: start\n");
00149     #endif
00150
00151     // Resetting input data
00152     buffer = NULL;
00153     input->type = INPUT_TYPE_XML;
00154
00155     // Getting the root node
00156     #if DEBUG_INPUT
00157         fprintf (stderr, "input_open_xml: getting the root node\n");
00158     #endif
00159     node = xmlDocGetRootElement (doc);

```

```

00160     if (xmlStrcmp (node->name, (const xmlChar *) LABEL_OPTIMIZE))
00161     {
00162         input_error (gettext ("Bad root XML node"));
00163         goto exit_on_error;
00164     }
00165
00166     // Getting result and variables file names
00167     if (!input->result)
00168     {
00169         input->result =
00170             (char *) xmlGetProp (node, (const xmlChar *) LABEL_RESULT_FILE);
00171         if (!input->result)
00172             input->result = (char *) xmlStrdup ((const xmlChar *)
result_name);
00173     }
00174     if (!input->variables)
00175     {
00176         input->variables =
00177             (char *) xmlGetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE);
00178         if (!input->variables)
00179             input->variables =
00180                 (char *) xmlStrdup ((const xmlChar *) variables_name);
00181     }
00182
00183     // Opening simulator program name
00184     input->simulator =
00185         (char *) xmlGetProp (node, (const xmlChar *) LABEL_SIMULATOR);
00186     if (!input->simulator)
00187     {
00188         input_error (gettext ("Bad simulator program"));
00189         goto exit_on_error;
00190     }
00191
00192     // Opening evaluator program name
00193     input->evaluator =
00194         (char *) xmlGetProp (node, (const xmlChar *) LABEL_EVALUATOR);
00195
00196     // Obtaining pseudo-random numbers generator seed
00197     input->seed
00198         = xml_node_get_uint_with_default (node, (const xmlChar *)
LABEL_SEED,
00199                                         DEFAULT_RANDOM_SEED, &error_code);
00200     if (error_code)
00201     {
00202         input_error (gettext ("Bad pseudo-random numbers generator seed"));
00203         goto exit_on_error;
00204     }
00205
00206     // Opening algorithm
00207     buffer = xmlGetProp (node, (const xmlChar *) LABEL_ALGORITHM);
00208     if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MONTE_CARLO))
00209     {
00210         input->algorithm = ALGORITHM_MONTE_CARLO;
00211
00212         // Obtaining simulations number
00213         input->nsimulations
00214             = xml_node_get_int (node, (const xmlChar *)
LABEL_NSIMULATIONS,
00215                               &error_code);
00216         if (error_code)
00217         {
00218             input_error (gettext ("Bad simulations number"));
00219             goto exit_on_error;
00220         }
00221     }
00222     else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_SWEEP))
00223         input->algorithm = ALGORITHM_SWEEP;
00224     else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_GENETIC))
00225     {
00226         input->algorithm = ALGORITHM_GENETIC;
00227
00228         // Obtaining population
00229         if (xmlHasProp (node, (const xmlChar *) LABEL_NPOPULATION))
00230         {
00231             input->nsimulations
00232                 = xml_node_get_uint (node, (const xmlChar *)
LABEL_NPOPULATION,
00233                                     &error_code);
00234             if (error_code || input->nsimulations < 3)
00235             {
00236                 input_error (gettext ("Invalid population number"));
00237                 goto exit_on_error;
00238             }
00239         }
00240         else
00241         {
00242             input_error (gettext ("No population number"));

```

```

00243         goto exit_on_error;
00244     }
00245
00246     // Obtaining generations
00247     if (xmlHasProp (node, (const xmlChar *) LABEL_NGENERATIONS))
00248     {
00249         input->niterations
00250         = xml_node_get_uint (node, (const xmlChar *)
00251 LABEL_NGENERATIONS,
00252                             &error_code);
00253         if (error_code || !input->niterations)
00254         {
00255             input_error (gettext ("Invalid generations number"));
00256             goto exit_on_error;
00257         }
00258     }
00259     else
00260     {
00261         input_error (gettext ("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 *)
00270 LABEL_MUTATION,
00271                             &error_code);
00272         if (error_code || input->mutation_ratio < 0.
00273             || input->mutation_ratio >= 1.)
00274         {
00275             input_error (gettext ("Invalid mutation probability"));
00276             goto exit_on_error;
00277         }
00278     }
00279     else
00280     {
00281         input_error (gettext ("No mutation probability"));
00282         goto exit_on_error;
00283     }
00284
00285     // Obtaining reproduction probability
00286     if (xmlHasProp (node, (const xmlChar *) LABEL_REPRODUCTION))
00287     {
00288         input->reproduction_ratio
00289         = xml_node_get_float (node, (const xmlChar *)
00290 LABEL_REPRODUCTION,
00291                             &error_code);
00292         if (error_code || input->reproduction_ratio < 0.
00293             || input->reproduction_ratio >= 1.0)
00294         {
00295             input_error (gettext ("Invalid reproduction probability"));
00296             goto exit_on_error;
00297         }
00298     }
00299     else
00300     {
00301         input_error (gettext ("No reproduction probability"));
00302         goto exit_on_error;
00303     }
00304
00305     // Obtaining adaptation probability
00306     if (xmlHasProp (node, (const xmlChar *) LABEL_ADAPTATION))
00307     {
00308         input->adaptation_ratio
00309         = xml_node_get_float (node, (const xmlChar *)
00310 LABEL_ADAPTATION,
00311                             &error_code);
00312         if (error_code || input->adaptation_ratio < 0.
00313             || input->adaptation_ratio >= 1.)
00314         {
00315             input_error (gettext ("Invalid adaptation probability"));
00316             goto exit_on_error;
00317         }
00318     }
00319     else
00320     {
00321         input_error (gettext ("No adaptation probability"));
00322         goto exit_on_error;
00323     }
00324
00325     // Checking survivals
00326     i = input->mutation_ratio * input->nsimulations;
00327     i += input->reproduction_ratio * input->
00328 nsimulations;
00329     i += input->adaptation_ratio * input->

```

```

    nsimulations;
00325     if (i > input->nsimulations - 2)
00326     {
00327         input_error
00328             (gettext
00329              ("No enough survival entities to reproduce the population"));
00330         goto exit_on_error;
00331     }
00332 }
00333 else
00334 {
00335     input_error (gettext ("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 {
00344     // Obtaining iterations number
00345     input->niterations
00346         = xml_node_get_uint (node, (const xmlChar *)
00347 LABEL_NITERATIONS,
00348                             &error_code);
00349     if (error_code == 1)
00350         input->niterations = 1;
00351     else if (error_code)
00352     {
00353         input_error (gettext ("Bad iterations number"));
00354         goto exit_on_error;
00355     }
00356
00357     // Obtaining best number
00358     input->nbest
00359         = xml_node_get_uint_with_default (node, (const xmlChar *)
00360 LABEL_NBEST,
00361                                         1, &error_code);
00362     if (error_code || !input->nbest)
00363     {
00364         input_error (gettext ("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 (gettext ("Invalid tolerance"));
00376         goto exit_on_error;
00377     }
00378
00379     // Getting direction search method parameters
00380     if (xmlHasProp (node, (const xmlChar *) LABEL_NSTEPS))
00381     {
00382         input->nsteps =
00383             xml_node_get_uint (node, (const xmlChar *)
00384 LABEL_NSTEPS,
00385                             &error_code);
00386         if (error_code || !input->nsteps)
00387         {
00388             input_error (gettext ("Invalid steps number"));
00389             goto exit_on_error;
00390         }
00391         buffer = xmlGetProp (node, (const xmlChar *) LABEL_DIRECTION);
00392         if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_COORDINATES))
00393             input->direction = DIRECTION_METHOD_COORDINATES;
00394         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_RANDOM))
00395             input->direction = DIRECTION_METHOD_RANDOM;
00396         input->nestimates
00397             = xml_node_get_uint (node, (const xmlChar *)
00398 LABEL_NESTIMATES,
00399                             &error_code);
00400         if (error_code || !input->nestimates)
00401         {
00402             input_error (gettext ("Invalid estimates number"));
00403             goto exit_on_error;
00404         }
00405     }
00406     else
00407     {
00408         input_error

```

```

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

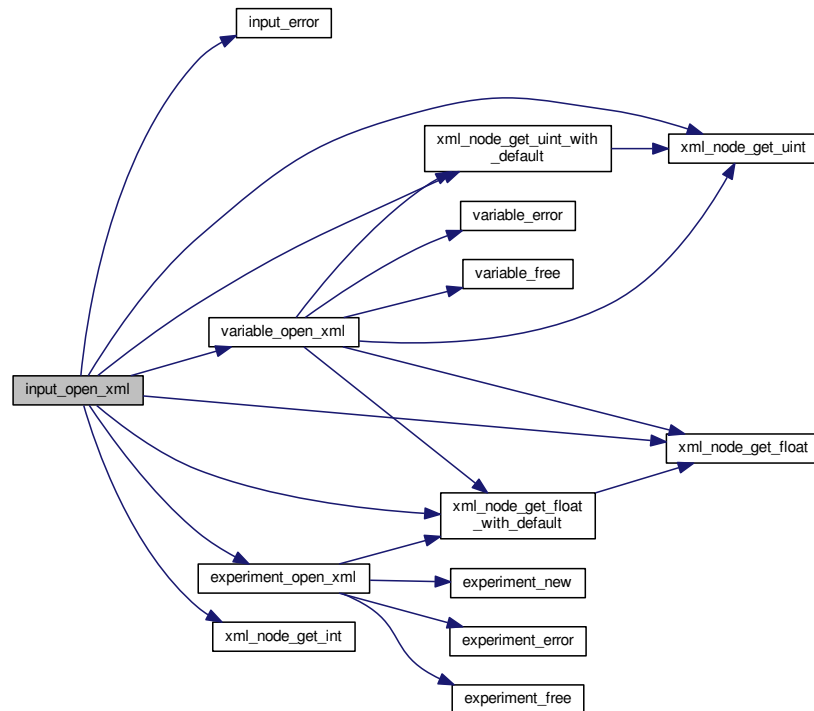
```

```

00489         if (!variable_open_xml (input->variable +
input->nvariables, child,
00490                                input->algorithm, input->nsteps))
00491             goto exit_on_error;
00492         ++input->nvariables;
00493     }
00494     if (!input->nvariables)
00495     {
00496         input_error (gettext ("No optimization variables"));
00497         goto exit_on_error;
00498     }
00499     buffer = NULL;
00500
00501     // Obtaining the error norm
00502     if (xmlHasProp (node, (const xmlChar *) LABEL_NORM))
00503     {
00504         buffer = xmlGetProp (node, (const xmlChar *) LABEL_NORM);
00505         if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_EUCLIDIAN))
00506             input->norm = ERROR_NORM_EUCLIDIAN;
00507         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MAXIMUM))
00508             input->norm = ERROR_NORM_MAXIMUM;
00509         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_P))
00510         {
00511             input->norm = ERROR_NORM_P;
00512             input->p
00513             = xml_node_get_float (node, (const xmlChar *)
LABEL_P, &error_code);
00514             if (!error_code)
00515             {
00516                 input_error (gettext ("Bad P parameter"));
00517                 goto exit_on_error;
00518             }
00519         }
00520         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_TAXICAB))
00521             input->norm = ERROR_NORM_TAXICAB;
00522         else
00523         {
00524             input_error (gettext ("Unknown error norm"));
00525             goto exit_on_error;
00526         }
00527         xmlFree (buffer);
00528     }
00529     else
00530         input->norm = ERROR_NORM_EUCLIDIAN;
00531
00532     // Closing the XML document
00533     xmlFreeDoc (doc);
00534
00535     #if DEBUG_INPUT
00536     fprintf (stderr, "input_open_xml: end\n");
00537     #endif
00538     return 1;
00539
00540 exit_on_error:
00541     xmlFree (buffer);
00542     xmlFreeDoc (doc);
00543     #if DEBUG_INPUT
00544     fprintf (stderr, "input_open_xml: end\n");
00545     #endif
00546     return 0;
00547 }

```

Here is the call graph for this function:



## 5.8 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 2012-2016, 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
00032  #define _GNU_SOURCE
00033  #include "config.h"
00034  #include <stdio.h>
00035  #include <string.h>
00036  #include <libxml/parser.h>
00037  #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
00063 void
00064 input_new ()
00065 {
00066     #if DEBUG_INPUT
00067         fprintf (stderr, "input_new: start\n");
00068     #endif
00069     input->nvariables = input->nexperiments = input->nsteps = 0;
00070     input->simulator = input->evaluator = input->directory = input->
        name = NULL;
00071     input->experiment = NULL;
00072     input->variable = NULL;
00073     #if DEBUG_INPUT
00074         fprintf (stderr, "input_new: end\n");
00075     #endif
00076 }
00077
00082 void
00083 input_free ()
00084 {
00085     unsigned int i;
00086     #if DEBUG_INPUT
00087         fprintf (stderr, "input_free: start\n");
00088     #endif
00089     g_free (input->name);
00090     g_free (input->directory);
00091     for (i = 0; i < input->nexperiments; ++i)
00092         experiment_free (input->experiment + i, input->type);
00093     for (i = 0; i < input->nvariables; ++i)
00094         variable_free (input->variable + i, input->type);
00095     g_free (input->experiment);
00096     g_free (input->variable);
00097     if (input->type == INPUT_TYPE_XML)
00098     {
00099         xmlFree (input->evaluator);
00100         xmlFree (input->simulator);
00101         xmlFree (input->result);
00102         xmlFree (input->variables);
00103     }
00104     else
00105     {
00106         g_free (input->evaluator);
00107         g_free (input->simulator);
00108         g_free (input->result);
00109         g_free (input->variables);
00110     }
00111     input->nexperiments = input->nvariables = input->nsteps = 0;
00112     #if DEBUG_INPUT
00113         fprintf (stderr, "input_free: end\n");
00114     #endif
00115 }
00116
00123 void
00124 input_error (char *message)
00125 {
00126     char buffer[64];
00127     snprintf (buffer, 64, "%s: %s\n", gettext ("Input"), message);
00128     error_message = g_strdup (buffer);
00129 }
00130
00138 int
00139 input_open_xml (xmlDoc * doc)
00140 {
00141     char buffer2[64];
00142     xmlNode *node, *child;
00143     xmlChar *buffer;
00144     int error_code;
00145     unsigned int i;
00146
00147     #if DEBUG_INPUT
00148         fprintf (stderr, "input_open_xml: start\n");
00149     #endif
00150

```

```

00151 // Resetting input data
00152 buffer = NULL;
00153 input->type = INPUT_TYPE_XML;
00154
00155 // Getting the root node
00156 #if DEBUG_INPUT
00157 fprintf (stderr, "input_open_xml: getting the root node\n");
00158 #endif
00159 node = xmlDocGetRootElement (doc);
00160 if (xmlStrcmp (node->name, (const xmlChar *) LABEL_OPTIMIZE))
00161 {
00162     input_error (gettext ("Bad root XML node"));
00163     goto exit_on_error;
00164 }
00165
00166 // Getting result and variables file names
00167 if (!input->result)
00168 {
00169     input->result =
00170         (char *) xmlGetProp (node, (const xmlChar *) LABEL_RESULT_FILE);
00171     if (!input->result)
00172         input->result = (char *) xmlStrdup ((const xmlChar *) result_name);
00173 }
00174 if (!input->variables)
00175 {
00176     input->variables =
00177         (char *) xmlGetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE);
00178     if (!input->variables)
00179         input->variables =
00180             (char *) xmlStrdup ((const xmlChar *) variables_name);
00181 }
00182
00183 // Opening simulator program name
00184 input->simulator =
00185     (char *) xmlGetProp (node, (const xmlChar *) LABEL_SIMULATOR);
00186 if (!input->simulator)
00187 {
00188     input_error (gettext ("Bad simulator program"));
00189     goto exit_on_error;
00190 }
00191
00192 // Opening evaluator program name
00193 input->evaluator =
00194     (char *) xmlGetProp (node, (const xmlChar *) LABEL_EVALUATOR);
00195
00196 // Obtaining pseudo-random numbers generator seed
00197 input->seed
00198     = xml_node_get_uint_with_default (node, (const xmlChar *)
00199 LABEL_SEED,
00200                                     DEFAULT_RANDOM_SEED, &error_code);
00201 if (error_code)
00202 {
00203     input_error (gettext ("Bad pseudo-random numbers generator seed"));
00204     goto exit_on_error;
00205 }
00206
00207 // Opening algorithm
00208 buffer = xmlGetProp (node, (const xmlChar *) LABEL_ALGORITHM);
00209 if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MONTE_CARLO))
00210 {
00211     input->algorithm = ALGORITHM_MONTE_CARLO;
00212
00213     // Obtaining simulations number
00214     input->nsimulations
00215         = xml_node_get_int (node, (const xmlChar *)
00216 LABEL_NSIMULATIONS,
00217                             &error_code);
00218     if (error_code)
00219     {
00220         input_error (gettext ("Bad simulations number"));
00221         goto exit_on_error;
00222     }
00223 }
00224 else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_SWEEP))
00225     input->algorithm = ALGORITHM_SWEEP;
00226 else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_GENETIC))
00227 {
00228     input->algorithm = ALGORITHM_GENETIC;
00229
00230     // Obtaining population
00231     if (xmlHasProp (node, (const xmlChar *) LABEL_NPOPULATION))
00232     {
00233         input->nsimulations
00234             = xml_node_get_uint (node, (const xmlChar *)
00235 LABEL_NPOPULATION,
00236                                 &error_code);
00237         if (error_code || input->nsimulations < 3)

```

```

00235         {
00236             input_error (gettext ("Invalid population number"));
00237             goto exit_on_error;
00238         }
00239     }
00240     else
00241     {
00242         input_error (gettext ("No population number"));
00243         goto exit_on_error;
00244     }
00245
00246     // Obtaining generations
00247     if (xmlHasProp (node, (const xmlChar *) LABEL_NGENERATIONS))
00248     {
00249         input->niterations
00250         = xml_node_get_uint (node, (const xmlChar *)
00251 LABEL_NGENERATIONS,
00252                             &error_code);
00253         if (error_code || !input->niterations)
00254         {
00255             input_error (gettext ("Invalid generations number"));
00256             goto exit_on_error;
00257         }
00258     }
00259     else
00260     {
00261         input_error (gettext ("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 *)
00270 LABEL_MUTATION,
00271                             &error_code);
00272         if (error_code || input->mutation_ratio < 0.
00273             || input->mutation_ratio >= 1.)
00274         {
00275             input_error (gettext ("Invalid mutation probability"));
00276             goto exit_on_error;
00277         }
00278     }
00279     else
00280     {
00281         input_error (gettext ("No mutation probability"));
00282         goto exit_on_error;
00283     }
00284
00285     // Obtaining reproduction probability
00286     if (xmlHasProp (node, (const xmlChar *) LABEL_REPRODUCTION))
00287     {
00288         input->reproduction_ratio
00289         = xml_node_get_float (node, (const xmlChar *)
00290 LABEL_REPRODUCTION,
00291                             &error_code);
00292         if (error_code || input->reproduction_ratio < 0.
00293             || input->reproduction_ratio >= 1.0)
00294         {
00295             input_error (gettext ("Invalid reproduction probability"));
00296             goto exit_on_error;
00297         }
00298     }
00299     else
00300     {
00301         input_error (gettext ("No reproduction probability"));
00302         goto exit_on_error;
00303     }
00304
00305     // Obtaining adaptation probability
00306     if (xmlHasProp (node, (const xmlChar *) LABEL_ADAPTATION))
00307     {
00308         input->adaptation_ratio
00309         = xml_node_get_float (node, (const xmlChar *)
00310 LABEL_ADAPTATION,
00311                             &error_code);
00312         if (error_code || input->adaptation_ratio < 0.
00313             || input->adaptation_ratio >= 1.)
00314         {
00315             input_error (gettext ("Invalid adaptation probability"));
00316             goto exit_on_error;
00317         }
00318     }
00319     else
00320     {
00321         input_error (gettext ("No adaptation probability"));
00322     }

```

```

00318         goto exit_on_error;
00319     }
00320
00321     // Checking survivals
00322     i = input->mutation_ratio * input->nsimulations;
00323     i += input->reproduction_ratio * input->nsimulations;
00324     i += input->adaptation_ratio * input->nsimulations;
00325     if (i > input->nsimulations - 2)
00326     {
00327         input_error
00328             (gettext
00329              ("No enough survival entities to reproduce the population"));
00330         goto exit_on_error;
00331     }
00332 }
00333 else
00334 {
00335     input_error (gettext ("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 {
00344
00345     // Obtaining iterations number
00346     input->niterations
00347         = xml_node_get_uint (node, (const xmlChar *)
00348 LABEL_NITERATIONS,
00349                             &error_code);
00350     if (error_code == 1)
00351         input->niterations = 1;
00352     else if (error_code)
00353     {
00354         input_error (gettext ("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 *)
00361 LABEL_NBEST,
00362                                         1, &error_code);
00363     if (error_code || !input->nbest)
00364     {
00365         input_error (gettext ("Invalid best number"));
00366         goto exit_on_error;
00367     }
00368
00369     // Obtaining tolerance
00370     input->tolerance
00371         = xml_node_get_float_with_default (node,
00372                                         (const xmlChar *) LABEL_TOLERANCE,
00373                                         0., &error_code);
00374     if (error_code || input->tolerance < 0.)
00375     {
00376         input_error (gettext ("Invalid tolerance"));
00377         goto exit_on_error;
00378     }
00379
00380     // Getting direction search method parameters
00381     if (xmlHasProp (node, (const xmlChar *) LABEL_NSTEPS))
00382     {
00383         input->nsteps =
00384             xml_node_get_uint (node, (const xmlChar *)
00385 LABEL_NSTEPS,
00386                             &error_code);
00387         if (error_code || !input->nsteps)
00388         {
00389             input_error (gettext ("Invalid steps number"));
00390             goto exit_on_error;
00391         }
00392         buffer = xmlGetProp (node, (const xmlChar *) LABEL_DIRECTION);
00393         if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_COORDINATES))
00394             input->direction = DIRECTION_METHOD_COORDINATES;
00395         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_RANDOM))
00396         {
00397             input->direction = DIRECTION_METHOD_RANDOM;
00398             input->nestimates
00399                 = xml_node_get_uint (node, (const xmlChar *)
00400 LABEL_NESTIMATES,
00401                                     &error_code);
00402             if (error_code || !input->nestimates)
00403             {
00404                 input_error (gettext ("Invalid estimates number"));

```

```

00401             goto exit_on_error;
00402         }
00403     }
00404     else
00405     {
00406         input_error
00407         (gettext ("Unknown method to estimate the direction search"));
00408         goto exit_on_error;
00409     }
00410     xmlFree (buffer);
00411     buffer = NULL;
00412     input->relaxation
00413     = xml_node_get_float_with_default (node,
00414         (const xmlChar *)
00415         LABEL_RELAXATION,
00416         DEFAULT_RELAXATION, &error_code);
00417     if (error_code || input->relaxation < 0. || input->
relaxation > 2.)
00418     {
00419         input_error (gettext ("Invalid relaxation parameter"));
00420         goto exit_on_error;
00421     }
00422     else
00423     {
00424         input->nsteps = 0;
00425     }
00426     // Obtaining the threshold
00427     input->threshold =
00428     xml_node_get_float_with_default (node, (const xmlChar *)
LABEL_THRESHOLD,
00429         0., &error_code);
00430     if (error_code)
00431     {
00432         input_error (gettext ("Invalid threshold"));
00433         goto exit_on_error;
00434     }
00435     // Reading the experimental data
00436     for (child = node->children; child; child = child->next)
00437     {
00438         if (xmlStrcmp (child->name, (const xmlChar *) LABEL_EXPERIMENT))
00439             break;
00440         #if DEBUG_INPUT
00441         fprintf (stderr, "input_open_xml: nexperiments=%u\n",
00442             input->nexperiments);
00443         #endif
00444         input->experiment = (Experiment *)
00445         g_realloc (input->experiment,
00446             (1 + input->nexperiments) * sizeof (Experiment));
00447         if (!input->nexperiments)
00448         {
00449             if (!experiment_open_xml (input->experiment, child, 0))
00450                 goto exit_on_error;
00451         }
00452         else
00453         {
00454             if (!experiment_open_xml (input->experiment + input->
nexperiments,
00455                 child, input->experiment->ninputs))
00456                 goto exit_on_error;
00457         }
00458         ++input->nexperiments;
00459         #if DEBUG_INPUT
00460         fprintf (stderr, "input_open_xml: nexperiments=%u\n",
00461             input->nexperiments);
00462         #endif
00463     }
00464     if (!input->nexperiments)
00465     {
00466         input_error (gettext ("No optimization experiments"));
00467         goto exit_on_error;
00468     }
00469     buffer = NULL;
00470     // Reading the variables data
00471     for (; child; child = child->next)
00472     {
00473         #if DEBUG_INPUT
00474         fprintf (stderr, "input_open_xml: nvariables=%u\n", input->nvariables);
00475         #endif
00476         if (xmlStrcmp (child->name, (const xmlChar *) LABEL_VARIABLE))
00477         {
00478             snprintf (buffer2, 64, "%s %u: %s",
00479                 gettext ("Variable"),
00480                 input->nvariables + 1, gettext ("bad XML node"));
00481             input_error (buffer2);
00482             goto exit_on_error;
00483         }
00484     }

```

```

00485     }
00486     input->variable = (Variable *)
00487     g_realloc (input->variable,
00488               (1 + input->nvariables) * sizeof (Variable));
00489     if (!variable_open_xml (input->variable + input->
nvariables, child,
00490                           input->algorithm, input->nsteps))
00491         goto exit_on_error;
00492     ++input->nvariables;
00493 }
00494 if (!input->nvariables)
00495 {
00496     input_error (gettext ("No optimization variables"));
00497     goto exit_on_error;
00498 }
00499 buffer = NULL;
00500
00501 // Obtaining the error norm
00502 if (xmlHasProp (node, (const xmlChar *) LABEL_NORM))
00503 {
00504     buffer = xmlGetProp (node, (const xmlChar *) LABEL_NORM);
00505     if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_EUCLIDIAN))
00506         input->norm = ERROR_NORM_EUCLIDIAN;
00507     else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MAXIMUM))
00508         input->norm = ERROR_NORM_MAXIMUM;
00509     else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_P))
00510     {
00511         input->norm = ERROR_NORM_P;
00512         input->p
00513         = xml_node_get_float (node, (const xmlChar *)
LABEL_P, &error_code);
00514         if (!error_code)
00515         {
00516             input_error (gettext ("Bad P parameter"));
00517             goto exit_on_error;
00518         }
00519     }
00520     else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_TAXICAB))
00521         input->norm = ERROR_NORM_TAXICAB;
00522     else
00523     {
00524         input_error (gettext ("Unknown error norm"));
00525         goto exit_on_error;
00526     }
00527     xmlFree (buffer);
00528 }
00529 else
00530     input->norm = ERROR_NORM_EUCLIDIAN;
00531
00532 // Closing the XML document
00533 xmlFreeDoc (doc);
00534
00535 #if DEBUG_INPUT
00536 fprintf (stderr, "input_open_xml: end\n");
00537 #endif
00538 return 1;
00539
00540 exit_on_error:
00541 xmlFree (buffer);
00542 xmlFreeDoc (doc);
00543 #if DEBUG_INPUT
00544 fprintf (stderr, "input_open_xml: end\n");
00545 #endif
00546 return 0;
00547 }
00548
00549 int
00550 input_open_json (JsonParser * parser)
00551 {
00552     JsonNode *node, *child;
00553     JsonObject *object;
00554     JsonArray *array;
00555     const char *buffer;
00556     int error_code;
00557     unsigned int i, n;
00558
00559 #if DEBUG_INPUT
00560 fprintf (stderr, "input_open_json: start\n");
00561 #endif
00562
00563 // Resetting input data
00564 input->type = INPUT_TYPE_JSON;
00565
00566 // Getting the root node
00567 #if DEBUG_INPUT
00568 fprintf (stderr, "input_open_json: getting the root node\n");
00569 #endif

```

```

00577     node = json_parser_get_root (parser);
00578     object = json_node_get_object (node);
00579
00580     // Getting result and variables file names
00581     if (!input->result)
00582     {
00583         buffer = json_object_get_string_member (object, LABEL_RESULT_FILE);
00584         if (!buffer)
00585             buffer = result_name;
00586         input->result = g_strdup (buffer);
00587     }
00588     else
00589         input->result = g_strdup (result_name);
00590     if (!input->variables)
00591     {
00592         buffer = json_object_get_string_member (object, LABEL_VARIABLES_FILE);
00593         if (!buffer)
00594             buffer = variables_name;
00595         input->variables = g_strdup (buffer);
00596     }
00597     else
00598         input->variables = g_strdup (variables_name);
00599
00600     // Opening simulator program name
00601     buffer = json_object_get_string_member (object, LABEL_SIMULATOR);
00602     if (!buffer)
00603     {
00604         input_error (gettext ("Bad simulator program"));
00605         goto exit_on_error;
00606     }
00607     input->simulator = g_strdup (buffer);
00608
00609     // Opening evaluator program name
00610     buffer = json_object_get_string_member (object, LABEL_EVALUATOR);
00611     if (buffer)
00612         input->evaluator = g_strdup (buffer);
00613
00614     // Obtaining pseudo-random numbers generator seed
00615     input->seed
00616     = json_object_get_uint_with_default (object,
00617     LABEL_SEED,
00618     DEFAULT_RANDOM_SEED, &error_code);
00619     if (error_code)
00620     {
00621         input_error (gettext ("Bad pseudo-random numbers generator seed"));
00622         goto exit_on_error;
00623     }
00624
00625     // Opening algorithm
00626     buffer = json_object_get_string_member (object, LABEL_ALGORITHM);
00627     if (!strcmp (buffer, LABEL_MONTE_CARLO))
00628     {
00629         input->algorithm = ALGORITHM_MONTE_CARLO;
00630     }
00631     // Obtaining simulations number
00632     input->nsimulations
00633     = json_object_get_int (object, LABEL_NSIMULATIONS, &error_code);
00634     if (error_code)
00635     {
00636         input_error (gettext ("Bad simulations number"));
00637         goto exit_on_error;
00638     }
00639     else if (!strcmp (buffer, LABEL_SWEEP))
00640         input->algorithm = ALGORITHM_SWEEP;
00641     else if (!strcmp (buffer, LABEL_GENETIC))
00642     {
00643         input->algorithm = ALGORITHM_GENETIC;
00644     }
00645
00646     // Obtaining population
00647     if (json_object_get_member (object, LABEL_NPOPULATION))
00648     {
00649         input->nsimulations
00650         = json_object_get_uint (object,
00651     LABEL_NPOPULATION, &error_code);
00652         if (error_code || input->nsimulations < 3)
00653         {
00654             input_error (gettext ("Invalid population number"));
00655             goto exit_on_error;
00656         }
00657     }
00658     else
00659     {
00660         input_error (gettext ("No population number"));
00661         goto exit_on_error;
00662     }

```

```

00661
00662 // Obtaining generations
00663 if (json_object_get_member (object, LABEL_NGENERATIONS))
00664 {
00665     input->niterations
00666     = json_object_get_uint (object,
00667 LABEL_NGENERATIONS, &error_code);
00668     if (error_code || !input->niterations)
00669     {
00669         input_error (gettext ("Invalid generations number"));
00670         goto exit_on_error;
00671     }
00672 }
00673 else
00674 {
00675     input_error (gettext ("No generations number"));
00676     goto exit_on_error;
00677 }
00678
00679 // Obtaining mutation probability
00680 if (json_object_get_member (object, LABEL_MUTATION))
00681 {
00682     input->mutation_ratio
00683     = json_object_get_float (object, LABEL_MUTATION, &error_code
00684 );
00685     if (error_code || input->mutation_ratio < 0.
00686         || input->mutation_ratio >= 1.)
00687     {
00688         input_error (gettext ("Invalid mutation probability"));
00689         goto exit_on_error;
00690     }
00691 }
00692 else
00693 {
00694     input_error (gettext ("No mutation probability"));
00695     goto exit_on_error;
00696 }
00697
00698 // Obtaining reproduction probability
00699 if (json_object_get_member (object, LABEL_REPRODUCTION))
00700 {
00701     input->reproduction_ratio
00702     = json_object_get_float (object,
00703 LABEL_REPRODUCTION, &error_code);
00704     if (error_code || input->reproduction_ratio < 0.
00705         || input->reproduction_ratio >= 1.0)
00706     {
00707         input_error (gettext ("Invalid reproduction probability"));
00708         goto exit_on_error;
00709     }
00710 }
00711 else
00712 {
00713     input_error (gettext ("No reproduction probability"));
00714     goto exit_on_error;
00715 }
00716
00717 // Obtaining adaptation probability
00718 if (json_object_get_member (object, LABEL_ADAPTATION))
00719 {
00720     input->adaptation_ratio
00721     = json_object_get_float (object,
00722 LABEL_ADAPTATION, &error_code);
00723     if (error_code || input->adaptation_ratio < 0.
00724         || input->adaptation_ratio >= 1.)
00725     {
00726         input_error (gettext ("Invalid adaptation probability"));
00727         goto exit_on_error;
00728     }
00729 }
00730 else
00731 {
00732     input_error (gettext ("No adaptation probability"));
00733     goto exit_on_error;
00734 }
00735
00736 // Checking survivals
00737 i = input->mutation_ratio * input->nsimulations;
00738 i += input->reproduction_ratio * input->nsimulations;
00739 i += input->adaptation_ratio * input->nsimulations;
00740 if (i > input->nsimulations - 2)
00741 {
00742     input_error
00743     (gettext
00744      ("No enough survival entities to reproduce the population"));
00745     goto exit_on_error;
00746 }

```



```

00744     }
00745     else
00746     {
00747         input_error (gettext ("Unknown algorithm"));
00748         goto exit_on_error;
00749     }
00750
00751     if (input->algorithm == ALGORITHM_MONTE_CARLO
00752         || input->algorithm == ALGORITHM_SWEEP)
00753     {
00754
00755         // Obtaining iterations number
00756         input->niterations
00757         = json_object_get_uint (object, LABEL_NITERATIONS, &error_code
00758 );
00759
00760         if (error_code == 1)
00761             input->niterations = 1;
00762         else if (error_code)
00763         {
00764             input_error (gettext ("Bad iterations number"));
00765             goto exit_on_error;
00766         }
00767
00768         // Obtaining best number
00769         input->nbest
00770         = json_object_get_uint_with_default (object,
00771 LABEL_NBEST, 1,
00772                                     &error_code);
00773
00774         if (error_code || !input->nbest)
00775         {
00776             input_error (gettext ("Invalid best number"));
00777             goto exit_on_error;
00778         }
00779
00780         // Obtaining tolerance
00781         input->tolerance
00782         = json_object_get_float_with_default (object,
00783 LABEL_TOLERANCE, 0.,
00784                                     &error_code);
00785
00786         if (error_code || input->tolerance < 0.)
00787         {
00788             input_error (gettext ("Invalid tolerance"));
00789             goto exit_on_error;
00790         }
00791
00792         // Getting direction search method parameters
00793         if (json_object_get_member (object, LABEL_NSTEPS))
00794         {
00795             input->nsteps
00796             = json_object_get_uint (object, LABEL_NSTEPS, &error_code);
00797             if (error_code || !input->nsteps)
00798             {
00799                 input_error (gettext ("Invalid steps number"));
00800                 goto exit_on_error;
00801             }
00802             buffer = json_object_get_string_member (object, LABEL_DIRECTION);
00803             if (!strcmp (buffer, LABEL_COORDINATES))
00804                 input->direction = DIRECTION_METHOD_COORDINATES;
00805             else if (!strcmp (buffer, LABEL_RANDOM))
00806             {
00807                 input->direction = DIRECTION_METHOD_RANDOM;
00808                 input->nestimates
00809                 = json_object_get_uint (object,
00810 LABEL_NESTIMATES, &error_code);
00811                 if (error_code || !input->nestimates)
00812                 {
00813                     input_error (gettext ("Invalid estimates number"));
00814                     goto exit_on_error;
00815                 }
00816             }
00817             else
00818             {
00819                 input_error
00820                 (gettext ("Unknown method to estimate the direction search"));
00821                 goto exit_on_error;
00822             }
00823             input->relaxation
00824             = json_object_get_float_with_default (object,
00825 LABEL_RELAXATION,
00826                                     DEFAULT_RELAXATION,
00827                                     &error_code);
00828
00829             if (error_code || input->relaxation < 0. || input->
00830 relaxation > 2.)
00831             {
00832                 input_error (gettext ("Invalid relaxation parameter"));
00833                 goto exit_on_error;
00834             }

```

```

00825     }
00826     else
00827         input->nsteps = 0;
00828     }
00829     // Obtaining the threshold
00830     input->threshold
00831     = json_object_get_float_with_default (object,
00832     LABEL_THRESHOLD, 0.,
00833     &error_code);
00834     if (error_code)
00835     {
00836         input_error (gettext ("Invalid threshold"));
00837         goto exit_on_error;
00838     }
00839     // Reading the experimental data
00840     array = json_object_get_array_member (object, LABEL_EXPERIMENTS);
00841     n = json_array_get_length (array);
00842     input->experiment = (Experiment *) g_malloc (n * sizeof (
00843     Experiment));
00844     for (i = 0; i < n; ++i)
00845     {
00846         #if DEBUG_INPUT
00847             fprintf (stderr, "input_open_json: nexperiments=%u\n",
00848             input->nexperiments);
00849         #endif
00850         child = json_array_get_element (array, i);
00851         if (!input->nexperiments)
00852         {
00853             if (!experiment_open_json (input->experiment, child, 0))
00854                 goto exit_on_error;
00855             else
00856             {
00857                 if (!experiment_open_json (input->experiment + input->
00858                 nexperiments,
00859                 child, input->experiment->ninputs))
00860                     goto exit_on_error;
00861                 ++input->nexperiments;
00862             }
00863             #if DEBUG_INPUT
00864                 fprintf (stderr, "input_open_json: nexperiments=%u\n",
00865                 input->nexperiments);
00866             #endif
00867             if (!input->nexperiments)
00868             {
00869                 input_error (gettext ("No optimization experiments"));
00870                 goto exit_on_error;
00871             }
00872         }
00873         // Reading the variables data
00874         array = json_object_get_array_member (object, LABEL_VARIABLES);
00875         n = json_array_get_length (array);
00876         input->variable = (Variable *) g_malloc (n * sizeof (Variable));
00877         for (i = 0; i < n; ++i)
00878         {
00879             #if DEBUG_INPUT
00880                 fprintf (stderr, "input_open_json: nvariables=%u\n", input->nvariables);
00881             #endif
00882             child = json_array_get_element (array, i);
00883             if (!variable_open_json (input->variable + input->
00884             nvariables, child,
00885             input->algorithm, input->nsteps))
00886                 goto exit_on_error;
00887             ++input->nvariables;
00888         }
00889         if (!input->nvariables)
00890         {
00891             input_error (gettext ("No optimization variables"));
00892             goto exit_on_error;
00893         }
00894         // Obtaining the error norm
00895         if (json_object_get_member (object, LABEL_NORM))
00896         {
00897             buffer = json_object_get_string_member (object, LABEL_NORM);
00898             if (!strcmp (buffer, LABEL_EUCLIDIAN))
00899                 input->norm = ERROR_NORM_EUCLIDIAN;
00900             else if (!strcmp (buffer, LABEL_MAXIMUM))
00901                 input->norm = ERROR_NORM_MAXIMUM;
00902             else if (!strcmp (buffer, LABEL_P))
00903             {
00904                 input->norm = ERROR_NORM_P;
00905                 input->p = json_object_get_float (object,
00906                 LABEL_P, &error_code);
00907                 if (!error_code)

```

```

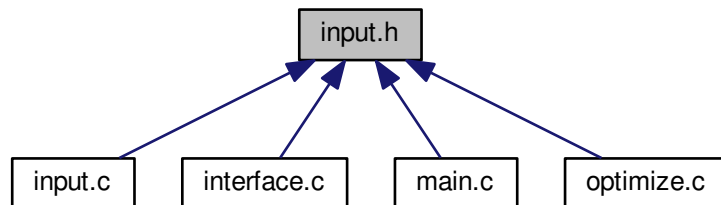
00907         {
00908             input_error (gettext ("Bad P parameter"));
00909             goto exit_on_error;
00910         }
00911     }
00912     else if (!strcmp (buffer, LABEL_TAXICAB))
00913         input->norm = ERROR_NORM_TAXICAB;
00914     else
00915     {
00916         input_error (gettext ("Unknown error norm"));
00917         goto exit_on_error;
00918     }
00919 }
00920 else
00921     input->norm = ERROR_NORM_EUCLIDIAN;
00922
00923 // Closing the JSON document
00924 g_object_unref (parser);
00925
00926 #if DEBUG_INPUT
00927 fprintf (stderr, "input_open_json: end\n");
00928 #endif
00929 return 1;
00930
00931 exit_on_error:
00932 g_object_unref (parser);
00933 #if DEBUG_INPUT
00934 fprintf (stderr, "input_open_json: end\n");
00935 #endif
00936 return 0;
00937 }
00938
00946 int
00947 input_open (char *filename)
00948 {
00949     xmlDoc *doc;
00950     JsonParser *parser;
00951
00952 #if DEBUG_INPUT
00953 fprintf (stderr, "input_open: start\n");
00954 #endif
00955
00956 // Resetting input data
00957 input_new ();
00958
00959 // Opening input file
00960 #if DEBUG_INPUT
00961 fprintf (stderr, "input_open: opening the input file %s\n", filename);
00962 fprintf (stderr, "input_open: trying XML format\n");
00963 #endif
00964 doc = xmlParseFile (filename);
00965 if (!doc)
00966 {
00967 #if DEBUG_INPUT
00968 fprintf (stderr, "input_open: trying JSON format\n");
00969 #endif
00970 parser = json_parser_new ();
00971 if (!json_parser_load_from_file (parser, filename, NULL))
00972 {
00973     input_error (gettext ("Unable to parse the input file"));
00974     goto exit_on_error;
00975 }
00976 if (!input_open_json (parser))
00977     goto exit_on_error;
00978 }
00979 else if (!input_open_xml (doc))
00980     goto exit_on_error;
00981
00982 // Getting the working directory
00983 input->directory = g_path_get_dirname (filename);
00984 input->name = g_path_get_basename (filename);
00985
00986 #if DEBUG_INPUT
00987 fprintf (stderr, "input_open: end\n");
00988 #endif
00989 return 1;
00990
00991 exit_on_error:
00992 show_error (error_message);
00993 g_free (error_message);
00994 input_free ();
00995 #if DEBUG_INPUT
00996 fprintf (stderr, "input_open: end\n");
00997 #endif
00998 return 0;
00999 }

```

## 5.9 input.h File Reference

Header file to define the input functions.

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



### Data Structures

- struct [Input](#)

*Struct to define the optimization input file.*

### Enumerations

- enum [DirectionMethod](#) { [DIRECTION\\_METHOD\\_COORDINATES](#) = 0, [DIRECTION\\_METHOD\\_RANDOM](#) = 1 }

*Enum to define the methods to estimate the direction search.*

- 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](#) ()  
*Function to create a new [Input](#) struct.*
- void [input\\_free](#) ()  
*Function to free the memory of the input file data.*
- void [input\\_error](#) (char \*message)  
*Function to print an error message opening an [Input](#) struct.*
- int [input\\_open\\_xml](#) (xmlDoc \*doc)  
*Function to open the input file in XML format.*
- int [input\\_open\\_json](#) (JsonParser \*parser)  
*Function to open the input file in JSON format.*
- int [input\\_open](#) (char \*filename)  
*Function to open the input file.*

## Variables

- [Input input](#) [1]  
Global [Input](#) struct to set the input data.
- const char \* [result\\_name](#)  
Name of the result file.
- const char \* [variables\\_name](#)  
Name of the variables file.

### 5.9.1 Detailed Description

Header file to define the input functions.

#### Authors

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#### Copyright

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Definition in file [input.h](#).

### 5.9.2 Enumeration Type Documentation

#### 5.9.2.1 enum DirectionMethod

Enum to define the methods to estimate the direction search.

##### Enumerator

**DIRECTION\_METHOD\_COORDINATES** Coordinates descent method.  
**DIRECTION\_METHOD\_RANDOM** Random method.

Definition at line 45 of file [input.h](#).

```
00046 {
00047     DIRECTION_METHOD_COORDINATES = 0,
00048     DIRECTION_METHOD_RANDOM = 1,
00049 };
```

#### 5.9.2.2 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:  $\max_i |w_i x_i|$ .  
**ERROR\_NORM\_P** P-norm  $\sqrt[p]{\sum_i |w_i x_i|^p}$ .  
**ERROR\_NORM\_TAXICAB** Taxicab norm  $\sum_i |w_i x_i|$ .

Definition at line 55 of file [input.h](#).

```
00056 {
00057     ERROR_NORM_EUCLIDIAN = 0,
00059     ERROR_NORM_MAXIMUM = 1,
00061     ERROR_NORM_P = 2,
00063     ERROR_NORM_TAXICAB = 3
00065 };
```

### 5.9.3 Function Documentation

#### 5.9.3.1 void input\_error ( char \* message )

Function to print an error message opening an [Input](#) struct.

##### Parameters

<i>message</i>	Error message.
----------------	----------------

Definition at line [124](#) of file [input.c](#).

```
00125 {
00126     char buffer[64];
00127     snprintf (buffer, 64, "%s: %s\n", gettext ("Input"), message);
00128     error_message = g_strdup (buffer);
00129 }
```

#### 5.9.3.2 int input\_open ( char \* filename )

Function to open the input file.

##### Parameters

<i>filename</i>	<a href="#">Input</a> data file name.
-----------------	---------------------------------------

##### Returns

1\_on\_success, 0\_on\_error.

Definition at line [947](#) of file [input.c](#).

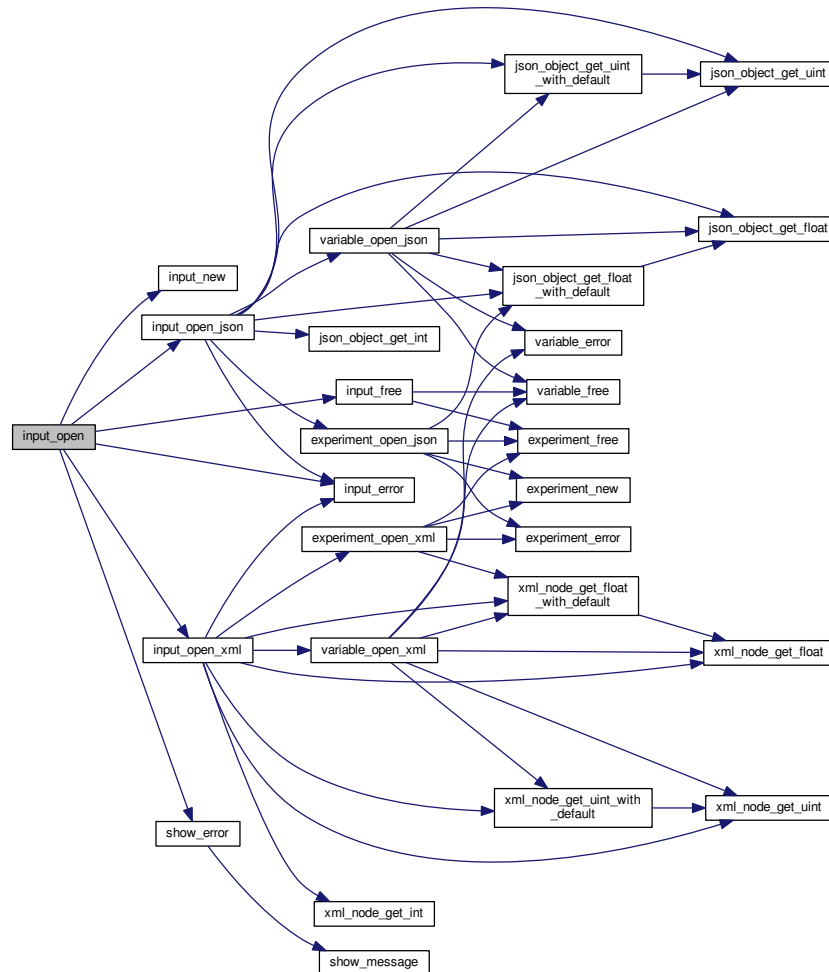
```
00948 {
00949     xmlDoc *doc;
00950     JsonParser *parser;
00951
00952     #if DEBUG_INPUT
00953     fprintf (stderr, "input_open: start\n");
00954     #endif
00955
00956     // Resetting input data
00957     input_new ();
00958
00959     // Opening input file
00960     #if DEBUG_INPUT
00961     fprintf (stderr, "input_open: opening the input file %s\n", filename);
00962     fprintf (stderr, "input_open: trying XML format\n");
00963     #endif
00964     doc = xmlParseFile (filename);
00965     if (!doc)
00966     {
00967         #if DEBUG_INPUT
00968         fprintf (stderr, "input_open: trying JSON format\n");
00969         #endif
00970         parser = json_parser_new ();
00971         if (!json_parser_load_from_file (parser, filename, NULL))
00972         {
00973             input_error (gettext ("Unable to parse the input file"));
00974             goto exit_on_error;
00975         }
00976         if (!input_open_json (parser))
00977             goto exit_on_error;
00978     }
00979     else if (!input_open_xml (doc))
00980         goto exit_on_error;
00981
00982     // Getting the working directory
00983     input->directory = g_path_get_dirname (filename);
00984     input->name = g_path_get_basename (filename);
00985
00986     #if DEBUG_INPUT
00987     fprintf (stderr, "input_open: end\n");
00988     #endif
00989     return 1;
00990 }
```

```

00990
00991 exit_on_error:
00992     show_error (error_message);
00993     g_free (error_message);
00994     input_free ();
00995     #if DEBUG_INPUT
00996     fprintf (stderr, "input_open: end\n");
00997     #endif
00998     return 0;
00999 }

```

Here is the call graph for this function:



### 5.9.3.3 int input\_open\_json ( JsonParser \* parser )

Function to open the input file in JSON format.

Parameters

<i>parser</i>	JsonParser struct.
---------------	--------------------

## Returns

1\_on\_success, 0\_on\_error.

Definition at line 557 of file [input.c](#).

```

00558 {
00559     JsonNode *node, *child;
00560     JsonObject *object;
00561     JsonArray *array;
00562     const char *buffer;
00563     int error_code;
00564     unsigned int i, n;
00565
00566     #if DEBUG_INPUT
00567         fprintf (stderr, "input_open_json: start\n");
00568     #endif
00569
00570     // Resetting input data
00571     input->type = INPUT_TYPE_JSON;
00572
00573     // Getting the root node
00574     #if DEBUG_INPUT
00575         fprintf (stderr, "input_open_json: getting the root node\n");
00576     #endif
00577     node = json_parser_get_root (parser);
00578     object = json_node_get_object (node);
00579
00580     // Getting result and variables file names
00581     if (!input->result)
00582     {
00583         buffer = json_object_get_string_member (object, LABEL_RESULT_FILE);
00584         if (!buffer)
00585             buffer = result_name;
00586         input->result = g_strdup (buffer);
00587     }
00588     else
00589         input->result = g_strdup (result_name);
00590     if (!input->variables)
00591     {
00592         buffer = json_object_get_string_member (object, LABEL_VARIABLES_FILE);
00593         if (!buffer)
00594             buffer = variables_name;
00595         input->variables = g_strdup (buffer);
00596     }
00597     else
00598         input->variables = g_strdup (variables_name);
00599
00600     // Opening simulator program name
00601     buffer = json_object_get_string_member (object, LABEL_SIMULATOR);
00602     if (!buffer)
00603     {
00604         input_error (gettext ("Bad simulator program"));
00605         goto exit_on_error;
00606     }
00607     input->simulator = g_strdup (buffer);
00608
00609     // Opening evaluator program name
00610     buffer = json_object_get_string_member (object, LABEL_EVALUATOR);
00611     if (buffer)
00612         input->evaluator = g_strdup (buffer);
00613
00614     // Obtaining pseudo-random numbers generator seed
00615     input->seed
00616     = json_object_get_uint_with_default (object,
00617     LABEL_SEED,
00618     DEFAULT_RANDOM_SEED, &error_code);
00619     if (error_code)
00620     {
00621         input_error (gettext ("Bad pseudo-random numbers generator seed"));
00622         goto exit_on_error;
00623     }
00624
00625     // Opening algorithm
00626     buffer = json_object_get_string_member (object, LABEL_ALGORITHM);
00627     if (!strcmp (buffer, LABEL_MONTE_CARLO))
00628     {
00629         input->algorithm = ALGORITHM_MONTE_CARLO;
00630
00631         // Obtaining simulations number
00632         input->nsimulations
00633         = json_object_get_int (object, LABEL_NSIMULATIONS, &error_code
00634     );
00635     if (error_code)
00636     {

```



```

00635         input_error (gettext ("Bad simulations number"));
00636         goto exit_on_error;
00637     }
00638 }
00639 else if (!strcmp (buffer, LABEL_SWEEP))
00640     input->algorithm = ALGORITHM_SWEEP;
00641 else if (!strcmp (buffer, LABEL_GENETIC))
00642 {
00643     input->algorithm = ALGORITHM_GENETIC;
00644
00645     // Obtaining population
00646     if (json_object_get_member (object, LABEL_NPOPULATION))
00647     {
00648         input->nsimulations
00649         = json_object_get_uint (object,
00650 LABEL_NPOPULATION, &error_code);
00651         if (error_code || input->nsimulations < 3)
00652         {
00653             input_error (gettext ("Invalid population number"));
00654             goto exit_on_error;
00655         }
00656     }
00657 else
00658 {
00659     input_error (gettext ("No population number"));
00660     goto exit_on_error;
00661 }
00662
00663 // Obtaining generations
00664 if (json_object_get_member (object, LABEL_NGENERATIONS))
00665 {
00666     input->niterations
00667     = json_object_get_uint (object,
00668 LABEL_NGENERATIONS, &error_code);
00669     if (error_code || !input->niterations)
00670     {
00671         input_error (gettext ("Invalid generations number"));
00672         goto exit_on_error;
00673     }
00674 }
00675 else
00676 {
00677     input_error (gettext ("No generations number"));
00678     goto exit_on_error;
00679 }
00680
00681 // Obtaining mutation probability
00682 if (json_object_get_member (object, LABEL_MUTATION))
00683 {
00684     input->mutation_ratio
00685     = json_object_get_float (object, LABEL_MUTATION, &error_code
00686 );
00687     if (error_code || input->mutation_ratio < 0.
00688         || input->mutation_ratio >= 1.)
00689     {
00690         input_error (gettext ("Invalid mutation probability"));
00691         goto exit_on_error;
00692     }
00693 }
00694 else
00695 {
00696     input_error (gettext ("No mutation probability"));
00697     goto exit_on_error;
00698 }
00699
00700 // Obtaining reproduction probability
00701 if (json_object_get_member (object, LABEL_REPRODUCTION))
00702 {
00703     input->reproduction_ratio
00704     = json_object_get_float (object,
00705 LABEL_REPRODUCTION, &error_code);
00706     if (error_code || input->reproduction_ratio < 0.
00707         || input->reproduction_ratio >= 1.0)
00708     {
00709         input_error (gettext ("Invalid reproduction probability"));
00710         goto exit_on_error;
00711     }
00712 }
00713 else
00714 {
00715     input_error (gettext ("No reproduction probability"));
00716     goto exit_on_error;
00717 }
00718
00719 // Obtaining adaptation probability
00720 if (json_object_get_member (object, LABEL_ADAPTATION))
00721 {

```

```

00718         input->adaptation_ratio
00719         = json_object_get_float (object,
LABEL_ADAPTATION, &error_code);
00720         if (error_code || input->adaptation_ratio < 0.
00721             || input->adaptation_ratio >= 1.)
00722         {
00723             input_error (gettext ("Invalid adaptation probability"));
00724             goto exit_on_error;
00725         }
00726     }
00727     else
00728     {
00729         input_error (gettext ("No adaptation probability"));
00730         goto exit_on_error;
00731     }
00732
00733     // Checking survivals
00734     i = input->mutation_ratio * input->nsimulations;
00735     i += input->reproduction_ratio * input->
nsimulations;
00736     i += input->adaptation_ratio * input->
nsimulations;
00737     if (i > input->nsimulations - 2)
00738     {
00739         input_error
00740         (gettext
00741          ("No enough survival entities to reproduce the population"));
00742         goto exit_on_error;
00743     }
00744 }
00745 else
00746 {
00747     input_error (gettext ("Unknown algorithm"));
00748     goto exit_on_error;
00749 }
00750
00751 if (input->algorithm == ALGORITHM_MONTE_CARLO
00752     || input->algorithm == ALGORITHM_SWEEP)
00753 {
00754
00755     // Obtaining iterations number
00756     input->niterations
00757     = json_object_get_uint (object, LABEL_NITERATIONS, &error_code
);
00758     if (error_code == 1)
00759         input->niterations = 1;
00760     else if (error_code)
00761     {
00762         input_error (gettext ("Bad iterations number"));
00763         goto exit_on_error;
00764     }
00765
00766     // Obtaining best number
00767     input->nbest
00768     = json_object_get_uint_with_default (object,
LABEL_NBEST, 1,
00769                                         &error_code);
00770     if (error_code || !input->nbest)
00771     {
00772         input_error (gettext ("Invalid best number"));
00773         goto exit_on_error;
00774     }
00775
00776     // Obtaining tolerance
00777     input->tolerance
00778     = json_object_get_float_with_default (object,
LABEL_TOLERANCE, 0.,
00779                                         &error_code);
00780     if (error_code || input->tolerance < 0.)
00781     {
00782         input_error (gettext ("Invalid tolerance"));
00783         goto exit_on_error;
00784     }
00785
00786     // Getting direction search method parameters
00787     if (json_object_get_member (object, LABEL_NSTEPS))
00788     {
00789         input->nsteps
00790         = json_object_get_uint (object, LABEL_NSTEPS, &error_code);
00791         if (error_code || !input->nsteps)
00792         {
00793             input_error (gettext ("Invalid steps number"));
00794             goto exit_on_error;
00795         }
00796         buffer = json_object_get_string_member (object, LABEL_DIRECTION);
00797         if (!strcmp (buffer, LABEL_COORDINATES))
00798             input->direction = DIRECTION_METHOD_COORDINATES;

```

```

00799         else if (!strcmp (buffer, LABEL_RANDOM))
00800         {
00801             input->direction = DIRECTION_METHOD_RANDOM;
00802             input->nestimates
00803             = json_object_get_uint (object,
LABEL_NESTIMATES, &error_code);
00804             if (error_code || !input->nestimates)
00805             {
00806                 input_error (gettext ("Invalid estimates number"));
00807                 goto exit_on_error;
00808             }
00809         }
00810         else
00811         {
00812             input_error
00813             (gettext ("Unknown method to estimate the direction search"));
00814             goto exit_on_error;
00815         }
00816         input->relaxation
00817         = json_object_get_float_with_default (object,
LABEL_RELAXATION,
                                DEFAULT_RELAXATION,
                                &error_code);
00819         if (error_code || input->relaxation < 0. || input->
relaxation > 2.)
00821         {
00822             input_error (gettext ("Invalid relaxation parameter"));
00823             goto exit_on_error;
00824         }
00825     }
00826     else
00827         input->nsteps = 0;
00828 }
00829 // Obtaining the threshold
00830 input->threshold
00831 = json_object_get_float_with_default (object,
LABEL_THRESHOLD, 0.,
                                &error_code);
00833 if (error_code)
00834 {
00835     input_error (gettext ("Invalid threshold"));
00836     goto exit_on_error;
00837 }
00838
00839 // Reading the experimental data
00840 array = json_object_get_array_member (object, LABEL_EXPERIMENTS);
00841 n = json_array_get_length (array);
00842 input->experiment = (Experiment *) g_malloc (n * sizeof (
Experiment));
00843 for (i = 0; i < n; ++i)
00844 {
00845     #if DEBUG_INPUT
00846         fprintf (stderr, "input_open_json: nexperiments=%u\n",
input->nexperiments);
00847     #endif
00848     child = json_array_get_element (array, i);
00849     if (!input->nexperiments)
00850     {
00851         if (!experiment_open_json (input->experiment, child, 0))
00852             goto exit_on_error;
00853     }
00854     else
00855     {
00856         if (!experiment_open_json (input->experiment +
input->nexperiments,
                                child, input->experiment->
ninputs))
00858             goto exit_on_error;
00859     }
00860     ++input->nexperiments;
00861     #if DEBUG_INPUT
00862         fprintf (stderr, "input_open_json: nexperiments=%u\n",
input->nexperiments);
00863     #endif
00864 }
00865 if (!input->nexperiments)
00866 {
00867     input_error (gettext ("No optimization experiments"));
00868     goto exit_on_error;
00869 }
00870
00871 // Reading the variables data
00872 array = json_object_get_array_member (object, LABEL_VARIABLES);
00873 n = json_array_get_length (array);
00874 input->variable = (Variable *) g_malloc (n * sizeof (
Variable));
00875 for (i = 0; i < n; ++i)

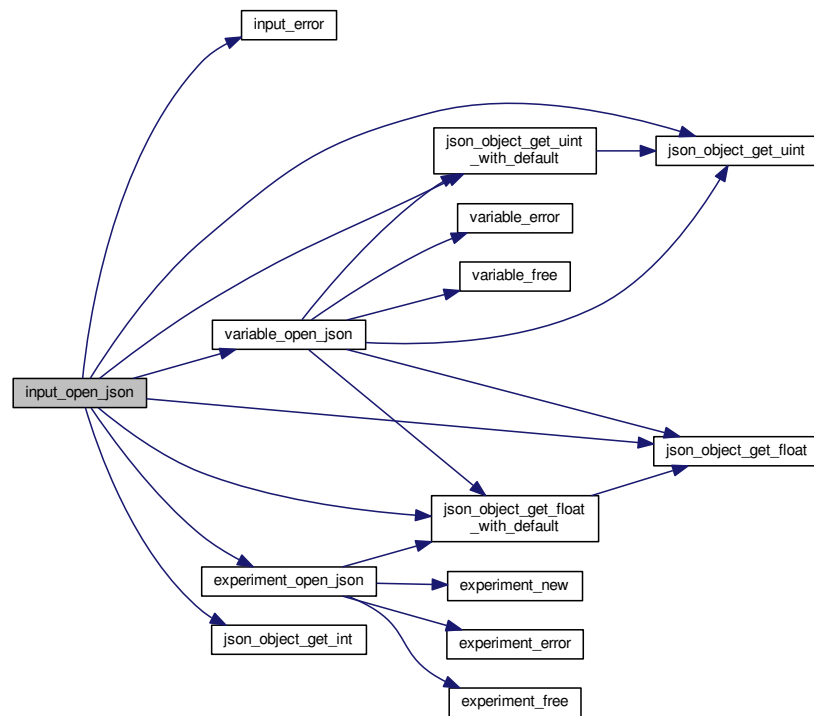
```

```

00878     {
00879 #if DEBUG_INPUT
00880     fprintf (stderr, "input_open_json: nvariables=%u\n", input->
nvariables);
00881 #endif
00882     child = json_array_get_element (array, i);
00883     if (!variable_open_json (input->variable +
input->nvariables, child,
00884                             input->algorithm, input->
nsteps))
00885         goto exit_on_error;
00886     ++input->nvariables;
00887 }
00888 if (!input->nvariables)
00889 {
00890     input_error (gettext ("No optimization variables"));
00891     goto exit_on_error;
00892 }
00893
00894 // Obtaining the error norm
00895 if (json_object_get_member (object, LABEL_NORM))
00896 {
00897     buffer = json_object_get_string_member (object, LABEL_NORM);
00898     if (!strcmp (buffer, LABEL_EUCLIDIAN))
00899         input->norm = ERROR_NORM_EUCLIDIAN;
00900     else if (!strcmp (buffer, LABEL_MAXIMUM))
00901         input->norm = ERROR_NORM_MAXIMUM;
00902     else if (!strcmp (buffer, LABEL_P))
00903     {
00904         input->norm = ERROR_NORM_P;
00905         input->p = json_object_get_float (object,
LABEL_P, &error_code);
00906         if (!error_code)
00907         {
00908             input_error (gettext ("Bad P parameter"));
00909             goto exit_on_error;
00910         }
00911     }
00912     else if (!strcmp (buffer, LABEL_TAXICAB))
00913         input->norm = ERROR_NORM_TAXICAB;
00914     else
00915     {
00916         input_error (gettext ("Unknown error norm"));
00917         goto exit_on_error;
00918     }
00919 }
00920 else
00921     input->norm = ERROR_NORM_EUCLIDIAN;
00922
00923 // Closing the JSON document
00924 g_object_unref (parser);
00925
00926 #if DEBUG_INPUT
00927 fprintf (stderr, "input_open_json: end\n");
00928 #endif
00929 return 1;
00930
00931 exit_on_error:
00932 g_object_unref (parser);
00933 #if DEBUG_INPUT
00934 fprintf (stderr, "input_open_json: end\n");
00935 #endif
00936 return 0;
00937 }

```

Here is the call graph for this function:



#### 5.9.3.4 int input\_open\_xml ( xmlDoc \* doc )

Function to open the input file in XML format.

##### Parameters

<i>doc</i>	xmlDoc struct.
------------	----------------

##### Returns

1\_on\_success, 0\_on\_error.

Definition at line 139 of file [input.c](#).

```

00140 {
00141     char buffer2[64];
00142     xmlNode *node, *child;
00143     xmlChar *buffer;
00144     int error_code;
00145     unsigned int i;
00146
00147     #if DEBUG_INPUT
00148         fprintf (stderr, "input_open_xml: start\n");
00149     #endif
00150
00151     // Resetting input data
00152     buffer = NULL;
00153     input->type = INPUT_TYPE_XML;
00154
00155     // Getting the root node
00156     #if DEBUG_INPUT
00157         fprintf (stderr, "input_open_xml: getting the root node\n");
00158     #endif
00159     node = xmlDocGetRootElement (doc);

```

```

00160     if (xmlStrcmp (node->name, (const xmlChar *) LABEL_OPTIMIZE))
00161     {
00162         input_error (gettext ("Bad root XML node"));
00163         goto exit_on_error;
00164     }
00165
00166     // Getting result and variables file names
00167     if (!input->result)
00168     {
00169         input->result =
00170             (char *) xmlGetProp (node, (const xmlChar *) LABEL_RESULT_FILE);
00171         if (!input->result)
00172             input->result = (char *) xmlStrdup ((const xmlChar *)
result_name);
00173     }
00174     if (!input->variables)
00175     {
00176         input->variables =
00177             (char *) xmlGetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE);
00178         if (!input->variables)
00179             input->variables =
00180                 (char *) xmlStrdup ((const xmlChar *) variables_name);
00181     }
00182
00183     // Opening simulator program name
00184     input->simulator =
00185         (char *) xmlGetProp (node, (const xmlChar *) LABEL_SIMULATOR);
00186     if (!input->simulator)
00187     {
00188         input_error (gettext ("Bad simulator program"));
00189         goto exit_on_error;
00190     }
00191
00192     // Opening evaluator program name
00193     input->evaluator =
00194         (char *) xmlGetProp (node, (const xmlChar *) LABEL_EVALUATOR);
00195
00196     // Obtaining pseudo-random numbers generator seed
00197     input->seed
00198         = xml_node_get_uint_with_default (node, (const xmlChar *)
LABEL_SEED,
00199                                         DEFAULT_RANDOM_SEED, &error_code);
00200     if (error_code)
00201     {
00202         input_error (gettext ("Bad pseudo-random numbers generator seed"));
00203         goto exit_on_error;
00204     }
00205
00206     // Opening algorithm
00207     buffer = xmlGetProp (node, (const xmlChar *) LABEL_ALGORITHM);
00208     if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MONTE_CARLO))
00209     {
00210         input->algorithm = ALGORITHM_MONTE_CARLO;
00211
00212         // Obtaining simulations number
00213         input->nsimulations
00214             = xml_node_get_int (node, (const xmlChar *)
LABEL_NSIMULATIONS,
00215                               &error_code);
00216         if (error_code)
00217         {
00218             input_error (gettext ("Bad simulations number"));
00219             goto exit_on_error;
00220         }
00221     }
00222     else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_SWEEP))
00223         input->algorithm = ALGORITHM_SWEEP;
00224     else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_GENETIC))
00225     {
00226         input->algorithm = ALGORITHM_GENETIC;
00227
00228         // Obtaining population
00229         if (xmlHasProp (node, (const xmlChar *) LABEL_NPOPULATION))
00230         {
00231             input->nsimulations
00232                 = xml_node_get_uint (node, (const xmlChar *)
LABEL_NPOPULATION,
00233                                     &error_code);
00234             if (error_code || input->nsimulations < 3)
00235             {
00236                 input_error (gettext ("Invalid population number"));
00237                 goto exit_on_error;
00238             }
00239         }
00240         else
00241         {
00242             input_error (gettext ("No population number"));

```

```

00243         goto exit_on_error;
00244     }
00245
00246     // Obtaining generations
00247     if (xmlHasProp (node, (const xmlChar *) LABEL_NGENERATIONS))
00248     {
00249         input->niterations
00250         = xml_node_get_uint (node, (const xmlChar *)
00251 LABEL_NGENERATIONS,
00252                             &error_code);
00253         if (error_code || !input->niterations)
00254         {
00255             input_error (gettext ("Invalid generations number"));
00256             goto exit_on_error;
00257         }
00258     }
00259     else
00260     {
00261         input_error (gettext ("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 *)
00270 LABEL_MUTATION,
00271                             &error_code);
00272         if (error_code || input->mutation_ratio < 0.
00273             || input->mutation_ratio >= 1.)
00274         {
00275             input_error (gettext ("Invalid mutation probability"));
00276             goto exit_on_error;
00277         }
00278     }
00279     else
00280     {
00281         input_error (gettext ("No mutation probability"));
00282         goto exit_on_error;
00283     }
00284
00285     // Obtaining reproduction probability
00286     if (xmlHasProp (node, (const xmlChar *) LABEL_REPRODUCTION))
00287     {
00288         input->reproduction_ratio
00289         = xml_node_get_float (node, (const xmlChar *)
00290 LABEL_REPRODUCTION,
00291                             &error_code);
00292         if (error_code || input->reproduction_ratio < 0.
00293             || input->reproduction_ratio >= 1.0)
00294         {
00295             input_error (gettext ("Invalid reproduction probability"));
00296             goto exit_on_error;
00297         }
00298     }
00299     else
00300     {
00301         input_error (gettext ("No reproduction probability"));
00302         goto exit_on_error;
00303     }
00304
00305     // Obtaining adaptation probability
00306     if (xmlHasProp (node, (const xmlChar *) LABEL_ADAPTATION))
00307     {
00308         input->adaptation_ratio
00309         = xml_node_get_float (node, (const xmlChar *)
00310 LABEL_ADAPTATION,
00311                             &error_code);
00312         if (error_code || input->adaptation_ratio < 0.
00313             || input->adaptation_ratio >= 1.)
00314         {
00315             input_error (gettext ("Invalid adaptation probability"));
00316             goto exit_on_error;
00317         }
00318     }
00319     else
00320     {
00321         input_error (gettext ("No adaptation probability"));
00322         goto exit_on_error;
00323     }
00324
00325     // Checking survivals
00326     i = input->mutation_ratio * input->nsimulations;
00327     i += input->reproduction_ratio * input->
00328 nsimulations;
00329     i += input->adaptation_ratio * input->

```

```

    nsimulations;
00325     if (i > input->nsimulations - 2)
00326     {
00327         input_error
00328             (gettext
00329                 ("No enough survival entities to reproduce the population"));
00330         goto exit_on_error;
00331     }
00332 }
00333 else
00334 {
00335     input_error (gettext ("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 {
00344     // Obtaining iterations number
00345     input->niterations
00346         = xml_node_get_uint (node, (const xmlChar *)
00347 LABEL_NITERATIONS,
00348                             &error_code);
00349     if (error_code == 1)
00350         input->niterations = 1;
00351     else if (error_code)
00352     {
00353         input_error (gettext ("Bad iterations number"));
00354         goto exit_on_error;
00355     }
00356
00357     // Obtaining best number
00358     input->nbest
00359         = xml_node_get_uint_with_default (node, (const xmlChar *)
00360 LABEL_NBEST,
00361                                         1, &error_code);
00362     if (error_code || !input->nbest)
00363     {
00364         input_error (gettext ("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 (gettext ("Invalid tolerance"));
00376         goto exit_on_error;
00377     }
00378
00379     // Getting direction search method parameters
00380     if (xmlHasProp (node, (const xmlChar *) LABEL_NSTEPS))
00381     {
00382         input->nsteps =
00383             xml_node_get_uint (node, (const xmlChar *)
00384 LABEL_NSTEPS,
00385                             &error_code);
00386         if (error_code || !input->nsteps)
00387         {
00388             input_error (gettext ("Invalid steps number"));
00389             goto exit_on_error;
00390         }
00391         buffer = xmlGetProp (node, (const xmlChar *) LABEL_DIRECTION);
00392         if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_COORDINATES))
00393             input->direction = DIRECTION_METHOD_COORDINATES;
00394         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_RANDOM))
00395             input->direction = DIRECTION_METHOD_RANDOM;
00396         input->nestimates
00397             = xml_node_get_uint (node, (const xmlChar *)
00398 LABEL_NESTIMATES,
00399                             &error_code);
00400         if (error_code || !input->nestimates)
00401         {
00402             input_error (gettext ("Invalid estimates number"));
00403             goto exit_on_error;
00404         }
00405     }
00406     else
00407     {
00408         input_error

```



```

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

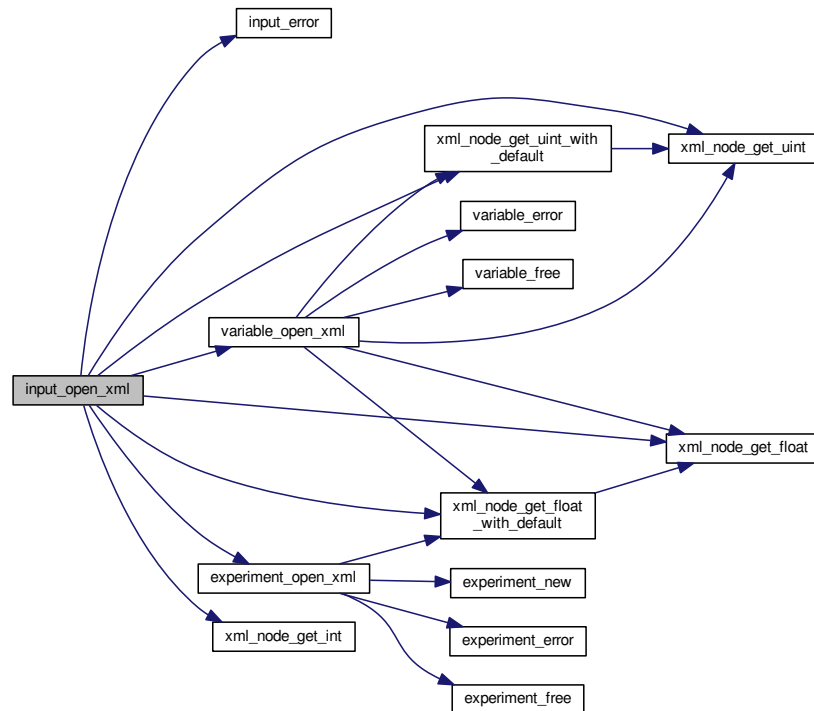
```

```

00489         if (!variable_open_xml (input->variable +
input->nvariables, child,
00490                                input->algorithm, input->nsteps))
00491             goto exit_on_error;
00492         ++input->nvariables;
00493     }
00494     if (!input->nvariables)
00495     {
00496         input_error (gettext ("No optimization variables"));
00497         goto exit_on_error;
00498     }
00499     buffer = NULL;
00500
00501     // Obtaining the error norm
00502     if (xmlHasProp (node, (const xmlChar *) LABEL_NORM))
00503     {
00504         buffer = xmlGetProp (node, (const xmlChar *) LABEL_NORM);
00505         if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_EUCLIDIAN))
00506             input->norm = ERROR_NORM_EUCLIDIAN;
00507         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_MAXIMUM))
00508             input->norm = ERROR_NORM_MAXIMUM;
00509         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_P))
00510         {
00511             input->norm = ERROR_NORM_P;
00512             input->p
00513             = xml_node_get_float (node, (const xmlChar *)
LABEL_P, &error_code);
00514             if (!error_code)
00515             {
00516                 input_error (gettext ("Bad P parameter"));
00517                 goto exit_on_error;
00518             }
00519         }
00520         else if (!xmlStrcmp (buffer, (const xmlChar *) LABEL_TAXICAB))
00521             input->norm = ERROR_NORM_TAXICAB;
00522         else
00523         {
00524             input_error (gettext ("Unknown error norm"));
00525             goto exit_on_error;
00526         }
00527         xmlFree (buffer);
00528     }
00529     else
00530         input->norm = ERROR_NORM_EUCLIDIAN;
00531
00532     // Closing the XML document
00533     xmlFreeDoc (doc);
00534
00535     #if DEBUG_INPUT
00536     fprintf (stderr, "input_open_xml: end\n");
00537     #endif
00538     return 1;
00539
00540 exit_on_error:
00541     xmlFree (buffer);
00542     xmlFreeDoc (doc);
00543     #if DEBUG_INPUT
00544     fprintf (stderr, "input_open_xml: end\n");
00545     #endif
00546     return 0;
00547 }

```

Here is the call graph for this function:



## 5.10 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 2012-2016, 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
00032  #ifndef INPUT__H
00033  #define INPUT__H 1
00034
00035  enum DirectionMethod
00036  {
00037      DIRECTION_METHOD_COORDINATES = 0,

```

```

00048     DIRECTION_METHOD_RANDOM = 1,
00049 };
00050
00055 enum ErrorNorm
00056 {
00057     ERROR_NORM_EUCLIDIAN = 0,
00059     ERROR_NORM_MAXIMUM = 1,
00061     ERROR_NORM_P = 2,
00063     ERROR_NORM_TAXICAB = 3
00065 };
00066
00071 typedef struct
00072 {
00073     Experiment *experiment;
00074     Variable *variable;
00075     char *result;
00076     char *variables;
00077     char *simulator;
00078     char *evaluator;
00080     char *directory;
00081     char *name;
00082     double tolerance;
00083     double mutation_ratio;
00084     double reproduction_ratio;
00085     double adaptation_ratio;
00086     double relaxation;
00087     double p;
00088     double threshold;
00089     unsigned long int seed;
00091     unsigned int nvariables;
00092     unsigned int nexperiments;
00093     unsigned int nsimulations;
00094     unsigned int algorithm;
00095     unsigned int nsteps;
00097     unsigned int direction;
00098     unsigned int nestimates;
00100     unsigned int niterations;
00101     unsigned int nbest;
00102     unsigned int norm;
00103     unsigned int type;
00104 } Input;
00105
00106 extern Input input[1];
00107 extern const char *result_name;
00108 extern const char *variables_name;
00109
00110 // Public functions
00111 void input_new ();
00112 void input_free ();
00113 void input_error (char *message);
00114 int input_open_xml (xmlDoc * doc);
00115 int input_open_json (JsonParser * parser);
00116 int input_open (char *filename);
00117
00118 #endif

```

## 5.11 interface.c File Reference

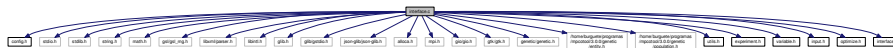
Source file to define the graphical interface functions.

```

#include "config.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#include <gsl/gsl_rng.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <glib/gstdio.h>
#include <json-glib/json-glib.h>
#include <alloca.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 GNU_SOURCE`
- `#define DEBUG_INTERFACE 1`  
*Macro to debug interface functions.*
- `#define INPUT_FILE "test-ga.xml"`  
*Macro to define the initial input file.*

## Functions

- void `input_save_direction_xml` (xmlNode \*node)  
*Function to save the direction search method data in a XML node.*
- void `input_save_direction_json` (JsonNode \*node)  
*Function to save the direction search method data in a JSON node.*
- void `input_save_xml` (xmlDoc \*doc)  
*Function to save the input file in XML format.*
- void `input_save_json` (JsonGenerator \*generator)  
*Function to save the input file in JSON format.*
- void `input_save` (char \*filename)  
*Function to save the input file.*
- void `options_new` ()  
*Function to open the options dialog.*
- void `running_new` ()  
*Function to open the running dialog.*
- unsigned int `window_get_algorithm` ()

- Function to get the stochastic algorithm number.*

  - unsigned int `window_get_direction ()`
- Function to get the direction search method number.*

  - unsigned int `window_get_norm ()`
- Function to get the norm method number.*

  - void `window_save_direction ()`
- Function to save the direction search method data in the input file.*

  - int `window_save ()`
- Function to save the input file.*

  - void `window_run ()`
- Function to run a optimization.*

  - void `window_help ()`
- Function to show a help dialog.*

  - void `window_about ()`
- Function to show an about dialog.*

  - void `window_update_direction ()`
- Function to update direction search method widgets view in the main window.*

  - void `window_update ()`
- Function to update the main window view.*

  - void `window_set_algorithm ()`
- Function to avoid memory errors changing the algorithm.*

  - void `window_set_experiment ()`
- Function to set the experiment data in the main window.*

  - void `window_remove_experiment ()`
- Function to remove an experiment in the main window.*

  - void `window_add_experiment ()`
- Function to add an experiment in the main window.*

  - void `window_name_experiment ()`
- Function to set the experiment name in the main window.*

  - void `window_weight_experiment ()`
- Function to update the experiment weight in the main window.*

  - void `window_inputs_experiment ()`
- Function to update the experiment input templates number in the main window.*

  - void `window_template_experiment (void *data)`
- Function to update the experiment i-th input template in the main window.*

  - void `window_set_variable ()`
- Function to set the variable data in the main window.*

  - void `window_remove_variable ()`
- Function to remove a variable in the main window.*

  - void `window_add_variable ()`
- Function to add a variable in the main window.*

  - void `window_label_variable ()`
- Function to set the variable label in the main window.*

  - void `window_precision_variable ()`
- Function to update the variable precision in the main window.*

  - void `window_rangemin_variable ()`
- Function to update the variable rangemin in the main window.*

  - void `window_rangemax_variable ()`
- Function to update the variable rangemax in the main window.*

  - void `window_rangeminabs_variable ()`
- Function to update the variable rangeminabs in the main window.*

- void [window\\_rangemaxabs\\_variable](#) ()  
*Function to update the variable rangemaxabs in the main window.*
- void [window\\_step\\_variable](#) ()  
*Function to update the variable step in the main window.*
- void [window\\_update\\_variable](#) ()  
*Function to update the variable data in the main window.*
- int [window\\_read](#) (char \*filename)  
*Function to read the input data of a file.*
- void [window\\_open](#) ()  
*Function to open the input data.*
- void [window\\_new](#) ()  
*Function to open the main window.*

## Variables

- const char \* [logo](#) []  
*Logo pixmap.*
- [Options](#) [options](#) [1]  
*Options struct to define the options dialog.*
- [Running](#) [running](#) [1]  
*Running struct to define the running dialog.*
- [Window](#) [window](#) [1]  
*Window struct to define the main interface window.*

### 5.11.1 Detailed Description

Source file to define the graphical interface functions.

#### Authors

Javier Burguete and Borja Latorre.

#### Copyright

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Definition in file [interface.c](#).

### 5.11.2 Function Documentation

#### 5.11.2.1 void input\_save ( char \* filename )

Function to save the input file.

#### Parameters

<i>filename</i>	<a href="#">Input</a> file name.
-----------------	----------------------------------

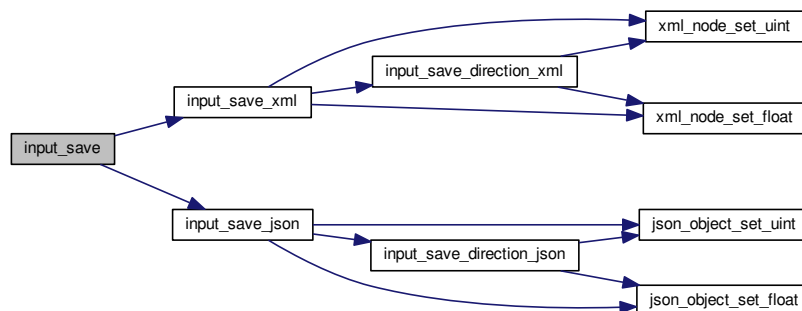
Definition at line [580](#) of file [interface.c](#).

```

00581 {
00582     xmlDoc *doc;
00583     JsonGenerator *generator;
00584
00585     #if DEBUG_INTERFACE
00586         fprintf (stderr, "input_save: start\n");
00587     #endif
00588
00589     // Getting the input file directory
00590     input->name = g_path_get_basename (filename);
00591     input->directory = g_path_get_dirname (filename);
00592
00593     if (input->type == INPUT_TYPE_XML)
00594     {
00595         // Opening the input file
00596         doc = xmlNewDoc ((const xmlChar *) "1.0");
00597         input_save_xml (doc);
00598
00599         // Saving the XML file
00600         xmlSaveFormatFile (filename, doc, 1);
00601
00602         // Freeing memory
00603         xmlFreeDoc (doc);
00604     }
00605     else
00606     {
00607         // Opening the input file
00608         generator = json_generator_new ();
00609         json_generator_set_pretty (generator, TRUE);
00610         input_save_json (generator);
00611
00612         // Saving the JSON file
00613         json_generator_to_file (generator, filename, NULL);
00614
00615         // Freeing memory
00616         g_object_unref (generator);
00617     }
00618
00619     #if DEBUG_INTERFACE
00620         fprintf (stderr, "input_save: end\n");
00621     #endif
00622 }

```

Here is the call graph for this function:



#### 5.11.2.2 void input\_save\_direction\_json ( JsonNode \* node )

Function to save the direction search method data in a JSON node.

##### Parameters



<i>node</i>	JSON node.
-------------	------------

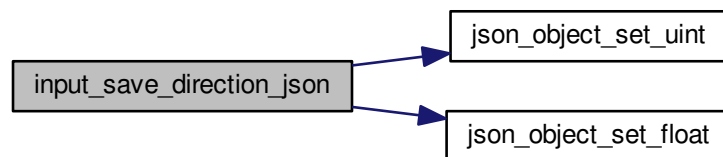
Definition at line 209 of file [interface.c](#).

```

00210 {
00211     JsonObject *object;
00212     #if DEBUG_INTERFACE
00213     fprintf (stderr, "input_save_direction_json: start\n");
00214     #endif
00215     object = json_node_get_object (node);
00216     if (input->nsteps)
00217     {
00218         json_object_set_uint (object, LABEL_NSTEPS,
00219 input->nsteps);
00219         if (input->relaxation != DEFAULT_RELAXATION)
00220             json_object_set_float (object, LABEL_RELAXATION,
00221 input->relaxation);
00221         switch (input->direction)
00222         {
00223             case DIRECTION_METHOD_COORDINATES:
00224                 json_object_set_string_member (object, LABEL_DIRECTION,
00225 LABEL_COORDINATES);
00226                 break;
00227             default:
00228                 json_object_set_string_member (object, LABEL_DIRECTION,
00229 LABEL_RANDOM);
00229                 json_object_set_uint (object, LABEL_NESTIMATES,
00230 input->nestimates);
00230         }
00231     }
00232     #if DEBUG_INTERFACE
00233     fprintf (stderr, "input_save_direction_json: end\n");
00234     #endif
00235 }

```

Here is the call graph for this function:



### 5.11.2.3 void input\_save\_direction\_xml ( xmlNode \* node )

Function to save the direction search method data in a XML node.

**Parameters**

<i>node</i>	XML node.
-------------	-----------

Definition at line 173 of file [interface.c](#).

```

00174 {
00175     #if DEBUG_INTERFACE
00176     fprintf (stderr, "input_save_direction_xml: start\n");
00177     #endif
00178     if (input->nsteps)
00179     {
00180         xml_node_set_uint (node, (const xmlChar *) LABEL_NSTEPS,
00181 input->nsteps);
00181         if (input->relaxation != DEFAULT_RELAXATION)
00182             xml_node_set_float (node, (const xmlChar *)

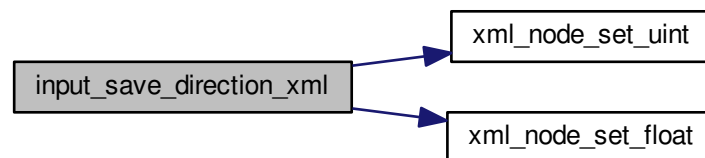
```

```

    LABEL_RELAXATION,
00183         input->relaxation);
00184     switch (input->direction)
00185     {
00186     case DIRECTION_METHOD_COORDINATES:
00187         xmlSetProp (node, (const xmlChar *) LABEL_DIRECTION,
00188                     (const xmlChar *) LABEL_COORDINATES);
00189         break;
00190     default:
00191         xmlSetProp (node, (const xmlChar *) LABEL_DIRECTION,
00192                     (const xmlChar *) LABEL_RANDOM);
00193         xml_node_set_uint (node, (const xmlChar *)
    LABEL_NESTIMATES,
00194                             input->nestimates);
00195     }
00196 }
00197 #if DEBUG_INTERFACE
00198 fprintf (stderr, "input_save_direction_xml: end\n");
00199 #endif
00200 }

```

Here is the call graph for this function:



#### 5.11.2.4 void input\_save\_json ( JsonGenerator \* generator )

Function to save the input file in JSON format.

##### Parameters

<i>generator</i>	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, *object2;
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_alloc ();
00429     object = json_object_new ();
00430     json_node_init_object (node, object);
00431     json_generator_set_root (generator, node);
00432
00433     // Adding properties to the root JSON node
00434     if (strcmp (input->result, result_name))
00435         json_object_set_string_member (object, LABEL_RESULT_FILE,
    input->result);
00436     if (strcmp (input->variables, variables_name))
00437         json_object_set_string_member (object, LABEL_VARIABLES_FILE,
    input->variables);
00438     file = g_file_new_for_path (input->directory);

```

```

00440 file2 = g_file_new_for_path (input->simulator);
00441 buffer = g_file_get_relative_path (file, file2);
00442 g_object_unref (file2);
00443 json_object_set_string_member (object, LABEL_SIMULATOR, buffer);
00444 g_free (buffer);
00445 if (input->evaluator)
00446 {
00447     file2 = g_file_new_for_path (input->evaluator);
00448     buffer = g_file_get_relative_path (file, file2);
00449     g_object_unref (file2);
00450     if (strlen (buffer))
00451         json_object_set_string_member (object, LABEL_EVALUATOR, buffer);
00452     g_free (buffer);
00453 }
00454 if (input->seed != DEFAULT_RANDOM_SEED)
00455     json_object_set_uint (object, LABEL_SEED,
00456 input->seed);
00457 // Setting the algorithm
00458 buffer = (char *) g_slice_alloc (64);
00459 switch (input->algorithm)
00460 {
00461     case ALGORITHM_MONTE_CARLO:
00462         json_object_set_string_member (object, LABEL_ALGORITHM,
00463 LABEL_MONTE_CARLO);
00464         snprintf (buffer, 64, "%u", input->nsimulations);
00465         json_object_set_string_member (object, LABEL_NSIMULATIONS, buffer);
00466         snprintf (buffer, 64, "%u", input->niterations);
00467         json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00468         snprintf (buffer, 64, "%.3lg", input->tolerance);
00469         json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00470         snprintf (buffer, 64, "%u", input->nbest);
00471         json_object_set_string_member (object, LABEL_NBEST, buffer);
00472         input_save_direction_json (node);
00473         break;
00474     case ALGORITHM_SWEEP:
00475         json_object_set_string_member (object, LABEL_ALGORITHM,
00476 LABEL_SWEEP);
00477         snprintf (buffer, 64, "%u", input->niterations);
00478         json_object_set_string_member (object, LABEL_NITERATIONS, buffer);
00479         snprintf (buffer, 64, "%.3lg", input->tolerance);
00480         json_object_set_string_member (object, LABEL_TOLERANCE, buffer);
00481         snprintf (buffer, 64, "%u", input->nbest);
00482         json_object_set_string_member (object, LABEL_NBEST, buffer);
00483         input_save_direction_json (node);
00484         break;
00485     default:
00486         json_object_set_string_member (object, LABEL_ALGORITHM,
00487 LABEL_GENETIC);
00488         snprintf (buffer, 64, "%u", input->nsimulations);
00489         json_object_set_string_member (object, LABEL_NPOPULATION, buffer);
00490         snprintf (buffer, 64, "%u", input->niterations);
00491         json_object_set_string_member (object, LABEL_NGENERATIONS, buffer);
00492         snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00493         json_object_set_string_member (object, LABEL_MUTATION, buffer);
00494         snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00495         json_object_set_string_member (object, LABEL_REPRODUCTION, buffer);
00496         snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00497         json_object_set_string_member (object, LABEL_ADAPTATION, buffer);
00498         break;
00499 }
00500 g_slice_free1 (64, buffer);
00501 if (input->threshold != 0.)
00502     json_object_set_float (object, LABEL_THRESHOLD,
00503 input->threshold);
00504 // Setting the experimental data
00505 array = json_array_new ();
00506 for (i = 0; i < input->nexperiments; ++i)
00507 {
00508     child = json_node_alloc ();
00509     object2 = json_object_new ();
00510     json_object_set_string_member (object2, LABEL_NAME,
00511 input->experiment[i].name);
00512     if (input->experiment[i].weight != 1.)
00513         json_object_set_float (object2, LABEL_WEIGHT,
00514 input->experiment[i].weight);
00515     for (j = 0; j < input->experiment->ninputs; ++j)
00516         json_object_set_string_member (object2, template[j],
00517 input->experiment[i].
00518 template[j]);
00519     json_node_set_object (child, object2);
00520     json_array_add_element (array, child);
00521 }
00522 json_object_set_array_member (object, LABEL_EXPERIMENTS, array);
00523 // Setting the variables data

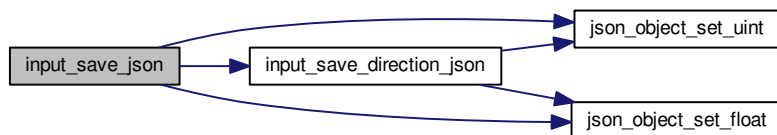
```

```

00522     array = json_array_new ();
00523     for (i = 0; i < input->nvariables; ++i)
00524     {
00525         child = json_node_alloc ();
00526         object2 = json_object_new ();
00527         json_object_set_string_member (object2, LABEL_NAME,
00528                                     input->variable[i].name);
00529         json_object_set_float (object2, LABEL_MINIMUM,
00530                               input->variable[i].rangemin);
00531         if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00532             json_object_set_float (object2,
00533                                   LABEL_ABSOLUTE_MINIMUM,
00534                                   input->variable[i].rangeminabs);
00535         json_object_set_float (object2, LABEL_MAXIMUM,
00536                               input->variable[i].rangemax);
00537         if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00538             json_object_set_float (object2,
00539                                   LABEL_ABSOLUTE_MAXIMUM,
00540                                   input->variable[i].rangemaxabs);
00541         if (input->variable[i].precision !=
00542             DEFAULT_PRECISION)
00543             json_object_set_uint (object2, LABEL_PRECISION,
00544                                  input->variable[i].precision);
00545         if (input->algorithm == ALGORITHM_SWEEP)
00546             json_object_set_uint (object2, LABEL_NSWEEPS,
00547                                  input->variable[i].nsweeps);
00548         else if (input->algorithm == ALGORITHM_GENETIC)
00549             json_object_set_uint (object2, LABEL_NBITS,
00550                                  input->variable[i].nbits);
00551         if (input->nsteps)
00552             json_object_set_float (object, LABEL_STEP,
00553                                   input->variable[i].step);
00554         json_node_set_object (child, object2);
00555         json_array_add_element (array, child);
00556     }
00557     json_object_set_array_member (object, LABEL_VARIABLES, array);
00558
00559     // Saving the error norm
00560     switch (input->norm)
00561     {
00562     case ERROR_NORM_MAXIMUM:
00563         json_object_set_string_member (object, LABEL_NORM, LABEL_MAXIMUM);
00564         break;
00565     case ERROR_NORM_P:
00566         json_object_set_string_member (object, LABEL_NORM, LABEL_P);
00567         json_object_set_float (object, LABEL_P, input->
00568                                p);
00569         break;
00570     case ERROR_NORM_TAXICAB:
00571         json_object_set_string_member (object, LABEL_NORM, LABEL_TAXICAB);
00572     }
00573
00574 #if DEBUG_INTERFACE
00575     fprintf (stderr, "input_save_json: end\n");
00576 #endif
00577 }

```

Here is the call graph for this function:



#### 5.11.2.5 void input\_save\_xml ( xmlDoc \* doc )

Function to save the input file in XML format.

## Parameters

<i>doc</i>	xmlDoc struct.
------------	----------------

Definition at line 244 of file [interface.c](#).

```

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

```

```

00323         (xmlChar *) buffer);
00324     snprintf (buffer, 64, "%u", input->niterations);
00325     xmlSetProp (node, (const xmlChar *) LABEL_NGENERATIONS,
00326         (xmlChar *) buffer);
00327     snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00328     xmlSetProp (node, (const xmlChar *) LABEL_MUTATION, (xmlChar *) buffer);
00329     snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00330     xmlSetProp (node, (const xmlChar *) LABEL_REPRODUCTION,
00331         (xmlChar *) buffer);
00332     snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00333     xmlSetProp (node, (const xmlChar *) LABEL_ADAPTATION, (xmlChar *) buffer);
00334     break;
00335 }
00336 g_slice_free1 (64, buffer);
00337 if (input->threshold != 0.)
00338     xml_node_set_float (node, (const xmlChar *)
00339 LABEL_THRESHOLD,
00340         input->threshold);
00341 // Setting the experimental data
00342 for (i = 0; i < input->nexperiments; ++i)
00343 {
00344     child = xmlNewChild (node, 0, (const xmlChar *) LABEL_EXPERIMENT, 0);
00345     xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00346         (xmlChar *) input->experiment[i].name);
00347     if (input->experiment[i].weight != 1.)
00348         xml_node_set_float (child, (const xmlChar *)
00349 LABEL_WEIGHT,
00350             input->experiment[i].weight);
00351     for (j = 0; j < input->experiment->ninputs; ++j)
00352         xmlSetProp (child, (const xmlChar *) template[j],
00353             (xmlChar *) input->experiment[i].template[j]);
00354 }
00355 // Setting the variables data
00356 for (i = 0; i < input->nvariables; ++i)
00357 {
00358     child = xmlNewChild (node, 0, (const xmlChar *) LABEL_VARIABLE, 0);
00359     xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00360         (xmlChar *) input->variable[i].name);
00361     xml_node_set_float (child, (const xmlChar *)
00362 LABEL_MINIMUM,
00363         input->variable[i].rangemin);
00364     if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00365         xml_node_set_float (child, (const xmlChar *)
00366 LABEL_ABSOLUTE_MINIMUM,
00367             input->variable[i].rangeminabs);
00368     xml_node_set_float (child, (const xmlChar *)
00369 LABEL_MAXIMUM,
00370         input->variable[i].rangemax);
00371     if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00372         xml_node_set_float (child, (const xmlChar *)
00373 LABEL_ABSOLUTE_MAXIMUM,
00374             input->variable[i].rangemaxabs);
00375     if (input->variable[i].precision !=
00376         DEFAULT_PRECISION)
00377         xml_node_set_uint (child, (const xmlChar *)
00378 LABEL_PRECISION,
00379             input->variable[i].precision);
00380     if (input->algorithm == ALGORITHM_SWEEP)
00381         xml_node_set_uint (child, (const xmlChar *)
00382 LABEL_NSWEEPS,
00383             input->variable[i].nsweeps);
00384     else if (input->algorithm == ALGORITHM_GENETIC)
00385         xml_node_set_uint (child, (const xmlChar *) LABEL_NBITS,
00386             input->variable[i].nbits);
00387     if (input->nsteps)
00388         xml_node_set_float (child, (const xmlChar *)
00389 LABEL_STEP,
00390             input->variable[i].step);
00391 }
00392 // Saving the error norm
00393 switch (input->norm)
00394 {
00395     case ERROR_NORM_MAXIMUM:
00396         xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00397             (const xmlChar *) LABEL_MAXIMUM);
00398         break;
00399     case ERROR_NORM_P:
00400         xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00401             (const xmlChar *) LABEL_P);
00402         xml_node_set_float (node, (const xmlChar *) LABEL_P,
00403             input->p);
00404         break;
00405     case ERROR_NORM_TAXICAB:
00406         xmlSetProp (node, (const xmlChar *) LABEL_NORM,

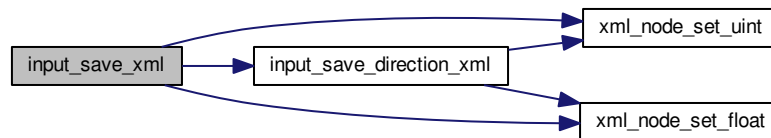
```

```

00399             (const xmlChar *) LABEL_TAXICAB);
00400     }
00401
00402 #if DEBUG_INTERFACE
00403     fprintf (stderr, "input_save: end\n");
00404 #endif
00405 }

```

Here is the call graph for this function:



#### 5.11.2.6 unsigned int window\_get\_algorithm ( )

Function to get the stochastic algorithm number.

##### Returns

Stochastic algorithm number.

Definition at line 731 of file [interface.c](#).

```

00732 {
00733     unsigned int i;
00734 #if DEBUG_INTERFACE
00735     fprintf (stderr, "window_get_algorithm: start\n");
00736 #endif
00737     i = gtk_array_get_active (window->button_algorithm,
00738                             NALGORITHMS);
00738 #if DEBUG_INTERFACE
00739     fprintf (stderr, "window_get_algorithm: %u\n", i);
00740     fprintf (stderr, "window_get_algorithm: end\n");
00741 #endif
00742     return i;
00743 }

```

Here is the call graph for this function:



#### 5.11.2.7 unsigned int window\_get\_direction ( )

Function to get the direction search method number.

## Returns

Direction search method number.

Definition at line 751 of file [interface.c](#).

```
00752 {  
00753     unsigned int i;  
00754     #if DEBUG_INTERFACE  
00755     fprintf (stderr, "window_get_direction: start\n");  
00756     #endif  
00757     i = gtk_array_get_active (window->button_direction,  
        NDIRECTIONS);  
00758     #if DEBUG_INTERFACE  
00759     fprintf (stderr, "window_get_direction: %u\n", i);  
00760     fprintf (stderr, "window_get_direction: end\n");  
00761     #endif  
00762     return i;  
00763 }
```

Here is the call graph for this function:



### 5.11.2.8 unsigned int window\_get\_norm ( )

Function to get the norm method number.

## Returns

Norm method number.

Definition at line 771 of file [interface.c](#).

```
00772 {  
00773     unsigned int i;  
00774     #if DEBUG_INTERFACE  
00775     fprintf (stderr, "window_get_norm: start\n");  
00776     #endif  
00777     i = gtk_array_get_active (window->button_norm,  
        NNORMS);  
00778     #if DEBUG_INTERFACE  
00779     fprintf (stderr, "window_get_norm: %u\n", i);  
00780     fprintf (stderr, "window_get_norm: end\n");  
00781     #endif  
00782     return i;  
00783 }
```

Here is the call graph for this function:





## 5.11.2.9 int window\_read ( char \* filename )

Function to read the input data of a file.

## Parameters

<i>filename</i>	File name.
-----------------	------------

## Returns

1 on succes, 0 on error.

Definition at line 1876 of file [interface.c](#).

```

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

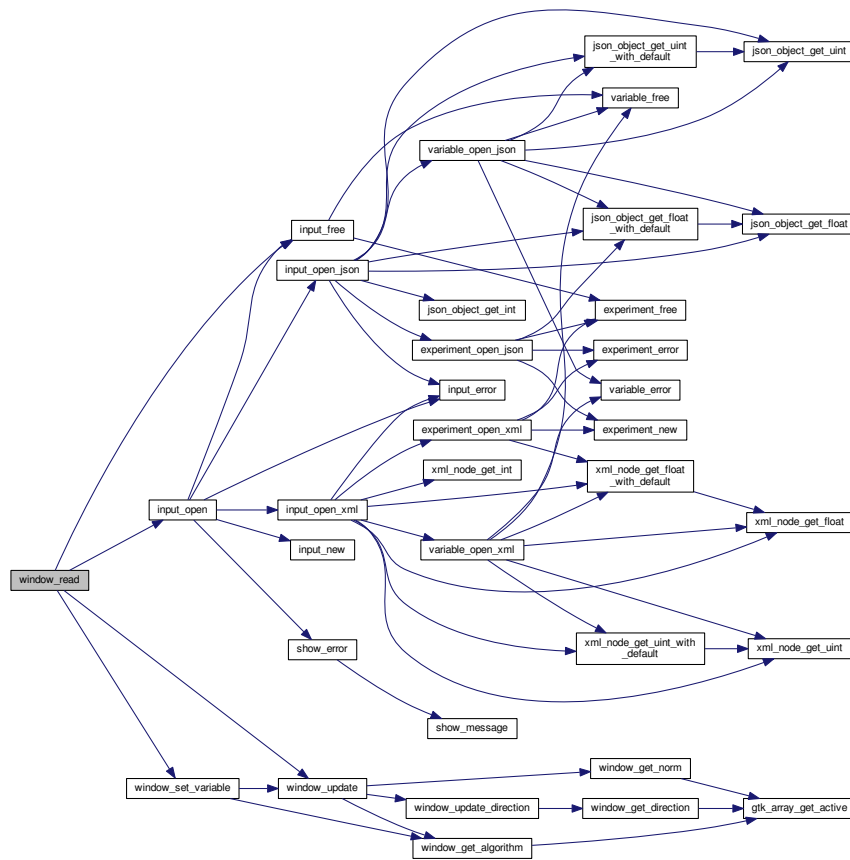
```

```

01937                                     (gdouble) input->nestimates);
01938     }
01939 }
01940 break;
01941 default:
01942     gtk_spin_button_set_value (window->spin_population,
01943                               (gdouble) input->nsimulations);
01944     gtk_spin_button_set_value (window->spin_generations,
01945                               (gdouble) input->niterations);
01946     gtk_spin_button_set_value (window->spin_mutation, input->
01947                               mutation_ratio);
01947     gtk_spin_button_set_value (window->spin_reproduction,
01948                               input->reproduction_ratio);
01949     gtk_spin_button_set_value (window->spin_adaptation,
01950                               input->adaptation_ratio);
01951 }
01952 gtk_toggle_button_set_active
01953 (GTK_TOGGLE_BUTTON (window->button_norm[input->norm]), TRUE);
01954 gtk_spin_button_set_value (window->spin_p, input->p);
01955 gtk_spin_button_set_value (window->spin_threshold, input->
01956                             threshold);
01957 g_signal_handler_block (window->combo_experiment, window->
01958                         id_experiment);
01959 g_signal_handler_block (window->button_experiment,
01960                         window->id_experiment_name);
01961 gtk_combo_box_text_remove_all (window->combo_experiment);
01962 for (i = 0; i < input->nexperiments; ++i)
01963     gtk_combo_box_text_append_text (window->combo_experiment,
01964                                     input->experiment[i].name);
01965 g_signal_handler_unblock
01966 (window->button_experiment, window->
01967     id_experiment_name);
01968 g_signal_handler_unblock (window->combo_experiment,
01969                             window->id_experiment);
01970 gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), 0);
01971 g_signal_handler_block (window->combo_variable, window->
01972                         id_variable);
01973 g_signal_handler_block (window->entry_variable, window->
01974                         id_variable_label);
01975 gtk_combo_box_text_remove_all (window->combo_variable);
01976 for (i = 0; i < input->nvariables; ++i)
01977     gtk_combo_box_text_append_text (window->combo_variable,
01978                                     input->variable[i].name);
01979 g_signal_handler_unblock (window->entry_variable, window->
01980                             id_variable_label);
01981 g_signal_handler_unblock (window->combo_variable, window->
01982                             id_variable);
01983 gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), 0);
01984 window_set_variable ();
01985 window_update ();
01986
01987 #if DEBUG_INTERFACE
01988 fprintf (stderr, "window_read: end\n");
01989 #endif
01990 return 1;
01991 }

```

Here is the call graph for this function:



#### 5.11.2.10 int window\_save ( )

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 (gettext ("Save file"),
00837                                     window->window,
00838                                     GTK_FILE_CHOOSER_ACTION_SAVE,
00839                                     gettext ("Cancel"),
00840                                     GTK_RESPONSE_CANCEL,
00841                                     gettext ("OK"), GTK_RESPONSE_OK, NULL);
00842     gtk_file_chooser_set_do_overwrite_confirmation (GTK_FILE_CHOOSER (dlg), TRUE);
00843     buffer = g_build_filename (input->directory, input->name, NULL);
00844     gtk_file_chooser_set_filename (GTK_FILE_CHOOSER (dlg), buffer);
  
```

```

00845 g_free (buffer);
00846
00847 // Adding XML filter
00848 filter1 = (GtkFileFilter *) gtk_file_filter_new ();
00849 gtk_file_filter_set_name (filter1, "XML");
00850 gtk_file_filter_add_pattern (filter1, "*.xml");
00851 gtk_file_filter_add_pattern (filter1, "*.XML");
00852 gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter1);
00853
00854 // Adding JSON filter
00855 filter2 = (GtkFileFilter *) gtk_file_filter_new ();
00856 gtk_file_filter_set_name (filter2, "JSON");
00857 gtk_file_filter_add_pattern (filter2, "*.json");
00858 gtk_file_filter_add_pattern (filter2, "*.JSON");
00859 gtk_file_filter_add_pattern (filter2, "*.js");
00860 gtk_file_filter_add_pattern (filter2, "*.JS");
00861 gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter2);
00862
00863 if (input->type == INPUT_TYPE_XML)
00864     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter1);
00865 else
00866     gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter2);
00867
00868 // If OK response then saving
00869 if (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
00870 {
00871     // Setting input file type
00872     filter1 = gtk_file_chooser_get_filter (GTK_FILE_CHOOSER (dlg));
00873     buffer = (char *) gtk_file_filter_get_name (filter1);
00874     if (!strcmp (buffer, "XML"))
00875         input->type = INPUT_TYPE_XML;
00876     else
00877         input->type = INPUT_TYPE_JSON;
00878
00879     // Adding properties to the root XML node
00880     input->simulator = gtk_file_chooser_get_filename
00881         (GTK_FILE_CHOOSER (window->button_simulator));
00882     if (gtk_toggle_button_get_active
00883         (GTK_TOGGLE_BUTTON (window->check_evaluator)))
00884         input->evaluator = gtk_file_chooser_get_filename
00885             (GTK_FILE_CHOOSER (window->button_evaluator));
00886     else
00887         input->evaluator = NULL;
00888     if (input->type == INPUT_TYPE_XML)
00889     {
00890         input->result
00891             = (char *) xmlStrdup ((const xmlChar *)
00892                 gtk_entry_get_text (window->entry_result));
00893         input->variables
00894             = (char *) xmlStrdup ((const xmlChar *)
00895                 gtk_entry_get_text (window->
00896                     entry_variables));
00897     }
00898     else
00899     {
00900         input->result = g_strdup (gtk_entry_get_text (window->
00901             entry_result));
00902         input->variables
00903             = g_strdup (gtk_entry_get_text (window->entry_variables));
00904     }
00905
00906     // Setting the algorithm
00907     switch (window_get_algorithm ())
00908     {
00909     case ALGORITHM_MONTE_CARLO:
00910         input->algorithm = ALGORITHM_MONTE_CARLO;
00911         input->nsimulations
00912             = gtk_spin_button_get_value_as_int (window->spin_simulations);
00913         input->niterations
00914             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00915         input->tolerance = gtk_spin_button_get_value (window->
00916             spin_tolerance);
00917         input->nbest = gtk_spin_button_get_value_as_int (window->
00918             spin_bests);
00919         window_save_direction ();
00920         break;
00921     case ALGORITHM_SWEEP:
00922         input->algorithm = ALGORITHM_SWEEP;
00923         input->niterations
00924             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00925         input->tolerance = gtk_spin_button_get_value (window->
00926             spin_tolerance);
00927         input->nbest = gtk_spin_button_get_value_as_int (window->
00928             spin_bests);
00929         window_save_direction ();
00930         break;
00931     default:

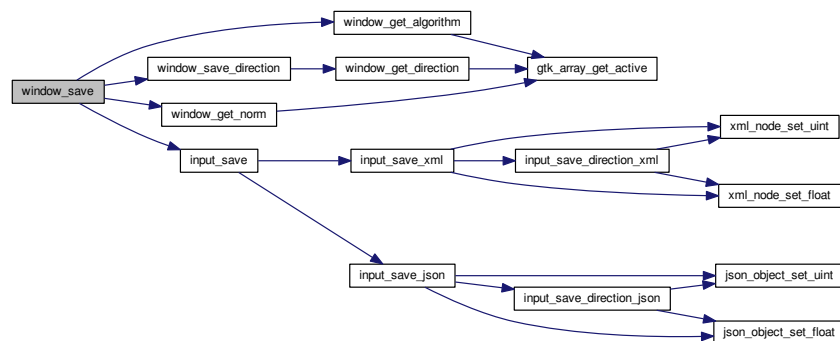
```

```

00926     input->algorithm = ALGORITHM_GENETIC;
00927     input->nsimulations
00928     = gtk_spin_button_get_value_as_int (window->spin_population);
00929     input->niterations
00930     = gtk_spin_button_get_value_as_int (window->spin_generations);
00931     input->mutation_ratio
00932     = gtk_spin_button_get_value (window->spin_mutation);
00933     input->reproduction_ratio
00934     = gtk_spin_button_get_value (window->spin_reproduction);
00935     input->adaptation_ratio
00936     = gtk_spin_button_get_value (window->spin_adaptation);
00937     break;
00938 }
00939 input->norm = window_get_norm ();
00940 input->p = gtk_spin_button_get_value (window->spin_p);
00941 input->threshold = gtk_spin_button_get_value (window->
spin_threshold);
00942
00943 // Saving the XML file
00944 buffer = gtk_file_chooser_get_filename (GTK_FILE_CHOOSER (dlg));
00945 input_save (buffer);
00946
00947 // Closing and freeing memory
00948 g_free (buffer);
00949 gtk_widget_destroy (GTK_WIDGET (dlg));
00950 #if DEBUG_INTERFACE
00951 fprintf (stderr, "window_save: end\n");
00952 #endif
00953 return 1;
00954 }
00955
00956 // Closing and freeing memory
00957 gtk_widget_destroy (GTK_WIDGET (dlg));
00958 #if DEBUG_INTERFACE
00959 fprintf (stderr, "window_save: end\n");
00960 #endif
00961 return 0;
00962 }

```

Here is the call graph for this function:



#### 5.11.2.11 void window\_template\_experiment ( void \* data )

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

##### Parameters

<i>data</i>	Callback data (i-th input template).
-------------	--------------------------------------

Definition at line 1520 of file [interface.c](#).

```

01521 {
01522     unsigned int i, j;
01523     char *buffer;
01524     GFile *file1, *file2;
01525     #if DEBUG_INTERFACE

```

```

01526     fprintf (stderr, "window_template_experiment: start\n");
01527 #endif
01528     i = (size_t) data;
01529     j = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01530     file1
01531         = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->button_template[i]));
01532     file2 = g_file_new_for_path (input->directory);
01533     buffer = g_file_get_relative_path (file2, file1);
01534     if (input->type == INPUT_TYPE_XML)
01535         input->experiment[j].template[i] = (char *) xmlStrdup ((xmlChar *) buffer);
01536     else
01537         input->experiment[j].template[i] = g_strdup (buffer);
01538     g_free (buffer);
01539     g_object_unref (file2);
01540     g_object_unref (file1);
01541 #if DEBUG_INTERFACE
01542     fprintf (stderr, "window_template_experiment: end\n");
01543 #endif
01544 }

```

## 5.12 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 2012-2016, 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
00032 #define _GNU_SOURCE
00033 #include "config.h"
00034 #include <stdio.h>
00035 #include <stdlib.h>
00036 #include <string.h>
00037 #include <math.h>
00038 #include <gsl/gsl_rng.h>
00039 #include <libxml/parser.h>
00040 #include <libintl.h>
00041 #include <glib.h>
00042 #include <glib/gstdio.h>
00043 #include <json-glib/json-glib.h>
00044 #ifdef G_OS_WIN32
00045 #include <windows.h>
00046 #elif !defined (__BSD_VISIBLE)
00047 #include <alloca.h>
00048 #endif
00049 #if HAVE_MPI
00050 #include <mpi.h>
00051 #endif
00052 #include <gio/gio.h>
00053 #include <gtk/gtk.h>
00054 #include "genetic/genetic.h"
00055 #include "utils.h"
00056 #include "experiment.h"
00057 #include "variable.h"
00058 #include "input.h"
00059 #include "optimize.h"
00060 #include "interface.h"
00061

```

```

00068 #define DEBUG_INTERFACE 1
00069
00070
00074 #ifdef G_OS_WIN32
00075 #define INPUT_FILE "test-ga-win.xml"
00076 #else
00077 #define INPUT_FILE "test-ga.xml"
00078 #endif
00079
00080 const char *logo[] = {
00081     "32 32 3 1",
00082     "    c None",
00083     ".    c #0000FF",
00084     "+    c #FF0000",
00085     "                                ",
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 const char * logo[] = {
00121     "32 32 3 1",
00122     "    c #FFFFFFFFFFFF",
00123     ".    c #00000000FFFF",
00124     "X    c #FFFF00000000",
00125     "                                ",
00126     "                                ",
00127     "                                ",
00128     "    .    .    .    .    ",
00129     "    .    .    .    .    ",
00130     "    .    .    .    .    ",
00131     "    .    .    .    .    ",
00132     "    .    .    XXX    .    ",
00133     "    .    .    XXXXX    .    ",
00134     "    .    .    XXXXX    .    ",
00135     "    .    .    XXXXX    .    ",
00136     "    XXX    .    XXX    XXX    ",
00137     "    XXXXX    .    .    XXXXX    ",
00138     "    XXXXX    .    .    XXXXX    ",
00139     "    XXXXX    .    .    XXXXX    ",
00140     "    XXX    .    .    XXX    ",
00141     "    .    .    .    .    ",
00142     "    .    XXX    .    .    ",
00143     "    .    XXXXX    .    .    ",
00144     "    .    XXXXX    .    .    ",
00145     "    .    XXXXX    .    .    ",
00146     "    .    XXX    .    .    ",
00147     "    .    .    .    .    ",
00148     "    .    .    .    .    ",
00149     "    .    .    .    .    ",
00150     "    .    .    .    .    ",
00151     "    .    .    .    .    ",
00152     "    .    .    .    .    ",
00153     "    .    .    .    .    ",
00154     "                                ",
00155     "                                ",
00156     "    };
00157 */

```

```

00158
00159 Options options[1];
00161 Running running[1];
00163 Window window[1];
00165
00172 void
00173 input_save_direction_xml (xmlNode * node)
00174 {
00175     #if DEBUG_INTERFACE
00176         fprintf (stderr, "input_save_direction_xml: start\n");
00177     #endif
00178     if (input->nsteps)
00179     {
00180         xml_node_set_uint (node, (const xmlChar *) LABEL_NSTEPS,
input->nsteps);
00181         if (input->relaxation != DEFAULT_RELAXATION)
00182             xml_node_set_float (node, (const xmlChar *)
LABEL_RELAXATION,
input->relaxation);
00183         switch (input->direction)
00184         {
00185             case DIRECTION_METHOD_COORDINATES:
00186                 xmlSetProp (node, (const xmlChar *) LABEL_DIRECTION,
(const xmlChar *) LABEL_COORDINATES);
00187                 break;
00188             default:
00189                 xmlSetProp (node, (const xmlChar *) LABEL_DIRECTION,
(const xmlChar *) LABEL_RANDOM);
00190                 xml_node_set_uint (node, (const xmlChar *)
LABEL_NESTIMATES,
input->nestimates);
00191         }
00192     }
00193     #if DEBUG_INTERFACE
00194         fprintf (stderr, "input_save_direction_xml: end\n");
00195     #endif
00196 }
00197
00208 void
00209 input_save_direction_json (JsonNode * node)
00210 {
00211     JsonObject *object;
00212     #if DEBUG_INTERFACE
00213         fprintf (stderr, "input_save_direction_json: start\n");
00214     #endif
00215     object = json_node_get_object (node);
00216     if (input->nsteps)
00217     {
00218         json_object_set_uint (object, LABEL_NSTEPS,
input->nsteps);
00219         if (input->relaxation != DEFAULT_RELAXATION)
00220             json_object_set_float (object, LABEL_RELAXATION,
input->relaxation);
00221         switch (input->direction)
00222         {
00223             case DIRECTION_METHOD_COORDINATES:
00224                 json_object_set_string_member (object, LABEL_DIRECTION,
LABEL_COORDINATES);
00225                 break;
00226             default:
00227                 json_object_set_string_member (object, LABEL_DIRECTION,
LABEL_RANDOM);
00228                 json_object_set_uint (object, LABEL_NESTIMATES,
input->nestimates);
00229         }
00230     }
00231     #if DEBUG_INTERFACE
00232         fprintf (stderr, "input_save_direction_json: end\n");
00233     #endif
00234 }
00235
00243 void
00244 input_save_xml (xmlDoc * doc)
00245 {
00246     unsigned int i, j;
00247     char *buffer;
00248     xmlNode *node, *child;
00249     GFile *file, *file2;
00250
00251     #if DEBUG_INTERFACE
00252         fprintf (stderr, "input_save_xml: start\n");
00253     #endif
00254
00255     // Setting root XML node
00256     node = xmlNewDocNode (doc, 0, (const xmlChar *) LABEL_OPTIMIZE, 0);
00257     xmlDocSetRootElement (doc, node);
00258

```



```

00259 // Adding properties to the root XML node
00260 if (xmlStrcmp
00261     ((const xmlChar *) input->result, (const xmlChar *) result_name))
00262     xmlSetProp (node, (const xmlChar *) LABEL_RESULT_FILE,
00263                 (xmlChar *) input->result);
00264 if (xmlStrcmp
00265     ((const xmlChar *) input->variables, (const xmlChar *)
variables_name))
00266     xmlSetProp (node, (const xmlChar *) LABEL_VARIABLES_FILE,
00267                 (xmlChar *) input->variables);
00268 file = g_file_new_for_path (input->directory);
00269 file2 = g_file_new_for_path (input->simulator);
00270 buffer = g_file_get_relative_path (file, file2);
00271 g_object_unref (file2);
00272 xmlSetProp (node, (const xmlChar *) LABEL_SIMULATOR, (xmlChar *) buffer);
00273 g_free (buffer);
00274 if (input->evaluator)
00275     {
00276         file2 = g_file_new_for_path (input->evaluator);
00277         buffer = g_file_get_relative_path (file, file2);
00278         g_object_unref (file2);
00279         if (xmlStrlen ((xmlChar *) buffer))
00280             xmlSetProp (node, (const xmlChar *) LABEL_EVALUATOR,
00281                         (xmlChar *) buffer);
00282         g_free (buffer);
00283     }
00284 if (input->seed != DEFAULT_RANDOM_SEED)
00285     xml_node_set_uint (node, (const xmlChar *) LABEL_SEED,
input->seed);
00286
00287 // Setting the algorithm
00288 buffer = (char *) g_slice_alloc (64);
00289 switch (input->algorithm)
00290     {
00291     case ALGORITHM_MONTE_CARLO:
00292         xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00293                     (const xmlChar *) LABEL_MONTE_CARLO);
00294         snprintf (buffer, 64, "%u", input->nsimulations);
00295         xmlSetProp (node, (const xmlChar *) LABEL_NSIMULATIONS,
00296                     (xmlChar *) buffer);
00297         snprintf (buffer, 64, "%u", input->niterations);
00298         xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00299                     (xmlChar *) buffer);
00300         snprintf (buffer, 64, "%.3lg", input->tolerance);
00301         xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00302         snprintf (buffer, 64, "%u", input->nbest);
00303         xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00304         input_save_direction_xml (node);
00305         break;
00306     case ALGORITHM_SWEEP:
00307         xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00308                     (const xmlChar *) LABEL_SWEEP);
00309         snprintf (buffer, 64, "%u", input->niterations);
00310         xmlSetProp (node, (const xmlChar *) LABEL_NITERATIONS,
00311                     (xmlChar *) buffer);
00312         snprintf (buffer, 64, "%.3lg", input->tolerance);
00313         xmlSetProp (node, (const xmlChar *) LABEL_TOLERANCE, (xmlChar *) buffer);
00314         snprintf (buffer, 64, "%u", input->nbest);
00315         xmlSetProp (node, (const xmlChar *) LABEL_NBEST, (xmlChar *) buffer);
00316         input_save_direction_xml (node);
00317         break;
00318     default:
00319         xmlSetProp (node, (const xmlChar *) LABEL_ALGORITHM,
00320                     (const xmlChar *) LABEL_GENETIC);
00321         snprintf (buffer, 64, "%u", input->nsimulations);
00322         xmlSetProp (node, (const xmlChar *) LABEL_NPOPULATION,
00323                     (xmlChar *) buffer);
00324         snprintf (buffer, 64, "%u", input->niterations);
00325         xmlSetProp (node, (const xmlChar *) LABEL_NGENERATIONS,
00326                     (xmlChar *) buffer);
00327         snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00328         xmlSetProp (node, (const xmlChar *) LABEL_MUTATION, (xmlChar *) buffer);
00329         snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00330         xmlSetProp (node, (const xmlChar *) LABEL_REPRODUCTION,
00331                     (xmlChar *) buffer);
00332         snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00333         xmlSetProp (node, (const xmlChar *) LABEL_ADAPTATION, (xmlChar *) buffer);
00334         break;
00335     }
00336 g_slice_free1 (64, buffer);
00337 if (input->threshold != 0.)
00338     xml_node_set_float (node, (const xmlChar *)
LABEL_THRESHOLD,
00339                         input->threshold);
00340
00341 // Setting the experimental data
00342 for (i = 0; i < input->nexperiments; ++i)

```

```

00343     {
00344         child = xmlNewChild (node, 0, (const xmlChar *) LABEL_EXPERIMENT, 0);
00345         xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00346             (xmlChar *) input->experiment[i].name);
00347         if (input->experiment[i].weight != 1.)
00348             xml_node_set_float (child, (const xmlChar *)
LABEL_WEIGHT,
00349                 input->experiment[i].weight);
00350         for (j = 0; j < input->experiment->ninputs; ++j)
00351             xmlSetProp (child, (const xmlChar *) template[j],
00352                 (xmlChar *) input->experiment[i].template[j]);
00353     }
00354
00355     // Setting the variables data
00356     for (i = 0; i < input->nvariables; ++i)
00357     {
00358         child = xmlNewChild (node, 0, (const xmlChar *) LABEL_VARIABLE, 0);
00359         xmlSetProp (child, (const xmlChar *) LABEL_NAME,
00360             (xmlChar *) input->variable[i].name);
00361         xml_node_set_float (child, (const xmlChar *)
LABEL_MINIMUM,
00362             input->variable[i].rangemin);
00363         if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00364             xml_node_set_float (child, (const xmlChar *)
LABEL_ABSOLUTE_MINIMUM,
00365                 input->variable[i].rangeminabs);
00366         xml_node_set_float (child, (const xmlChar *)
LABEL_MAXIMUM,
00367             input->variable[i].rangemax);
00368         if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00369             xml_node_set_float (child, (const xmlChar *)
LABEL_ABSOLUTE_MAXIMUM,
00370                 input->variable[i].rangemaxabs);
00371         if (input->variable[i].precision !=
DEFAULT_PRECISION)
00372             xml_node_set_uint (child, (const xmlChar *)
LABEL_PRECISION,
00373                 input->variable[i].precision);
00374         if (input->algorithm == ALGORITHM_SWEEP)
00375             xml_node_set_uint (child, (const xmlChar *)
LABEL_NSWEEPS,
00376                 input->variable[i].nsweeps);
00377         else if (input->algorithm == ALGORITHM_GENETIC)
00378             xml_node_set_uint (child, (const xmlChar *) LABEL_NBITS,
00379                 input->variable[i].nbits);
00380         if (input->nsteps)
00381             xml_node_set_float (child, (const xmlChar *)
LABEL_STEP,
00382                 input->variable[i].step);
00383     }
00384
00385     // Saving the error norm
00386     switch (input->norm)
00387     {
00388     case ERROR_NORM_MAXIMUM:
00389         xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00390             (const xmlChar *) LABEL_MAXIMUM);
00391         break;
00392     case ERROR_NORM_P:
00393         xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00394             (const xmlChar *) LABEL_P);
00395         xml_node_set_float (node, (const xmlChar *) LABEL_P,
input->p);
00396         break;
00397     case ERROR_NORM_TAXICAB:
00398         xmlSetProp (node, (const xmlChar *) LABEL_NORM,
00399             (const xmlChar *) LABEL_TAXICAB);
00400     }
00401
00402     #if DEBUG_INTERFACE
00403     fprintf (stderr, "input_save: end\n");
00404     #endif
00405 }
00406
00413 void
00414 input_save_json (JsonGenerator * generator)
00415 {
00416     unsigned int i, j;
00417     char *buffer;
00418     JsonNode *node, *child;
00419     JsonObject *object, *object2;
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_alloc ();
00429 object = json_object_new ();
00430 json_node_init_object (node, object);
00431 json_generator_set_root (generator, node);
00432
00433 // Adding properties to the root JSON node
00434 if (strcmp (input->result, result_name))
00435     json_object_set_string_member (object, LABEL_RESULT_FILE,
input->result);
00436 if (strcmp (input->variables, variables_name))
00437     json_object_set_string_member (object, LABEL_VARIABLES_FILE,
input->variables);
00438
00439 file = g_file_new_for_path (input->directory);
00440 file2 = g_file_new_for_path (input->simulator);
00441 buffer = g_file_get_relative_path (file, file2);
00442 g_object_unref (file2);
00443 json_object_set_string_member (object, LABEL_SIMULATOR, buffer);
00444 g_free (buffer);
00445 if (input->evaluator)
00446 {
00447     file2 = g_file_new_for_path (input->evaluator);
00448     buffer = g_file_get_relative_path (file, file2);
00449     g_object_unref (file2);
00450     if (strlen (buffer))
00451         json_object_set_string_member (object, LABEL_EVALUATOR, buffer);
00452     g_free (buffer);
00453 }
00454 if (input->seed != DEFAULT_RANDOM_SEED)
00455     json_object_set_uint (object, LABEL_SEED,
input->seed);
00456
00457 // Setting the algorithm
00458 buffer = (char *) g_slice_alloc (64);
00459 switch (input->algorithm)
00460 {
00461     case ALGORITHM_MONTE_CARLO:
00462         json_object_set_string_member (object, LABEL_ALGORITHM,
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_direction_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_direction_json (node);
00482         break;
00483     default:
00484         json_object_set_string_member (object, LABEL_ALGORITHM,
LABEL_GENETIC);
00485         snprintf (buffer, 64, "%u", input->nsimulations);
00486         json_object_set_string_member (object, LABEL_NPOPULATION, buffer);
00487         snprintf (buffer, 64, "%u", input->niterations);
00488         json_object_set_string_member (object, LABEL_NGENERATIONS, buffer);
00489         snprintf (buffer, 64, "%.3lg", input->mutation_ratio);
00490         json_object_set_string_member (object, LABEL_MUTATION, buffer);
00491         snprintf (buffer, 64, "%.3lg", input->reproduction_ratio);
00492         json_object_set_string_member (object, LABEL_REPRODUCTION, buffer);
00493         snprintf (buffer, 64, "%.3lg", input->adaptation_ratio);
00494         json_object_set_string_member (object, LABEL_ADAPTATION, buffer);
00495         break;
00496 }
00497 g_slice_free1 (64, buffer);
00498 if (input->threshold != 0.)
00499     json_object_set_float (object, LABEL_THRESHOLD,
input->threshold);
00500
00501 // Setting the experimental data
00502 array = json_array_new ();
00503 for (i = 0; i < input->nexperiments; ++i)
00504 {
00505     child = json_node_alloc ();
00506     object2 = json_object_new ();

```

```

00508     json_object_set_string_member (object2, LABEL_NAME,
00509                                   input->experiment[i].name);
00510     if (input->experiment[i].weight != 1.)
00511         json_object_set_float (object2, LABEL_WEIGHT,
00512                                input->experiment[i].weight);
00513     for (j = 0; j < input->experiment->ninputs; ++j)
00514         json_object_set_string_member (object2, template[j],
00515                                       input->experiment[i].
template[j]);
00516     json_node_set_object (child, object2);
00517     json_array_add_element (array, child);
00518 }
00519 json_object_set_array_member (object, LABEL_EXPERIMENTS, array);
00520
00521 // Setting the variables data
00522 array = json_array_new ();
00523 for (i = 0; i < input->nvariables; ++i)
00524 {
00525     child = json_node_alloc ();
00526     object2 = json_object_new ();
00527     json_object_set_string_member (object2, LABEL_NAME,
00528                                   input->variable[i].name);
00529     json_object_set_float (object2, LABEL_MINIMUM,
00530                            input->variable[i].rangemin);
00531     if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
00532         json_object_set_float (object2,
LABEL_ABSOLUTE_MINIMUM,
00533                                input->variable[i].rangeminabs);
00534     json_object_set_float (object2, LABEL_MAXIMUM,
00535                            input->variable[i].rangemax);
00536     if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
00537         json_object_set_float (object2,
LABEL_ABSOLUTE_MAXIMUM,
00538                                input->variable[i].rangemaxabs);
00539     if (input->variable[i].precision !=
DEFAULT_PRECISION)
00540         json_object_set_uint (object2, LABEL_PRECISION,
00541                               input->variable[i].precision);
00542     if (input->algorithm == ALGORITHM_SWEEP)
00543         json_object_set_uint (object2, LABEL_NSWEEPS,
00544                               input->variable[i].nsweeps);
00545     else if (input->algorithm == ALGORITHM_GENETIC)
00546         json_object_set_uint (object2, LABEL_NBITS,
input->variable[i].nbits);
00547     if (input->nsteps)
00548         json_object_set_float (object, LABEL_STEP,
input->variable[i].step);
00549     json_node_set_object (child, object2);
00550     json_array_add_element (array, child);
00551 }
00552 json_object_set_array_member (object, LABEL_VARIABLES, array);
00553
00554 // Saving the error norm
00555 switch (input->norm)
00556 {
00557     case ERROR_NORM_MAXIMUM:
00558         json_object_set_string_member (object, LABEL_NORM, LABEL_MAXIMUM);
00559         break;
00560     case ERROR_NORM_P:
00561         json_object_set_string_member (object, LABEL_NORM, LABEL_P);
00562         json_object_set_float (object, LABEL_P, input->
p);
00563         break;
00564     case ERROR_NORM_TAXICAB:
00565         json_object_set_string_member (object, LABEL_NORM, LABEL_TAXICAB);
00566 }
00567
00568 #if DEBUG_INTERFACE
00569     fprintf (stderr, "input_save_json: end\n");
00570 #endif
00571 }
00572
00573 void
00580 input_save (char *filename)
00581 {
00582     xmlDoc *doc;
00583     JsonGenerator *generator;
00584
00585     #if DEBUG_INTERFACE
00586         fprintf (stderr, "input_save: start\n");
00587     #endif
00588
00589     // Getting the input file directory
00590     input->name = g_path_get_basename (filename);
00591     input->directory = g_path_get_dirname (filename);
00592
00593     if (input->type == INPUT_TYPE_XML)

```

```

00594     {
00595         // Opening the input file
00596         doc = xmlNewDoc ((const xmlChar *) "1.0");
00597         input_save_xml (doc);
00598
00599         // Saving the XML file
00600         xmlSaveFormatFile (filename, doc, 1);
00601
00602         // Freeing memory
00603         xmlFreeDoc (doc);
00604     }
00605     else
00606     {
00607         // Opening the input file
00608         generator = json_generator_new ();
00609         json_generator_set_pretty (generator, TRUE);
00610         input_save_json (generator);
00611
00612         // Saving the JSON file
00613         json_generator_to_file (generator, filename, NULL);
00614
00615         // Freeing memory
00616         g_object_unref (generator);
00617     }
00618
00619 #if DEBUG_INTERFACE
00620     fprintf (stderr, "input_save: end\n");
00621 #endif
00622 }
00623
00624 void
00625 options_new ()
00626 {
00627 #if DEBUG_INTERFACE
00628     fprintf (stderr, "options_new: start\n");
00629 #endif
00630     options->label_seed = (GtkLabel *)
00631         gtk_label_new (gettext ("Pseudo-random numbers generator seed"));
00632     options->spin_seed = (GtkSpinButton *)
00633         gtk_spin_button_new_with_range (0., (gdouble) G_MAXULONG, 1.);
00634     gtk_widget_set_tooltip_text
00635         (GTK_WIDGET (options->spin_seed),
00636          gettext ("Seed to init the pseudo-random numbers generator"));
00637     gtk_spin_button_set_value (options->spin_seed, (gdouble) input->
00638 seed);
00639     options->label_threads = (GtkLabel *)
00640         gtk_label_new (gettext ("Threads number for the stochastic algorithm"));
00641     options->spin_threads
00642         = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00643     gtk_widget_set_tooltip_text
00644         (GTK_WIDGET (options->spin_threads),
00645          gettext ("Number of threads to perform the calibration/optimization for "
00646 "the stochastic algorithm"));
00647     gtk_spin_button_set_value (options->spin_threads, (gdouble)
00648 nthreads);
00649     options->label_direction = (GtkLabel *)
00650         gtk_label_new (gettext ("Threads number for the direction search method"));
00651     options->spin_direction
00652         = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
00653     gtk_widget_set_tooltip_text
00654         (GTK_WIDGET (options->spin_direction),
00655          gettext ("Number of threads to perform the calibration/optimization for "
00656 "the direction search method"));
00657     gtk_spin_button_set_value (options->spin_direction,
00658 (gdouble) nthreads_direction);
00659     options->grid = (GtkGrid *) gtk_grid_new ();
00660     gtk_grid_attach (options->grid, GTK_WIDGET (options->label_seed), 0, 0, 1, 1);
00661     gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_seed), 1, 0, 1, 1);
00662     gtk_grid_attach (options->grid, GTK_WIDGET (options->label_threads),
00663 0, 1, 1, 1);
00664     gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_threads),
00665 1, 1, 1, 1);
00666     gtk_grid_attach (options->grid, GTK_WIDGET (options->label_direction),
00667 0, 2, 1, 1);
00668     gtk_grid_attach (options->grid, GTK_WIDGET (options->spin_direction),
00669 1, 2, 1, 1);
00670     gtk_widget_show_all (GTK_WIDGET (options->grid));
00671     options->dialog = (GtkDialog *)
00672         gtk_dialog_new_with_buttons (gettext ("Options"),
00673 window->window,
00674 GTK_DIALOG_MODAL,
00675 gettext ("OK"), GTK_RESPONSE_OK,
00676 gettext ("Cancel"), GTK_RESPONSE_CANCEL,
00677 NULL);
00678     gtk_container_add
00679         (GTK_CONTAINER (gtk_dialog_get_content_area (options->dialog)),
00680          GTK_WIDGET (options->grid));

```

```

00683     if (gtk_dialog_run (options->dialog) == GTK_RESPONSE_OK)
00684     {
00685         input->seed
00686         = (unsigned long int) gtk_spin_button_get_value (options->spin_seed);
00687         nthreads = gtk_spin_button_get_value_as_int (options->spin_threads);
00688         nthreads_direction
00689         = gtk_spin_button_get_value_as_int (options->spin_direction);
00690     }
00691     gtk_widget_destroy (GTK_WIDGET (options->dialog));
00692 #if DEBUG_INTERFACE
00693     fprintf (stderr, "options_new: end\n");
00694 #endif
00695 }
00696
00701 void
00702 running_new ()
00703 {
00704     #if DEBUG_INTERFACE
00705     fprintf (stderr, "running_new: start\n");
00706     #endif
00707     running->label = (GtkLabel *) gtk_label_new (gettext ("Calculating ..."));
00708     running->spinner = (GtkSpinner *) gtk_spinner_new ();
00709     running->grid = (GtkGrid *) gtk_grid_new ();
00710     gtk_grid_attach (running->grid, GTK_WIDGET (running->label), 0, 0, 1, 1);
00711     gtk_grid_attach (running->grid, GTK_WIDGET (running->spinner), 0, 1, 1, 1);
00712     running->dialog = (GtkDialog *)
00713     gtk_dialog_new_with_buttons (gettext ("Calculating"),
00714                                 window->window, GTK_DIALOG_MODAL, NULL, NULL);
00715     gtk_container_add
00716     (GTK_CONTAINER (gtk_dialog_get_content_area (running->dialog)),
00717      GTK_WIDGET (running->grid));
00718     gtk_spinner_start (running->spinner);
00719     gtk_widget_show_all (GTK_WIDGET (running->dialog));
00720 #if DEBUG_INTERFACE
00721     fprintf (stderr, "running_new: end\n");
00722 #endif
00723 }
00724
00730 unsigned int
00731 window_get_algorithm ()
00732 {
00733     unsigned int i;
00734     #if DEBUG_INTERFACE
00735     fprintf (stderr, "window_get_algorithm: start\n");
00736     #endif
00737     i = gtk_array_get_active (window->button_algorithm,
00738                               NALGORITHMS);
00738     #if DEBUG_INTERFACE
00739     fprintf (stderr, "window_get_algorithm: %u\n", i);
00740     fprintf (stderr, "window_get_algorithm: end\n");
00741     #endif
00742     return i;
00743 }
00744
00750 unsigned int
00751 window_get_direction ()
00752 {
00753     unsigned int i;
00754     #if DEBUG_INTERFACE
00755     fprintf (stderr, "window_get_direction: start\n");
00756     #endif
00757     i = gtk_array_get_active (window->button_direction,
00758                               NDIRECTIONS);
00758     #if DEBUG_INTERFACE
00759     fprintf (stderr, "window_get_direction: %u\n", i);
00760     fprintf (stderr, "window_get_direction: end\n");
00761     #endif
00762     return i;
00763 }
00764
00770 unsigned int
00771 window_get_norm ()
00772 {
00773     unsigned int i;
00774     #if DEBUG_INTERFACE
00775     fprintf (stderr, "window_get_norm: start\n");
00776     #endif
00777     i = gtk_array_get_active (window->button_norm,
00778                               NNORMS);
00778     #if DEBUG_INTERFACE
00779     fprintf (stderr, "window_get_norm: %u\n", i);
00780     fprintf (stderr, "window_get_norm: end\n");
00781     #endif
00782     return i;
00783 }
00784
00789 void

```

```

00790 window_save_direction ()
00791 {
00792     #if DEBUG_INTERFACE
00793         fprintf (stderr, "window_save_direction: start\n");
00794     #endif
00795     if (gtk_toggle_button_get_active
00796         (GTK_TOGGLE_BUTTON (window->check_direction)))
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_direction ())
00801         {
00802             case DIRECTION_METHOD_COORDINATES:
00803                 input->direction = DIRECTION_METHOD_COORDINATES;
00804                 break;
00805             default:
00806                 input->direction = DIRECTION_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_direction: end\n");
00815     #endif
00816 }
00817
00823 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 (gettext ("Save file"),
00837                                     window->window,
00838                                     GTK_FILE_CHOOSER_ACTION_SAVE,
00839                                     gettext ("_Cancel"),
00840                                     GTK_RESPONSE_CANCEL,
00841                                     gettext ("_OK"), GTK_RESPONSE_OK, NULL);
00842     gtk_file_chooser_set_do_overwrite_confirmation (GTK_FILE_CHOOSER (dlg), TRUE);
00843     buffer = g_build_filename (input->directory, input->name, NULL);
00844     gtk_file_chooser_set_filename (GTK_FILE_CHOOSER (dlg), buffer);
00845     g_free (buffer);
00846
00847     // Adding XML filter
00848     filter1 = (GtkFileFilter *) gtk_file_filter_new ();
00849     gtk_file_filter_set_name (filter1, "XML");
00850     gtk_file_filter_add_pattern (filter1, "*.xml");
00851     gtk_file_filter_add_pattern (filter1, "*.XML");
00852     gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter1);
00853
00854     // Adding JSON filter
00855     filter2 = (GtkFileFilter *) gtk_file_filter_new ();
00856     gtk_file_filter_set_name (filter2, "JSON");
00857     gtk_file_filter_add_pattern (filter2, "*.json");
00858     gtk_file_filter_add_pattern (filter2, "*.JSON");
00859     gtk_file_filter_add_pattern (filter2, "*.js");
00860     gtk_file_filter_add_pattern (filter2, "*.JS");
00861     gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter2);
00862
00863     if (input->type == INPUT_TYPE_XML)
00864         gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter1);
00865     else
00866         gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter2);
00867
00868     // If OK response then saving
00869     if (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
00870     {
00871         // Setting input file type
00872         filter1 = gtk_file_chooser_get_filter (GTK_FILE_CHOOSER (dlg));
00873         buffer = (char *) gtk_file_filter_get_name (filter1);
00874         if (!strcmp (buffer, "XML"))
00875             input->type = INPUT_TYPE_XML;
00876         else
00877             input->type = INPUT_TYPE_JSON;
00878
00879         // Adding properties to the root XML node

```

```

00880     input->simulator = gtk_file_chooser_get_filename
00881     (GTK_FILE_CHOOSER (window->button_simulator));
00882     if (gtk_toggle_button_get_active
00883     (GTK_TOGGLE_BUTTON (window->check_evaluator)))
00884         input->evaluator = gtk_file_chooser_get_filename
00885         (GTK_FILE_CHOOSER (window->button_evaluator));
00886     else
00887         input->evaluator = NULL;
00888     if (input->type == INPUT_TYPE_XML)
00889     {
00890         input->result
00891         = (char *) xmlStrdup ((const xmlChar *)
00892         gtk_entry_get_text (window->entry_result));
00893         input->variables
00894         = (char *) xmlStrdup ((const xmlChar *)
00895         gtk_entry_get_text (window->entry_variables));
00896     }
00897     else
00898     {
00899         input->result = g_strdup (gtk_entry_get_text (window->
00900         entry_result));
00901         input->variables
00902         = g_strdup (gtk_entry_get_text (window->entry_variables));
00903     }
00904     // Setting the algorithm
00905     switch (window_get_algorithm ())
00906     {
00907         case ALGORITHM_MONTE_CARLO:
00908             input->algorithm = ALGORITHM_MONTE_CARLO;
00909             input->nsimulations
00910             = gtk_spin_button_get_value_as_int (window->spin_simulations);
00911             input->niterations
00912             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00913             input->tolerance = gtk_spin_button_get_value (window->
00914             spin_tolerance);
00915             input->nbest = gtk_spin_button_get_value_as_int (window->
00916             spin_bests);
00917             window_save_direction ();
00918             break;
00919         case ALGORITHM_SWEEP:
00920             input->algorithm = ALGORITHM_SWEEP;
00921             input->niterations
00922             = gtk_spin_button_get_value_as_int (window->spin_iterations);
00923             input->tolerance = gtk_spin_button_get_value (window->
00924             spin_tolerance);
00925             input->nbest = gtk_spin_button_get_value_as_int (window->
00926             spin_bests);
00927             window_save_direction ();
00928             break;
00929         default:
00930             input->algorithm = ALGORITHM_GENETIC;
00931             input->nsimulations
00932             = gtk_spin_button_get_value_as_int (window->spin_population);
00933             input->niterations
00934             = gtk_spin_button_get_value_as_int (window->spin_generations);
00935             input->mutation_ratio
00936             = gtk_spin_button_get_value (window->spin_mutation);
00937             input->reproduction_ratio
00938             = gtk_spin_button_get_value (window->spin_reproduction);
00939             input->adaptation_ratio
00940             = gtk_spin_button_get_value (window->spin_adaptation);
00941             break;
00942     }
00943     input->norm = window_get_norm ();
00944     input->p = gtk_spin_button_get_value (window->spin_p);
00945     input->threshold = gtk_spin_button_get_value (window->
00946     spin_threshold);
00947     // Saving the XML file
00948     buffer = gtk_file_chooser_get_filename (GTK_FILE_CHOOSER (dlg));
00949     input_save (buffer);
00950     // Closing and freeing memory
00951     g_free (buffer);
00952     gtk_widget_destroy (GTK_WIDGET (dlg));
00953     #if DEBUG_INTERFACE
00954     fprintf (stderr, "window_save: end\n");
00955     #endif
00956     return 1;
00957 }
00958 // Closing and freeing memory
00959 gtk_widget_destroy (GTK_WIDGET (dlg));
00960 #if DEBUG_INTERFACE
00961 fprintf (stderr, "window_save: end\n");
00962 #endif

```



```

00961     return 0;
00962 }
00963
00968 void
00969 window_run ()
00970 {
00971     unsigned int i;
00972     char *msg, *msg2, buffer[64], buffer2[64];
00973     #if DEBUG_INTERFACE
00974     fprintf (stderr, "window_run: start\n");
00975     #endif
00976     if (!window_save ())
00977     {
00978         #if DEBUG_INTERFACE
00979         fprintf (stderr, "window_run: end\n");
00980         #endif
00981         return;
00982     }
00983     running_new ();
00984     while (gtk_events_pending ())
00985         gtk_main_iteration ();
00986     optimize_open ();
00987     #if DEBUG_INTERFACE
00988     fprintf (stderr, "window_run: closing running dialog\n");
00989     #endif
00990     gtk_spinner_stop (running->spinner);
00991     gtk_widget_destroy (GTK_WIDGET (running->dialog));
00992     #if DEBUG_INTERFACE
00993     fprintf (stderr, "window_run: displaying results\n");
00994     #endif
00995     snprintf (buffer, 64, "error = %.15le\n", optimize->error_old[0]);
00996     msg2 = g_strdup (buffer);
00997     for (i = 0; i < optimize->nvariables; ++i, msg2 = msg)
00998     {
00999         snprintf (buffer, 64, "%s = %s\n",
01000                 input->variable[i].name, format[input->
01001 variable[i].precision]);
01002         snprintf (buffer2, 64, buffer, optimize->value_old[i]);
01003         msg = g_strconcat (msg2, buffer2, NULL);
01004         g_free (msg2);
01005     }
01006     snprintf (buffer, 64, "%s = %.6lg s", gettext ("Calculation time"),
01007             optimize->calculation_time);
01008     msg = g_strconcat (msg2, buffer, NULL);
01009     g_free (msg2);
01010     show_message (gettext ("Best result"), msg, INFO_TYPE);
01011     g_free (msg);
01012     #if DEBUG_INTERFACE
01013     fprintf (stderr, "window_run: freeing memory\n");
01014     #endif
01015     optimize_free ();
01016     #if DEBUG_INTERFACE
01017     fprintf (stderr, "window_run: end\n");
01018     #endif
01019 }
01020
01024 void
01025 window_help ()
01026 {
01027     char *buffer, *buffer2;
01028     #if DEBUG_INTERFACE
01029     fprintf (stderr, "window_help: start\n");
01030     #endif
01031     buffer2 = g_build_filename (window->application_directory, "..", "manuals",
01032                                gettext ("user-manual.pdf"), NULL);
01033     buffer = g_filename_to_uri (buffer2, NULL, NULL);
01034     g_free (buffer2);
01035     gtk_show_uri (NULL, buffer, GDK_CURRENT_TIME, NULL);
01036     #if DEBUG_INTERFACE
01037     fprintf (stderr, "window_help: uri=%s\n", buffer);
01038     #endif
01039     g_free (buffer);
01040     #if DEBUG_INTERFACE
01041     fprintf (stderr, "window_help: end\n");
01042     #endif
01043 }
01044
01049 void
01050 window_about ()
01051 {
01052     static const gchar *authors[] = {
01053         "Javier Burguete Tolosa <jburguete@eead.csic.es>",
01054         "Borja Latorre Garcés <borja.latorre@csic.es>",
01055         NULL
01056     };
01057     #if DEBUG_INTERFACE
01058     fprintf (stderr, "window_about: start\n");

```

```

01059 #endif
01060 gtk_show_about_dialog
01061 (window->window,
01062  "program_name", "MPCOTool",
01063  "comments",
01064  gettext ("The Multi-Purposes Calibration and Optimization Tool.\n"
01065           "A software to perform calibrations or optimizations of "
01066           "empirical parameters"),
01067  "authors", authors,
01068  "translator-credits", "Javier Burguete Tolosa <jburguete@eead.csic.es>",
01069  "version", "3.0.0",
01070  "copyright", "Copyright 2012-2016 Javier Burguete Tolosa",
01071  "logo", window->logo,
01072  "website", "https://github.com/jburguete/mpcotool",
01073  "license-type", GTK_LICENSE_BSD, NULL);
01074 #if DEBUG_INTERFACE
01075 fprintf (stderr, "window_about: end\n");
01076 #endif
01077 }
01078
01084 void
01085 window_update_direction ()
01086 {
01087 #if DEBUG_INTERFACE
01088 fprintf (stderr, "window_update_direction: start\n");
01089 #endif
01090 gtk_widget_show (GTK_WIDGET (window->check_direction));
01091 if (gtk_toggle_button_get_active
01092     (GTK_TOGGLE_BUTTON (window->check_direction)))
01093 {
01094     gtk_widget_show (GTK_WIDGET (window->grid_direction));
01095     gtk_widget_show (GTK_WIDGET (window->label_step));
01096     gtk_widget_show (GTK_WIDGET (window->spin_step));
01097 }
01098 switch (window_get_direction ())
01099 {
01100     case DIRECTION_METHOD_COORDINATES:
01101         gtk_widget_hide (GTK_WIDGET (window->label_estimates));
01102         gtk_widget_hide (GTK_WIDGET (window->spin_estimates));
01103         break;
01104     default:
01105         gtk_widget_show (GTK_WIDGET (window->label_estimates));
01106         gtk_widget_show (GTK_WIDGET (window->spin_estimates));
01107 }
01108 #if DEBUG_INTERFACE
01109 fprintf (stderr, "window_update_direction: end\n");
01110 #endif
01111 }
01112
01117 void
01118 window_update ()
01119 {
01120     unsigned int i;
01121 #if DEBUG_INTERFACE
01122 fprintf (stderr, "window_update: start\n");
01123 #endif
01124 gtk_widget_set_sensitive
01125 (GTK_WIDGET (window->button_evaluator),
01126  gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01127                                (window->check_evaluator)));
01128 gtk_widget_hide (GTK_WIDGET (window->label_simulations));
01129 gtk_widget_hide (GTK_WIDGET (window->spin_simulations));
01130 gtk_widget_hide (GTK_WIDGET (window->label_iterations));
01131 gtk_widget_hide (GTK_WIDGET (window->spin_iterations));
01132 gtk_widget_hide (GTK_WIDGET (window->label_tolerance));
01133 gtk_widget_hide (GTK_WIDGET (window->spin_tolerance));
01134 gtk_widget_hide (GTK_WIDGET (window->label_bests));
01135 gtk_widget_hide (GTK_WIDGET (window->spin_bests));
01136 gtk_widget_hide (GTK_WIDGET (window->label_population));
01137 gtk_widget_hide (GTK_WIDGET (window->spin_population));
01138 gtk_widget_hide (GTK_WIDGET (window->label_generations));
01139 gtk_widget_hide (GTK_WIDGET (window->spin_generations));
01140 gtk_widget_hide (GTK_WIDGET (window->label_mutation));
01141 gtk_widget_hide (GTK_WIDGET (window->spin_mutation));
01142 gtk_widget_hide (GTK_WIDGET (window->label_reproduction));
01143 gtk_widget_hide (GTK_WIDGET (window->spin_reproduction));
01144 gtk_widget_hide (GTK_WIDGET (window->label_adaptation));
01145 gtk_widget_hide (GTK_WIDGET (window->spin_adaptation));
01146 gtk_widget_hide (GTK_WIDGET (window->label_sweeps));
01147 gtk_widget_hide (GTK_WIDGET (window->spin_sweeps));
01148 gtk_widget_hide (GTK_WIDGET (window->label_bits));
01149 gtk_widget_hide (GTK_WIDGET (window->spin_bits));
01150 gtk_widget_hide (GTK_WIDGET (window->check_direction));
01151 gtk_widget_hide (GTK_WIDGET (window->grid_direction));
01152 gtk_widget_hide (GTK_WIDGET (window->label_step));
01153 gtk_widget_hide (GTK_WIDGET (window->spin_step));
01154 gtk_widget_hide (GTK_WIDGET (window->label_p));

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```

01155 gtk_widget_hide (GTK_WIDGET (window->spin_p));
01156 i = gtk_spin_button_get_value_as_int (window->spin_iterations);
01157 switch (window_get_algorithm ())
01158 {
01159     case ALGORITHM_MONTE_CARLO:
01160         gtk_widget_show (GTK_WIDGET (window->label_simulations));
01161         gtk_widget_show (GTK_WIDGET (window->spin_simulations));
01162         gtk_widget_show (GTK_WIDGET (window->label_iterations));
01163         gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01164         if (i > 1)
01165         {
01166             gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01167             gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01168             gtk_widget_show (GTK_WIDGET (window->label_bests));
01169             gtk_widget_show (GTK_WIDGET (window->spin_bests));
01170         }
01171         window_update_direction ();
01172         break;
01173     case ALGORITHM_SWEEP:
01174         gtk_widget_show (GTK_WIDGET (window->label_iterations));
01175         gtk_widget_show (GTK_WIDGET (window->spin_iterations));
01176         if (i > 1)
01177         {
01178             gtk_widget_show (GTK_WIDGET (window->label_tolerance));
01179             gtk_widget_show (GTK_WIDGET (window->spin_tolerance));
01180             gtk_widget_show (GTK_WIDGET (window->label_bests));
01181             gtk_widget_show (GTK_WIDGET (window->spin_bests));
01182         }
01183         gtk_widget_show (GTK_WIDGET (window->label_sweeps));
01184         gtk_widget_show (GTK_WIDGET (window->spin_sweeps));
01185         gtk_widget_show (GTK_WIDGET (window->check_direction));
01186         window_update_direction ();
01187         break;
01188     default:
01189         gtk_widget_show (GTK_WIDGET (window->label_population));
01190         gtk_widget_show (GTK_WIDGET (window->spin_population));
01191         gtk_widget_show (GTK_WIDGET (window->label_generations));
01192         gtk_widget_show (GTK_WIDGET (window->spin_generations));
01193         gtk_widget_show (GTK_WIDGET (window->label_mutation));
01194         gtk_widget_show (GTK_WIDGET (window->spin_mutation));
01195         gtk_widget_show (GTK_WIDGET (window->label_reproduction));
01196         gtk_widget_show (GTK_WIDGET (window->spin_reproduction));
01197         gtk_widget_show (GTK_WIDGET (window->label_adaptation));
01198         gtk_widget_show (GTK_WIDGET (window->spin_adaptation));
01199         gtk_widget_show (GTK_WIDGET (window->label_bits));
01200         gtk_widget_show (GTK_WIDGET (window->spin_bits));
01201     }
01202     gtk_widget_set_sensitive
01203     (GTK_WIDGET (window->button_remove_experiment),
01204      input->nexperiments > 1);
01204     gtk_widget_set_sensitive
01205     (GTK_WIDGET (window->button_remove_variable), input->
01206      nvariables > 1);
01206     for (i = 0; i < input->experiment->ninputs; ++i)
01207     {
01208         gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01209         gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01210         gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 0);
01211         gtk_widget_set_sensitive (GTK_WIDGET (window->button_template[i]), 1);
01212         g_signal_handler_block
01213         (window->check_template[i], window->id_template[i]);
01214         g_signal_handler_block (window->button_template[i], window->
01215         id_input[i]);
01215         gtk_toggle_button_set_active
01216         (GTK_TOGGLE_BUTTON (window->check_template[i]), 1);
01217         g_signal_handler_unblock
01218         (window->button_template[i], window->id_input[i]);
01219         g_signal_handler_unblock
01220         (window->check_template[i], window->id_template[i]);
01221     }
01222     if (i > 0)
01223     {
01224         gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i - 1]), 1);
01225         gtk_widget_set_sensitive
01226         (GTK_WIDGET (window->button_template[i - 1]),
01227          gtk_toggle_button_get_active
01228          (GTK_TOGGLE_BUTTON (window->check_template[i - 1])));
01229     }
01230     if (i < MAX_NINPUTS)
01231     {
01232         gtk_widget_show (GTK_WIDGET (window->check_template[i]));
01233         gtk_widget_show (GTK_WIDGET (window->button_template[i]));
01234         gtk_widget_set_sensitive (GTK_WIDGET (window->check_template[i]), 1);
01235         gtk_widget_set_sensitive
01236         (GTK_WIDGET (window->button_template[i]),
01237          gtk_toggle_button_get_active
01238          (GTK_TOGGLE_BUTTON (window->check_template[i])));

```

```

01239     g_signal_handler_block
01240     (window->check_template[i], window->id_template[i]);
01241     g_signal_handler_block (window->button_template[i], window->
id_input[i]);
01242     gtk_toggle_button_set_active
01243     (GTK_TOGGLE_BUTTON (window->check_template[i]), 0);
01244     g_signal_handler_unblock
01245     (window->button_template[i], window->id_input[i]);
01246     g_signal_handler_unblock
01247     (window->check_template[i], window->id_template[i]);
01248 }
01249 while (++i < MAX_NINPUTS)
01250 {
01251     gtk_widget_hide (GTK_WIDGET (window->check_template[i]));
01252     gtk_widget_hide (GTK_WIDGET (window->button_template[i]));
01253 }
01254 gtk_widget_set_sensitive
01255 (GTK_WIDGET (window->spin_minabs),
01256  gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_minabs)));
01257 gtk_widget_set_sensitive
01258 (GTK_WIDGET (window->spin_maxabs),
01259  gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (window->check_maxabs)));
01260 if (window_get_norm () == ERROR_NORM_P)
01261 {
01262     gtk_widget_show (GTK_WIDGET (window->label_p));
01263     gtk_widget_show (GTK_WIDGET (window->spin_p));
01264 }
01265 #if DEBUG_INTERFACE
01266 fprintf (stderr, "window_update: end\n");
01267 #endif
01268 }
01269 void
01270 window_set_algorithm ()
01271 {
01272     int i;
01273     #if DEBUG_INTERFACE
01274     fprintf (stderr, "window_set_algorithm: start\n");
01275     #endif
01276     i = window_get_algorithm ();
01277     switch (i)
01278     {
01279     case ALGORITHM_SWEEP:
01280         i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01281         if (i < 0)
01282             i = 0;
01283         gtk_spin_button_set_value (window->spin_sweeps,
01284                                   (gdouble) input->variable[i].
nsweps);
01285         break;
01286     case ALGORITHM_GENETIC:
01287         i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01288         if (i < 0)
01289             i = 0;
01290         gtk_spin_button_set_value (window->spin_bits,
01291                                   (gdouble) input->variable[i].nbits);
01292     }
01293     window_update ();
01294     #if DEBUG_INTERFACE
01295     fprintf (stderr, "window_set_algorithm: end\n");
01296     #endif
01297 }
01298 void
01299 window_set_experiment ()
01300 {
01301     unsigned int i, j;
01302     char *buffer1, *buffer2;
01303     #if DEBUG_INTERFACE
01304     fprintf (stderr, "window_set_experiment: start\n");
01305     #endif
01306     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01307     gtk_spin_button_set_value (window->spin_weight, input->
experiment[i].weight);
01308     buffer1 = gtk_combo_box_text_get_active_text (window->combo_experiment);
01309     buffer2 = g_build_filename (input->directory, buffer1, NULL);
01310     g_free (buffer1);
01311     g_signal_handler_block
01312     (window->button_experiment, window->id_experiment_name);
01313     gtk_file_chooser_set_filename
01314     (GTK_FILE_CHOOSER (window->button_experiment), buffer2);
01315     g_signal_handler_unblock
01316     (window->button_experiment, window->id_experiment_name);
01317     g_free (buffer2);
01318     for (j = 0; j < input->experiment->ninputs; ++j)
01319     {
01320         g_signal_handler_block (window->button_template[j], window->

```

```

    id_input[j]);
01331     buffer2 = g_build_filename (input->directory,
01332                                input->experiment[i].template[j], NULL);
01333     gtk_file_chooser_set_filename
01334     (GTK_FILE_CHOOSER (window->button_template[j]), buffer2);
01335     g_free (buffer2);
01336     g_signal_handler_unblock
01337     (window->button_template[j], window->id_input[j]);
01338 }
01339 #if DEBUG_INTERFACE
01340 fprintf (stderr, "window_set_experiment: end\n");
01341 #endif
01342 }
01343
01344 void
01345 window_remove_experiment ()
01346 {
01347     unsigned int i, j;
01348 #if DEBUG_INTERFACE
01349 fprintf (stderr, "window_remove_experiment: start\n");
01350 #endif
01351 i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01352 g_signal_handler_block (window->combo_experiment, window->
01353 id_experiment);
01354 gtk_combo_box_text_remove (window->combo_experiment, i);
01355 g_signal_handler_unblock (window->combo_experiment, window->
01356 id_experiment);
01357 experiment_free (input->experiment + i, input->
01358 type);
01359 --input->nexperiments;
01360 for (j = i; j < input->nexperiments; ++j)
01361     memcpy (input->experiment + j, input->experiment + j + 1,
01362            sizeof (Experiment));
01363 j = input->nexperiments - 1;
01364 if (i > j)
01365     i = j;
01366 for (j = 0; j < input->experiment->ninputs; ++j)
01367     g_signal_handler_block (window->button_template[j], window->
01368 id_input[j]);
01369 g_signal_handler_block
01370 (window->button_experiment, window->id_experiment_name);
01371 gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01372 g_signal_handler_unblock
01373 (window->button_experiment, window->id_experiment_name);
01374 for (j = 0; j < input->experiment->ninputs; ++j)
01375     g_signal_handler_unblock (window->button_template[j], window->
01376 id_input[j]);
01377 window_update ();
01378 #if DEBUG_INTERFACE
01379 fprintf (stderr, "window_remove_experiment: end\n");
01380 #endif
01381 }
01382
01383 void
01384 window_add_experiment ()
01385 {
01386     unsigned int i, j;
01387 #if DEBUG_INTERFACE
01388 fprintf (stderr, "window_add_experiment: start\n");
01389 #endif
01390 i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01391 g_signal_handler_block (window->combo_experiment, window->
01392 id_experiment);
01393 gtk_combo_box_text_insert_text
01394 (window->combo_experiment, i, input->experiment[i].
01395 name);
01396 g_signal_handler_unblock (window->combo_experiment, window->
01397 id_experiment);
01398 input->experiment = (Experiment *) g_realloc
01399 (input->experiment, (input->nexperiments + 1) * sizeof (
01400 Experiment));
01401 for (j = input->nexperiments - 1; j > i; --j)
01402     memcpy (input->experiment + j + 1, input->experiment + j,
01403            sizeof (Experiment));
01404 input->experiment[j + 1].weight = input->experiment[j].
01405 weight;
01406 input->experiment[j + 1].ninputs = input->
01407 experiment[j].ninputs;
01408 if (input->type == INPUT_TYPE_XML)
01409 {
01410     input->experiment[j + 1].name
01411     = (char *) xmlStrdup ((xmlChar *) input->experiment[j].
01412 name);
01413 for (j = 0; j < input->experiment->ninputs; ++j)
01414     input->experiment[i + 1].template[j]
01415     = (char *) xmlStrdup ((xmlChar *) input->experiment[i].
01416 template[j]);

```

```

01412     }
01413     else
01414     {
01415         input->experiment[j + 1].name = g_strdup (input->
experiment[j].name);
01416         for (j = 0; j < input->experiment->ninputs; ++j)
01417             input->experiment[i + 1].template[j]
01418                 = g_strdup (input->experiment[i].template[j]);
01419     }
01420     ++input->nexperiments;
01421     for (j = 0; j < input->experiment->ninputs; ++j)
01422         g_signal_handler_block (window->button_template[j], window->
id_input[j]);
01423     g_signal_handler_block
01424         (window->button_experiment, window->id_experiment_name);
01425     gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i + 1);
01426     g_signal_handler_unblock
01427         (window->button_experiment, window->id_experiment_name);
01428     for (j = 0; j < input->experiment->ninputs; ++j)
01429         g_signal_handler_unblock (window->button_template[j], window->
id_input[j]);
01430     window_update ();
01431     #if DEBUG_INTERFACE
01432     fprintf (stderr, "window_add_experiment: end\n");
01433     #endif
01434 }
01435
01440 void
01441 window_name_experiment ()
01442 {
01443     unsigned int i;
01444     char *buffer;
01445     GFile *file1, *file2;
01446     #if DEBUG_INTERFACE
01447     fprintf (stderr, "window_name_experiment: start\n");
01448     #endif
01449     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01450     file1
01451         = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->button_experiment));
01452     file2 = g_file_new_for_path (input->directory);
01453     buffer = g_file_get_relative_path (file2, file1);
01454     g_signal_handler_block (window->combo_experiment, window->
id_experiment);
01455     gtk_combo_box_text_remove (window->combo_experiment, i);
01456     gtk_combo_box_text_insert_text (window->combo_experiment, i, buffer);
01457     gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), i);
01458     g_signal_handler_unblock (window->combo_experiment, window->
id_experiment);
01459     g_free (buffer);
01460     g_object_unref (file2);
01461     g_object_unref (file1);
01462     #if DEBUG_INTERFACE
01463     fprintf (stderr, "window_name_experiment: end\n");
01464     #endif
01465 }
01466
01471 void
01472 window_weight_experiment ()
01473 {
01474     unsigned int i;
01475     #if DEBUG_INTERFACE
01476     fprintf (stderr, "window_weight_experiment: start\n");
01477     #endif
01478     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01479     input->experiment[i].weight = gtk_spin_button_get_value (window->
spin_weight);
01480     #if DEBUG_INTERFACE
01481     fprintf (stderr, "window_weight_experiment: end\n");
01482     #endif
01483 }
01484
01490 void
01491 window_inputs_experiment ()
01492 {
01493     unsigned int j;
01494     #if DEBUG_INTERFACE
01495     fprintf (stderr, "window_inputs_experiment: start\n");
01496     #endif
01497     j = input->experiment->ninputs - 1;
01498     if (j
01499         && !gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01500             (window->check_template[j])))
01501         --input->experiment->ninputs;
01502     if (input->experiment->ninputs < MAX_NINPUTS
01503         && gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON
01504             (window->check_template[j])))
01505         ++input->experiment->ninputs;

```

```

01506     window_update ();
01507 #if DEBUG_INTERFACE
01508     fprintf (stderr, "window_inputs_experiment: end\n");
01509 #endif
01510 }
01511
01519 void
01520 window_template_experiment (void *data)
01521 {
01522     unsigned int i, j;
01523     char *buffer;
01524     GFile *file1, *file2;
01525 #if DEBUG_INTERFACE
01526     fprintf (stderr, "window_template_experiment: start\n");
01527 #endif
01528     i = (size_t) data;
01529     j = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01530     file1
01531     = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->button_template[i]));
01532     file2 = g_file_new_for_path (input->directory);
01533     buffer = g_file_get_relative_path (file2, file1);
01534     if (input->type == INPUT_TYPE_XML)
01535         input->experiment[j].template[i] = (char *) xmlStrdup ((xmlChar *) buffer);
01536     else
01537         input->experiment[j].template[i] = g_strdup (buffer);
01538     g_free (buffer);
01539     g_object_unref (file2);
01540     g_object_unref (file1);
01541 #if DEBUG_INTERFACE
01542     fprintf (stderr, "window_template_experiment: end\n");
01543 #endif
01544 }
01545
01550 void
01551 window_set_variable ()
01552 {
01553     unsigned int i;
01554 #if DEBUG_INTERFACE
01555     fprintf (stderr, "window_set_variable: start\n");
01556 #endif
01557     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01558     g_signal_handler_block (window->entry_variable, window->
01559         id_variable_label);
01560     gtk_entry_set_text (window->entry_variable, input->variable[i].
01561         name);
01562     g_signal_handler_unblock (window->entry_variable, window->
01563         id_variable_label);
01564     gtk_spin_button_set_value (window->spin_min, input->variable[i].
01565         rangemin);
01566     gtk_spin_button_set_value (window->spin_max, input->variable[i].
01567         rangemax);
01568     if (input->variable[i].rangeminabs != -G_MAXDOUBLE)
01569     {
01570         gtk_spin_button_set_value (window->spin_minabs,
01571             input->variable[i].rangeminabs);
01572         gtk_toggle_button_set_active
01573             (GTK_TOGGLE_BUTTON (window->check_minabs), 1);
01574     }
01575     else
01576     {
01577         gtk_spin_button_set_value (window->spin_minabs, -G_MAXDOUBLE);
01578         gtk_toggle_button_set_active
01579             (GTK_TOGGLE_BUTTON (window->check_minabs), 0);
01580     }
01581     if (input->variable[i].rangemaxabs != G_MAXDOUBLE)
01582     {
01583         gtk_spin_button_set_value (window->spin_maxabs,
01584             input->variable[i].rangemaxabs);
01585         gtk_toggle_button_set_active
01586             (GTK_TOGGLE_BUTTON (window->check_maxabs), 1);
01587     }
01588     else
01589     {
01590         gtk_spin_button_set_value (window->spin_maxabs, G_MAXDOUBLE);
01591         gtk_toggle_button_set_active
01592             (GTK_TOGGLE_BUTTON (window->check_maxabs), 0);
01593     }
01594     gtk_spin_button_set_value (window->spin_precision,
01595         input->variable[i].precision);
01596     gtk_spin_button_set_value (window->spin_steps, (gdouble) input->
01597         nsteps);
01598     if (input->nsteps)
01599         gtk_spin_button_set_value (window->spin_step, input->variable[i].
01600             step);
01601 #if DEBUG_INTERFACE
01602     fprintf (stderr, "window_set_variable: precision[%u]=%u\n", i,
01603         input->variable[i].precision);

```

```

01597 #endif
01598     switch (window_get_algorithm ())
01599     {
01600         case ALGORITHM_SWEEP:
01601             gtk_spin_button_set_value (window->spin_sweeps,
01602                                     (gdouble) input->variable[i].
01603                                     nsweeps);
01604         #if DEBUG_INTERFACE
01605             fprintf (stderr, "window_set_variable: nsweeps[%u]=%u\n", i,
01606                     input->variable[i].nsweeps);
01607         #endif
01608             break;
01609         case ALGORITHM_GENETIC:
01610             gtk_spin_button_set_value (window->spin_bits,
01611                                     (gdouble) input->variable[i].nbits);
01612         #if DEBUG_INTERFACE
01613             fprintf (stderr, "window_set_variable: nbits[%u]=%u\n", i,
01614                     input->variable[i].nbits);
01615         #endif
01616             break;
01617     }
01618     window_update ();
01619     #if DEBUG_INTERFACE
01620     fprintf (stderr, "window_set_variable: end\n");
01621     #endif
01622 }
01623 void
01624 window_remove_variable ()
01625 {
01626     unsigned int i, j;
01627     #if DEBUG_INTERFACE
01628     fprintf (stderr, "window_remove_variable: start\n");
01629     #endif
01630     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01631     g_signal_handler_block (window->combo_variable, window->
01632                             id_variable);
01633     gtk_combo_box_text_remove (window->combo_variable, i);
01634     g_signal_handler_unblock (window->combo_variable, window->
01635                               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 (
01640                 Variable));
01641     j = input->nvariables - 1;
01642     if (i > j)
01643         i = j;
01644     g_signal_handler_block (window->entry_variable, window->
01645                             id_variable_label);
01646     gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01647     g_signal_handler_unblock (window->entry_variable, window->
01648                               id_variable_label);
01649     window_update ();
01650     #if DEBUG_INTERFACE
01651     fprintf (stderr, "window_remove_variable: end\n");
01652     #endif
01653 }
01654 void
01655 window_add_variable ()
01656 {
01657     unsigned int i, j;
01658     #if DEBUG_INTERFACE
01659     fprintf (stderr, "window_add_variable: start\n");
01660     #endif
01661     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01662     g_signal_handler_block (window->combo_variable, window->
01663                             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->
01667                               id_variable);
01668     input->variable = (Variable *) g_realloc
01669         (input->variable, (input->nvariables + 1) * sizeof (
01670             Variable));
01671     for (j = input->nvariables - 1; j > i; --j)
01672         memcpy (input->variable + j + 1, input->variable + j, sizeof (
01673             Variable));
01674     memcpy (input->variable + j + 1, input->variable + j, sizeof (
01675             Variable));
01676     if (input->type == INPUT_TYPE_XML)
01677         input->variable[j + 1].name
01678             = (char *) xmlStrdup ((xmlChar *) input->variable[j].name);
01679     else
01680         input->variable[j + 1].name = g_strdup (input->
01681             variable[j].name);

```



```

01680     ++input->nvariables;
01681     g_signal_handler_block (window->entry_variable, window->
id_variable_label);
01682     gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i + 1);
01683     g_signal_handler_unblock (window->entry_variable, window->
id_variable_label);
01684     window_update ();
01685     #if DEBUG_INTERFACE
01686     fprintf (stderr, "window_add_variable: end\n");
01687     #endif
01688 }
01689
01694 void
01695 window_label_variable ()
01696 {
01697     unsigned int i;
01698     const char *buffer;
01699     #if DEBUG_INTERFACE
01700     fprintf (stderr, "window_label_variable: start\n");
01701     #endif
01702     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01703     buffer = gtk_entry_get_text (window->entry_variable);
01704     g_signal_handler_block (window->combo_variable, window->
id_variable);
01705     gtk_combo_box_text_remove (window->combo_variable, i);
01706     gtk_combo_box_text_insert_text (window->combo_variable, i, buffer);
01707     gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), i);
01708     g_signal_handler_unblock (window->combo_variable, window->
id_variable);
01709     #if DEBUG_INTERFACE
01710     fprintf (stderr, "window_label_variable: end\n");
01711     #endif
01712 }
01713
01718 void
01719 window_precision_variable ()
01720 {
01721     unsigned int i;
01722     #if DEBUG_INTERFACE
01723     fprintf (stderr, "window_precision_variable: start\n");
01724     #endif
01725     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01726     input->variable[i].precision
01727     = (unsigned int) gtk_spin_button_get_value_as_int (window->spin_precision);
01728     gtk_spin_button_set_digits (window->spin_min, input->variable[i].
precision);
01729     gtk_spin_button_set_digits (window->spin_max, input->variable[i].
precision);
01730     gtk_spin_button_set_digits (window->spin_minabs,
input->variable[i].precision);
01731     gtk_spin_button_set_digits (window->spin_maxabs,
input->variable[i].precision);
01732     #if DEBUG_INTERFACE
01733     fprintf (stderr, "window_precision_variable: end\n");
01734     #endif
01735 }
01736
01743 void
01744 window_rangemin_variable ()
01745 {
01746     unsigned int i;
01747     #if DEBUG_INTERFACE
01748     fprintf (stderr, "window_rangemin_variable: start\n");
01749     #endif
01750     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01751     input->variable[i].rangemin = gtk_spin_button_get_value (window->
spin_min);
01752     #if DEBUG_INTERFACE
01753     fprintf (stderr, "window_rangemin_variable: end\n");
01754     #endif
01755 }
01756
01761 void
01762 window_rangemax_variable ()
01763 {
01764     unsigned int i;
01765     #if DEBUG_INTERFACE
01766     fprintf (stderr, "window_rangemax_variable: start\n");
01767     #endif
01768     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01769     input->variable[i].rangemax = gtk_spin_button_get_value (window->
spin_max);
01770     #if DEBUG_INTERFACE
01771     fprintf (stderr, "window_rangemax_variable: end\n");
01772     #endif
01773 }
01774

```

```

01779 void
01780 window_rangeminabs_variable ()
01781 {
01782     unsigned int i;
01783     #if DEBUG_INTERFACE
01784     fprintf (stderr, "window_rangeminabs_variable: start\n");
01785     #endif
01786     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01787     input->variable[i].rangeminabs
01788     = gtk_spin_button_get_value (window->spin_minabs);
01789     #if DEBUG_INTERFACE
01790     fprintf (stderr, "window_rangeminabs_variable: end\n");
01791     #endif
01792 }
01793
01794 void
01795 window_rangemaxabs_variable ()
01796 {
01797     unsigned int i;
01798     #if DEBUG_INTERFACE
01799     fprintf (stderr, "window_rangemaxabs_variable: start\n");
01800     #endif
01801     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01802     input->variable[i].rangemaxabs
01803     = gtk_spin_button_get_value (window->spin_maxabs);
01804     #if DEBUG_INTERFACE
01805     fprintf (stderr, "window_rangemaxabs_variable: end\n");
01806     #endif
01807 }
01808
01809 void
01810 window_step_variable ()
01811 {
01812     unsigned int i;
01813     #if DEBUG_INTERFACE
01814     fprintf (stderr, "window_step_variable: start\n");
01815     #endif
01816     i = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_variable));
01817     input->variable[i].step = gtk_spin_button_get_value (window->
01818     spin_step);
01819     #if DEBUG_INTERFACE
01820     fprintf (stderr, "window_step_variable: end\n");
01821     #endif
01822 }
01823
01824 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         input->variable[i].nsweeps
01838         = gtk_spin_button_get_value_as_int (window->spin_sweeps);
01839     #if DEBUG_INTERFACE
01840         fprintf (stderr, "window_update_variable: nsweeps[%d]=%u\n", i,
01841         input->variable[i].nsweeps);
01842     #endif
01843         break;
01844     case ALGORITHM_GENETIC:
01845         input->variable[i].nbits
01846         = gtk_spin_button_get_value_as_int (window->spin_bits);
01847     #if DEBUG_INTERFACE
01848         fprintf (stderr, "window_update_variable: nbits[%d]=%u\n", i,
01849         input->variable[i].nbits);
01850     #endif
01851     }
01852     #if DEBUG_INTERFACE
01853     fprintf (stderr, "window_update_variable: end\n");
01854     #endif
01855 }
01856
01857 int
01858 window_read (char *filename)
01859 {
01860     unsigned int i;
01861     char *buffer;
01862     #if DEBUG_INTERFACE
01863     fprintf (stderr, "window_read: start\n");
01864     #endif
01865 }
01866

```

```

01884 // Reading new input file
01885 input_free ();
01886 if (!input_open (filename))
01887 {
01888 #if DEBUG_INTERFACE
01889     fprintf (stderr, "window_read: end\n");
01890 #endif
01891     return 0;
01892 }
01893
01894 // Setting GTK+ widgets data
01895 gtk_entry_set_text (window->entry_result, input->result);
01896 gtk_entry_set_text (window->entry_variables, input->
variables);
01897 buffer = g_build_filename (input->directory, input->
simulator, NULL);
01898 gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
(window->button_simulator), buffer);
01899 g_free (buffer);
01900 gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON (window->check_evaluator),
(size_t) input->evaluator);
01901
01902 if (input->evaluator)
01903 {
01904     buffer = g_build_filename (input->directory, input->
evaluator, NULL);
01905     gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
(window->button_evaluator), buffer);
01906     g_free (buffer);
01907 }
01908
01909 gtk_toggle_button_set_active
01910 (GTK_TOGGLE_BUTTON (window->button_algorithm[input->
algorithm]), TRUE);
01911
01912 switch (input->algorithm)
01913 {
01914     case ALGORITHM_MONTE_CARLO:
01915         gtk_spin_button_set_value (window->spin_simulations,
(gdouble) input->nsimulations);
01916     case ALGORITHM_SWEEP:
01917         gtk_spin_button_set_value (window->spin_iterations,
(gdouble) input->niterations);
01918         gtk_spin_button_set_value (window->spin_bests, (gdouble) input->
nbest);
01919         gtk_spin_button_set_value (window->spin_tolerance, input->
tolerance);
01920         gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON (window->check_direction),
input->nsteps);
01921         if (input->nsteps)
01922         {
01923             gtk_toggle_button_set_active
01924                 (GTK_TOGGLE_BUTTON (window->button_direction
[input->direction]), TRUE);
01925             gtk_spin_button_set_value (window->spin_steps,
(gdouble) input->nsteps);
01926             gtk_spin_button_set_value (window->spin_relaxation,
(gdouble) input->relaxation);
01927             switch (input->direction)
01928             {
01929                 case DIRECTION_METHOD_RANDOM:
01930                     gtk_spin_button_set_value (window->spin_estimates,
(gdouble) input->nestimates);
01931             }
01932         }
01933         break;
01934     default:
01935         gtk_spin_button_set_value (window->spin_population,
(gdouble) input->nsimulations);
01936         gtk_spin_button_set_value (window->spin_generations,
(gdouble) input->niterations);
01937         gtk_spin_button_set_value (window->spin_mutation, input->
mutation_ratio);
01938         gtk_spin_button_set_value (window->spin_reproduction,
input->reproduction_ratio);
01939         gtk_spin_button_set_value (window->spin_adaptation,
input->adaptation_ratio);
01940     }
01941     gtk_toggle_button_set_active
01942         (GTK_TOGGLE_BUTTON (window->button_norm[input->norm]), TRUE);
01943     gtk_spin_button_set_value (window->spin_p, input->p);
01944     gtk_spin_button_set_value (window->spin_threshold, input->
threshold);
01945     g_signal_handler_block (window->combo_experiment, window->
id_experiment);
01946     g_signal_handler_block (window->button_experiment,
window->id_experiment_name);
01947     gtk_combo_box_text_remove_all (window->combo_experiment);
01948     for (i = 0; i < input->nexperiments; ++i)
01949         gtk_combo_box_text_append_text (window->combo_experiment,

```

```

01962         input->experiment[i].name);
01963     g_signal_handler_unblock
01964     (window->button_experiment, window->id_experiment_name);
01965     g_signal_handler_unblock (window->combo_experiment, window->
id_experiment);
01966     gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), 0);
01967     g_signal_handler_block (window->combo_variable, window->
id_variable);
01968     g_signal_handler_block (window->entry_variable, window->
id_variable_label);
01969     gtk_combo_box_text_remove_all (window->combo_variable);
01970     for (i = 0; i < input->nvariables; ++i)
01971         gtk_combo_box_text_append_text (window->combo_variable,
input->variable[i].name);
01972     g_signal_handler_unblock (window->entry_variable, window->
id_variable_label);
01974     g_signal_handler_unblock (window->combo_variable, window->
id_variable);
01975     gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_variable), 0);
01976     window_set_variable ();
01977     window_update ();
01978
01979     #if DEBUG_INTERFACE
01980     fprintf (stderr, "window_read: end\n");
01981     #endif
01982     return 1;
01983 }
01984
01989 void
01990 window_open ()
01991 {
01992     GtkFileChooserDialog *dlg;
01993     GtkFileFilter *filter;
01994     char *buffer, *directory, *name;
01995
01996     #if DEBUG_INTERFACE
01997     fprintf (stderr, "window_open: start\n");
01998     #endif
01999
02000     // Saving a backup of the current input file
02001     directory = g_strdup (input->directory);
02002     name = g_strdup (input->name);
02003
02004     // Opening dialog
02005     dlg = (GtkFileChooserDialog *)
02006         gtk_file_chooser_dialog_new (gettext ("Open input file"),
02007                                     window->window,
02008                                     GTK_FILE_CHOOSER_ACTION_OPEN,
02009                                     gettext ("_Cancel"), GTK_RESPONSE_CANCEL,
02010                                     gettext ("_OK"), GTK_RESPONSE_OK, NULL);
02011
02012     // Adding XML filter
02013     filter = (GtkFileFilter *) gtk_file_filter_new ();
02014     gtk_file_filter_set_name (filter, "XML");
02015     gtk_file_filter_add_pattern (filter, "*.xml");
02016     gtk_file_filter_add_pattern (filter, "*.XML");
02017     gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02018
02019     // Adding JSON filter
02020     filter = (GtkFileFilter *) gtk_file_filter_new ();
02021     gtk_file_filter_set_name (filter, "JSON");
02022     gtk_file_filter_add_pattern (filter, "*.json");
02023     gtk_file_filter_add_pattern (filter, "*.JSON");
02024     gtk_file_filter_add_pattern (filter, "*.js");
02025     gtk_file_filter_add_pattern (filter, "*.JS");
02026     gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter);
02027
02028     // If OK saving
02029     while (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
02030     {
02031
02032         // Trying to open the input file
02033         buffer = gtk_file_chooser_get_filename (GTK_FILE_CHOOSER (dlg));
02034         if (!window_read (buffer))
02035         {
02036             #if DEBUG_INTERFACE
02037             fprintf (stderr, "window_open: error reading input file\n");
02038             #endif
02039             g_free (buffer);
02040
02041             // Reading backup file on error
02042             buffer = g_build_filename (directory, name, NULL);
02043             if (!input_open (buffer))
02044             {
02045
02046                 // Closing on backup file reading error
02047             #if DEBUG_INTERFACE

```

```

02048             fprintf (stderr, "window_read: error reading backup file\n");
02049 #endif
02050             g_free (buffer);
02051             break;
02052         }
02053         g_free (buffer);
02054     }
02055     else
02056     {
02057         g_free (buffer);
02058         break;
02059     }
02060 }
02061
02062 // Freeing and closing
02063 g_free (name);
02064 g_free (directory);
02065 gtk_widget_destroy (GTK_WIDGET (dlg));
02066 #if DEBUG_INTERFACE
02067 fprintf (stderr, "window_open: end\n");
02068 #endif
02069 }
02070
02071 void
02072 window_new ()
02073 {
02074     unsigned int i;
02075     char *buffer, *buffer2, buffer3[64];
02076     char *label_algorithm[NALGORITHMS] = {
02077         "_Monte-Carlo", gettext ("_Sweep"), gettext ("_Genetic")
02078     };
02079     char *tip_algorithm[NALGORITHMS] = {
02080         gettext ("Monte-Carlo brute force algorithm"),
02081         gettext ("Sweep brute force algorithm"),
02082         gettext ("Genetic algorithm")
02083     };
02084     char *label_direction[NDIRECTIONS] = {
02085         gettext ("_Coordinates descent"), gettext ("_Random")
02086     };
02087     char *tip_direction[NDIRECTIONS] = {
02088         gettext ("Coordinates direction estimate method"),
02089         gettext ("Random direction estimate method")
02090     };
02091     char *label_norm[NNORMS] = { "L2", "L", "Lp", "L1" };
02092     char *tip_norm[NNORMS] = {
02093         gettext ("Euclidean error norm (L2)"),
02094         gettext ("Maximum error norm (L)"),
02095         gettext ("P error norm (Lp)"),
02096         gettext ("Taxicab error norm (L1)")
02097     };
02098     #if DEBUG_INTERFACE
02099     fprintf (stderr, "window_new: start\n");
02100     #endif
02101     // Creating the window
02102     window->window = main_window
02103         = (GtkWindow *) gtk_window_new (GTK_WINDOW_TOPLEVEL);
02104     // Finish when closing the window
02105     g_signal_connect (window->window, "delete-event", gtk_main_quit, NULL);
02106     // Setting the window title
02107     gtk_window_set_title (window->window, "MPCOTool");
02108     // Creating the open button
02109     window->button_open = (GtkToolButton *) gtk_tool_button_new
02110         (gtk_image_new_from_icon_name ("document-open",
02111             GTK_ICON_SIZE_LARGE_TOOLBAR),
02112         gettext ("Open"));
02113     g_signal_connect (window->button_open, "clicked", window_open, NULL);
02114     // Creating the save button
02115     window->button_save = (GtkToolButton *) gtk_tool_button_new
02116         (gtk_image_new_from_icon_name ("document-save",
02117             GTK_ICON_SIZE_LARGE_TOOLBAR),
02118         gettext ("Save"));
02119     g_signal_connect (window->button_save, "clicked", (void (*)(void *))
02120         window_save,
02121         NULL);
02122     // Creating the run button
02123     window->button_run = (GtkToolButton *) gtk_tool_button_new
02124         (gtk_image_new_from_icon_name ("system-run",
02125             GTK_ICON_SIZE_LARGE_TOOLBAR),
02126         gettext ("Run"));
02127     g_signal_connect (window->button_run, "clicked", window_run, NULL);

```

```

02138
02139 // Creating the options button
02140 window->button_options = (GtkToolButton *) gtk_tool_button_new
02141 (gtk_image_new_from_icon_name ("preferences-system",
02142                               GTK_ICON_SIZE_LARGE_TOOLBAR),
02143  gettext ("Options"));
02144 g_signal_connect (window->button_options, "clicked", options_new, NULL);
02145
02146 // Creating the help button
02147 window->button_help = (GtkToolButton *) gtk_tool_button_new
02148 (gtk_image_new_from_icon_name ("help-browser",
02149                               GTK_ICON_SIZE_LARGE_TOOLBAR),
02150  gettext ("Help"));
02151 g_signal_connect (window->button_help, "clicked", window_help, NULL);
02152
02153 // Creating the about button
02154 window->button_about = (GtkToolButton *) gtk_tool_button_new
02155 (gtk_image_new_from_icon_name ("help-about",
02156                               GTK_ICON_SIZE_LARGE_TOOLBAR),
02157  gettext ("About"));
02158 g_signal_connect (window->button_about, "clicked", window_about, NULL);
02159
02160 // Creating the exit button
02161 window->button_exit = (GtkToolButton *) gtk_tool_button_new
02162 (gtk_image_new_from_icon_name ("application-exit",
02163                               GTK_ICON_SIZE_LARGE_TOOLBAR),
02164  gettext ("Exit"));
02165 g_signal_connect (window->button_exit, "clicked", gtk_main_quit, NULL);
02166
02167 // Creating the buttons bar
02168 window->bar_buttons = (GtkToolbar *) gtk_toolbar_new ();
02169 gtk_toolbar_insert
02170 (window->bar_buttons, GTK_TOOL_ITEM (window->button_open), 0);
02171 gtk_toolbar_insert
02172 (window->bar_buttons, GTK_TOOL_ITEM (window->button_save), 1);
02173 gtk_toolbar_insert
02174 (window->bar_buttons, GTK_TOOL_ITEM (window->button_run), 2);
02175 gtk_toolbar_insert
02176 (window->bar_buttons, GTK_TOOL_ITEM (window->button_options), 3);
02177 gtk_toolbar_insert
02178 (window->bar_buttons, GTK_TOOL_ITEM (window->button_help), 4);
02179 gtk_toolbar_insert
02180 (window->bar_buttons, GTK_TOOL_ITEM (window->button_about), 5);
02181 gtk_toolbar_insert
02182 (window->bar_buttons, GTK_TOOL_ITEM (window->button_exit), 6);
02183 gtk_toolbar_set_style (window->bar_buttons, GTK_TOOLBAR_BOTH);
02184
02185 // Creating the simulator program label and entry
02186 window->label_simulator
02187 = (GtkLabel *) gtk_label_new (gettext ("Simulator program"));
02188 window->button_simulator = (GtkFileChooserButton *)
02189 gtk_file_chooser_button_new (gettext ("Simulator program"),
02190                             GTK_FILE_CHOOSER_ACTION_OPEN);
02191 gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_simulator),
02192                             gettext ("Simulator program executable file"));
02193 gtk_widget_set_hexexpand (GTK_WIDGET (window->button_simulator), TRUE);
02194
02195 // Creating the evaluator program label and entry
02196 window->check_evaluator = (GtkCheckButton *)
02197 gtk_check_button_new_with_mnemonic (gettext ("Evaluator program"));
02198 g_signal_connect (window->check_evaluator, "toggled",
02199 window_update, NULL);
02200 window->button_evaluator = (GtkFileChooserButton *)
02201 gtk_file_chooser_button_new (gettext ("Evaluator program"),
02202                             GTK_FILE_CHOOSER_ACTION_OPEN);
02203 gtk_widget_set_tooltip_text
02204 (GTK_WIDGET (window->button_evaluator),
02205  gettext ("Optional evaluator program executable file"));
02206
02207 // Creating the results files labels and entries
02208 window->label_result = (GtkLabel *) gtk_label_new (gettext ("Result file"));
02209 window->entry_result = (GtkEntry *) gtk_entry_new ();
02210 gtk_widget_set_tooltip_text
02211 (GTK_WIDGET (window->entry_result), gettext ("Best results file"));
02212 window->label_variables
02213 = (GtkLabel *) gtk_label_new (gettext ("Variables file"));
02214 window->entry_variables = (GtkEntry *) gtk_entry_new ();
02215 gtk_widget_set_tooltip_text
02216 (GTK_WIDGET (window->entry_variables),
02217  gettext ("All simulated results file"));
02218
02219 // Creating the files grid and attaching widgets
02220 window->grid_files = (GtkGrid *) gtk_grid_new ();
02221 gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
02222 label_simulator),
02223                0, 0, 1, 1);
02224 gtk_grid_attach (window->grid_files, GTK_WIDGET (window->

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    button_simulator),
02223     1, 0, 1, 1);
02224     gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
check_evaluator),
02225         0, 1, 1, 1);
02226     gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
button_evaluator),
02227         1, 1, 1, 1);
02228     gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
label_result),
02229         0, 2, 1, 1);
02230     gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
entry_result),
02231         1, 2, 1, 1);
02232     gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
label_variables),
02233         0, 3, 1, 1);
02234     gtk_grid_attach (window->grid_files, GTK_WIDGET (window->
entry_variables),
02235         1, 3, 1, 1);
02236
02237     // Creating the algorithm properties
02238     window->label_simulations = (GtkLabel *) gtk_label_new
02239     (gettext ("Simulations number"));
02240     window->spin_simulations
02241     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02242     gtk_widget_set_tooltip_text
02243     (GTK_WIDGET (window->spin_simulations),
02244      gettext ("Number of simulations to perform for each iteration"));
02245     gtk_widget_set_hexpand (GTK_WIDGET (window->spin_simulations), TRUE);
02246     window->label_iterations = (GtkLabel *)
02247     gtk_label_new (gettext ("Iterations number"));
02248     window->spin_iterations
02249     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02250     gtk_widget_set_tooltip_text
02251     (GTK_WIDGET (window->spin_iterations), gettext ("Number of iterations"));
02252     g_signal_connect
02253     (window->spin_iterations, "value-changed", window_update, NULL);
02254     gtk_widget_set_hexpand (GTK_WIDGET (window->spin_iterations), TRUE);
02255     window->label_tolerance = (GtkLabel *) gtk_label_new (gettext ("Tolerance"));
02256     window->spin_tolerance
02257     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02258     gtk_widget_set_tooltip_text
02259     (GTK_WIDGET (window->spin_tolerance),
02260      gettext ("Tolerance to set the variable interval on the next iteration"));
02261     window->label_bests = (GtkLabel *) gtk_label_new (gettext ("Bests number"));
02262     window->spin_bests
02263     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02264     gtk_widget_set_tooltip_text
02265     (GTK_WIDGET (window->spin_bests),
02266      gettext ("Number of best simulations used to set the variable interval "
02267               "on the next iteration"));
02268     window->label_population
02269     = (GtkLabel *) gtk_label_new (gettext ("Population number"));
02270     window->spin_population
02271     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02272     gtk_widget_set_tooltip_text
02273     (GTK_WIDGET (window->spin_population),
02274      gettext ("Number of population for the genetic algorithm"));
02275     gtk_widget_set_hexpand (GTK_WIDGET (window->spin_population), TRUE);
02276     window->label_generations
02277     = (GtkLabel *) gtk_label_new (gettext ("Generations number"));
02278     window->spin_generations
02279     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e6, 1.);
02280     gtk_widget_set_tooltip_text
02281     (GTK_WIDGET (window->spin_generations),
02282      gettext ("Number of generations for the genetic algorithm"));
02283     window->label_mutation
02284     = (GtkLabel *) gtk_label_new (gettext ("Mutation ratio"));
02285     window->spin_mutation
02286     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02287     gtk_widget_set_tooltip_text
02288     (GTK_WIDGET (window->spin_mutation),
02289      gettext ("Ratio of mutation for the genetic algorithm"));
02290     window->label_reproduction
02291     = (GtkLabel *) gtk_label_new (gettext ("Reproduction ratio"));
02292     window->spin_reproduction
02293     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02294     gtk_widget_set_tooltip_text
02295     (GTK_WIDGET (window->spin_reproduction),
02296      gettext ("Ratio of reproduction for the genetic algorithm"));
02297     window->label_adaptation
02298     = (GtkLabel *) gtk_label_new (gettext ("Adaptation ratio"));
02299     window->spin_adaptation
02300     = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02301     gtk_widget_set_tooltip_text
02302     (GTK_WIDGET (window->spin_adaptation),

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02303     gettext ("Ratio of adaptation for the genetic algorithm"));
02304     window->label_threshold = (GtkLabel *) gtk_label_new (gettext ("Threshold"));
02305     window->spin_threshold = (GtkSpinButton *) gtk_spin_button_new_with_range
02306     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02307     gtk_widget_set_tooltip_text
02308     (GTK_WIDGET (window->spin_threshold),
02309     gettext ("Threshold in the objective function to finish the simulations"));
02310     window->scrolled_threshold
02311     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02312     gtk_container_add (GTK_CONTAINER (window->scrolled_threshold),
02313     GTK_WIDGET (window->spin_threshold));
02314     // gtk_widget_set_hexpand (GTK_WIDGET (window->scrolled_threshold), TRUE);
02315     // gtk_widget_set_halign (GTK_WIDGET (window->scrolled_threshold),
02316     // GTK_ALIGN_FILL);
02317
02318     // Creating the direction search method properties
02319     window->check_direction = (GtkCheckButton *)
02320     gtk_check_button_new_with_mnemonic (gettext ("_Direction search method"));
02321     g_signal_connect (window->check_direction, "clicked",
02322     window_update, NULL);
02323     window->grid_direction = (GtkGrid *) gtk_grid_new ();
02324     window->button_direction[0] = (GtkRadioButton *)
02325     gtk_radio_button_new_with_mnemonic (NULL, label_direction[0]);
02326     gtk_grid_attach (window->grid_direction,
02327     GTK_WIDGET (window->button_direction[0]), 0, 0, 1, 1);
02328     g_signal_connect (window->button_direction[0], "clicked",
02329     window_update,
02330     NULL);
02331     for (i = 0; ++i < NDIRECTIONS;)
02332     {
02333         window->button_direction[i] = (GtkRadioButton *)
02334         gtk_radio_button_new_with_mnemonic
02335         (gtk_radio_button_get_group (window->button_direction[0]),
02336         label_direction[i]);
02337         gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_direction[i]),
02338         tip_direction[i]);
02339         gtk_grid_attach (window->grid_direction,
02340         GTK_WIDGET (window->button_direction[i]), 0, i, 1, 1);
02341         g_signal_connect (window->button_direction[i], "clicked",
02342         window_update, NULL);
02343     }
02344     window->label_steps = (GtkLabel *) gtk_label_new (gettext ("Steps number"));
02345     window->spin_steps = (GtkSpinButton *)
02346     gtk_spin_button_new_with_range (1., 1.e12, 1.);
02347     gtk_widget_set_hexpand (GTK_WIDGET (window->spin_steps), TRUE);
02348     window->label_estimates
02349     = (GtkLabel *) gtk_label_new (gettext ("Direction estimates number"));
02350     window->spin_estimates = (GtkSpinButton *)
02351     gtk_spin_button_new_with_range (1., 1.e3, 1.);
02352     window->label_relaxation
02353     = (GtkLabel *) gtk_label_new (gettext ("Relaxation parameter"));
02354     window->spin_relaxation = (GtkSpinButton *)
02355     gtk_spin_button_new_with_range (0., 2., 0.001);
02356     gtk_grid_attach (window->grid_direction, GTK_WIDGET (window->
02357     label_steps),
02358     0, NDIRECTIONS, 1, 1);
02359     gtk_grid_attach (window->grid_direction, GTK_WIDGET (window->
02360     spin_steps),
02361     1, NDIRECTIONS, 1, 1);
02362     gtk_grid_attach (window->grid_direction, GTK_WIDGET (window->
02363     label_estimates),
02364     0, NDIRECTIONS + 1, 1, 1);
02365     gtk_grid_attach (window->grid_direction, GTK_WIDGET (window->
02366     spin_estimates),
02367     1, NDIRECTIONS + 1, 1, 1);
02368     gtk_grid_attach (window->grid_direction,
02369     GTK_WIDGET (window->label_relaxation), 0, NDIRECTIONS + 2, 1,
02370     1);
02371     gtk_grid_attach (window->grid_direction, GTK_WIDGET (window->
02372     spin_relaxation),
02373     1, NDIRECTIONS + 2, 1, 1);
02374
02375     // Creating the array of algorithms
02376     window->grid_algorithm = (GtkGrid *) gtk_grid_new ();
02377     window->button_algorithm[0] = (GtkRadioButton *)
02378     gtk_radio_button_new_with_mnemonic (NULL, label_algorithm[0]);
02379     gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[0]),
02380     tip_algorithm[0]);
02381     gtk_grid_attach (window->grid_algorithm,
02382     GTK_WIDGET (window->button_algorithm[0]), 0, 0, 1, 1);
02383     g_signal_connect (window->button_algorithm[0], "clicked",
02384     window_set_algorithm, NULL);
02385     for (i = 0; ++i < NALGORITHMS;)
02386     {
02387         window->button_algorithm[i] = (GtkRadioButton *)
02388         gtk_radio_button_new_with_mnemonic
02389         (gtk_radio_button_get_group (window->button_algorithm[0]),

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02383         label_algorithm[i]);
02384     gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_algorithm[i]),
02385         tip_algorithm[i]);
02386     gtk_grid_attach (window->grid_algorithm,
02387         GTK_WIDGET (window->button_algorithm[i]), 0, i, 1, 1);
02388     g_signal_connect (window->button_algorithm[i], "clicked",
02389         window_set_algorithm, NULL);
02390 }
02391 gtk_grid_attach (window->grid_algorithm,
02392     GTK_WIDGET (window->label_simulations), 0,
02393     NALGORITHMS, 1, 1);
02394 gtk_grid_attach (window->grid_algorithm,
02395     GTK_WIDGET (window->spin_simulations), 1, NALGORITHMS, 1, 1);
02396 gtk_grid_attach (window->grid_algorithm,
02397     GTK_WIDGET (window->label_iterations), 0,
02398     NALGORITHMS + 1, 1, 1);
02399 gtk_grid_attach (window->grid_algorithm,
02400     GTK_WIDGET (window->spin_iterations), 1,
02401     NALGORITHMS + 1, 1, 1);
02402 gtk_grid_attach (window->grid_algorithm,
02403     GTK_WIDGET (window->label_tolerance), 0,
02404     NALGORITHMS + 2, 1, 1);
02405 gtk_grid_attach (window->grid_algorithm,
02406     GTK_WIDGET (window->spin_tolerance), 1,
02407     NALGORITHMS + 2, 1, 1);
02408 gtk_grid_attach (window->grid_algorithm,
02409     GTK_WIDGET (window->label_bests), 0, NALGORITHMS + 3, 1, 1);
02410 gtk_grid_attach (window->grid_algorithm,
02411     GTK_WIDGET (window->spin_bests), 1, NALGORITHMS + 3, 1, 1);
02412 gtk_grid_attach (window->grid_algorithm,
02413     GTK_WIDGET (window->label_population), 0,
02414     NALGORITHMS + 4, 1, 1);
02415 gtk_grid_attach (window->grid_algorithm,
02416     GTK_WIDGET (window->spin_population), 1,
02417     NALGORITHMS + 4, 1, 1);
02418 gtk_grid_attach (window->grid_algorithm,
02419     GTK_WIDGET (window->label_generations), 0,
02420     NALGORITHMS + 5, 1, 1);
02421 gtk_grid_attach (window->grid_algorithm,
02422     GTK_WIDGET (window->spin_generations), 1,
02423     NALGORITHMS + 5, 1, 1);
02424 gtk_grid_attach (window->grid_algorithm,
02425     GTK_WIDGET (window->label_mutation), 0,
02426     NALGORITHMS + 6, 1, 1);
02427 gtk_grid_attach (window->grid_algorithm,
02428     GTK_WIDGET (window->spin_mutation), 1,
02429     NALGORITHMS + 6, 1, 1);
02430 gtk_grid_attach (window->grid_algorithm,
02431     GTK_WIDGET (window->label_reproduction), 0,
02432     NALGORITHMS + 7, 1, 1);
02433 gtk_grid_attach (window->grid_algorithm,
02434     GTK_WIDGET (window->spin_reproduction), 1,
02435     NALGORITHMS + 7, 1, 1);
02436 gtk_grid_attach (window->grid_algorithm,
02437     GTK_WIDGET (window->label_adaptation), 0,
02438     NALGORITHMS + 8, 1, 1);
02439 gtk_grid_attach (window->grid_algorithm,
02440     GTK_WIDGET (window->spin_adaptation), 1,
02441     NALGORITHMS + 8, 1, 1);
02442 gtk_grid_attach (window->grid_algorithm,
02443     GTK_WIDGET (window->check_direction), 0,
02444     NALGORITHMS + 9, 2, 1);
02445 gtk_grid_attach (window->grid_algorithm,
02446     GTK_WIDGET (window->grid_direction), 0,
02447     NALGORITHMS + 10, 2, 1);
02448 gtk_grid_attach (window->grid_algorithm, GTK_WIDGET (window->
label_threshold),
02449     0, NALGORITHMS + 11, 1, 1);
02450 gtk_grid_attach (window->grid_algorithm,
02451     GTK_WIDGET (window->scrolled_threshold), 1,
02452     NALGORITHMS + 11, 1, 1);
02453 window->frame_algorithm = (GtkFrame *) gtk_frame_new (gettext ("Algorithm"));
02454 gtk_container_add (GTK_CONTAINER (window->frame_algorithm),
02455     GTK_WIDGET (window->grid_algorithm));
02456
02457 // Creating the variable widgets
02458 window->combo_variable = (GtkComboBoxText *) gtk_combo_box_text_new ();
02459 gtk_widget_set_tooltip_text
02460     (GTK_WIDGET (window->combo_variable), gettext ("Variables selector"));
02461 window->id_variable = g_signal_connect
02462     (window->combo_variable, "changed", window_set_variable, NULL);
02463 window->button_add_variable
02464     = (GtkButton *) gtk_button_new_from_icon_name ("list-add",
02465         GTK_ICON_SIZE_BUTTON);
02466 g_signal_connect
02467     (window->button_add_variable, "clicked",
    window_add_variable, NULL);

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02468 gtk_widget_set_tooltip_text
02469     (GTK_WIDGET (window->button_add_variable), gettext ("Add variable"));
02470 window->button_remove_variable
02471     = (GtkButton *) gtk_button_new_from_icon_name ("list-remove",
02472     GTK_ICON_SIZE_BUTTON);
02473 g_signal_connect
02474     (window->button_remove_variable, "clicked",
02475     window_remove_variable, NULL);
02476 gtk_widget_set_tooltip_text
02477     (GTK_WIDGET (window->button_remove_variable), gettext ("Remove variable"));
02478 window->label_variable = (GtkLabel *) gtk_label_new (gettext ("Name"));
02479 window->entry_variable = (GtkEntry *) gtk_entry_new ();
02480 gtk_widget_set_tooltip_text
02481     (GTK_WIDGET (window->entry_variable), gettext ("Variable name"));
02482 gtk_widget_set_expand (GTK_WIDGET (window->entry_variable), TRUE);
02483 window->id_variable_label = g_signal_connect
02484     (window->entry_variable, "changed", window_label_variable, NULL);
02485 window->label_min = (GtkLabel *) gtk_label_new (gettext ("Minimum"));
02486 window->spin_min = (GtkSpinButton *) gtk_spin_button_new_with_range
02487     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02488 gtk_widget_set_tooltip_text
02489     (GTK_WIDGET (window->spin_min),
02490     gettext ("Minimum initial value of the variable"));
02491 window->scrolled_min
02492     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02493 gtk_container_add (GTK_CONTAINER (window->scrolled_min),
02494     GTK_WIDGET (window->spin_min));
02495 g_signal_connect (window->spin_min, "value-changed",
02496     window_rangemin_variable, NULL);
02497 window->label_max = (GtkLabel *) gtk_label_new (gettext ("Maximum"));
02498 window->spin_max = (GtkSpinButton *) gtk_spin_button_new_with_range
02499     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02500 gtk_widget_set_tooltip_text
02501     (GTK_WIDGET (window->spin_max),
02502     gettext ("Maximum initial value of the variable"));
02503 window->scrolled_max
02504     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02505 gtk_container_add (GTK_CONTAINER (window->scrolled_max),
02506     GTK_WIDGET (window->spin_max));
02507 g_signal_connect (window->spin_max, "value-changed",
02508     window_rangemax_variable, NULL);
02509 window->check_minabs = (GtkCheckButton *)
02510     gtk_check_button_new_with_mnemonic (gettext ("Absolute minimum"));
02511 g_signal_connect (window->check_minabs, "toggled", window_update, NULL);
02512 window->spin_minabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02513     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02514 gtk_widget_set_tooltip_text
02515     (GTK_WIDGET (window->spin_minabs),
02516     gettext ("Minimum allowed value of the variable"));
02517 window->scrolled_minabs
02518     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02519 gtk_container_add (GTK_CONTAINER (window->scrolled_minabs),
02520     GTK_WIDGET (window->spin_minabs));
02521 g_signal_connect (window->spin_minabs, "value-changed",
02522     window_rangeminabs_variable, NULL);
02523 window->check_maxabs = (GtkCheckButton *)
02524     gtk_check_button_new_with_mnemonic (gettext ("Absolute maximum"));
02525 g_signal_connect (window->check_maxabs, "toggled", window_update, NULL);
02526 window->spin_maxabs = (GtkSpinButton *) gtk_spin_button_new_with_range
02527     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02528 gtk_widget_set_tooltip_text
02529     (GTK_WIDGET (window->spin_maxabs),
02530     gettext ("Maximum allowed value of the variable"));
02531 window->scrolled_maxabs
02532     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02533 gtk_container_add (GTK_CONTAINER (window->scrolled_maxabs),
02534     GTK_WIDGET (window->spin_maxabs));
02535 g_signal_connect (window->spin_maxabs, "value-changed",
02536     window_rangemaxabs_variable, NULL);
02537 window->label_precision
02538     = (GtkLabel *) gtk_label_new (gettext ("Precision digits"));
02539 window->spin_precision = (GtkSpinButton *)
02540     gtk_spin_button_new_with_range (0., (gdouble) DEFAULT_PRECISION, 1.);
02541 gtk_widget_set_tooltip_text
02542     (GTK_WIDGET (window->spin_precision),
02543     gettext ("Number of precision floating point digits\n"
02544     "0 is for integer numbers"));
02545 g_signal_connect (window->spin_precision, "value-changed",
02546     window_precision_variable, NULL);
02547 window->label_sweeps = (GtkLabel *) gtk_label_new (gettext ("Sweeps number"));
02548 window->spin_sweeps
02549     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 1.e12, 1.);
02550 gtk_widget_set_tooltip_text
02551     (GTK_WIDGET (window->spin_sweeps),
02552     gettext ("Number of steps sweeping the variable"));
02553 g_signal_connect
02554     (window->spin_sweeps, "value-changed", window_update_variable, NULL);

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02554 window->label_bits = (GtkLabel *) gtk_label_new (gettext ("Bits number"));
02555 window->spin_bits
02556     = (GtkSpinButton *) gtk_spin_button_new_with_range (1., 64., 1.);
02557 gtk_widget_set_tooltip_text
02558     (GTK_WIDGET (window->spin_bits),
02559      gettext ("Number of bits to encode the variable"));
02560 g_signal_connect
02561     (window->spin_bits, "value-changed", window_update_variable, NULL);
02562 window->label_step = (GtkLabel *) gtk_label_new (gettext ("Step size"));
02563 window->spin_step = (GtkSpinButton *) gtk_spin_button_new_with_range
02564     (-G_MAXDOUBLE, G_MAXDOUBLE, precision[DEFAULT_PRECISION]);
02565 gtk_widget_set_tooltip_text
02566     (GTK_WIDGET (window->spin_step),
02567      gettext ("Initial step size for the direction search method"));
02568 window->scrolled_step
02569     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02570 gtk_container_add (GTK_CONTAINER (window->scrolled_step),
02571                  GTK_WIDGET (window->spin_step));
02572 g_signal_connect
02573     (window->spin_step, "value-changed", window_step_variable, NULL);
02574 window->grid_variable = (GtkGrid *) gtk_grid_new ();
02575 gtk_grid_attach (window->grid_variable,
02576                 GTK_WIDGET (window->combo_variable), 0, 0, 2, 1);
02577 gtk_grid_attach (window->grid_variable,
02578                 GTK_WIDGET (window->button_add_variable), 2, 0, 1, 1);
02579 gtk_grid_attach (window->grid_variable,
02580                 GTK_WIDGET (window->button_remove_variable), 3, 0, 1, 1);
02581 gtk_grid_attach (window->grid_variable,
02582                 GTK_WIDGET (window->label_variable), 0, 1, 1, 1);
02583 gtk_grid_attach (window->grid_variable,
02584                 GTK_WIDGET (window->entry_variable), 1, 1, 3, 1);
02585 gtk_grid_attach (window->grid_variable,
02586                 GTK_WIDGET (window->label_min), 0, 2, 1, 1);
02587 gtk_grid_attach (window->grid_variable,
02588                 GTK_WIDGET (window->scrolled_min), 1, 2, 3, 1);
02589 gtk_grid_attach (window->grid_variable,
02590                 GTK_WIDGET (window->label_max), 0, 3, 1, 1);
02591 gtk_grid_attach (window->grid_variable,
02592                 GTK_WIDGET (window->scrolled_max), 1, 3, 3, 1);
02593 gtk_grid_attach (window->grid_variable,
02594                 GTK_WIDGET (window->check_minabs), 0, 4, 1, 1);
02595 gtk_grid_attach (window->grid_variable,
02596                 GTK_WIDGET (window->scrolled_minabs), 1, 4, 3, 1);
02597 gtk_grid_attach (window->grid_variable,
02598                 GTK_WIDGET (window->check_maxabs), 0, 5, 1, 1);
02599 gtk_grid_attach (window->grid_variable,
02600                 GTK_WIDGET (window->scrolled_maxabs), 1, 5, 3, 1);
02601 gtk_grid_attach (window->grid_variable,
02602                 GTK_WIDGET (window->label_precision), 0, 6, 1, 1);
02603 gtk_grid_attach (window->grid_variable,
02604                 GTK_WIDGET (window->spin_precision), 1, 6, 3, 1);
02605 gtk_grid_attach (window->grid_variable,
02606                 GTK_WIDGET (window->label_sweeps), 0, 7, 1, 1);
02607 gtk_grid_attach (window->grid_variable,
02608                 GTK_WIDGET (window->spin_sweeps), 1, 7, 3, 1);
02609 gtk_grid_attach (window->grid_variable,
02610                 GTK_WIDGET (window->label_bits), 0, 8, 1, 1);
02611 gtk_grid_attach (window->grid_variable,
02612                 GTK_WIDGET (window->spin_bits), 1, 8, 3, 1);
02613 gtk_grid_attach (window->grid_variable,
02614                 GTK_WIDGET (window->label_step), 0, 9, 1, 1);
02615 gtk_grid_attach (window->grid_variable,
02616                 GTK_WIDGET (window->scrolled_step), 1, 9, 3, 1);
02617 window->frame_variable = (GtkFrame *) gtk_frame_new (gettext ("Variable"));
02618 gtk_container_add (GTK_CONTAINER (window->frame_variable),
02619                  GTK_WIDGET (window->grid_variable));
02620
02621 // Creating the experiment widgets
02622 window->combo_experiment = (GtkComboBoxText *) gtk_combo_box_text_new ();
02623 gtk_widget_set_tooltip_text (GTK_WIDGET (window->combo_experiment),
02624                             gettext ("Experiment selector"));
02625 window->id_experiment = g_signal_connect
02626     (window->combo_experiment, "changed", window_set_experiment, NULL);
02627
02628 window->button_add_experiment
02629     = (GtkButton *) gtk_button_new_from_icon_name ("list-add",
02630                                                  GTK_ICON_SIZE_BUTTON);
02631 g_signal_connect
02632     (window->button_add_experiment, "clicked",
02633      window_add_experiment, NULL);
02634 gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_add_experiment),
02635                             gettext ("Add experiment"));
02636 window->button_remove_experiment
02637     = (GtkButton *) gtk_button_new_from_icon_name ("list-remove",
02638                                                  GTK_ICON_SIZE_BUTTON);
02639 g_signal_connect (window->button_remove_experiment, "clicked",
02640                  window_remove_experiment, NULL);

```

```

02639 gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_remove_experiment),
02640                             gettext ("Remove experiment"));
02641 window->label_experiment
02642 = (GtkLabel *) gtk_label_new (gettext ("Experimental data file"));
02643 window->button_experiment = (GtkFileChooserButton *)
02644     gtk_file_chooser_button_new (gettext ("Experimental data file"),
02645                                 GTK_FILE_CHOOSER_ACTION_OPEN);
02646 gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_experiment),
02647                             gettext ("Experimental data file"));
02648 window->id_experiment_name
02649 = g_signal_connect (window->button_experiment, "selection-changed",
02650                    window_name_experiment, NULL);
02651 gtk_widget_set_hexexpand (GTK_WIDGET (window->button_experiment), TRUE);
02652 window->label_weight = (GtkLabel *) gtk_label_new (gettext ("Weight"));
02653 window->spin_weight
02654 = (GtkSpinButton *) gtk_spin_button_new_with_range (0., 1., 0.001);
02655 gtk_widget_set_tooltip_text
02656 (GTK_WIDGET (window->spin_weight),
02657  gettext ("Weight factor to build the objective function"));
02658 g_signal_connect
02659 (window->spin_weight, "value-changed", window_weight_experiment,
NULL);
02660 window->grid_experiment = (GtkGrid *) gtk_grid_new ();
02661 gtk_grid_attach (window->grid_experiment,
02662                 GTK_WIDGET (window->combo_experiment), 0, 0, 2, 1);
02663 gtk_grid_attach (window->grid_experiment,
02664                 GTK_WIDGET (window->button_add_experiment), 2, 0, 1, 1);
02665 gtk_grid_attach (window->grid_experiment,
02666                 GTK_WIDGET (window->button_remove_experiment), 3, 0, 1, 1);
02667 gtk_grid_attach (window->grid_experiment,
02668                 GTK_WIDGET (window->label_experiment), 0, 1, 1, 1);
02669 gtk_grid_attach (window->grid_experiment,
02670                 GTK_WIDGET (window->button_experiment), 1, 1, 3, 1);
02671 gtk_grid_attach (window->grid_experiment,
02672                 GTK_WIDGET (window->label_weight), 0, 2, 1, 1);
02673 gtk_grid_attach (window->grid_experiment,
02674                 GTK_WIDGET (window->spin_weight), 1, 2, 3, 1);
02675 for (i = 0; i < MAX_NINPUTS; ++i)
02676 {
02677     snprintf (buffer3, 64, "%s %u", gettext ("Input template"), i + 1);
02678     window->check_template[i] = (GtkCheckButton *)
02679         gtk_check_button_new_with_label (buffer3);
02680     window->id_template[i]
02681 = g_signal_connect (window->check_template[i], "toggled",
02682                    window_inputs_experiment, NULL);
02683     gtk_grid_attach (window->grid_experiment,
02684                     GTK_WIDGET (window->check_template[i]), 0, 3 + i, 1, 1);
02685     window->button_template[i] = (GtkFileChooserButton *)
02686         gtk_file_chooser_button_new (gettext ("Input template"),
02687                                     GTK_FILE_CHOOSER_ACTION_OPEN);
02688     gtk_widget_set_tooltip_text
02689 (GTK_WIDGET (window->button_template[i]),
02690  gettext ("Experimental input template file"));
02691     window->id_input[i]
02692 = g_signal_connect_swapped (window->button_template[i],
02693                             "selection-changed",
02694                             (void *) window_template_experiment,
02695                             (void *) (size_t) i);
02696     gtk_grid_attach (window->grid_experiment,
02697                     GTK_WIDGET (window->button_template[i]), 1, 3 + i, 3, 1);
02698 }
02699 window->frame_experiment
02700 = (GtkFrame *) gtk_frame_new (gettext ("Experiment"));
02701 gtk_container_add (GTK_CONTAINER (window->frame_experiment),
02702                   GTK_WIDGET (window->grid_experiment));
02703
02704 // Creating the error norm widgets
02705 window->frame_norm = (GtkFrame *) gtk_frame_new (gettext ("Error norm"));
02706 window->grid_norm = (GtkGrid *) gtk_grid_new ();
02707 gtk_container_add (GTK_CONTAINER (window->frame_norm),
02708                   GTK_WIDGET (window->grid_norm));
02709 window->button_norm[0] = (GtkRadioButton *)
02710     gtk_radio_button_new_with_mnemonic (NULL, label_norm[0]);
02711 gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[0]),
02712                             tip_norm[0]);
02713 gtk_grid_attach (window->grid_norm,
02714                 GTK_WIDGET (window->button_norm[0]), 0, 0, 1, 1);
02715 g_signal_connect (window->button_norm[0], "clicked", window_update, NULL);
02716 for (i = 0; ++i < NNORMS;)
02717 {
02718     window->button_norm[i] = (GtkRadioButton *)
02719         gtk_radio_button_new_with_mnemonic
02720         (gtk_radio_button_get_group (window->button_norm[0]), label_norm[i]);
02721     gtk_widget_set_tooltip_text (GTK_WIDGET (window->button_norm[i]),
02722                                 tip_norm[i]);
02723     gtk_grid_attach (window->grid_norm,
02724                     GTK_WIDGET (window->button_norm[i]), 0, i, 1, 1);

```

```

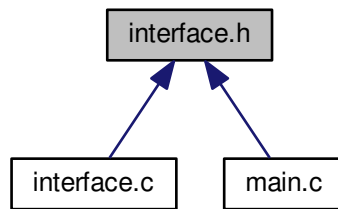
02725     g_signal_connect (window->button_norm[i], "clicked",
window_update, NULL);
02726 }
02727 window->label_p = (GtkLabel *) gtk_label_new (gettext ("P parameter"));
02728 gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->label_p), 1, 1, 1, 1);
02729 window->spin_p = (GtkSpinButton *)
02730     gtk_spin_button_new_with_range (-G_MAXDOUBLE, G_MAXDOUBLE, 0.01);
02731 gtk_widget_set_tooltip_text
02732     (GTK_WIDGET (window->spin_p), gettext ("P parameter for the P error norm"));
02733 window->scrolled_p
02734     = (GtkScrolledWindow *) gtk_scrolled_window_new (NULL, NULL);
02735 gtk_container_add (GTK_CONTAINER (window->scrolled_p),
02736     GTK_WIDGET (window->spin_p));
02737 gtk_widget_set_hexexpand (GTK_WIDGET (window->scrolled_p), TRUE);
02738 gtk_widget_set_halign (GTK_WIDGET (window->scrolled_p), GTK_ALIGN_FILL);
02739 gtk_grid_attach (window->grid_norm, GTK_WIDGET (window->scrolled_p),
02740     1, 2, 1, 2);
02741
02742 // Creating the grid and attaching the widgets to the grid
02743 window->grid = (GtkGrid *) gtk_grid_new ();
02744 gtk_grid_attach (window->grid, GTK_WIDGET (window->bar_buttons), 0, 0, 3, 1);
02745 gtk_grid_attach (window->grid, GTK_WIDGET (window->grid_files), 0, 1, 1, 1);
02746 gtk_grid_attach (window->grid,
02747     GTK_WIDGET (window->frame_algorithm), 0, 2, 1, 1);
02748 gtk_grid_attach (window->grid,
02749     GTK_WIDGET (window->frame_variable), 1, 2, 1, 1);
02750 gtk_grid_attach (window->grid,
02751     GTK_WIDGET (window->frame_experiment), 2, 2, 1, 1);
02752 gtk_grid_attach (window->grid, GTK_WIDGET (window->frame_norm), 1, 1, 2, 1);
02753 gtk_container_add (GTK_CONTAINER (window->window), GTK_WIDGET (window->
grid));
02754
02755 // Setting the window logo
02756 window->logo = gdk_pixbuf_new_from_xpm_data (logo);
02757 gtk_window_set_icon (window->window, window->logo);
02758
02759 // Showing the window
02760 gtk_widget_show_all (GTK_WIDGET (window->window));
02761
02762 // In GTK+ 3.16 and 3.18 the default scrolled size is wrong
02763 #if GTK_MINOR_VERSION >= 16
02764 gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_min), -1, 40);
02765 gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_max), -1, 40);
02766 gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_minabs), -1, 40);
02767 gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_maxabs), -1, 40);
02768 gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_step), -1, 40);
02769 gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_p), -1, 40);
02770 gtk_widget_set_size_request (GTK_WIDGET (window->scrolled_threshold), -1, 40);
02771 #endif
02772
02773 // Reading initial example
02774 input_new ();
02775 buffer2 = g_get_current_dir ();
02776 buffer = g_build_filename (buffer2, "..", "tests", "test1", INPUT_FILE, NULL);
02777 g_free (buffer2);
02778 window_read (buffer);
02779 g_free (buffer);
02780
02781 #if DEBUG_INTERFACE
02782     fprintf (stderr, "window_new: start\n");
02783 #endif
02784 }

```

## 5.13 interface.h File Reference

Header file to define the graphical interface functions.

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



## Data Structures

- struct [Options](#)  
*Struct to define the options dialog.*
- struct [Running](#)  
*Struct to define the running dialog.*
- struct [Window](#)  
*Struct to define the main window.*

## Macros

- #define [MAX\\_LENGTH](#) ([DEFAULT\\_PRECISION](#) + 8)  
*Max length of texts allowed in GtkSpinButtons.*

## Functions

- static GtkWidget \* [gtk\\_button\\_new\\_from\\_icon\\_name](#) (const char \*name, GtkIconSize size)
- unsigned int [gtk\\_array\\_get\\_active](#) (GtkRadioButton \*array[], unsigned int n)  
*Function to get the active GtkRadioButton.*
- void [input\\_save](#) (char \*filename)  
*Function to save the input file.*
- void [options\\_new](#) ()  
*Function to open the options dialog.*
- void [running\\_new](#) ()  
*Function to open the running dialog.*
- unsigned int [window\\_get\\_algorithm](#) ()  
*Function to get the stochastic algorithm number.*
- unsigned int [window\\_get\\_direction](#) ()  
*Function to get the direction search method number.*
- unsigned int [window\\_get\\_norm](#) ()  
*Function to get the norm method number.*
- void [window\\_save\\_direction](#) ()  
*Function to save the direction search method data in the input file.*
- int [window\\_save](#) ()  
*Function to save the input file.*

- void [window\\_run](#) ()  
*Function to run a optimization.*
- void [window\\_help](#) ()  
*Function to show a help dialog.*
- void [window\\_update\\_direction](#) ()  
*Function to update direction search method widgets view in the main window.*
- void [window\\_update](#) ()  
*Function to update the main window view.*
- void [window\\_set\\_algorithm](#) ()  
*Function to avoid memory errors changing the algorithm.*
- void [window\\_set\\_experiment](#) ()  
*Function to set the experiment data in the main window.*
- void [window\\_remove\\_experiment](#) ()  
*Function to remove an experiment in the main window.*
- void [window\\_add\\_experiment](#) ()  
*Function to add an experiment in the main window.*
- void [window\\_name\\_experiment](#) ()  
*Function to set the experiment name in the main window.*
- void [window\\_weight\\_experiment](#) ()  
*Function to update the experiment weight in the main window.*
- void [window\\_inputs\\_experiment](#) ()  
*Function to update the experiment input templates number in the main window.*
- void [window\\_template\\_experiment](#) (void \*data)  
*Function to update the experiment i-th input template in the main window.*
- void [window\\_set\\_variable](#) ()  
*Function to set the variable data in the main window.*
- void [window\\_remove\\_variable](#) ()  
*Function to remove a variable in the main window.*
- void [window\\_add\\_variable](#) ()  
*Function to add a variable in the main window.*
- void [window\\_label\\_variable](#) ()  
*Function to set the variable label in the main window.*
- void [window\\_precision\\_variable](#) ()  
*Function to update the variable precision in the main window.*
- void [window\\_rangemin\\_variable](#) ()  
*Function to update the variable rangemin in the main window.*
- void [window\\_rangemax\\_variable](#) ()  
*Function to update the variable rangemax in the main window.*
- void [window\\_rangeminabs\\_variable](#) ()  
*Function to update the variable rangeminabs in the main window.*
- void [window\\_rangemaxabs\\_variable](#) ()  
*Function to update the variable rangemaxabs in the main window.*
- void [window\\_update\\_variable](#) ()  
*Function to update the variable data in the main window.*
- int [window\\_read](#) (char \*filename)  
*Function to read the input data of a file.*
- void [window\\_open](#) ()  
*Function to open the input data.*
- void [window\\_new](#) ()  
*Function to open the main window.*

## Variables

- `const char * logo []`  
*Logo pixmap.*
- `Options options [1]`  
*Options struct to define the options dialog.*
- `Running running [1]`  
*Running struct to define the running dialog.*
- `Window window [1]`  
*Window struct to define the main interface window.*

### 5.13.1 Detailed Description

Header file to define the graphical interface functions.

#### Authors

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#### Copyright

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Definition in file [interface.h](#).

### 5.13.2 Function Documentation

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

Function to get the active GtkRadioButton.

##### Parameters

<i>array</i>	Array of GtkRadioButtons.
<i>n</i>	Number of GtkRadioButtons.

##### Returns

Active GtkRadioButton.

Definition at line [561](#) of file [utils.c](#).

```
00562 {
00563     unsigned int i;
00564     for (i = 0; i < n; ++i)
00565         if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (array[i])))
00566             break;
00567     return i;
00568 }
```

#### 5.13.2.2 `void input_save ( char * filename )`

Function to save the input file.



## Parameters

<i>filename</i>	Input file name.
-----------------	------------------

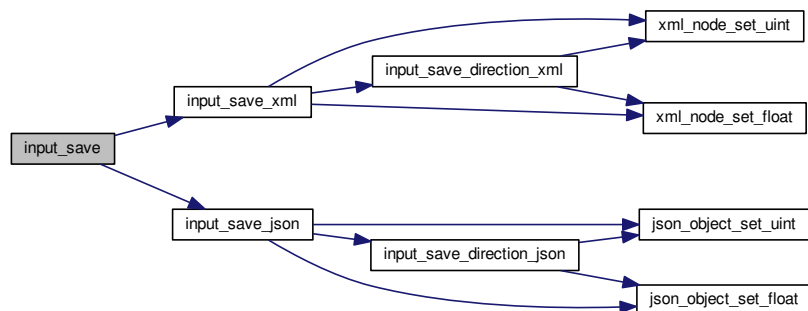
Definition at line 580 of file [interface.c](#).

```

00581 {
00582     xmlDoc *doc;
00583     JsonGenerator *generator;
00584
00585 #if DEBUG_INTERFACE
00586     fprintf (stderr, "input_save: start\n");
00587 #endif
00588
00589     // Getting the input file directory
00590     input->name = g_path_get_basename (filename);
00591     input->directory = g_path_get_dirname (filename);
00592
00593     if (input->type == INPUT_TYPE_XML)
00594     {
00595         // Opening the input file
00596         doc = xmlNewDoc ((const xmlChar *) "1.0");
00597         input_save_xml (doc);
00598
00599         // Saving the XML file
00600         xmlSaveFormatFile (filename, doc, 1);
00601
00602         // Freeing memory
00603         xmlFreeDoc (doc);
00604     }
00605     else
00606     {
00607         // Opening the input file
00608         generator = json_generator_new ();
00609         json_generator_set_pretty (generator, TRUE);
00610         input_save_json (generator);
00611
00612         // Saving the JSON file
00613         json_generator_to_file (generator, filename, NULL);
00614
00615         // Freeing memory
00616         g_object_unref (generator);
00617     }
00618
00619 #if DEBUG_INTERFACE
00620     fprintf (stderr, "input_save: end\n");
00621 #endif
00622 }

```

Here is the call graph for this function:



### 5.13.2.3 unsigned int window\_get\_algorithm ( )

Function to get the stochastic algorithm number.

### Returns

Stochastic algorithm number.

Definition at line 731 of file [interface.c](#).

```
00732 {
00733     unsigned int i;
00734     #if DEBUG_INTERFACE
00735     fprintf (stderr, "window_get_algorithm: start\n");
00736     #endif
00737     i = gtk_array_get_active (window->button_algorithm,
00738                             NALGORITHMS);
00739     #if DEBUG_INTERFACE
00739     fprintf (stderr, "window_get_algorithm: %u\n", i);
00740     fprintf (stderr, "window_get_algorithm: end\n");
00741     #endif
00742     return i;
00743 }
```

Here is the call graph for this function:



#### 5.13.2.4 unsigned int window\_get\_direction ( )

Function to get the direction search method number.

### Returns

Direction search method number.

Definition at line 751 of file [interface.c](#).

```
00752 {
00753     unsigned int i;
00754     #if DEBUG_INTERFACE
00755     fprintf (stderr, "window_get_direction: start\n");
00756     #endif
00757     i = gtk_array_get_active (window->button_direction,
00758                             NDIRECTIONS);
00759     #if DEBUG_INTERFACE
00759     fprintf (stderr, "window_get_direction: %u\n", i);
00760     fprintf (stderr, "window_get_direction: end\n");
00761     #endif
00762     return i;
00763 }
```

Here is the call graph for this function:



## 5.13.2.5 unsigned int window\_get\_norm ( )

Function to get the norm method number.

## Returns

Norm method number.

Definition at line 771 of file [interface.c](#).

```
00772 {
00773     unsigned int i;
00774     #if DEBUG_INTERFACE
00775     fprintf (stderr, "window_get_norm: start\n");
00776     #endif
00777     i = gtk_array_get_active (window->button_norm,
00778                             NNORMS);
00779     #if DEBUG_INTERFACE
00779     fprintf (stderr, "window_get_norm: %u\n", i);
00780     fprintf (stderr, "window_get_norm: end\n");
00781     #endif
00782     return i;
00783 }
```

Here is the call graph for this function:



## 5.13.2.6 int window\_read ( char \* filename )

Function to read the input data of a file.

## Parameters

<i>filename</i>	File name.
-----------------	------------

## Returns

1 on succes, 0 on error.

Definition at line 1876 of file [interface.c](#).

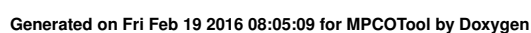
```
01877 {
01878     unsigned int i;
01879     char *buffer;
01880     #if DEBUG_INTERFACE
01881     fprintf (stderr, "window_read: start\n");
01882     #endif
01883     // Reading new input file
01884     input_free ();
01885     if (!input_open (filename))
01886     {
01887     #if DEBUG_INTERFACE
01888     fprintf (stderr, "window_read: end\n");
01889     #endif
01890     return 0;
01891     }
01892 }
```

```

01893
01894 // Setting GTK+ widgets data
01895 gtk_entry_set_text (window->entry_result, input->result);
01896 gtk_entry_set_text (window->entry_variables, input->
variables);
01897 buffer = g_build_filename (input->directory, input->
simulator, NULL);
01898 gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01899 (window->button_simulator), buffer);
01900 g_free (buffer);
01901 gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON (window->check_evaluator),
01902 (size_t) input->evaluator);
01903 if (input->evaluator)
01904 {
01905     buffer = g_build_filename (input->directory, input->
evaluator, NULL);
01906     gtk_file_chooser_set_filename (GTK_FILE_CHOOSER
01907 (window->button_evaluator), buffer);
01908     g_free (buffer);
01909 }
01910 gtk_toggle_button_set_active
01911 (GTK_TOGGLE_BUTTON (window->button_algorithm[input->
algorithm]), TRUE);
01912 switch (input->algorithm)
01913 {
01914     case ALGORITHM_MONTE_CARLO:
01915         gtk_spin_button_set_value (window->spin_simulations,
01916 (gdouble) input->nsimulations);
01917     case ALGORITHM_SWEEP:
01918         gtk_spin_button_set_value (window->spin_iterations,
01919 (gdouble) input->niterations);
01920         gtk_spin_button_set_value (window->spin_bests, (gdouble)
input->nbest);
01921         gtk_spin_button_set_value (window->spin_tolerance,
input->tolerance);
01922         gtk_toggle_button_set_active (GTK_TOGGLE_BUTTON (window->
check_direction),
input->nsteps);
01923         if (input->nsteps)
01924         {
01925             gtk_toggle_button_set_active
01926 (GTK_TOGGLE_BUTTON (window->button_direction
[input->direction]), TRUE);
01927             gtk_spin_button_set_value (window->spin_steps,
01928 (gdouble) input->nsteps);
01929             gtk_spin_button_set_value (window->spin_relaxation,
01930 (gdouble) input->relaxation);
01931             switch (input->direction)
01932             {
01933                 case DIRECTION_METHOD_RANDOM:
01934                     gtk_spin_button_set_value (window->spin_estimates,
01935 (gdouble) input->nestimates);
01936                 }
01937             }
01938             break;
01939         default:
01940             gtk_spin_button_set_value (window->spin_population,
01941 (gdouble) input->nsimulations);
01942             gtk_spin_button_set_value (window->spin_generations,
01943 (gdouble) input->niterations);
01944             gtk_spin_button_set_value (window->spin_mutation, input->
mutation_ratio);
01945             gtk_spin_button_set_value (window->spin_reproduction,
input->reproduction_ratio);
01946             gtk_spin_button_set_value (window->spin_adaptation,
input->adaptation_ratio);
01947         }
01948         gtk_toggle_button_set_active
01949 (GTK_TOGGLE_BUTTON (window->button_norm[input->norm]), TRUE);
01950         gtk_spin_button_set_value (window->spin_p, input->p);
01951         gtk_spin_button_set_value (window->spin_threshold, input->
threshold);
01952         g_signal_handler_block (window->combo_experiment, window->
id_experiment);
01953         g_signal_handler_block (window->button_experiment,
window->id_experiment_name);
01954         gtk_combo_box_text_remove_all (window->combo_experiment);
01955         for (i = 0; i < input->nexperiments; ++i)
01956             gtk_combo_box_text_append_text (window->combo_experiment,
input->experiment[i].name);
01957         g_signal_handler_unblock
01958 (window->button_experiment, window->
id_experiment_name);
01959         g_signal_handler_unblock (window->combo_experiment,
window->id_experiment);
01960         gtk_combo_box_set_active (GTK_COMBO_BOX (window->combo_experiment), 0);
01961         g_signal_handler_block (window->combo_variable, window->

```

Here is the call graph for this function:



```

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 (gettext ("Save file"),
00837                                     window->window,
00838                                     GTK_FILE_CHOOSER_ACTION_SAVE,
00839                                     gettext ("Cancel"),
00840                                     GTK_RESPONSE_CANCEL,
00841                                     gettext ("OK"), GTK_RESPONSE_OK, NULL);
00842     gtk_file_chooser_set_do_overwrite_confirmation (GTK_FILE_CHOOSER (dlg), TRUE);
00843     buffer = g_build_filename (input->directory, input->name, NULL);
00844     gtk_file_chooser_set_filename (GTK_FILE_CHOOSER (dlg), buffer);
00845     g_free (buffer);
00846
00847     // Adding XML filter
00848     filter1 = (GtkFileFilter *) gtk_file_filter_new ();
00849     gtk_file_filter_set_name (filter1, "XML");
00850     gtk_file_filter_add_pattern (filter1, "*.xml");
00851     gtk_file_filter_add_pattern (filter1, "*.XML");
00852     gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter1);
00853
00854     // Adding JSON filter
00855     filter2 = (GtkFileFilter *) gtk_file_filter_new ();
00856     gtk_file_filter_set_name (filter2, "JSON");
00857     gtk_file_filter_add_pattern (filter2, "*.json");
00858     gtk_file_filter_add_pattern (filter2, "*.JSON");
00859     gtk_file_filter_add_pattern (filter2, "*.js");
00860     gtk_file_filter_add_pattern (filter2, "*.JS");
00861     gtk_file_chooser_add_filter (GTK_FILE_CHOOSER (dlg), filter2);
00862
00863     if (input->type == INPUT_TYPE_XML)
00864         gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter1);
00865     else
00866         gtk_file_chooser_set_filter (GTK_FILE_CHOOSER (dlg), filter2);
00867
00868     // If OK response then saving
00869     if (gtk_dialog_run (GTK_DIALOG (dlg)) == GTK_RESPONSE_OK)
00870     {
00871         // Setting input file type
00872         filter1 = gtk_file_chooser_get_filter (GTK_FILE_CHOOSER (dlg));
00873         buffer = (char *) gtk_file_filter_get_name (filter1);
00874         if (!strcmp (buffer, "XML"))
00875             input->type = INPUT_TYPE_XML;
00876         else
00877             input->type = INPUT_TYPE_JSON;
00878
00879         // Adding properties to the root XML node
00880         input->simulator = gtk_file_chooser_get_filename
00881             (GTK_FILE_CHOOSER (window->button_simulator));
00882         if (gtk_toggle_button_get_active
00883             (GTK_TOGGLE_BUTTON (window->check_evaluator)))
00884             input->evaluator = gtk_file_chooser_get_filename
00885                 (GTK_FILE_CHOOSER (window->button_evaluator));
00886         else
00887             input->evaluator = NULL;
00888         if (input->type == INPUT_TYPE_XML)
00889         {
00890             input->result
00891                 = (char *) xmlStrdup ((const xmlChar *)
00892                                     gtk_entry_get_text (window->entry_result));
00893             input->variables
00894                 = (char *) xmlStrdup ((const xmlChar *)
00895                                     gtk_entry_get_text (window->
00896                                     entry_variables));
00897         }
00898         else
00899         {
00900             input->result = g_strdup (gtk_entry_get_text (window->
00901             entry_result));
00902             input->variables
00903                 = g_strdup (gtk_entry_get_text (window->entry_variables));
00904         }
00905
00906         // Setting the algorithm
00907         switch (window_get_algorithm ())
00908         {
00909             case ALGORITHM_MONTE_CARLO:
00910                 input->algorithm = ALGORITHM_MONTE_CARLO;
00911                 input->nsimulations

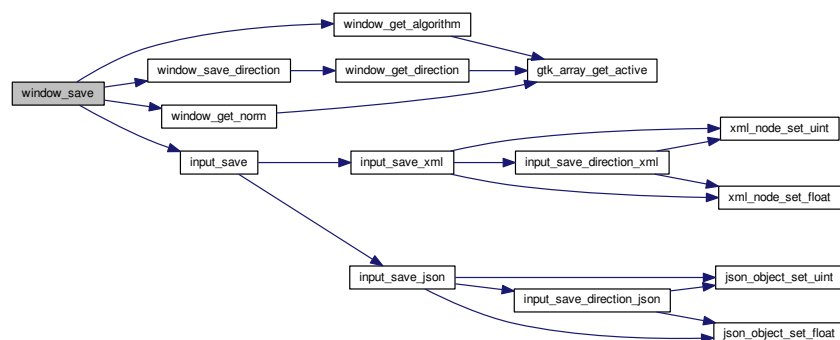
```

```

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

```

Here is the call graph for this function:



5.13.2.8 `void window_template_experiment ( void * data )`

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



## Parameters

<i>data</i>	Callback data (i-th input template).
-------------	--------------------------------------

Definition at line 1520 of file [interface.c](#).

```

01521 {
01522     unsigned int i, j;
01523     char *buffer;
01524     GFile *file1, *file2;
01525     #if DEBUG_INTERFACE
01526     fprintf (stderr, "window_template_experiment: start\n");
01527     #endif
01528     i = (size_t) data;
01529     j = gtk_combo_box_get_active (GTK_COMBO_BOX (window->combo_experiment));
01530     file1
01531     = gtk_file_chooser_get_file (GTK_FILE_CHOOSER (window->button_template[i]));
01532     file2 = g_file_new_for_path (input->directory);
01533     buffer = g_file_get_relative_path (file2, file1);
01534     if (input->type == INPUT_TYPE_XML)
01535         input->experiment[j].template[i] = (char *) xmlStrdup ((xmlChar *) buffer);
01536     else
01537         input->experiment[j].template[i] = g_strdup (buffer);
01538     g_free (buffer);
01539     g_object_unref (file2);
01540     g_object_unref (file1);
01541     #if DEBUG_INTERFACE
01542     fprintf (stderr, "window_template_experiment: end\n");
01543     #endif
01544 }
```

## 5.14 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 2012-2016, AUTHORS.
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00011 are permitted provided that the following conditions are met:
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00013     1. Redistributions of source code must retain the above copyright notice,
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00015
00016     2. Redistributions in binary form must reproduce the above copyright notice,
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00021 WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
00022 MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT
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00025 PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR
00026 BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN
00027 CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING
00028 IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY
00029 OF SUCH DAMAGE.
00030 */
00031
00032 #ifndef INTERFACE__H
00033 #define INTERFACE__H 1
00034
00035 #define MAX_LENGTH (DEFAULT_PRECISION + 8)
00036
00037 typedef struct
00038 {
00039     GtkDialog *dialog;
00040     GtkGrid *grid;
00041     GtkLabel *label_seed;
00042     GtkSpinButton *spin_seed;
00043     GtkLabel *label_threads;
00044     GtkSpinButton *spin_threads;
00045     GtkLabel *label_direction;
00046     GtkSpinButton *spin_direction;
00047 } Options;
00048
00049 typedef struct
```

```

00068 {
00069     GtkWidget *dialog;
00070     GtkWidget *label;
00071     GtkSpinner *spinner;
00072     GtkWidget *grid;
00073 } Running;
00074
00075 typedef struct
00076 {
00077     GtkWidget *window;
00078     GtkWidget *grid;
00079     GtkWidget *bar_buttons;
00080     GtkWidget *button_open;
00081     GtkWidget *button_save;
00082     GtkWidget *button_run;
00083     GtkWidget *button_options;
00084     GtkWidget *button_help;
00085     GtkWidget *button_about;
00086     GtkWidget *button_exit;
00087     GtkWidget *grid_files;
00088     GtkWidget *label_simulator;
00089     GtkWidget *button_simulator;
00090     GtkWidget *check_evaluator;
00091     GtkWidget *button_evaluator;
00092     GtkWidget *label_result;
00093     GtkWidget *entry_result;
00094     GtkWidget *label_variables;
00095     GtkWidget *entry_variables;
00096     GtkWidget *frame_norm;
00097     GtkWidget *grid_norm;
00098     GtkWidget *button_norm[NNORMS];
00099     GtkWidget *label_p;
00100     GtkWidget *spin_p;
00101     GtkWidget *scrolled_p;
00102     GtkWidget *frame_algorithm;
00103     GtkWidget *grid_algorithm;
00104     GtkWidget *button_algorithm[NALGORITHMS];
00105     GtkWidget *label_simulations;
00106     GtkWidget *spin_simulations;
00107     GtkWidget *label_iterations;
00108     GtkWidget *spin_iterations;
00109     GtkWidget *label_tolerance;
00110     GtkWidget *spin_tolerance;
00111     GtkWidget *label_bests;
00112     GtkWidget *spin_bests;
00113     GtkWidget *label_population;
00114     GtkWidget *spin_population;
00115     GtkWidget *label_generations;
00116     GtkWidget *spin_generations;
00117     GtkWidget *label_mutation;
00118     GtkWidget *spin_mutation;
00119     GtkWidget *label_reproduction;
00120     GtkWidget *spin_reproduction;
00121     GtkWidget *label_adaptation;
00122     GtkWidget *spin_adaptation;
00123     GtkWidget *check_direction;
00124     GtkWidget *grid_direction;
00125     GtkWidget *button_direction[NDIRECTIONS];
00126     GtkWidget *label_steps;
00127     GtkWidget *spin_steps;
00128     GtkWidget *label_estimates;
00129     GtkWidget *spin_estimates;
00130     GtkWidget *label_relaxation;
00131     GtkWidget *spin_relaxation;
00132     GtkWidget *label_threshold;
00133     GtkWidget *spin_threshold;
00134     GtkWidget *scrolled_threshold;
00135     GtkWidget *frame_variable;
00136     GtkWidget *grid_variable;
00137     GtkWidget *comboBoxText *combo_variable;
00138     GtkWidget *button_add_variable;
00139     GtkWidget *button_remove_variable;
00140     GtkWidget *label_variable;
00141     GtkWidget *entry_variable;
00142     GtkWidget *label_min;
00143     GtkWidget *spin_min;
00144     GtkWidget *scrolled_min;
00145     GtkWidget *label_max;
00146     GtkWidget *spin_max;
00147     GtkWidget *scrolled_max;
00148     GtkWidget *check_minabs;
00149     GtkWidget *spin_minabs;
00150     GtkWidget *scrolled_minabs;
00151     GtkWidget *check_maxabs;
00152     GtkWidget *spin_maxabs;
00153     GtkWidget *scrolled_maxabs;
00154     GtkWidget *label_precision;

```

```

00178   GtkWidget *spin_precision;
00179   GtkWidget *label_sweeps;
00180   GtkWidget *spin_sweeps;
00181   GtkWidget *label_bits;
00182   GtkWidget *spin_bits;
00183   GtkWidget *label_step;
00184   GtkWidget *spin_step;
00185   GtkWidget *scrolled_step;
00186   GtkWidget *frame_experiment;
00187   GtkWidget *grid_experiment;
00188   GtkWidget *combo_experiment;
00189   GtkWidget *button_add_experiment;
00190   GtkWidget *button_remove_experiment;
00191   GtkWidget *label_experiment;
00192   GtkWidget *button_experiment;
00194   GtkWidget *label_weight;
00195   GtkWidget *spin_weight;
00196   GtkWidget *check_template[MAX_NINPUTS];
00198   GtkWidget *button_template[MAX_NINPUTS];
00200   GdkPixbuf *logo;
00201   Experiment *experiment;
00202   Variable *variable;
00203   char *application_directory;
00204   gulong id_experiment;
00205   gulong id_experiment_name;
00206   gulong id_variable;
00207   gulong id_variable_label;
00208   gulong id_template[MAX_NINPUTS];
00210   gulong id_input[MAX_NINPUTS];
00212   unsigned int n_experiments;
00213   unsigned int n_variables;
00214 } Window;
00215
00216 // Global variables
00217 extern const char *logo[];
00218 extern Options options[1];
00219 extern Running running[1];
00220 extern Window window[1];
00221
00222 // Inline functions
00223 #if GTK_MAJOR_VERSION <= 3 && GTK_MINOR_VERSION < 10
00224 static inline GtkWidget *
00225 gtk_button_new_from_icon_name (const char *name, GtkIconSize size)
00226 {
00227     GtkWidget *button;
00228     GtkWidget *image;
00229     button = (GtkWidget *) gtk_button_new ();
00230     image = (GtkWidget *) gtk_image_new_from_icon_name (name, size);
00231     gtk_button_set_image (button, GTK_WIDGET (image));
00232     return button;
00233 }
00234 #endif
00235
00236 // Public functions
00237 unsigned int gtk_array_get_active (GtkRadioButton * array[], unsigned int n);
00238 void input_save (char *filename);
00239 void options_new ();
00240 void running_new ();
00241 unsigned int window_get_algorithm ();
00242 unsigned int window_get_direction ();
00243 unsigned int window_get_norm ();
00244 void window_save_direction ();
00245 int window_save ();
00246 void window_run ();
00247 void window_help ();
00248 void window_update_direction ();
00249 void window_update ();
00250 void window_set_algorithm ();
00251 void window_set_experiment ();
00252 void window_remove_experiment ();
00253 void window_add_experiment ();
00254 void window_name_experiment ();
00255 void window_weight_experiment ();
00256 void window_inputs_experiment ();
00257 void window_template_experiment (void *data);
00258 void window_set_variable ();
00259 void window_remove_variable ();
00260 void window_add_variable ();
00261 void window_label_variable ();
00262 void window_precision_variable ();
00263 void window_rangemin_variable ();
00264 void window_rangemax_variable ();
00265 void window_rangeminabs_variable ();
00266 void window_rangemaxabs_variable ();
00267 void window_update_variable ();
00268 int window_read (char *filename);
00269 void window_open ();

```

```
00270 void window_new ();
00271
00272 #endif
```

## 5.15 main.c File Reference

Main source file.

```
#include "config.h"
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#include <locale.h>
#include <gsl/gsl_rng.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <glib.h>
#include <json-glib/json-glib.h>
#include <mpi.h>
#include <gio/gio.h>
#include <gtk/gtk.h>
#include "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 main.c:



### Macros

- `#define GNU_SOURCE`
- `#define DEBUG_MAIN 0`  
Macro to debug main functions.

### Functions

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

#### 5.15.1 Detailed Description

Main source file.

#### Authors

Javier Burguete and Borja Latorre.

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Definition in file [main.c](#).

## 5.16 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.
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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
00032 #define _GNU_SOURCE
00033 #include "config.h"
00034 #include <stdio.h>
00035 #include <stdlib.h>
00036 #include <string.h>
00037 #include <math.h>
00038 #include <locale.h>
00039 #include <gsl/gsl_rng.h>
00040 #include <libxml/parser.h>
00041 #include <libintl.h>
00042 #include <glib.h>
00043 #include <json-glib/json-glib.h>
00044 #ifdef G_OS_WIN32
00045 #include <windows.h>
00046 #endif
00047 #if HAVE_MPI
00048 #include <mpi.h>
00049 #endif
00050 #if HAVE_GTK
00051 #include <gio/gio.h>
00052 #include <gtk/gtk.h>
00053 #endif
00054 #include "genetic/genetic.h"
00055 #include "utils.h"
00056 #include "experiment.h"
00057 #include "variable.h"
00058 #include "input.h"
00059 #include "optimize.h"
00060 #if HAVE_GTK
00061 #include "interface.h"
00062 #endif
00063
00064 #define DEBUG_MAIN 0
00065
00066 int
00067 main (int argn, char **argc)
00068 {
00069     #if HAVE_GTK
00070     char *buffer;
00071     #endif
00072
00073     // Starting pseudo-random numbers generator

```

```

00089 #if DEBUG_MAIN
00090 fprintf (stderr, "main: starting pseudo-random numbers generator\n");
00091 #endif
00092 optimize->rng = gsl_rng_alloc (gsl_rng_taus2);
00093
00094 // Allowing spaces in the XML data file
00095 #if DEBUG_MAIN
00096 fprintf (stderr, "main: allowing spaces in the XML data file\n");
00097 #endif
00098 xmlKeepBlanksDefault (0);
00099
00100 // Starting MPI
00101 #if HAVE_MPI
00102 #if DEBUG_MAIN
00103 fprintf (stderr, "main: starting MPI\n");
00104 #endif
00105 MPI_Init (&argn, &argc);
00106 MPI_Comm_size (MPI_COMM_WORLD, &ntasks);
00107 MPI_Comm_rank (MPI_COMM_WORLD, &optimize->mpi_rank);
00108 printf ("rank=%d tasks=%d\n", optimize->mpi_rank, ntasks);
00109 #else
00110 ntasks = 1;
00111 #endif
00112
00113 // Resetting result and variables file names
00114 #if DEBUG_MAIN
00115 fprintf (stderr, "main: resetting result and variables file names\n");
00116 #endif
00117 input->result = input->variables = NULL;
00118
00119 #if HAVE_GTK
00120
00121 // Getting threads number and pseudo-random numbers generator seed
00122 nthreads_direction = nthreads = cores_number ();
00123 optimize->seed = DEFAULT_RANDOM_SEED;
00124
00125 // Setting local language and international floating point numbers notation
00126 setlocale (LC_ALL, "");
00127 setlocale (LC_NUMERIC, "C");
00128 window->application_directory = g_get_current_dir ();
00129 buffer = g_build_filename (window->application_directory,
    LOCALE_DIR, NULL);
00130 bindtextdomain (PROGRAM_INTERFACE, buffer);
00131 bind_textdomain_codeset (PROGRAM_INTERFACE, "UTF-8");
00132 textdomain (PROGRAM_INTERFACE);
00133
00134 // Initing GTK+
00135 gtk_disable_setlocale ();
00136 gtk_init (&argn, &argc);
00137
00138 // Opening the main window
00139 window_new ();
00140 gtk_main ();
00141
00142 // Freeing memory
00143 input_free ();
00144 g_free (buffer);
00145 gtk_widget_destroy (GTK_WIDGET (window->window));
00146 g_free (window->application_directory);
00147
00148 #else
00149
00150 // Checking syntax
00151 if (argn < 2)
00152 {
00153     printf ("The syntax is:\n"
00154             ".//mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00155             "[variables_file]\n");
00156     return 1;
00157 }
00158
00159 // Getting threads number and pseudo-random numbers generator seed
00160 #if DEBUG_MAIN
00161 fprintf (stderr, "main: getting threads number and pseudo-random numbers "
00162         "generator seed\n");
00163 #endif
00164 nthreads_direction = nthreads = cores_number ();
00165 optimize->seed = DEFAULT_RANDOM_SEED;
00166 if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00167 {
00168     nthreads_direction = nthreads = atoi (argc[2]);
00169     if (!nthreads)
00170     {
00171         printf ("Bad threads number\n");
00172         return 2;
00173     }
00174     argc += 2;

```

```

00175     argn -= 2;
00176     if (argn > 2 && !strcmp (argc[1], "--seed"))
00177     {
00178         optimize->seed = atoi (argc[2]);
00179         argc += 2;
00180         argn -= 2;
00181     }
00182 }
00183 else if (argn > 2 && !strcmp (argc[1], "--seed"))
00184 {
00185     optimize->seed = atoi (argc[2]);
00186     argc += 2;
00187     argn -= 2;
00188     if (argn > 2 && !strcmp (argc[1], "-nthreads"))
00189     {
00190         nthreads_direction = nthreads = atoi (argc[2]);
00191         if (!nthreads)
00192         {
00193             printf ("Bad threads number\n");
00194             return 2;
00195         }
00196         argc += 2;
00197         argn -= 2;
00198     }
00199 }
00200 printf ("nthreads=%u\n", nthreads);
00201 printf ("seed=%lu\n", optimize->seed);
00202
00203 // Checking arguments
00204 #if DEBUG_MAIN
00205 fprintf (stderr, "main: checking arguments\n");
00206 #endif
00207 if (argn > 4 || argn < 2)
00208 {
00209     printf ("The syntax is:\n"
00210            " ./mpcotoolbin [-nthreads x] [-seed s] data_file [result_file] "
00211            "[variables_file]\n");
00212     return 1;
00213 }
00214 if (argn > 2)
00215     input->result = (char *) xmlStrdup ((xmlChar *) argc[2]);
00216 if (argn == 4)
00217     input->variables = (char *) xmlStrdup ((xmlChar *) argc[3]);
00218
00219 // Making optimization
00220 #if DEBUG_MAIN
00221 fprintf (stderr, "main: making optimization\n");
00222 #endif
00223 if (input_open (argc[1]))
00224     optimize_open ();
00225
00226 // Freeing memory
00227 #if DEBUG_MAIN
00228 fprintf (stderr, "main: freeing memory and closing\n");
00229 #endif
00230 optimize_free ();
00231
00232 #endif
00233
00234 // Closing MPI
00235 #if HAVE_MPI
00236 MPI_Finalize ();
00237 #endif
00238
00239 // Freeing memory
00240 gsl_rng_free (optimize->rng);
00241
00242 // Closing
00243 return 0;
00244 }

```

## 5.17 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 <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 _GNU_SOURCE`
- `#define DEBUG_OPTIMIZE 0`  
Macro to debug optimize functions.
- `#define RM "rm"`  
Macro to define the shell remove command.

## Functions

- void `optimize_input` (unsigned int simulation, char \*`input`, GMappedFile \*`template`)  
Function to write the simulation input file.
- double `optimize_parse` (unsigned int simulation, unsigned int experiment)  
Function to parse input files, simulating and calculating the \ objective function.
- double `optimize_norm_euclidian` (unsigned int simulation)  
Function to calculate the Euclidian error norm.
- double `optimize_norm_maximum` (unsigned int simulation)  
Function to calculate the maximum error norm.
- double `optimize_norm_p` (unsigned int simulation)  
Function to calculate the P error norm.
- double `optimize_norm_taxicab` (unsigned int simulation)  
Function to calculate the taxicab error norm.
- void `optimize_print` ()  
Function to print the results.
- void `optimize_save_variables` (unsigned int simulation, double error)  
Function to save in a file the variables and the error.
- void `optimize_best` (unsigned int simulation, double value)



- Function to save the best simulations.*

  - void `optimize_sequential` ()

*Function to optimize sequentially.*
- void \* `optimize_thread` (`ParallelData` \*data)

*Function to optimize on a thread.*
- void `optimize_merge` (unsigned int nsaveds, unsigned int \*simulation\_best, double \*error\_best)

*Function to merge the 2 optimization results.*
- void `optimize_synchronise` ()

*Function to synchronise the optimization results of MPI tasks.*
- void `optimize_sweep` ()

*Function to optimize with the sweep algorithm.*
- void `optimize_MonteCarlo` ()

*Function to optimize with the Monte-Carlo algorithm.*
- void `optimize_best_direction` (unsigned int simulation, double value)

*Function to save the best simulation in a direction search method.*
- void `optimize_direction_sequential` (unsigned int simulation)

*Function to estimate the direction search sequentially.*
- void \* `optimize_direction_thread` (`ParallelData` \*data)

*Function to estimate the direction search on a thread.*
- double `optimize_estimate_direction_random` (unsigned int variable, unsigned int estimate)

*Function to estimate a component of the direction search vector.*
- double `optimize_estimate_direction_coordinates` (unsigned int variable, unsigned int estimate)

*Function to estimate a component of the direction search vector.*
- void `optimize_step_direction` (unsigned int simulation)

*Function to do a step of the direction search method.*
- void `optimize_direction` ()

*Function to optimize with a direction search method.*
- double `optimize_genetic_objective` (`Entity` \*entity)

*Function to calculate the objective function of an entity.*
- void `optimize_genetic` ()

*Function to optimize with the genetic algorithm.*
- void `optimize_save_old` ()

*Function to save the best results on iterative methods.*
- void `optimize_merge_old` ()

*Function to merge the best results with the previous step best results on iterative methods.*
- void `optimize_refine` ()

*Function to refine the search ranges of the variables in iterative algorithms.*
- void `optimize_step` ()

*Function to do a step of the iterative algorithm.*
- void `optimize_iterate` ()

*Function to iterate the algorithm.*
- void `optimize_free` ()

*Function to free the memory used by the `Optimize` struct.*
- void `optimize_open` ()

*Function to open and perform a optimization.*

## Variables

- int [ntasks](#)  
*Number of tasks.*
- unsigned int [nthreads](#)  
*Number of threads.*
- unsigned int [nthreads\\_direction](#)  
*Number of threads for the direction search method.*
- GMutex [mutex](#) [1]  
*Mutex struct.*
- void(\* [optimize\\_algorithm](#) )()  
*Pointer to the function to perform a optimization algorithm step.*
- double(\* [optimize\\_estimate\\_direction](#) )(unsigned int variable, unsigned int estimate)  
*Pointer to the function to estimate the direction.*
- double(\* [optimize\\_norm](#) )(unsigned int simulation)  
*Pointer to the error norm function.*
- [Optimize optimize](#) [1]  
*Optimization data.*

### 5.17.1 Detailed Description

Source file to define the optimization functions.

#### Authors

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Definition in file [optimize.c](#).

### 5.17.2 Function Documentation

#### 5.17.2.1 void optimize\_best ( unsigned int *simulation*, double *value* )

Function to save the best simulations.

##### Parameters

<i>simulation</i>	Simulation number.
<i>value</i>	Objective function value.

Definition at line [462](#) of file [optimize.c](#).

```

00463 {
00464     unsigned int i, j;
00465     double e;
00466     #if DEBUG_OPTIMIZE
00467         fprintf (stderr, "optimize_best: start\n");
00468         fprintf (stderr, "optimize_best: nsaveds=%u nbest=%u\n",
00469                 optimize->nsaveds, optimize->nbest);
00470     #endif
00471     if (optimize->nsaveds < optimize->nbest
00472         || value < optimize->error_best[optimize->nsaveds - 1])
00473     {
00474         if (optimize->nsaveds < optimize->nbest)
00475             ++optimize->nsaveds;

```

```

00476     optimize->error_best[optimize->nsaveds - 1] = value;
00477     optimize->simulation_best[optimize->nsaveds - 1] = simulation;
00478     for (i = optimize->nsaveds; --i;)
00479     {
00480         if (optimize->error_best[i] < optimize->
error_best[i - 1])
00481         {
00482             j = optimize->simulation_best[i];
00483             e = optimize->error_best[i];
00484             optimize->simulation_best[i] = optimize->
simulation_best[i - 1];
00485             optimize->error_best[i] = optimize->
error_best[i - 1];
00486             optimize->simulation_best[i - 1] = j;
00487             optimize->error_best[i - 1] = e;
00488         }
00489         else
00490             break;
00491     }
00492 }
00493 #if DEBUG_OPTIMIZE
00494 fprintf (stderr, "optimize_best: end\n");
00495 #endif
00496 }

```

### 5.17.2.2 void optimize\_best\_direction ( unsigned int *simulation*, double *value* )

Function to save the best simulation in a direction search method.

#### Parameters

<i>simulation</i>	Simulation number.
<i>value</i>	Objective function value.

Definition at line 787 of file [optimize.c](#).

```

00788 {
00789 #if DEBUG_OPTIMIZE
00790     fprintf (stderr, "optimize_best_direction: start\n");
00791     fprintf (stderr,
00792             "optimize_best_direction: simulation=%u value=%.14le best=%.14le\n",
00793             simulation, value, optimize->error_best[0]);
00794 #endif
00795     if (value < optimize->error_best[0])
00796     {
00797         optimize->error_best[0] = value;
00798         optimize->simulation_best[0] = simulation;
00799 #if DEBUG_OPTIMIZE
00800         fprintf (stderr,
00801                 "optimize_best_direction: BEST simulation=%u value=%.14le\n",
00802                 simulation, value);
00803 #endif
00804     }
00805 #if DEBUG_OPTIMIZE
00806     fprintf (stderr, "optimize_best_direction: end\n");
00807 #endif
00808 }

```

### 5.17.2.3 void optimize\_direction\_sequential ( unsigned int *simulation* )

Function to estimate the direction search sequentially.

#### Parameters

<i>simulation</i>	Simulation number.
-------------------	--------------------

Definition at line 817 of file [optimize.c](#).

```

00818 {
00819     unsigned int i, j;
00820     double e;
00821 #if DEBUG_OPTIMIZE
00822     fprintf (stderr, "optimize_direction_sequential: start\n");
00823     fprintf (stderr, "optimize_direction_sequential: nstart_direction=%u "

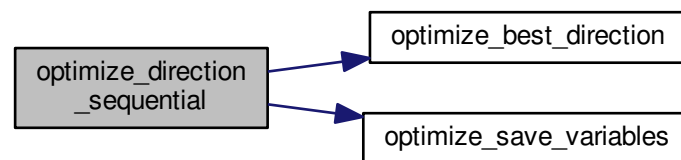
```

```

00824         "nend_direction=%u\n",
00825         optimize->nstart_direction, optimize->
nend_direction);
00826 #endif
00827     for (i = optimize->nstart_direction; i < optimize->nend_direction; ++i)
00828     {
00829         j = simulation + i;
00830         e = optimize_norm (j);
00831         optimize_best_direction (j, e);
00832         optimize_save_variables (j, e);
00833         if (e < optimize->threshold)
00834         {
00835             optimize->stop = 1;
00836             break;
00837         }
00838 #if DEBUG_OPTIMIZE
00839         fprintf (stderr, "optimize_direction_sequential: i=%u e=%lg\n", i, e);
00840 #endif
00841     }
00842 #if DEBUG_OPTIMIZE
00843     fprintf (stderr, "optimize_direction_sequential: end\n");
00844 #endif
00845 }

```

Here is the call graph for this function:



#### 5.17.2.4 void \* optimize\_direction\_thread ( ParallelData \* data )

Function to estimate the direction search on a thread.

##### Parameters

<i>data</i>	Function data.
-------------	----------------

##### Returns

NULL

Definition at line 855 of file [optimize.c](#).

```

00856 {
00857     unsigned int i, thread;
00858     double e;
00859     #if DEBUG_OPTIMIZE
00860         fprintf (stderr, "optimize_direction_thread: start\n");
00861     #endif
00862     thread = data->thread;
00863     #if DEBUG_OPTIMIZE
00864         fprintf (stderr, "optimize_direction_thread: thread=%u start=%u end=%u\n",
00865                 thread,
00866                 optimize->thread_direction[thread],
00867                 optimize->thread_direction[thread + 1]);
00868     #endif
00869     for (i = optimize->thread_direction[thread];
00870          i < optimize->thread_direction[thread + 1]; ++i)
00871     {

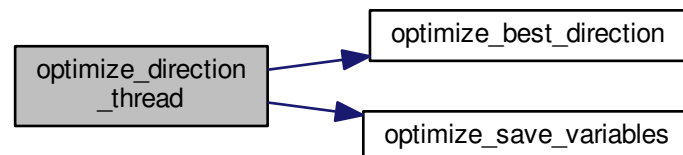
```

```

00872     e = optimize_norm (i);
00873     g_mutex_lock (mutex);
00874     optimize_best_direction (i, e);
00875     optimize_save_variables (i, e);
00876     if (e < optimize->threshold)
00877         optimize->stop = 1;
00878     g_mutex_unlock (mutex);
00879     if (optimize->stop)
00880         break;
00881 #if DEBUG_OPTIMIZE
00882     fprintf (stderr, "optimize_direction_thread: i=%u e=%lg\n", i, e);
00883 #endif
00884 }
00885 #if DEBUG_OPTIMIZE
00886     fprintf (stderr, "optimize_direction_thread: end\n");
00887 #endif
00888     g_thread_exit (NULL);
00889     return NULL;
00890 }

```

Here is the call graph for this function:



#### 5.17.2.5 double optimize\_estimate\_direction\_coordinates ( unsigned int *variable*, unsigned int *estimate* )

Function to estimate a component of the direction search vector.

##### Parameters

<i>variable</i>	Variable number.
<i>estimate</i>	Estimate number.

Definition at line 929 of file [optimize.c](#).

```

00931 {
00932     double x;
00933     #if DEBUG_OPTIMIZE
00934     fprintf (stderr, "optimize_estimate_direction_coordinates: start\n");
00935     #endif
00936     x = optimize->direction[variable];
00937     if (estimate >= (2 * variable) && estimate < (2 * variable + 2))
00938     {
00939         if (estimate & 1)
00940             x += optimize->step[variable];
00941         else
00942             x -= optimize->step[variable];
00943     }
00944     #if DEBUG_OPTIMIZE
00945     fprintf (stderr,
00946             "optimize_estimate_direction_coordinates: direction=%lg\n",
00947             variable, x);
00948     fprintf (stderr, "optimize_estimate_direction_coordinates: end\n");
00949     #endif
00950     return x;
00951 }

```

5.17.2.6 `double optimize_estimate_direction_random ( unsigned int variable, unsigned int estimate )`

Function to estimate a component of the direction search vector.

## Parameters

<i>variable</i>	Variable number.
<i>estimate</i>	Estimate number.

Definition at line 902 of file `optimize.c`.

```

00904 {
00905     double x;
00906     #if DEBUG_OPTIMIZE
00907     fprintf (stderr, "optimize_estimate_direction_random: start\n");
00908     #endif
00909     x = optimize->direction[variable]
00910        + (1. - 2. * gsl_rng_uniform (optimize->rng)) * optimize->
00911        step[variable];
00912     #if DEBUG_OPTIMIZE
00913     fprintf (stderr, "optimize_estimate_direction_random: direction%u=%lg\n",
00914             variable, x);
00915     fprintf (stderr, "optimize_estimate_direction_random: end\n");
00916     #endif
00917     return x;
00918 }
```

### 5.17.2.7 double optimize\_genetic\_objective ( Entity \* entity )

Function to calculate the objective function of an entity.

## Parameters

<i>entity</i>	entity data.
---------------	--------------

## Returns

objective function value.

Definition at line 1096 of file `optimize.c`.

```

01097 {
01098     unsigned int j;
01099     double objective;
01100     char buffer[64];
01101     #if DEBUG_OPTIMIZE
01102     fprintf (stderr, "optimize_genetic_objective: start\n");
01103     #endif
01104     for (j = 0; j < optimize->nvariables; ++j)
01105     {
01106         optimize->value[entity->id * optimize->nvariables + j]
01107             = genetic_get_variable (entity, optimize->genetic_variable + j);
01108     }
01109     objective = optimize_norm (entity->id);
01110     g_mutex_lock (mutex);
01111     for (j = 0; j < optimize->nvariables; ++j)
01112     {
01113         snprintf (buffer, 64, "%s ", format[optimize->precision[j]]);
01114         fprintf (optimize->file_variables, buffer,
01115                 genetic_get_variable (entity, optimize->genetic_variable + j));
01116     }
01117     fprintf (optimize->file_variables, "%.14le\n", objective);
01118     g_mutex_unlock (mutex);
01119     #if DEBUG_OPTIMIZE
01120     fprintf (stderr, "optimize_genetic_objective: end\n");
01121     #endif
01122     return objective;
01123 }
```

### 5.17.2.8 void optimize\_input ( unsigned int simulation, char \* input, GMappedFile \* template )

Function to write the simulation input file.

## Parameters

<i>simulation</i>	Simulation number.
<i>input</i>	Input file name.
<i>template</i>	Template of the input file name.

Definition at line 103 of file [optimize.c](#).

```

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

```



5.17.2.9 void optimize\_merge ( unsigned int *nsaveds*, unsigned int \* *simulation\_best*, double \* *error\_best* )

Function to merge the 2 optimization results.

## Parameters

<i>nsaveds</i>	Number of saved results.
<i>simulation_best</i>	Array of best simulation numbers.
<i>error_best</i>	Array of best objective function values.

Definition at line 585 of file [optimize.c](#).

```

00587 {
00588     unsigned int i, j, k, s[optimize->nbest];
00589     double e[optimize->nbest];
00590     #if DEBUG_OPTIMIZE
00591     fprintf (stderr, "optimize_merge: start\n");
00592     #endif
00593     i = j = k = 0;
00594     do
00595     {
00596         if (i == optimize->nsaveds)
00597         {
00598             s[k] = simulation_best[j];
00599             e[k] = error_best[j];
00600             ++j;
00601             ++k;
00602             if (j == nsaveds)
00603                 break;
00604         }
00605         else if (j == nsaveds)
00606         {
00607             s[k] = optimize->simulation_best[i];
00608             e[k] = optimize->error_best[i];
00609             ++i;
00610             ++k;
00611             if (i == optimize->nsaveds)
00612                 break;
00613         }
00614         else if (optimize->error_best[i] > error_best[j])
00615         {
00616             s[k] = simulation_best[j];
00617             e[k] = error_best[j];
00618             ++j;
00619             ++k;
00620         }
00621         else
00622         {
00623             s[k] = optimize->simulation_best[i];
00624             e[k] = optimize->error_best[i];
00625             ++i;
00626             ++k;
00627         }
00628     }
00629     while (k < optimize->nbest);
00630     optimize->nsaveds = k;
00631     memcpy (optimize->simulation_best, s, k * sizeof (unsigned int));
00632     memcpy (optimize->error_best, e, k * sizeof (double));
00633     #if DEBUG_OPTIMIZE
00634     fprintf (stderr, "optimize_merge: end\n");
00635     #endif
00636 }

```

#### 5.17.2.10 double optimize\_norm\_euclidian ( unsigned int *simulation* )

Function to calculate the Euclidian error norm.

## Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

## Returns

Euclidian error norm.

Definition at line 295 of file [optimize.c](#).

```

00296 {
00297     double e, ei;

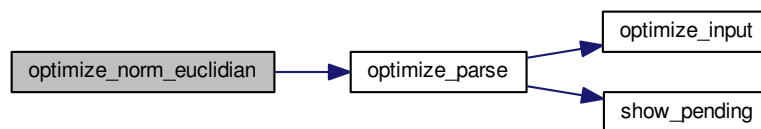
```

```

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

```

Here is the call graph for this function:



#### 5.17.2.11 double optimize\_norm\_maximum ( unsigned int *simulation* )

Function to calculate the maximum error norm.

##### Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

##### Returns

Maximum error norm.

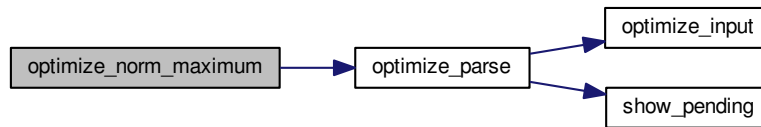
Definition at line 324 of file [optimize.c](#).

```

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:



#### 5.17.2.12 double optimize\_norm\_p ( unsigned int *simulation* )

Function to calculate the P error norm.

##### Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

##### Returns

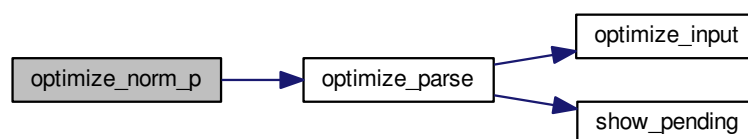
P error norm.

Definition at line [352](#) of file [optimize.c](#).

```

00353 {
00354     double e, ei;
00355     unsigned int i;
00356     #if DEBUG_OPTIMIZE
00357     fprintf (stderr, "optimize_norm_p: start\n");
00358     #endif
00359     e = 0.;
00360     for (i = 0; i < optimize->nexperiments; ++i)
00361     {
00362         ei = fabs (optimize_parse (simulation, i));
00363         e += pow (ei, optimize->p);
00364     }
00365     e = pow (e, 1. / optimize->p);
00366     #if DEBUG_OPTIMIZE
00367     fprintf (stderr, "optimize_norm_p: error=%lg\n", e);
00368     fprintf (stderr, "optimize_norm_p: end\n");
00369     #endif
00370     return e;
00371 }
  
```

Here is the call graph for this function:



5.17.2.13 double optimize\_norm\_taxicab ( unsigned int *simulation* )

Function to calculate the taxicab error norm.

## Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

## Returns

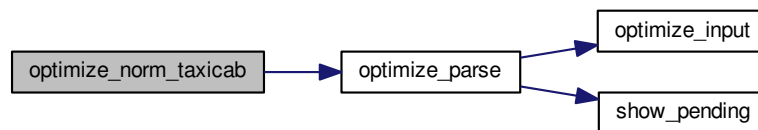
Taxicab error norm.

Definition at line 381 of file [optimize.c](#).

```

00382 {
00383     double e;
00384     unsigned int i;
00385     #if DEBUG_OPTIMIZE
00386     fprintf (stderr, "optimize_norm_taxicab: start\n");
00387     #endif
00388     e = 0.;
00389     for (i = 0; i < optimize->nexperiments; ++i)
00390         e += fabs (optimize_parse (simulation, i));
00391     #if DEBUG_OPTIMIZE
00392     fprintf (stderr, "optimize_norm_taxicab: error=%lg\n", e);
00393     fprintf (stderr, "optimize_norm_taxicab: end\n");
00394     #endif
00395     return e;
00396 }
```

Here is the call graph for this function:



#### 5.17.2.14 double optimize\_parse ( unsigned int *simulation*, unsigned int *experiment* )

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

## Parameters

<i>simulation</i>	Simulation number.
<i>experiment</i>	<a href="#">Experiment</a> number.

## Returns

Objective function value.

Definition at line 189 of file [optimize.c](#).

```

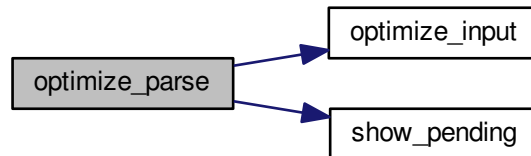
00190 {
00191     unsigned int i;
00192     double e;
00193     char buffer[512], input[MAX_NINPUTS][32], output[32], result[32], *buffer2,
00194         *buffer3, *buffer4;
00195     FILE *file_result;
00196
00197     #if DEBUG_OPTIMIZE
00198     fprintf (stderr, "optimize_parse: start\n");
00199     fprintf (stderr, "optimize_parse: simulation=%u experiment=%u\n", simulation,
00200         experiment);
```

```

00201 #endif
00202
00203 // Opening input files
00204 for (i = 0; i < optimize->ninputs; ++i)
00205 {
00206     snprintf (&input[i][0], 32, "input-%u-%u-%u", i, simulation, experiment);
00207 #if DEBUG_OPTIMIZE
00208     fprintf (stderr, "optimize_parse: i=%u input=%s\n", i, &input[i][0]);
00209 #endif
00210     optimize_input (simulation, &input[i][0], optimize->
00211         file[i][experiment]);
00212 }
00213 for (; i < MAX_NINPUTS; ++i)
00214     strcpy (&input[i][0], "");
00215 #if DEBUG_OPTIMIZE
00216 fprintf (stderr, "optimize_parse: parsing end\n");
00217 #endif
00218 // Performing the simulation
00219 snprintf (output, 32, "output-%u-%u", simulation, experiment);
00220 buffer2 = g_path_get_dirname (optimize->simulator);
00221 buffer3 = g_path_get_basename (optimize->simulator);
00222 buffer4 = g_build_filename (buffer2, buffer3, NULL);
00223 snprintf (buffer, 512, "%s\ " %s %s %s %s %s %s %s %s %s",
00224     buffer4, input[0], input[1], input[2], input[3], input[4], input[5],
00225     input[6], input[7], output);
00226 g_free (buffer4);
00227 g_free (buffer3);
00228 g_free (buffer2);
00229 #if DEBUG_OPTIMIZE
00230 fprintf (stderr, "optimize_parse: %s\n", buffer);
00231 #endif
00232 system (buffer);
00233
00234 // Checking the objective value function
00235 if (optimize->evaluator)
00236 {
00237     snprintf (result, 32, "result-%u-%u", simulation, experiment);
00238     buffer2 = g_path_get_dirname (optimize->evaluator);
00239     buffer3 = g_path_get_basename (optimize->evaluator);
00240     buffer4 = g_build_filename (buffer2, buffer3, NULL);
00241     snprintf (buffer, 512, "%s\ " %s %s %s",
00242         buffer4, output, optimize->experiment[experiment], result);
00243     g_free (buffer4);
00244     g_free (buffer3);
00245     g_free (buffer2);
00246 #if DEBUG_OPTIMIZE
00247     fprintf (stderr, "optimize_parse: %s\n", buffer);
00248 #endif
00249     system (buffer);
00250     file_result = g_fopen (result, "r");
00251     e = atof (fgets (buffer, 512, file_result));
00252     fclose (file_result);
00253 }
00254 else
00255 {
00256     strcpy (result, "");
00257     file_result = g_fopen (output, "r");
00258     e = atof (fgets (buffer, 512, file_result));
00259     fclose (file_result);
00260 }
00261
00262 // Removing files
00263 #if !DEBUG_OPTIMIZE
00264 for (i = 0; i < optimize->ninputs; ++i)
00265 {
00266     if (optimize->file[i][0])
00267     {
00268         snprintf (buffer, 512, RM " %s", &input[i][0]);
00269         system (buffer);
00270     }
00271 }
00272     snprintf (buffer, 512, RM " %s %s", output, result);
00273     system (buffer);
00274 #endif
00275
00276 // Processing pending events
00277 show_pending ();
00278
00279 #if DEBUG_OPTIMIZE
00280 fprintf (stderr, "optimize_parse: end\n");
00281 #endif
00282
00283 // Returning the objective function
00284 return e * optimize->weight[experiment];
00285 }

```

Here is the call graph for this function:



#### 5.17.2.15 void optimize\_save\_variables ( unsigned int *simulation*, double *error* )

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

##### Parameters

<i>simulation</i>	Simulation number.
<i>error</i>	Error value.

Definition at line 434 of file [optimize.c](#).

```

00435 {
00436     unsigned int i;
00437     char buffer[64];
00438     #if DEBUG_OPTIMIZE
00439     fprintf (stderr, "optimize_save_variables: start\n");
00440     #endif
00441     for (i = 0; i < optimize->nvariables; ++i)
00442     {
00443         snprintf (buffer, 64, "%s ", format[optimize->precision[i]]);
00444         fprintf (optimize->file_variables, buffer,
00445             optimize->value[simulation * optimize->
00446                 nvariables + i]);
00447         fprintf (optimize->file_variables, "%.14le\n", error);
00448     #if DEBUG_OPTIMIZE
00449     fprintf (stderr, "optimize_save_variables: end\n");
00450     #endif
00451 }
  
```

#### 5.17.2.16 void optimize\_step\_direction ( unsigned int *simulation* )

Function to do a step of the direction search method.

##### Parameters

<i>simulation</i>	Simulation number.
-------------------	--------------------

Definition at line 960 of file [optimize.c](#).

```

00961 {
00962     GThread *thread[nthreads_direction];
00963     ParallelData data[nthreads_direction];
00964     unsigned int i, j, k, b;
00965     #if DEBUG_OPTIMIZE
00966     fprintf (stderr, "optimize_step_direction: start\n");
00967     #endif
00968     for (i = 0; i < optimize->nestimates; ++i)
00969     {
00970         k = (simulation + i) * optimize->nvariables;
00971         b = optimize->simulation_best[0] * optimize->
  
```

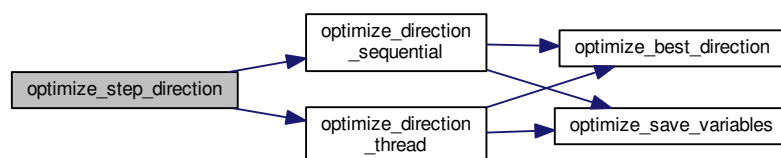


```

    nvariables;
00972 #if DEBUG_OPTIMIZE
00973     fprintf (stderr, "optimize_step_direction: simulation=%u best=%u\n",
00974             simulation + i, optimize->simulation_best[0]);
00975 #endif
00976     for (j = 0; j < optimize->nvariables; ++j, ++k, ++b)
00977     {
00978     #if DEBUG_OPTIMIZE
00979         fprintf (stderr,
00980                 "optimize_step_direction: estimate=%u best%u=%.14le\n",
00981                 i, j, optimize->value[b]);
00982     #endif
00983         optimize->value[k]
00984             = optimize->value[b] + optimize_estimate_direction (j,
00985 i);
00986         optimize->value[k] = fmin (fmax (optimize->value[k],
00987                                     optimize->rangeminabs[j]),
00988                                     optimize->rangemaxabs[j]);
00989     #if DEBUG_OPTIMIZE
00990         fprintf (stderr,
00991                 "optimize_step_direction: estimate=%u variable%u=%.14le\n",
00992                 i, j, optimize->value[k]);
00993     #endif
00994     }
00995     if (nthreads_direction == 1)
00996         optimize_direction_sequential (simulation);
00997     else
00998     {
00999         for (i = 0; i <= nthreads_direction; ++i)
01000         {
01001             optimize->thread_direction[i]
01002                 = simulation + optimize->nstart_direction
01003                 + i * (optimize->nend_direction - optimize->
01004 nstart_direction)
01005                 / nthreads_direction;
01006     #if DEBUG_OPTIMIZE
01007         fprintf (stderr,
01008                 "optimize_step_direction: i=%u thread_direction=%u\n",
01009                 i, optimize->thread_direction[i]);
01010     #endif
01011         for (i = 0; i < nthreads_direction; ++i)
01012         {
01013             data[i].thread = i;
01014             thread[i] = g_thread_new
01015                 (NULL, (void (*) ) optimize_direction_thread, &data[i]);
01016         }
01017         for (i = 0; i < nthreads_direction; ++i)
01018             g_thread_join (thread[i]);
01019     }
01020 #if DEBUG_OPTIMIZE
01021     fprintf (stderr, "optimize_step_direction: end\n");
01022 #endif
01023 }

```

Here is the call graph for this function:



#### 5.17.2.17 void \* optimize\_thread ( ParallelData \* data )

Function to optimize on a thread.

## Parameters

<i>data</i>	Function data.
-------------	----------------

## Returns

NULL

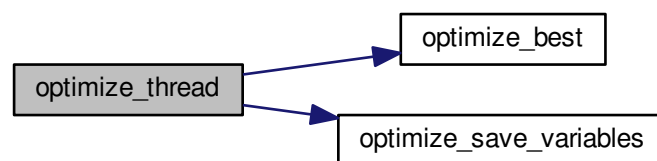
Definition at line 539 of file [optimize.c](#).

```

00540 {
00541     unsigned int i, thread;
00542     double e;
00543     #if DEBUG_OPTIMIZE
00544     fprintf (stderr, "optimize_thread: start\n");
00545     #endif
00546     thread = data->thread;
00547     #if DEBUG_OPTIMIZE
00548     fprintf (stderr, "optimize_thread: thread=%u start=%u end=%u\n", thread,
00549             optimize->thread[thread], optimize->thread[thread + 1]);
00550     #endif
00551     for (i = optimize->thread[thread]; i < optimize->thread[thread + 1]; ++i)
00552     {
00553         e = optimize_norm (i);
00554         g_mutex_lock (mutex);
00555         optimize_best (i, e);
00556         optimize_save_variables (i, e);
00557         if (e < optimize->threshold)
00558             optimize->stop = 1;
00559         g_mutex_unlock (mutex);
00560         if (optimize->stop)
00561             break;
00562     #if DEBUG_OPTIMIZE
00563     fprintf (stderr, "optimize_thread: i=%u e=%lg\n", i, e);
00564     #endif
00565     }
00566     #if DEBUG_OPTIMIZE
00567     fprintf (stderr, "optimize_thread: end\n");
00568     #endif
00569     g_thread_exit (NULL);
00570     return NULL;
00571 }

```

Here is the call graph for this function:



## 5.18 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 Burquete and Borja Latorre.
00007
00008 Copyright 2012-2016, 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
00032 #define _GNU_SOURCE
00033 #include "config.h"
00034 #include <stdio.h>
00035 #include <stdlib.h>
00036 #include <string.h>
00037 #include <math.h>
00038 #include <gsl/gsl_rng.h>
00039 #include <libxml/parser.h>
00040 #include <libintl.h>
00041 #include <glib.h>
00042 #include <glib/gstdio.h>
00043 #include <json-glib/json-glib.h>
00044 #ifdef G_OS_WIN32
00045 #include <windows.h>
00046 #elif !defined(__BSD_VISIBLE)
00047 #include <alloca.h>
00048 #endif
00049 #if HAVE_MPI
00050 #include <mpi.h>
00051 #endif
00052 #include "genetic/genetic.h"
00053 #include "utils.h"
00054 #include "experiment.h"
00055 #include "variable.h"
00056 #include "input.h"
00057 #include "optimize.h"
00058
00059 #define DEBUG_OPTIMIZE 0
00060
00061 #ifdef G_OS_WIN32
00062 #define RM "del"
00063 #else
00064 #define RM "rm"
00065 #endif
00066
00067 int ntasks;
00068 unsigned int nthreads;
00069 unsigned int nthreads_direction;
00070 GMutex mutex[1];
00071 void (*optimize_algorithm) ();
00072 double (*optimize_estimate_direction) (unsigned int variable,
00073                                         unsigned int estimate);
00074 double (*optimize_norm) (unsigned int simulation);
00075 Optimize optimize[1];
00076
00077 void
00078 optimize_input (unsigned int simulation, char *input, GMappedFile * template)
00079 {
00080     unsigned int i;
00081     char buffer[32], value[32], *buffer2, *buffer3, *content;
00082     FILE *file;
00083     gsize length;
00084     GRegex *regex;
00085
00086     #if DEBUG_OPTIMIZE
00087     fprintf (stderr, "optimize_input: start\n");
00088     #endif
00089
00090     // Checking the file
00091     if (!template)
00092         goto optimize_input_end;
00093
00094     // Opening template
00095     content = g_mapped_file_get_contents (template);
00096     length = g_mapped_file_get_length (template);

```

```

00122 #if DEBUG_OPTIMIZE
00123     fprintf (stderr, "optimize_input: length=%lu\ncontent:\n%s", length, content);
00124 #endif
00125     file = g_fopen (input, "w");
00126
00127     // Parsing template
00128     for (i = 0; i < optimize->nvariables; ++i)
00129     {
00130         #if DEBUG_OPTIMIZE
00131             fprintf (stderr, "optimize_input: variable=%u\n", i);
00132         #endif
00133         snprintf (buffer, 32, "@variable%u@", i + 1);
00134         regex = g_regex_new (buffer, 0, 0, NULL);
00135         if (i == 0)
00136         {
00137             buffer2 = g_regex_replace_literal (regex, content, length, 0,
00138                                             optimize->label[i], 0, NULL);
00139         #if DEBUG_OPTIMIZE
00140             fprintf (stderr, "optimize_input: buffer2\n%s", buffer2);
00141         #endif
00142     }
00143     else
00144     {
00145         length = strlen (buffer3);
00146         buffer2 = g_regex_replace_literal (regex, buffer3, length, 0,
00147                                         optimize->label[i], 0, NULL);
00148         g_free (buffer3);
00149     }
00150     g_regex_unref (regex);
00151     length = strlen (buffer2);
00152     snprintf (buffer, 32, "@value%u@", i + 1);
00153     regex = g_regex_new (buffer, 0, 0, NULL);
00154     snprintf (value, 32, format[optimize->precision[i]],
00155             optimize->value[simulation * optimize->nvariables + i]);
00156
00157     #if DEBUG_OPTIMIZE
00158         fprintf (stderr, "optimize_input: value=%s\n", value);
00159     #endif
00160     buffer3 = g_regex_replace_literal (regex, buffer2, length, 0, value,
00161                                     0, NULL);
00162     g_free (buffer2);
00163     g_regex_unref (regex);
00164 }
00165
00166 // Saving input file
00167 fwrite (buffer3, strlen (buffer3), sizeof (char), file);
00168 g_free (buffer3);
00169 fclose (file);
00170
00171 optimize_input_end:
00172 #if DEBUG_OPTIMIZE
00173     fprintf (stderr, "optimize_input: end\n");
00174 #endif
00175     return;
00176 }
00177
00178 double
00179 optimize_parse (unsigned int simulation, unsigned int experiment)
00180 {
00181     unsigned int i;
00182     double e;
00183     char buffer[512], input[MAX_NINPUTS][32], output[32], result[32], *buffer2,
00184         *buffer3, *buffer4;
00185     FILE *file_result;
00186
00187     #if DEBUG_OPTIMIZE
00188         fprintf (stderr, "optimize_parse: start\n");
00189         fprintf (stderr, "optimize_parse: simulation=%u experiment=%u\n", simulation,
00190             experiment);
00191     #endif
00192
00193     // Opening input files
00194     for (i = 0; i < optimize->ninputs; ++i)
00195     {
00196         snprintf (&input[i][0], 32, "input-%u-%u-%u", i, simulation, experiment);
00197         #if DEBUG_OPTIMIZE
00198             fprintf (stderr, "optimize_parse: i=%u input=%s\n", i, &input[i][0]);
00199         #endif
00200         optimize_input (simulation, &input[i][0], optimize->file[i][experiment]);
00201     }
00202
00203     for (; i < MAX_NINPUTS; ++i)
00204         strcpy (&input[i][0], "");
00205     #if DEBUG_OPTIMIZE
00206         fprintf (stderr, "optimize_parse: parsing end\n");
00207     #endif
00208
00209     // Performing the simulation

```

```

00219     snprintf (output, 32, "output-%u-%u", simulation, experiment);
00220     buffer2 = g_path_get_dirname (optimize->simulator);
00221     buffer3 = g_path_get_basename (optimize->simulator);
00222     buffer4 = g_build_filename (buffer2, buffer3, NULL);
00223     snprintf (buffer, 512, "\"%s\" %s %s %s %s %s %s %s %s %s",
00224             buffer4, input[0], input[1], input[2], input[3], input[4], input[5],
00225             input[6], input[7], output);
00226     g_free (buffer4);
00227     g_free (buffer3);
00228     g_free (buffer2);
00229     #if DEBUG_OPTIMIZE
00230     fprintf (stderr, "optimize_parse: %s\n", buffer);
00231     #endif
00232     system (buffer);
00233
00234     // Checking the objective value function
00235     if (optimize->evaluator)
00236     {
00237         snprintf (result, 32, "result-%u-%u", simulation, experiment);
00238         buffer2 = g_path_get_dirname (optimize->evaluator);
00239         buffer3 = g_path_get_basename (optimize->evaluator);
00240         buffer4 = g_build_filename (buffer2, buffer3, NULL);
00241         snprintf (buffer, 512, "\"%s\" %s %s %s",
00242                 buffer4, output, optimize->experiment[experiment], result);
00243         g_free (buffer4);
00244         g_free (buffer3);
00245         g_free (buffer2);
00246         #if DEBUG_OPTIMIZE
00247         fprintf (stderr, "optimize_parse: %s\n", buffer);
00248         #endif
00249         system (buffer);
00250         file_result = g_fopen (result, "r");
00251         e = atof (fgets (buffer, 512, file_result));
00252         fclose (file_result);
00253     }
00254     else
00255     {
00256         strcpy (result, "");
00257         file_result = g_fopen (output, "r");
00258         e = atof (fgets (buffer, 512, file_result));
00259         fclose (file_result);
00260     }
00261
00262     // Removing files
00263     #if !DEBUG_OPTIMIZE
00264     for (i = 0; i < optimize->ninputs; ++i)
00265     {
00266         if (optimize->file[i][0])
00267         {
00268             snprintf (buffer, 512, RM " %s", &input[i][0]);
00269             system (buffer);
00270         }
00271     }
00272     snprintf (buffer, 512, RM " %s %s", output, result);
00273     system (buffer);
00274     #endif
00275
00276     // Processing pending events
00277     show_pending ();
00278
00279     #if DEBUG_OPTIMIZE
00280     fprintf (stderr, "optimize_parse: end\n");
00281     #endif
00282
00283     // Returning the objective function
00284     return e * optimize->weight[experiment];
00285 }
00286
00294 double
00295 optimize_norm_euclidian (unsigned int simulation)
00296 {
00297     double e, ei;
00298     unsigned int i;
00299     #if DEBUG_OPTIMIZE
00300     fprintf (stderr, "optimize_norm_euclidian: start\n");
00301     #endif
00302     e = 0.;
00303     for (i = 0; i < optimize->nexperiments; ++i)
00304     {
00305         ei = optimize_parse (simulation, i);
00306         e += ei * ei;
00307     }
00308     e = sqrt (e);
00309     #if DEBUG_OPTIMIZE
00310     fprintf (stderr, "optimize_norm_euclidian: error=%lg\n", e);
00311     fprintf (stderr, "optimize_norm_euclidian: end\n");
00312     #endif

```

```

00313     return e;
00314 }
00315
00323 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
00351 double
00352 optimize_norm_p (unsigned int simulation)
00353 {
00354     double e, ei;
00355     unsigned int i;
00356     #if DEBUG_OPTIMIZE
00357     fprintf (stderr, "optimize_norm_p: start\n");
00358     #endif
00359     e = 0.;
00360     for (i = 0; i < optimize->nexperiments; ++i)
00361     {
00362         ei = fabs (optimize_parse (simulation, i));
00363         e += pow (ei, optimize->p);
00364     }
00365     e = pow (e, 1. / optimize->p);
00366     #if DEBUG_OPTIMIZE
00367     fprintf (stderr, "optimize_norm_p: error=%lg\n", e);
00368     fprintf (stderr, "optimize_norm_p: end\n");
00369     #endif
00370     return e;
00371 }
00372
00380 double
00381 optimize_norm_taxicab (unsigned int simulation)
00382 {
00383     double e;
00384     unsigned int i;
00385     #if DEBUG_OPTIMIZE
00386     fprintf (stderr, "optimize_norm_taxicab: start\n");
00387     #endif
00388     e = 0.;
00389     for (i = 0; i < optimize->nexperiments; ++i)
00390         e += fabs (optimize_parse (simulation, i));
00391     #if DEBUG_OPTIMIZE
00392     fprintf (stderr, "optimize_norm_taxicab: error=%lg\n", e);
00393     fprintf (stderr, "optimize_norm_taxicab: end\n");
00394     #endif
00395     return e;
00396 }
00397
00402 void
00403 optimize_print ()
00404 {
00405     unsigned int i;
00406     char buffer[512];
00407     #if HAVE_MPI
00408     if (optimize->mpi_rank)
00409         return;
00410     #endif
00411     printf ("%s\n", gettext ("Best result"));
00412     fprintf (optimize->file_result, "%s\n", gettext ("Best result"));
00413     printf ("error = %.15le\n", optimize->error_old[0]);
00414     fprintf (optimize->file_result, "error = %.15le\n", optimize->
error_old[0]);
00415     for (i = 0; i < optimize->nvariables; ++i)
00416     {
00417         snprintf (buffer, 512, "%s = %s\n",
00418                 optimize->label[i], format[optimize->precision[i]]);
00419         printf (buffer, optimize->value_old[i]);
00420         fprintf (optimize->file_result, buffer, optimize->value_old[i]);
00421     }
00422     fflush (optimize->file_result);
00423 }

```

```

00424
00433 void
00434 optimize_save_variables (unsigned int simulation, double error)
00435 {
00436     unsigned int i;
00437     char buffer[64];
00438     #if DEBUG_OPTIMIZE
00439     fprintf (stderr, "optimize_save_variables: start\n");
00440     #endif
00441     for (i = 0; i < optimize->nvariables; ++i)
00442     {
00443         snprintf (buffer, 64, "%s ", format[optimize->precision[i]]);
00444         fprintf (optimize->file_variables, buffer,
00445                 optimize->value[simulation * optimize->nvariables + i]);
00446     }
00447     fprintf (optimize->file_variables, "%.14le\n", error);
00448     #if DEBUG_OPTIMIZE
00449     fprintf (stderr, "optimize_save_variables: end\n");
00450     #endif
00451 }
00452
00461 void
00462 optimize_best (unsigned int simulation, double value)
00463 {
00464     unsigned int i, j;
00465     double e;
00466     #if DEBUG_OPTIMIZE
00467     fprintf (stderr, "optimize_best: start\n");
00468     fprintf (stderr, "optimize_best: nsaveds=%u nbest=%u\n",
00469             optimize->nsaveds, optimize->nbest);
00470     #endif
00471     if (optimize->nsaveds < optimize->nbest
00472         || value < optimize->error_best[optimize->nsaveds - 1])
00473     {
00474         if (optimize->nsaveds < optimize->nbest)
00475             ++optimize->nsaveds;
00476         optimize->error_best[optimize->nsaveds - 1] = value;
00477         optimize->simulation_best[optimize->nsaveds - 1] = simulation;
00478         for (i = optimize->nsaveds; --i;)
00479         {
00480             if (optimize->error_best[i] < optimize->error_best[i - 1])
00481             {
00482                 j = optimize->simulation_best[i];
00483                 e = optimize->error_best[i];
00484                 optimize->simulation_best[i] = optimize->
simulation_best[i - 1];
00485                 optimize->error_best[i] = optimize->error_best[i - 1];
00486                 optimize->simulation_best[i - 1] = j;
00487                 optimize->error_best[i - 1] = e;
00488             }
00489             else
00490                 break;
00491         }
00492     }
00493     #if DEBUG_OPTIMIZE
00494     fprintf (stderr, "optimize_best: end\n");
00495     #endif
00496 }
00497
00502 void
00503 optimize_sequential ()
00504 {
00505     unsigned int i;
00506     double e;
00507     #if DEBUG_OPTIMIZE
00508     fprintf (stderr, "optimize_sequential: start\n");
00509     fprintf (stderr, "optimize_sequential: nstart=%u nend=%u\n",
00510             optimize->nstart, optimize->nend);
00511     #endif
00512     for (i = optimize->nstart; i < optimize->nend; ++i)
00513     {
00514         e = optimize_norm (i);
00515         optimize_best (i, e);
00516         optimize_save_variables (i, e);
00517         if (e < optimize->threshold)
00518         {
00519             optimize->stop = 1;
00520             break;
00521         }
00522     }
00523     #if DEBUG_OPTIMIZE
00524     fprintf (stderr, "optimize_sequential: i=%u e=%lg\n", i, e);
00525     #endif
00526     #if DEBUG_OPTIMIZE
00527     fprintf (stderr, "optimize_sequential: end\n");
00528     #endif
00529 }

```

```

00530
00538 void *
00539 optimize_thread (ParallelData * data)
00540 {
00541     unsigned int i, thread;
00542     double e;
00543     #if DEBUG_OPTIMIZE
00544     fprintf (stderr, "optimize_thread: start\n");
00545     #endif
00546     thread = data->thread;
00547     #if DEBUG_OPTIMIZE
00548     fprintf (stderr, "optimize_thread: thread=%u start=%u end=%u\n", thread,
00549             optimize->thread[thread], optimize->thread[thread + 1]);
00550     #endif
00551     for (i = optimize->thread[thread]; i < optimize->thread[thread + 1]; ++i)
00552     {
00553         e = optimize_norm (i);
00554         g_mutex_lock (mutex);
00555         optimize_best (i, e);
00556         optimize_save_variables (i, e);
00557         if (e < optimize->threshold)
00558             optimize->stop = 1;
00559         g_mutex_unlock (mutex);
00560         if (optimize->stop)
00561             break;
00562     #if DEBUG_OPTIMIZE
00563     fprintf (stderr, "optimize_thread: i=%u e=%lg\n", i, e);
00564     #endif
00565     }
00566     #if DEBUG_OPTIMIZE
00567     fprintf (stderr, "optimize_thread: end\n");
00568     #endif
00569     g_thread_exit (NULL);
00570     return NULL;
00571 }
00572
00584 void
00585 optimize_merge (unsigned int nsaveds, unsigned int *simulation_best,
00586                double *error_best)
00587 {
00588     unsigned int i, j, k, s[optimize->nbest];
00589     double e[optimize->nbest];
00590     #if DEBUG_OPTIMIZE
00591     fprintf (stderr, "optimize_merge: start\n");
00592     #endif
00593     i = j = k = 0;
00594     do
00595     {
00596         if (i == optimize->nsaveds)
00597         {
00598             s[k] = simulation_best[j];
00599             e[k] = error_best[j];
00600             ++j;
00601             ++k;
00602             if (j == nsaveds)
00603                 break;
00604         }
00605         else if (j == nsaveds)
00606         {
00607             s[k] = optimize->simulation_best[i];
00608             e[k] = optimize->error_best[i];
00609             ++i;
00610             ++k;
00611             if (i == optimize->nsaveds)
00612                 break;
00613         }
00614         else if (optimize->error_best[i] > error_best[j])
00615         {
00616             s[k] = simulation_best[j];
00617             e[k] = error_best[j];
00618             ++j;
00619             ++k;
00620         }
00621         else
00622         {
00623             s[k] = optimize->simulation_best[i];
00624             e[k] = optimize->error_best[i];
00625             ++i;
00626             ++k;
00627         }
00628     }
00629     while (k < optimize->nbest);
00630     optimize->nsaveds = k;
00631     memcpy (optimize->simulation_best, s, k * sizeof (unsigned int));
00632     memcpy (optimize->error_best, e, k * sizeof (double));
00633     #if DEBUG_OPTIMIZE
00634     fprintf (stderr, "optimize_merge: end\n");

```



```

00635 #endif
00636 }
00637
00642 #if HAVE_MPI
00643 void
00644 optimize_synchronise ()
00645 {
00646     unsigned int i, nsaveds, simulation_best[optimize->nbest], stop;
00647     double error_best[optimize->nbest];
00648     MPI_Status mpi_stat;
00649     #if DEBUG_OPTIMIZE
00650     fprintf (stderr, "optimize_synchronise: start\n");
00651     #endif
00652     if (optimize->mpi_rank == 0)
00653     {
00654         for (i = 1; i < ntasks; ++i)
00655         {
00656             MPI_Recv (&nsaveds, 1, MPI_INT, i, 1, MPI_COMM_WORLD, &mpi_stat);
00657             MPI_Recv (simulation_best, nsaveds, MPI_INT, i, 1,
00658                     MPI_COMM_WORLD, &mpi_stat);
00659             MPI_Recv (error_best, nsaveds, MPI_DOUBLE, i, 1,
00660                     MPI_COMM_WORLD, &mpi_stat);
00661             optimize_merge (nsaveds, simulation_best, error_best);
00662             MPI_Recv (&stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD, &mpi_stat);
00663             if (stop)
00664                 optimize->stop = 1;
00665         }
00666         for (i = 1; i < ntasks; ++i)
00667             MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, i, 1, MPI_COMM_WORLD);
00668     }
00669     else
00670     {
00671         MPI_Send (&optimize->nsaveds, 1, MPI_INT, 0, 1, MPI_COMM_WORLD);
00672         MPI_Send (optimize->simulation_best, optimize->nsaveds, MPI_INT, 0, 1,
00673                 MPI_COMM_WORLD);
00674         MPI_Send (optimize->error_best, optimize->nsaveds, MPI_DOUBLE, 0, 1,
00675                 MPI_COMM_WORLD);
00676         MPI_Send (&optimize->stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD);
00677         MPI_Recv (&stop, 1, MPI_UNSIGNED, 0, 1, MPI_COMM_WORLD, &mpi_stat);
00678         if (stop)
00679             optimize->stop = 1;
00680     }
00681     #if DEBUG_OPTIMIZE
00682     fprintf (stderr, "optimize_synchronise: end\n");
00683     #endif
00684 }
00685 #endif
00686
00691 void
00692 optimize_sweep ()
00693 {
00694     unsigned int i, j, k, l;
00695     double e;
00696     GThread *thread[nthreads];
00697     ParallelData data[nthreads];
00698     #if DEBUG_OPTIMIZE
00699     fprintf (stderr, "optimize_sweep: start\n");
00700     #endif
00701     for (i = 0; i < optimize->nsimulations; ++i)
00702     {
00703         k = i;
00704         for (j = 0; j < optimize->nvariables; ++j)
00705         {
00706             l = k % optimize->nsweeps[j];
00707             k /= optimize->nsweeps[j];
00708             e = optimize->rangemin[j];
00709             if (optimize->nsweeps[j] > 1)
00710                 e += l * (optimize->rangemax[j] - optimize->rangemin[j])
00711                     / (optimize->nsweeps[j] - 1);
00712             optimize->value[i * optimize->nvariables + j] = e;
00713         }
00714     }
00715     optimize->nsaveds = 0;
00716     if (nthreads <= 1)
00717         optimize_sequential ();
00718     else
00719     {
00720         for (i = 0; i < nthreads; ++i)
00721         {
00722             data[i].thread = i;
00723             thread[i] = g_thread_new (NULL, (void (*)(void *)) optimize_thread, &data[i]);
00724         }
00725         for (i = 0; i < nthreads; ++i)
00726             g_thread_join (thread[i]);
00727     }
00728     #if HAVE_MPI
00729     // Communicating tasks results

```

```

00730     optimize_synchronise ();
00731 #endif
00732 #if DEBUG_OPTIMIZE
00733     fprintf (stderr, "optimize_sweep: end\n");
00734 #endif
00735 }
00736
00741 void
00742 optimize_MonteCarlo ()
00743 {
00744     unsigned int i, j;
00745     GThread *thread[nthreads];
00746     ParallelData data[nthreads];
00747 #if DEBUG_OPTIMIZE
00748     fprintf (stderr, "optimize_MonteCarlo: start\n");
00749 #endif
00750     for (i = 0; i < optimize->nsimulations; ++i)
00751         for (j = 0; j < optimize->nvariables; ++j)
00752             optimize->value[i * optimize->nvariables + j]
00753                 = optimize->rangemin[j] + gsl_rng_uniform (optimize->rng)
00754                   * (optimize->rangemax[j] - optimize->rangemin[j]);
00755     optimize->nsaveds = 0;
00756     if (nthreads <= 1)
00757         optimize_sequential ();
00758     else
00759     {
00760         for (i = 0; i < nthreads; ++i)
00761         {
00762             data[i].thread = i;
00763             thread[i] = g_thread_new (NULL, (void (*) ) optimize_thread, &data[i]);
00764         }
00765         for (i = 0; i < nthreads; ++i)
00766             g_thread_join (thread[i]);
00767     }
00768 #if HAVE_MPI
00769     // Communicating tasks results
00770     optimize_synchronise ();
00771 #endif
00772 #if DEBUG_OPTIMIZE
00773     fprintf (stderr, "optimize_MonteCarlo: end\n");
00774 #endif
00775 }
00776
00786 void
00787 optimize_best_direction (unsigned int simulation, double value)
00788 {
00789 #if DEBUG_OPTIMIZE
00790     fprintf (stderr, "optimize_best_direction: start\n");
00791     fprintf (stderr,
00792             "optimize_best_direction: simulation=%u value=%.14le best=%.14le\n",
00793             simulation, value, optimize->error_best[0]);
00794 #endif
00795     if (value < optimize->error_best[0])
00796     {
00797         optimize->error_best[0] = value;
00798         optimize->simulation_best[0] = simulation;
00799 #if DEBUG_OPTIMIZE
00800         fprintf (stderr,
00801                 "optimize_best_direction: BEST simulation=%u value=%.14le\n",
00802                 simulation, value);
00803 #endif
00804     }
00805 #if DEBUG_OPTIMIZE
00806     fprintf (stderr, "optimize_best_direction: end\n");
00807 #endif
00808 }
00809
00816 void
00817 optimize_direction_sequential (unsigned int simulation)
00818 {
00819     unsigned int i, j;
00820     double e;
00821 #if DEBUG_OPTIMIZE
00822     fprintf (stderr, "optimize_direction_sequential: start\n");
00823     fprintf (stderr, "optimize_direction_sequential: nstart_direction=%u "
00824             "nend_direction=%u\n",
00825             optimize->nstart_direction, optimize->nend_direction);
00826 #endif
00827     for (i = optimize->nstart_direction; i < optimize->nend_direction; ++i)
00828     {
00829         j = simulation + i;
00830         e = optimize_norm (j);
00831         optimize_best_direction (j, e);
00832         optimize_save_variables (j, e);
00833         if (e < optimize->threshold)
00834         {
00835             optimize->stop = 1;

```

```

00836         break;
00837     }
00838     #if DEBUG_OPTIMIZE
00839     fprintf (stderr, "optimize_direction_sequential: i=%u e=%lg\n", i, e);
00840     #endif
00841 }
00842 #if DEBUG_OPTIMIZE
00843 fprintf (stderr, "optimize_direction_sequential: end\n");
00844 #endif
00845 }
00846
00854 void *
00855 optimize_direction_thread (ParallelData * data)
00856 {
00857     unsigned int i, thread;
00858     double e;
00859     #if DEBUG_OPTIMIZE
00860     fprintf (stderr, "optimize_direction_thread: start\n");
00861     #endif
00862     thread = data->thread;
00863     #if DEBUG_OPTIMIZE
00864     fprintf (stderr, "optimize_direction_thread: thread=%u start=%u end=%u\n",
00865             thread,
00866             optimize->thread_direction[thread],
00867             optimize->thread_direction[thread + 1]);
00868     #endif
00869     for (i = optimize->thread_direction[thread];
00870          i < optimize->thread_direction[thread + 1]; ++i)
00871     {
00872         e = optimize_norm (i);
00873         g_mutex_lock (mutex);
00874         optimize_best_direction (i, e);
00875         optimize_save_variables (i, e);
00876         if (e < optimize->threshold)
00877             optimize->stop = 1;
00878         g_mutex_unlock (mutex);
00879         if (optimize->stop)
00880             break;
00881     #if DEBUG_OPTIMIZE
00882     fprintf (stderr, "optimize_direction_thread: i=%u e=%lg\n", i, e);
00883     #endif
00884     }
00885     #if DEBUG_OPTIMIZE
00886     fprintf (stderr, "optimize_direction_thread: end\n");
00887     #endif
00888     g_thread_exit (NULL);
00889     return NULL;
00890 }
00891
00901 double
00902 optimize_estimate_direction_random (unsigned int variable,
00903                                     unsigned int estimate)
00904 {
00905     double x;
00906     #if DEBUG_OPTIMIZE
00907     fprintf (stderr, "optimize_estimate_direction_random: start\n");
00908     #endif
00909     x = optimize->direction[variable]
00910         + (1. - 2. * gsl_rng_uniform (optimize->rng)) * optimize->step[variable];
00911     #if DEBUG_OPTIMIZE
00912     fprintf (stderr, "optimize_estimate_direction_random: direction%u=%lg\n",
00913             variable, x);
00914     fprintf (stderr, "optimize_estimate_direction_random: end\n");
00915     #endif
00916     return x;
00917 }
00918
00928 double
00929 optimize_estimate_direction_coordinates (unsigned int variable,
00930                                         unsigned int estimate)
00931 {
00932     double x;
00933     #if DEBUG_OPTIMIZE
00934     fprintf (stderr, "optimize_estimate_direction_coordinates: start\n");
00935     #endif
00936     x = optimize->direction[variable];
00937     if (estimate >= (2 * variable) && estimate < (2 * variable + 2))
00938     {
00939         if (estimate & 1)
00940             x += optimize->step[variable];
00941         else
00942             x -= optimize->step[variable];
00943     }
00944     #if DEBUG_OPTIMIZE
00945     fprintf (stderr,
00946             "optimize_estimate_direction_coordinates: direction%u=%lg\n",
00947             variable, x);

```

```

00948     fprintf (stderr, "optimize_estimate_direction_coordinates: end\n");
00949 #endif
00950     return x;
00951 }
00952
00959 void
00960 optimize_step_direction (unsigned int simulation)
00961 {
00962     GThread *thread[nthreads_direction];
00963     ParallelData data[nthreads_direction];
00964     unsigned int i, j, k, b;
00965     #if DEBUG_OPTIMIZE
00966     fprintf (stderr, "optimize_step_direction: start\n");
00967 #endif
00968     for (i = 0; i < optimize->nestimates; ++i)
00969     {
00970         k = (simulation + i) * optimize->nvariables;
00971         b = optimize->simulation_best[0] * optimize->nvariables;
00972         #if DEBUG_OPTIMIZE
00973         fprintf (stderr, "optimize_step_direction: simulation=%u best=%u\n",
00974                 simulation + i, optimize->simulation_best[0]);
00975         #endif
00976         for (j = 0; j < optimize->nvariables; ++j, ++k, ++b)
00977         {
00978             #if DEBUG_OPTIMIZE
00979             fprintf (stderr,
00980                     "optimize_step_direction: estimate=%u best=%u=%.14le\n",
00981                     i, j, optimize->value[b]);
00982             #endif
00983             optimize->value[k]
00984             = optimize->value[b] + optimize_estimate_direction (j, i);
00985             optimize->value[k] = fmin (fmax (optimize->value[k],
00986                                           optimize->rangeminabs[j]),
00987                                     optimize->rangemaxabs[j]);
00988             #if DEBUG_OPTIMIZE
00989             fprintf (stderr,
00990                     "optimize_step_direction: estimate=%u variable%u=%.14le\n",
00991                     i, j, optimize->value[k]);
00992             #endif
00993         }
00994     }
00995     if (nthreads_direction == 1)
00996         optimize_direction_sequential (simulation);
00997     else
00998     {
00999         for (i = 0; i <= nthreads_direction; ++i)
01000         {
01001             optimize->thread_direction[i]
01002             = simulation + optimize->nstart_direction
01003             + i * (optimize->nend_direction - optimize->
01004                  nstart_direction)
01005             / nthreads_direction;
01006             #if DEBUG_OPTIMIZE
01007             fprintf (stderr,
01008                     "optimize_step_direction: i=%u thread_direction=%u\n",
01009                     i, optimize->thread_direction[i]);
01010             #endif
01011         }
01012         for (i = 0; i < nthreads_direction; ++i)
01013         {
01014             data[i].thread = i;
01015             thread[i] = g_thread_new
01016             (NULL, (void (*) ) optimize_direction_thread, &data[i]);
01017         }
01018         for (i = 0; i < nthreads_direction; ++i)
01019             g_thread_join (thread[i]);
01020         #if DEBUG_OPTIMIZE
01021         fprintf (stderr, "optimize_step_direction: end\n");
01022         #endif
01023     }
01024
01029 void
01030 optimize_direction ()
01031 {
01032     unsigned int i, j, k, b, s, adjust;
01033     #if DEBUG_OPTIMIZE
01034     fprintf (stderr, "optimize_direction: start\n");
01035     #endif
01036     for (i = 0; i < optimize->nvariables; ++i)
01037         optimize->direction[i] = 0.;
01038     b = optimize->simulation_best[0] * optimize->nvariables;
01039     s = optimize->nsimulations;
01040     adjust = 1;
01041     for (i = 0; i < optimize->nsteps; ++i, s += optimize->nestimates, b = k)
01042     {
01043         #if DEBUG_OPTIMIZE

```

```

01044     fprintf (stderr, "optimize_direction: step=%u old_best=%u\n",
01045                i, optimize->simulation_best[0]);
01046 #endif
01047     optimize_step_direction (s);
01048     k = optimize->simulation_best[0] * optimize->nvariables;
01049 #if DEBUG_OPTIMIZE
01050     fprintf (stderr, "optimize_direction: step=%u best=%u\n",
01051                i, optimize->simulation_best[0]);
01052 #endif
01053     if (k == b)
01054     {
01055         if (adjust)
01056             for (j = 0; j < optimize->nvariables; ++j)
01057                 optimize->step[j] *= 0.5;
01058         for (j = 0; j < optimize->nvariables; ++j)
01059             optimize->direction[j] = 0.;
01060         adjust = 1;
01061     }
01062     else
01063     {
01064         for (j = 0; j < optimize->nvariables; ++j)
01065         {
01066 #if DEBUG_OPTIMIZE
01067             fprintf (stderr,
01068                     "optimize_direction: best=%u old=%u\n",
01069                     j, optimize->value[k + j], j, optimize->value[b + j]);
01070 #endif
01071             optimize->direction[j]
01072                 = (1. - optimize->relaxation) * optimize->direction[j]
01073                   + optimize->relaxation
01074                     * (optimize->value[k + j] - optimize->value[b + j]);
01075 #if DEBUG_OPTIMIZE
01076             fprintf (stderr, "optimize_direction: direction=%u\n",
01077                     j, optimize->direction[j]);
01078 #endif
01079         }
01080         adjust = 0;
01081     }
01082 }
01083 #if DEBUG_OPTIMIZE
01084 fprintf (stderr, "optimize_direction: end\n");
01085 #endif
01086 }
01087
01095 double
01096 optimize_genetic_objective (Entity * entity)
01097 {
01098     unsigned int j;
01099     double objective;
01100     char buffer[64];
01101 #if DEBUG_OPTIMIZE
01102     fprintf (stderr, "optimize_genetic_objective: start\n");
01103 #endif
01104     for (j = 0; j < optimize->nvariables; ++j)
01105     {
01106         optimize->value[entity->id * optimize->nvariables + j]
01107             = genetic_get_variable (entity, optimize->genetic_variable + j);
01108     }
01109     objective = optimize_norm (entity->id);
01110     g_mutex_lock (mutex);
01111     for (j = 0; j < optimize->nvariables; ++j)
01112     {
01113         snprintf (buffer, 64, "%s ", format[optimize->precision[j]]);
01114         fprintf (optimize->file_variables, buffer,
01115                 genetic_get_variable (entity, optimize->genetic_variable + j));
01116     }
01117     fprintf (optimize->file_variables, "%.14le\n", objective);
01118     g_mutex_unlock (mutex);
01119 #if DEBUG_OPTIMIZE
01120     fprintf (stderr, "optimize_genetic_objective: end\n");
01121 #endif
01122     return objective;
01123 }
01124
01129 void
01130 optimize_genetic ()
01131 {
01132     char *best_genome;
01133     double best_objective, *best_variable;
01134 #if DEBUG_OPTIMIZE
01135     fprintf (stderr, "optimize_genetic: start\n");
01136     fprintf (stderr, "optimize_genetic: ntasks=%u nthreads=%u\n", ntasks,
01137             nthreads);
01138     fprintf (stderr,
01139             "optimize_genetic: nvariables=%u population=%u generations=%u\n",
01140             optimize->nvariables, optimize->nsimulations, optimize->
niterations);

```

```

01141     fprintf (stderr,
01142             "optimize_genetic: mutation=%lg reproduction=%lg adaptation=%lg\n",
01143             optimize->mutation_ratio, optimize->reproduction_ratio,
01144             optimize->adaptation_ratio);
01145 #endif
01146     genetic_algorithm_default (optimize->nvariables,
01147                               optimize->genetic_variable,
01148                               optimize->nsimulations,
01149                               optimize->niterations,
01150                               optimize->mutation_ratio,
01151                               optimize->reproduction_ratio,
01152                               optimize->adaptation_ratio,
01153                               optimize->seed,
01154                               optimize->threshold,
01155                               &optimize_genetic_objective,
01156                               &best_genome, &best_variable, &best_objective);
01157 #if DEBUG_OPTIMIZE
01158     fprintf (stderr, "optimize_genetic: the best\n");
01159 #endif
01160     optimize->error_old = (double *) g_malloc (sizeof (double));
01161     optimize->value_old
01162     = (double *) g_malloc (optimize->nvariables * sizeof (double));
01163     optimize->error_old[0] = best_objective;
01164     memcpy (optimize->value_old, best_variable,
01165             optimize->nvariables * sizeof (double));
01166     g_free (best_genome);
01167     g_free (best_variable);
01168     optimize_print ();
01169 #if DEBUG_OPTIMIZE
01170     fprintf (stderr, "optimize_genetic: end\n");
01171 #endif
01172 }
01173
01174 void
01175 optimize_save_old ()
01176 {
01177     unsigned int i, j;
01178 #if DEBUG_OPTIMIZE
01179     fprintf (stderr, "optimize_save_old: start\n");
01180     fprintf (stderr, "optimize_save_old: nsaveds=%u\n", optimize->nsaveds);
01181 #endif
01182     memcpy (optimize->error_old, optimize->error_best,
01183             optimize->nbest * sizeof (double));
01184     for (i = 0; i < optimize->nbest; ++i)
01185     {
01186         j = optimize->simulation_best[i];
01187 #if DEBUG_OPTIMIZE
01188         fprintf (stderr, "optimize_save_old: i=%u j=%u\n", i, j);
01189 #endif
01190         memcpy (optimize->value_old + i * optimize->nvariables,
01191                 optimize->value + j * optimize->nvariables,
01192                 optimize->nvariables * sizeof (double));
01193     }
01194 #if DEBUG_OPTIMIZE
01195     for (i = 0; i < optimize->nvariables; ++i)
01196         fprintf (stderr, "optimize_save_old: best variable %u=%lg\n",
01197                 i, optimize->value_old[i]);
01198     fprintf (stderr, "optimize_save_old: end\n");
01199 #endif
01200 }
01201
01202 void
01203 optimize_merge_old ()
01204 {
01205     unsigned int i, j, k;
01206     double v[optimize->nbest * optimize->nvariables], e[optimize->
01207     nbest],
01208     *enew, *eold;
01209 #if DEBUG_OPTIMIZE
01210     fprintf (stderr, "optimize_merge_old: start\n");
01211 #endif
01212     anew = optimize->error_best;
01213     eold = optimize->error_old;
01214     i = j = k = 0;
01215     do
01216     {
01217         if (*enew < *eold)
01218         {
01219             memcpy (v + k * optimize->nvariables,
01220                     optimize->value
01221                     + optimize->simulation_best[i] * optimize->
01222     nvariables,
01223                     optimize->nvariables * sizeof (double));
01224             e[k] = *enew;
01225             ++k;
01226             ++enew;
01227             ++i;

```

```

01235     }
01236     else
01237     {
01238         memcpy (v + k * optimize->nvariables,
01239                 optimize->value_old + j * optimize->nvariables,
01240                 optimize->nvariables * sizeof (double));
01241         e[k] = *eold;
01242         ++k;
01243         ++eold;
01244         ++j;
01245     }
01246 }
01247 while (k < optimize->nbest);
01248 memcpy (optimize->value_old, v, k * optimize->nvariables * sizeof (double));
01249 memcpy (optimize->error_old, e, k * sizeof (double));
01250 #if DEBUG_OPTIMIZE
01251 fprintf (stderr, "optimize_merge_old: end\n");
01252 #endif
01253 }
01254
01260 void
01261 optimize_refine ()
01262 {
01263     unsigned int i, j;
01264     double d;
01265     #if HAVE_MPI
01266     MPI_Status mpi_stat;
01267     #endif
01268     #if DEBUG_OPTIMIZE
01269     fprintf (stderr, "optimize_refine: start\n");
01270     #endif
01271     #if HAVE_MPI
01272     if (!optimize->mpi_rank)
01273     {
01274     #endif
01275         for (j = 0; j < optimize->nvariables; ++j)
01276         {
01277             optimize->rangemin[j] = optimize->rangemax[j]
01278             = optimize->value_old[j];
01279         }
01280         for (i = 0; ++i < optimize->nbest;)
01281         {
01282             for (j = 0; j < optimize->nvariables; ++j)
01283             {
01284                 optimize->rangemin[j]
01285                 = fmin (optimize->rangemin[j],
01286                        optimize->value_old[i * optimize->nvariables + j]);
01287                 optimize->rangemax[j]
01288                 = fmax (optimize->rangemax[j],
01289                        optimize->value_old[i * optimize->nvariables + j]);
01290             }
01291         }
01292         for (j = 0; j < optimize->nvariables; ++j)
01293         {
01294             d = optimize->tolerance
01295             * (optimize->rangemax[j] - optimize->rangemin[j]);
01296             switch (optimize->algorithm)
01297             {
01298             case ALGORITHM_MONTE_CARLO:
01299                 d *= 0.5;
01300                 break;
01301             default:
01302                 if (optimize->nsweeps[j] > 1)
01303                     d /= optimize->nsweeps[j] - 1;
01304                 else
01305                     d = 0.;
01306             }
01307             optimize->rangemin[j] -= d;
01308             optimize->rangemin[j]
01309             = fmax (optimize->rangemin[j], optimize->rangeminabs[j]);
01310             optimize->rangemax[j] += d;
01311             optimize->rangemax[j]
01312             = fmin (optimize->rangemax[j], optimize->rangemaxabs[j]);
01313             printf ("%s min=%lg max=%lg\n", optimize->label[j],
01314                    optimize->rangemin[j], optimize->rangemax[j]);
01315             fprintf (optimize->file_result, "%s min=%lg max=%lg\n",
01316                     optimize->label[j], optimize->rangemin[j],
01317                     optimize->rangemax[j]);
01318         }
01319     #if HAVE_MPI
01320         for (i = 1; i < ntasks; ++i)
01321         {
01322             MPI_Send (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, i,
01323                      1, MPI_COMM_WORLD);
01324             MPI_Send (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, i,
01325                      1, MPI_COMM_WORLD);
01326         }

```

```

01327     }
01328     else
01329     {
01330         MPI_Recv (optimize->rangemin, optimize->nvariables, MPI_DOUBLE, 0, 1,
01331                 MPI_COMM_WORLD, &mpi_stat);
01332         MPI_Recv (optimize->rangemax, optimize->nvariables, MPI_DOUBLE, 0, 1,
01333                 MPI_COMM_WORLD, &mpi_stat);
01334     }
01335 #endif
01336 #if DEBUG_OPTIMIZE
01337     fprintf (stderr, "optimize_refine: end\n");
01338 #endif
01339 }
01340
01341 void
01342 optimize_step ()
01343 {
01344     #if DEBUG_OPTIMIZE
01345         fprintf (stderr, "optimize_step: start\n");
01346     #endif
01347     optimize_algorithm ();
01348     if (optimize->nsteps)
01349         optimize_direction ();
01350     #if DEBUG_OPTIMIZE
01351         fprintf (stderr, "optimize_step: end\n");
01352     #endif
01353 }
01354
01355 void
01356 optimize_iterate ()
01357 {
01358     unsigned int i;
01359     #if DEBUG_OPTIMIZE
01360         fprintf (stderr, "optimize_iterate: start\n");
01361     #endif
01362     optimize->error_old = (double *) g_malloc (optimize->nbest * sizeof (double));
01363     optimize->value_old = (double *)
01364         g_malloc (optimize->nbest * optimize->nvariables * sizeof (double));
01365     optimize_step ();
01366     optimize_save_old ();
01367     optimize_refine ();
01368     optimize_print ();
01369     for (i = 1; i < optimize->niterations && !optimize->stop; ++i)
01370     {
01371         optimize_step ();
01372         optimize_merge_old ();
01373         optimize_refine ();
01374         optimize_print ();
01375     }
01376     #if DEBUG_OPTIMIZE
01377         fprintf (stderr, "optimize_iterate: end\n");
01378     #endif
01379 }
01380
01381 void
01382 optimize_free ()
01383 {
01384     unsigned int i, j;
01385     #if DEBUG_OPTIMIZE
01386         fprintf (stderr, "optimize_free: start\n");
01387     #endif
01388     for (j = 0; j < optimize->ninputs; ++j)
01389     {
01390         for (i = 0; i < optimize->nexperiments; ++i)
01391             g_mapped_file_unref (optimize->file[j][i]);
01392         g_free (optimize->file[j]);
01393     }
01394     g_free (optimize->error_old);
01395     g_free (optimize->value_old);
01396     g_free (optimize->value);
01397     g_free (optimize->genetic_variable);
01398     #if DEBUG_OPTIMIZE
01399         fprintf (stderr, "optimize_free: end\n");
01400     #endif
01401 }
01402
01403 void
01404 optimize_open ()
01405 {
01406     GTimeZone *tz;
01407     GDateTime *t0, *t;
01408     unsigned int i, j;
01409
01410     #if DEBUG_OPTIMIZE
01411         char *buffer;
01412         fprintf (stderr, "optimize_open: start\n");
01413     #endif

```



```

01430
01431 // Getting initial time
01432 #if DEBUG_OPTIMIZE
01433 fprintf (stderr, "optimize_open: getting initial time\n");
01434 #endif
01435 tz = g_time_zone_new_utc ();
01436 t0 = g_date_time_new_now (tz);
01437
01438 // Obtaining and initing the pseudo-random numbers generator seed
01439 #if DEBUG_OPTIMIZE
01440 fprintf (stderr, "optimize_open: getting initial seed\n");
01441 #endif
01442 if (optimize->seed == DEFAULT_RANDOM_SEED)
01443     optimize->seed = input->seed;
01444 gsl_rng_set (optimize->rng, optimize->seed);
01445
01446 // Replacing the working directory
01447 #if DEBUG_OPTIMIZE
01448 fprintf (stderr, "optimize_open: replacing the working directory\n");
01449 #endif
01450 g_chdir (input->directory);
01451
01452 // Getting results file names
01453 optimize->result = input->result;
01454 optimize->variables = input->variables;
01455
01456 // Obtaining the simulator file
01457 optimize->simulator = input->simulator;
01458
01459 // Obtaining the evaluator file
01460 optimize->evaluator = input->evaluator;
01461
01462 // Reading the algorithm
01463 optimize->algorithm = input->algorithm;
01464 switch (optimize->algorithm)
01465 {
01466     case ALGORITHM_MONTE_CARLO:
01467         optimize_algorithm = optimize_MonteCarlo;
01468         break;
01469     case ALGORITHM_SWEEP:
01470         optimize_algorithm = optimize_sweep;
01471         break;
01472     default:
01473         optimize_algorithm = optimize_genetic;
01474         optimize->mutation_ratio = input->mutation_ratio;
01475         optimize->reproduction_ratio = input->
01476         reproduction_ratio;
01477         optimize->adaptation_ratio = input->adaptation_ratio;
01478 }
01479 optimize->nvariables = input->nvariables;
01480 optimize->nsimulations = input->nsimulations;
01481 optimize->niterations = input->niterations;
01482 optimize->nbest = input->nbest;
01483 optimize->tolerance = input->tolerance;
01484 optimize->nsteps = input->nsteps;
01485 optimize->nestimates = 0;
01486 optimize->threshold = input->threshold;
01487 optimize->stop = 0;
01488 if (input->nsteps)
01489 {
01490     optimize->relaxation = input->relaxation;
01491     switch (input->direction)
01492     {
01493         case DIRECTION_METHOD_COORDINATES:
01494             optimize->nestimates = 2 * optimize->nvariables;
01495             optimize_estimate_direction =
01496             optimize_estimate_direction_coordinates;
01497             break;
01498         default:
01499             optimize->nestimates = input->nestimates;
01500             optimize_estimate_direction =
01501             optimize_estimate_direction_random;
01502     }
01503 }
01504 #if DEBUG_OPTIMIZE
01505 fprintf (stderr, "optimize_open: nbest=%u\n", optimize->nbest);
01506 #endif
01507 optimize->simulation_best
01508     = (unsigned int *) alloca (optimize->nbest * sizeof (unsigned int));
01509 optimize->error_best = (double *) alloca (optimize->nbest * sizeof (double));
01510
01511 // Reading the experimental data
01512 #if DEBUG_OPTIMIZE
01513 buffer = g_get_current_dir ();
01514 fprintf (stderr, "optimize_open: current directory=%s\n", buffer);
01515 g_free (buffer);

```

```

01514 #endif
01515     optimize->nexperiments = input->nexperiments;
01516     optimize->ninputs = input->experiment->ninputs;
01517     optimize->experiment
01518     = (char **) alloca (input->nexperiments * sizeof (char *));
01519     optimize->weight = (double *) alloca (input->nexperiments * sizeof (double));
01520     for (i = 0; i < input->experiment->ninputs; ++i)
01521         optimize->file[i] = (GMappedFile **)
01522             g_malloc (input->nexperiments * sizeof (GMappedFile *));
01523     for (i = 0; i < input->nexperiments; ++i)
01524     {
01525         #if DEBUG_OPTIMIZE
01526             fprintf (stderr, "optimize_open: i=%u\n", i);
01527         #endif
01528         optimize->experiment[i] = input->experiment[i].
name;
01529         optimize->weight[i] = input->experiment[i].weight;
01530         #if DEBUG_OPTIMIZE
01531             fprintf (stderr, "optimize_open: experiment=%s weight=%lg\n",
01532                     optimize->experiment[i], optimize->weight[i]);
01533         #endif
01534         for (j = 0; j < input->experiment->ninputs; ++j)
01535         {
01536             #if DEBUG_OPTIMIZE
01537                 fprintf (stderr, "optimize_open: template%u\n", j + 1);
01538             #endif
01539             optimize->file[j][i]
01540                 = g_mapped_file_new (input->experiment[i].template[j], 0, NULL);
01541         }
01542     }
01543
01544     // Reading the variables data
01545     #if DEBUG_OPTIMIZE
01546         fprintf (stderr, "optimize_open: reading variables\n");
01547     #endif
01548     optimize->label = (char **) alloca (input->nvariables * sizeof (char *));
01549     j = input->nvariables * sizeof (double);
01550     optimize->rangemin = (double *) alloca (j);
01551     optimize->rangeminabs = (double *) alloca (j);
01552     optimize->rangemax = (double *) alloca (j);
01553     optimize->rangemaxabs = (double *) alloca (j);
01554     optimize->step = (double *) alloca (j);
01555     j = input->nvariables * sizeof (unsigned int);
01556     optimize->precision = (unsigned int *) alloca (j);
01557     optimize->nsweeps = (unsigned int *) alloca (j);
01558     optimize->nbits = (unsigned int *) alloca (j);
01559     for (i = 0; i < input->nvariables; ++i)
01560     {
01561         optimize->label[i] = input->variable[i].name;
01562         optimize->rangemin[i] = input->variable[i].rangemin;
01563         optimize->rangeminabs[i] = input->variable[i].
rangeminabs;
01564         optimize->rangemax[i] = input->variable[i].rangemax;
01565         optimize->rangemaxabs[i] = input->variable[i].
rangemaxabs;
01566         optimize->precision[i] = input->variable[i].
precision;
01567         optimize->step[i] = input->variable[i].step;
01568         optimize->nsweeps[i] = input->variable[i].nsweeps;
01569         optimize->nbits[i] = input->variable[i].nbits;
01570     }
01571     if (input->algorithm == ALGORITHM_SWEEP)
01572     {
01573         optimize->nsimulations = 1;
01574         for (i = 0; i < input->nvariables; ++i)
01575         {
01576             if (input->algorithm == ALGORITHM_SWEEP)
01577             {
01578                 optimize->nsimulations *= optimize->nsweeps[i];
01579             #if DEBUG_OPTIMIZE
01580                 fprintf (stderr, "optimize_open: nsweeps=%u nsimulations=%u\n",
01581                         optimize->nsweeps[i], optimize->nsimulations);
01582             #endif
01583             }
01584         }
01585     }
01586     if (optimize->nsteps)
01587         optimize->direction
01588         = (double *) alloca (optimize->nvariables * sizeof (double));
01589
01590     // Setting error norm
01591     switch (input->norm)
01592     {
01593     case ERROR_NORM_EUCLIDIAN:
01594         optimize_norm = optimize_norm_euclidian;
01595         break;
01596     case ERROR_NORM_MAXIMUM:

```

```

01597     optimize_norm = optimize_norm_maximum;
01598     break;
01599     case ERROR_NORM_P:
01600         optimize_norm = optimize_norm_p;
01601         optimize->p = input->p;
01602         break;
01603     default:
01604         optimize_norm = optimize_norm_taxicab;
01605     }
01606
01607     // Allocating values
01608     #if DEBUG_OPTIMIZE
01609     fprintf (stderr, "optimize_open: allocating variables\n");
01610     fprintf (stderr, "optimize_open: nvariables=%u algorithm=%u\n",
01611             optimize->nvariables, optimize->algorithm);
01612     #endif
01613     optimize->genetic_variable = NULL;
01614     if (optimize->algorithm == ALGORITHM_GENETIC)
01615     {
01616         optimize->genetic_variable = (GeneticVariable *)
01617             g_malloc (optimize->nvariables * sizeof (GeneticVariable));
01618         for (i = 0; i < optimize->nvariables; ++i)
01619         {
01620             #if DEBUG_OPTIMIZE
01621             fprintf (stderr, "optimize_open: i=%u min=%lg max=%lg nbits=%u\n",
01622                     i, optimize->rangemin[i], optimize->rangemax[i],
01623                     optimize->nbits[i]);
01624             #endif
01625             optimize->genetic_variable[i].minimum = optimize->
01626                 rangemin[i];
01627             optimize->genetic_variable[i].maximum = optimize->
01628                 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 /
01648         ntasks;
01649     optimize->nend = (1 + optimize->mpi_rank) * optimize->nsimulations /
01650         ntasks;
01651     if (optimize->nsteps)
01652     {
01653         optimize->nstart_direction
01654             = optimize->mpi_rank * optimize->nestimates / ntasks;
01655         optimize->nend_direction
01656             = (1 + optimize->mpi_rank) * optimize->nestimates /
01657                 ntasks;
01658     }
01659     #else
01660     optimize->nstart = 0;
01661     optimize->nend = optimize->nsimulations;
01662     if (optimize->nsteps)
01663     {
01664         optimize->nstart_direction = 0;
01665         optimize->nend_direction = optimize->nestimates;
01666     }
01667     #endif
01668     #if DEBUG_OPTIMIZE
01669     fprintf (stderr, "optimize_open: nstart=%u nend=%u\n", optimize->nstart,
01670             optimize->nend);
01671     #endif
01672
01673     // Calculating simulations to perform for each thread
01674     optimize->thread
01675         = (unsigned int *) alloca ((1 + nthreads) * sizeof (unsigned int));
01676     for (i = 0; i <= nthreads; ++i)
01677     {
01678         optimize->thread[i] = optimize->nstart
01679             + i * (optimize->nend - optimize->nstart) / nthreads;
01680     }
01681     #if DEBUG_OPTIMIZE
01682     fprintf (stderr, "optimize_open: i=%u thread=%u\n", i,
01683             optimize->thread[i]);
01684     #endif

```

```

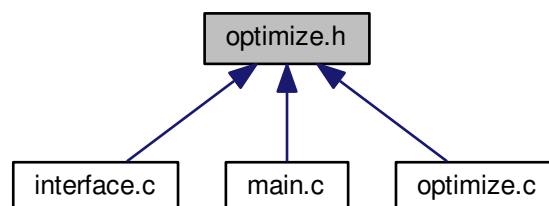
01679     }
01680     if (optimize->nsteps)
01681         optimize->thread_direction = (unsigned int *)
01682             alloca ((1 + nthreads_direction) * sizeof (unsigned int));
01683
01684     // Opening result files
01685     optimize->file_result = g_fopen (optimize->result, "w");
01686     optimize->file_variables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

```

## 5.19 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\\_input](#) (unsigned int simulation, char \*[input](#), GMappedFile \*[template](#))  
*Function to write the simulation input file.*
- double [optimize\\_parse](#) (unsigned int simulation, unsigned int experiment)  
*Function to parse input files, simulating and calculating the \ objective function.*
- double [optimize\\_norm\\_euclidian](#) (unsigned int simulation)  
*Function to calculate the Euclidian error norm.*
- double [optimize\\_norm\\_maximum](#) (unsigned int simulation)  
*Function to calculate the maximum error norm.*
- double [optimize\\_norm\\_p](#) (unsigned int simulation)  
*Function to calculate the P error norm.*
- double [optimize\\_norm\\_taxicab](#) (unsigned int simulation)  
*Function to calculate the taxicab error norm.*
- void [optimize\\_print](#) ()  
*Function to print the results.*
- void [optimize\\_save\\_variables](#) (unsigned int simulation, double error)  
*Function to save in a file the variables and the error.*
- void [optimize\\_best](#) (unsigned int simulation, double value)  
*Function to save the best simulations.*
- void [optimize\\_sequential](#) ()  
*Function to optimize sequentially.*
- void \* [optimize\\_thread](#) ([ParallelData](#) \*data)  
*Function to optimize on a thread.*
- void [optimize\\_merge](#) (unsigned int nsaveds, unsigned int \*simulation\_best, double \*error\_best)  
*Function to merge the 2 optimization results.*
- void [optimize\\_synchronise](#) ()  
*Function to synchronise the optimization results of MPI tasks.*
- void [optimize\\_sweep](#) ()  
*Function to optimize with the sweep algorithm.*
- void [optimize\\_MonteCarlo](#) ()  
*Function to optimize with the Monte-Carlo algorithm.*
- void [optimize\\_best\\_direction](#) (unsigned int simulation, double value)  
*Function to save the best simulation in a direction search method.*
- void [optimize\\_direction\\_sequential](#) (unsigned int simulation)  
*Function to estimate the direction search sequentially.*
- void \* [optimize\\_direction\\_thread](#) ([ParallelData](#) \*data)  
*Function to estimate the direction search on a thread.*
- double [optimize\\_estimate\\_direction\\_random](#) (unsigned int variable, unsigned int estimate)  
*Function to estimate a component of the direction search vector.*
- double [optimize\\_estimate\\_direction\\_coordinates](#) (unsigned int variable, unsigned int estimate)  
*Function to estimate a component of the direction search vector.*
- void [optimize\\_step\\_direction](#) (unsigned int simulation)  
*Function to do a step of the direction search method.*
- void [optimize\\_direction](#) ()  
*Function to optimize with a direction search method.*
- double [optimize\\_genetic\\_objective](#) (Entity \*entity)  
*Function to calculate the objective function of an entity.*
- void [optimize\\_genetic](#) ()  
*Function to optimize with the genetic algorithm.*
- void [optimize\\_save\\_old](#) ()

- *Function to save the best results on iterative methods.*
- void [optimize\\_merge\\_old](#) ()
- *Function to merge the best results with the previous step best results on iterative methods.*
- void [optimize\\_refine](#) ()
- *Function to refine the search ranges of the variables in iterative algorithms.*
- void [optimize\\_step](#) ()
- *Function to do a step of the iterative algorithm.*
- void [optimize\\_iterate](#) ()
- *Function to iterate the algorithm.*
- void [optimize\\_free](#) ()
- *Function to free the memory used by the [Optimize](#) struct.*
- void [optimize\\_open](#) ()
- *Function to open and perform a optimization.*

## Variables

- int [ntasks](#)
- *Number of tasks.*
- unsigned int [nthreads](#)
- *Number of threads.*
- unsigned int [nthreads\\_direction](#)
- *Number of threads for the direction search method.*
- GMutex [mutex](#) [1]
- *Mutex struct.*
- void(\* [optimize\\_algorithm](#) )()
- *Pointer to the function to perform a optimization algorithm step.*
- double(\* [optimize\\_estimate\\_direction](#) )(unsigned int variable, unsigned int estimate)
- *Pointer to the function to estimate the direction.*
- double(\* [optimize\\_norm](#) )(unsigned int simulation)
- *Pointer to the error norm function.*
- [Optimize optimize](#) [1]
- *Optimization data.*

### 5.19.1 Detailed Description

Header file to define the optimization functions.

#### Authors

Javier Burguete.

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Definition in file [optimize.h](#).

### 5.19.2 Function Documentation

#### 5.19.2.1 void [optimize\\_best](#) ( unsigned int *simulation*, double *value* )

Function to save the best simulations.

## Parameters

<i>simulation</i>	Simulation number.
<i>value</i>	Objective function value.

Definition at line 462 of file [optimize.c](#).

```

00463 {
00464     unsigned int i, j;
00465     double e;
00466     #if DEBUG_OPTIMIZE
00467         fprintf (stderr, "optimize_best: start\n");
00468         fprintf (stderr, "optimize_best: nsaveds=%u nbest=%u\n",
00469                 optimize->nsaveds, optimize->nbest);
00470     #endif
00471     if (optimize->nsaveds < optimize->nbest
00472         || value < optimize->error_best[optimize->nsaveds - 1])
00473     {
00474         if (optimize->nsaveds < optimize->nbest)
00475             ++optimize->nsaveds;
00476         optimize->error_best[optimize->nsaveds - 1] = value;
00477         optimize->simulation_best[optimize->nsaveds - 1] = simulation;
00478         for (i = optimize->nsaveds; --i;)
00479         {
00480             if (optimize->error_best[i] < optimize->
00481                 error_best[i - 1])
00482             {
00483                 j = optimize->simulation_best[i];
00484                 e = optimize->error_best[i];
00485                 optimize->simulation_best[i] = optimize->
00486                     simulation_best[i - 1];
00487                 optimize->error_best[i] = optimize->
00488                     error_best[i - 1];
00489                 optimize->simulation_best[i - 1] = j;
00490                 optimize->error_best[i - 1] = e;
00491             }
00492             else
00493                 break;
00494         }
00495     }
00496     #if DEBUG_OPTIMIZE
00497         fprintf (stderr, "optimize_best: end\n");
00498     #endif
00499 }
```

### 5.19.2.2 void optimize\_best\_direction ( unsigned int *simulation*, double *value* )

Function to save the best simulation in a direction search method.

## Parameters

<i>simulation</i>	Simulation number.
<i>value</i>	Objective function value.

Definition at line 787 of file [optimize.c](#).

```

00788 {
00789     #if DEBUG_OPTIMIZE
00790         fprintf (stderr, "optimize_best_direction: start\n");
00791         fprintf (stderr,
00792                 "optimize_best_direction: simulation=%u value=%.14le best=%.14le\n",
00793                 simulation, value, optimize->error_best[0]);
00794     #endif
00795     if (value < optimize->error_best[0])
00796     {
00797         optimize->error_best[0] = value;
00798         optimize->simulation_best[0] = simulation;
00799     }
00800     #if DEBUG_OPTIMIZE
00801         fprintf (stderr,
00802                 "optimize_best_direction: BEST simulation=%u value=%.14le\n",
00803                 simulation, value);
00804     #endif
00805     #if DEBUG_OPTIMIZE
00806         fprintf (stderr, "optimize_best_direction: end\n");
00807     #endif
00808 }
```

5.19.2.3 void optimize\_direction\_sequential ( unsigned int *simulation* )

Function to estimate the direction search sequentially.



## Parameters

<i>simulation</i>	Simulation number.
-------------------	--------------------

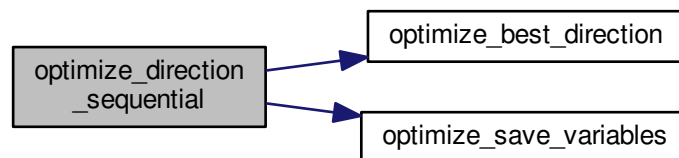
Definition at line 817 of file [optimize.c](#).

```

00818 {
00819     unsigned int i, j;
00820     double e;
00821     #if DEBUG_OPTIMIZE
00822     fprintf (stderr, "optimize_direction_sequential: start\n");
00823     fprintf (stderr, "optimize_direction_sequential: nstart_direction=%u "
00824             "nend_direction=%u\n",
00825             optimize->nstart_direction, optimize->
nend_direction);
00826     #endif
00827     for (i = optimize->nstart_direction; i < optimize->nend_direction; ++i)
00828     {
00829         j = simulation + i;
00830         e = optimize_norm (j);
00831         optimize_best_direction (j, e);
00832         optimize_save_variables (j, e);
00833         if (e < optimize->threshold)
00834         {
00835             optimize->stop = 1;
00836             break;
00837         }
00838     #if DEBUG_OPTIMIZE
00839     fprintf (stderr, "optimize_direction_sequential: i=%u e=%lg\n", i, e);
00840     #endif
00841     }
00842     #if DEBUG_OPTIMIZE
00843     fprintf (stderr, "optimize_direction_sequential: end\n");
00844     #endif
00845 }

```

Here is the call graph for this function:



#### 5.19.2.4 void\* optimize\_direction\_thread ( ParallelData \* data )

Function to estimate the direction search on a thread.

## Parameters

<i>data</i>	Function data.
-------------	----------------

## Returns

NULL

Definition at line 855 of file [optimize.c](#).

```

00856 {
00857     unsigned int i, thread;

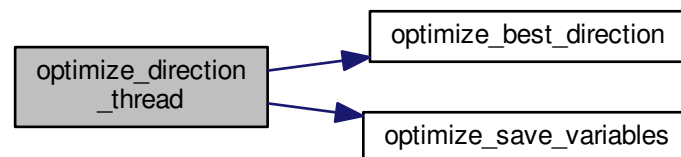
```

```

00858     double e;
00859     #if DEBUG_OPTIMIZE
00860     fprintf (stderr, "optimize_direction_thread: start\n");
00861     #endif
00862     thread = data->thread;
00863     #if DEBUG_OPTIMIZE
00864     fprintf (stderr, "optimize_direction_thread: thread=%u start=%u end=%u\n",
00865             thread,
00866             optimize->thread_direction[thread],
00867             optimize->thread_direction[thread + 1]);
00868     #endif
00869     for (i = optimize->thread_direction[thread];
00870          i < optimize->thread_direction[thread + 1]; ++i)
00871     {
00872         e = optimize_norm (i);
00873         g_mutex_lock (mutex);
00874         optimize_best_direction (i, e);
00875         optimize_save_variables (i, e);
00876         if (e < optimize->threshold)
00877             optimize->stop = 1;
00878         g_mutex_unlock (mutex);
00879         if (optimize->stop)
00880             break;
00881     #if DEBUG_OPTIMIZE
00882     fprintf (stderr, "optimize_direction_thread: i=%u e=%lg\n", i, e);
00883     #endif
00884     }
00885     #if DEBUG_OPTIMIZE
00886     fprintf (stderr, "optimize_direction_thread: end\n");
00887     #endif
00888     g_thread_exit (NULL);
00889     return NULL;
00890 }

```

Here is the call graph for this function:



#### 5.19.2.5 double optimize\_estimate\_direction\_coordinates ( unsigned int *variable*, unsigned int *estimate* )

Function to estimate a component of the direction search vector.

##### Parameters

<i>variable</i>	Variable number.
<i>estimate</i>	Estimate number.

Definition at line 929 of file [optimize.c](#).

```

00931 {
00932     double x;
00933     #if DEBUG_OPTIMIZE
00934     fprintf (stderr, "optimize_estimate_direction_coordinates: start\n");
00935     #endif
00936     x = optimize->direction[variable];
00937     if (estimate >= (2 * variable) && estimate < (2 * variable + 2))
00938     {
00939         if (estimate & 1)
00940             x += optimize->step[variable];
00941         else

```

```

00942     x -= optimize->step[variable];
00943 }
00944 #if DEBUG_OPTIMIZE
00945 fprintf (stderr,
00946         "optimize_estimate_direction_coordinates: direction%u=%lg\n",
00947         variable, x);
00948 fprintf (stderr, "optimize_estimate_direction_coordinates: end\n");
00949 #endif
00950 return x;
00951 }

```

#### 5.19.2.6 double optimize\_estimate\_direction\_random ( unsigned int *variable*, unsigned int *estimate* )

Function to estimate a component of the direction search vector.

##### Parameters

<i>variable</i>	Variable number.
<i>estimate</i>	Estimate number.

Definition at line 902 of file [optimize.c](#).

```

00904 {
00905     double x;
00906     #if DEBUG_OPTIMIZE
00907     fprintf (stderr, "optimize_estimate_direction_random: start\n");
00908     #endif
00909     x = optimize->direction[variable]
00910         + (1. - 2. * gsl_rng_uniform (optimize->rng)) * optimize->
00911         step[variable];
00912     #if DEBUG_OPTIMIZE
00913     fprintf (stderr, "optimize_estimate_direction_random: direction%u=%lg\n",
00914             variable, x);
00915     fprintf (stderr, "optimize_estimate_direction_random: end\n");
00916     #endif
00917     return x;
00918 }

```

#### 5.19.2.7 double optimize\_genetic\_objective ( Entity \* *entity* )

Function to calculate the objective function of an entity.

##### Parameters

<i>entity</i>	entity data.
---------------	--------------

##### Returns

objective function value.

Definition at line 1096 of file [optimize.c](#).

```

01097 {
01098     unsigned int j;
01099     double objective;
01100     char buffer[64];
01101     #if DEBUG_OPTIMIZE
01102     fprintf (stderr, "optimize_genetic_objective: start\n");
01103     #endif
01104     for (j = 0; j < optimize->nvariables; ++j)
01105     {
01106         optimize->value[entity->id * optimize->nvariables + j]
01107             = genetic_get_variable (entity, optimize->genetic_variable + j);
01108     }
01109     objective = optimize_norm (entity->id);
01110     g_mutex_lock (mutex);
01111     for (j = 0; j < optimize->nvariables; ++j)
01112     {
01113         snprintf (buffer, 64, "%s ", format[optimize->precision[j]]);
01114         fprintf (optimize->file_variables, buffer,
01115                 genetic_get_variable (entity, optimize->genetic_variable + j));
01116     }
01117     return objective;
01118 }

```

```

01116     }
01117     fprintf (optimize->file_variables, "%.14le\n", objective);
01118     g_mutex_unlock (mutex);
01119 #if DEBUG_OPTIMIZE
01120     fprintf (stderr, "optimize_genetic_objective: end\n");
01121 #endif
01122     return objective;
01123 }

```

#### 5.19.2.8 void optimize\_input ( unsigned int *simulation*, char \* *input*, GMappedFile \* *template* )

Function to write the simulation input file.

##### Parameters

<i>simulation</i>	Simulation number.
<i>input</i>	Input file name.
<i>template</i>	Template of the input file name.

Definition at line 103 of file [optimize.c](#).

```

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

```

```

00162     g_free (buffer2);
00163     g_regex_unref (regex);
00164 }
00165
00166 // Saving input file
00167 fwrite (buffer3, strlen (buffer3), sizeof (char), file);
00168 g_free (buffer3);
00169 fclose (file);
00170
00171 optimize_input_end:
00172 #if DEBUG_OPTIMIZE
00173     fprintf (stderr, "optimize_input: end\n");
00174 #endif
00175     return;
00176 }

```

#### 5.19.2.9 void optimize\_merge ( unsigned int *nsaveds*, unsigned int \* *simulation\_best*, double \* *error\_best* )

Function to merge the 2 optimization results.

##### Parameters

<i>nsaveds</i>	Number of saved results.
<i>simulation_best</i>	Array of best simulation numbers.
<i>error_best</i>	Array of best objective function values.

Definition at line 585 of file [optimize.c](#).

```

00587 {
00588     unsigned int i, j, k, s[optimize->nbest];
00589     double e[optimize->nbest];
00590 #if DEBUG_OPTIMIZE
00591     fprintf (stderr, "optimize_merge: start\n");
00592 #endif
00593     i = j = k = 0;
00594     do
00595     {
00596         if (i == optimize->nsaveds)
00597         {
00598             s[k] = simulation_best[j];
00599             e[k] = error_best[j];
00600             ++j;
00601             ++k;
00602             if (j == nsaveds)
00603                 break;
00604         }
00605         else if (j == nsaveds)
00606         {
00607             s[k] = optimize->simulation_best[i];
00608             e[k] = optimize->error_best[i];
00609             ++i;
00610             ++k;
00611             if (i == optimize->nsaveds)
00612                 break;
00613         }
00614         else if (optimize->error_best[i] > error_best[j])
00615         {
00616             s[k] = simulation_best[j];
00617             e[k] = error_best[j];
00618             ++j;
00619             ++k;
00620         }
00621         else
00622         {
00623             s[k] = optimize->simulation_best[i];
00624             e[k] = optimize->error_best[i];
00625             ++i;
00626             ++k;
00627         }
00628     }
00629     while (k < optimize->nbest);
00630     optimize->nsaveds = k;
00631     memcpy (optimize->simulation_best, s, k * sizeof (unsigned int));
00632     memcpy (optimize->error_best, e, k * sizeof (double));
00633 #if DEBUG_OPTIMIZE
00634     fprintf (stderr, "optimize_merge: end\n");
00635 #endif
00636 }

```

5.19.2.10 `double optimize_norm_euclidian ( unsigned int simulation )`

Function to calculate the Euclidian error norm.

## Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

## Returns

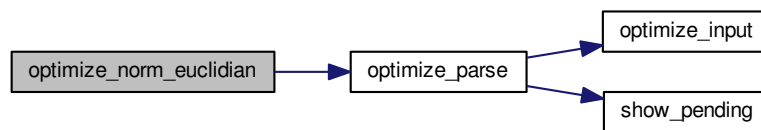
Euclidian error norm.

Definition at line 295 of file [optimize.c](#).

```

00296 {
00297     double e, ei;
00298     unsigned int i;
00299     #if DEBUG_OPTIMIZE
00300     fprintf (stderr, "optimize_norm_euclidian: start\n");
00301     #endif
00302     e = 0.;
00303     for (i = 0; i < optimize->nexperiments; ++i)
00304     {
00305         ei = optimize_parse (simulation, i);
00306         e += ei * ei;
00307     }
00308     e = sqrt (e);
00309     #if DEBUG_OPTIMIZE
00310     fprintf (stderr, "optimize_norm_euclidian: error=%lg\n", e);
00311     fprintf (stderr, "optimize_norm_euclidian: end\n");
00312     #endif
00313     return e;
00314 }
```

Here is the call graph for this function:



#### 5.19.2.11 double optimize\_norm\_maximum ( unsigned int *simulation* )

Function to calculate the maximum error norm.

## Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

## Returns

Maximum error norm.

Definition at line 324 of file [optimize.c](#).

```

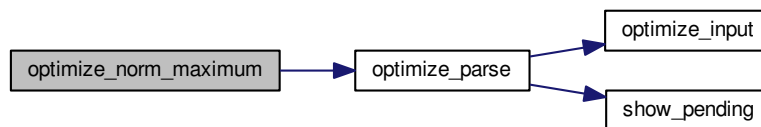
00325 {
00326     double e, ei;
00327     unsigned int i;
00328     #if DEBUG_OPTIMIZE
00329     fprintf (stderr, "optimize_norm_maximum: start\n");
00330     #endif
00331     e = 0.;
00332     for (i = 0; i < optimize->nexperiments; ++i)
00333     {
```

```

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:



#### 5.19.2.12 double optimize\_norm\_p ( unsigned int *simulation* )

Function to calculate the P error norm.

##### Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

##### Returns

P error norm.

Definition at line 352 of file [optimize.c](#).

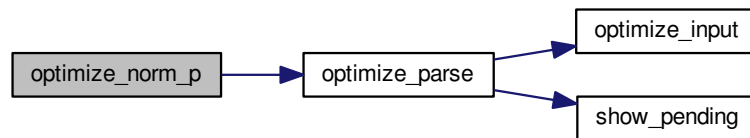
```

00353 {
00354     double e, ei;
00355     unsigned int i;
00356     #if DEBUG_OPTIMIZE
00357     fprintf (stderr, "optimize_norm_p: start\n");
00358     #endif
00359     e = 0.;
00360     for (i = 0; i < optimize->nexperiments; ++i)
00361     {
00362         ei = fabs (optimize_parse (simulation, i));
00363         e += pow (ei, optimize->p);
00364     }
00365     e = pow (e, 1. / optimize->p);
00366     #if DEBUG_OPTIMIZE
00367     fprintf (stderr, "optimize_norm_p: error=%lg\n", e);
00368     fprintf (stderr, "optimize_norm_p: end\n");
00369     #endif
00370     return e;
00371 }

```



Here is the call graph for this function:



#### 5.19.2.13 double optimize\_norm\_taxicab ( unsigned int *simulation* )

Function to calculate the taxicab error norm.

##### Parameters

<i>simulation</i>	simulation number.
-------------------	--------------------

##### Returns

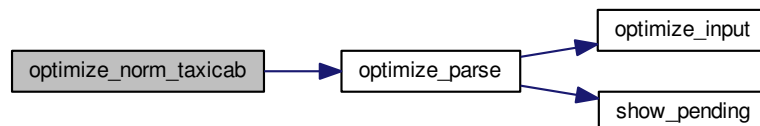
Taxicab error norm.

Definition at line 381 of file [optimize.c](#).

```

00382 {
00383     double e;
00384     unsigned int i;
00385     #if DEBUG_OPTIMIZE
00386     fprintf (stderr, "optimize_norm_taxicab: start\n");
00387     #endif
00388     e = 0.;
00389     for (i = 0; i < optimize->nexperiments; ++i)
00390         e += fabs (optimize_parse (simulation, i));
00391     #if DEBUG_OPTIMIZE
00392     fprintf (stderr, "optimize_norm_taxicab: error=%lg\n", e);
00393     fprintf (stderr, "optimize_norm_taxicab: end\n");
00394     #endif
00395     return e;
00396 }
  
```

Here is the call graph for this function:



#### 5.19.2.14 double optimize\_parse ( unsigned int *simulation*, unsigned int *experiment* )

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

## Parameters

<i>simulation</i>	Simulation number.
<i>experiment</i>	<a href="#">Experiment</a> number.

## Returns

Objective function value.

Definition at line 189 of file [optimize.c](#).

```

00190 {
00191     unsigned int i;
00192     double e;
00193     char buffer[512], input[MAX_NINPUTS][32], output[32], result[32], *buffer2,
00194           *buffer3, *buffer4;
00195     FILE *file_result;
00196
00197     #if DEBUG_OPTIMIZE
00198         fprintf (stderr, "optimize_parse: start\n");
00199         fprintf (stderr, "optimize_parse: simulation=%u experiment=%u\n", simulation,
00200                 experiment);
00201     #endif
00202
00203     // Opening input files
00204     for (i = 0; i < optimize->ninputs; ++i)
00205     {
00206         snprintf (&input[i][0], 32, "input-%u-%u-%u", i, simulation, experiment);
00207     #if DEBUG_OPTIMIZE
00208         fprintf (stderr, "optimize_parse: i=%u input=%s\n", i, &input[i][0]);
00209     #endif
00210         optimize_input (simulation, &input[i][0], optimize->
00211             file[i][experiment]);
00212     }
00213     for (; i < MAX_NINPUTS; ++i)
00214         strcpy (&input[i][0], "");
00215     #if DEBUG_OPTIMIZE
00216         fprintf (stderr, "optimize_parse: parsing end\n");
00217     #endif
00218
00219     // Performing the simulation
00220     snprintf (output, 32, "output-%u-%u", simulation, experiment);
00221     buffer2 = g_path_get_dirname (optimize->simulator);
00222     buffer3 = g_path_get_basename (optimize->simulator);
00223     buffer4 = g_build_filename (buffer2, buffer3, NULL);
00224     snprintf (buffer, 512, "\"%s\" %s %s %s %s %s %s %s %s %s",
00225             buffer4, input[0], input[1], input[2], input[3], input[4], input[5],
00226             input[6], input[7], output);
00227     g_free (buffer4);
00228     g_free (buffer3);
00229     g_free (buffer2);
00230     #if DEBUG_OPTIMIZE
00231         fprintf (stderr, "optimize_parse: %s\n", buffer);
00232     #endif
00233     system (buffer);
00234
00235     // Checking the objective value function
00236     if (optimize->evaluator)
00237     {
00238         snprintf (result, 32, "result-%u-%u", simulation, experiment);
00239         buffer2 = g_path_get_dirname (optimize->evaluator);
00240         buffer3 = g_path_get_basename (optimize->evaluator);
00241         buffer4 = g_build_filename (buffer2, buffer3, NULL);
00242         snprintf (buffer, 512, "\"%s\" %s %s %s",
00243             buffer4, output, optimize->experiment[experiment], result);
00244         g_free (buffer4);
00245         g_free (buffer3);
00246         g_free (buffer2);
00247     #if DEBUG_OPTIMIZE
00248         fprintf (stderr, "optimize_parse: %s\n", buffer);
00249     #endif
00250     }
00251     else
00252     {
00253         system (buffer);
00254         file_result = g_fopen (result, "r");
00255         e = atof (fgets (buffer, 512, file_result));
00256         fclose (file_result);
00257     }
00258     else
00259     {
00260         strcpy (result, "");
00261         file_result = g_fopen (output, "r");
00262         e = atof (fgets (buffer, 512, file_result));
00263         fclose (file_result);
00264     }
00265 }

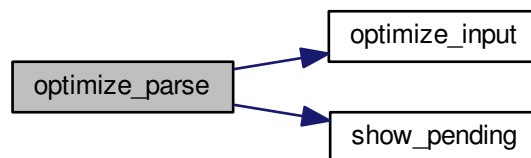
```

```

00260     }
00261
00262     // Removing files
00263     #if !DEBUG_OPTIMIZE
00264     for (i = 0; i < optimize->ninputs; ++i)
00265     {
00266         if (optimize->file[i][0])
00267         {
00268             snprintf (buffer, 512, RM " %s", &input[i][0]);
00269             system (buffer);
00270         }
00271     }
00272     snprintf (buffer, 512, RM " %s %s", output, result);
00273     system (buffer);
00274 #endif
00275
00276     // Processing pending events
00277     show_pending ();
00278
00279     #if DEBUG_OPTIMIZE
00280     fprintf (stderr, "optimize_parse: end\n");
00281 #endif
00282
00283     // Returning the objective function
00284     return e * optimize->weight[experiment];
00285 }

```

Here is the call graph for this function:



#### 5.19.2.15 void optimize\_save\_variables ( unsigned int *simulation*, double *error* )

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

##### Parameters

<i>simulation</i>	Simulation number.
<i>error</i>	Error value.

Definition at line 434 of file [optimize.c](#).

```

00435 {
00436     unsigned int i;
00437     char buffer[64];
00438     #if DEBUG_OPTIMIZE
00439     fprintf (stderr, "optimize_save_variables: start\n");
00440 #endif
00441     for (i = 0; i < optimize->nvariables; ++i)
00442     {
00443         snprintf (buffer, 64, "%s ", format[optimize->precision[i]]);
00444         fprintf (optimize->file_variables, buffer,
00445             optimize->value[simulation * optimize->
00446                 nvariables + i]);
00447         fprintf (optimize->file_variables, "%.14le\n", error);
00448     #if DEBUG_OPTIMIZE
00449     fprintf (stderr, "optimize_save_variables: end\n");
00450 #endif
00451 }

```

### 5.19.2.16 void optimize\_step\_direction ( unsigned int *simulation* )

Function to do a step of the direction search method.

#### Parameters

<i>simulation</i>	Simulation number.
-------------------	--------------------

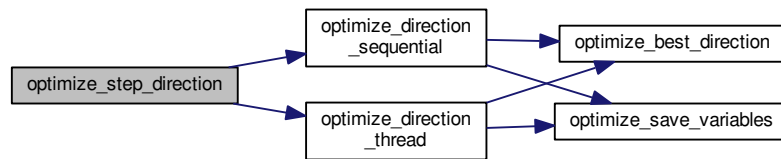
Definition at line 960 of file [optimize.c](#).

```

00961 {
00962     GThread *thread[nthreads_direction];
00963     ParallelData data[nthreads_direction];
00964     unsigned int i, j, k, b;
00965     #if DEBUG_OPTIMIZE
00966     fprintf (stderr, "optimize_step_direction: start\n");
00967     #endif
00968     for (i = 0; i < optimize->nestimates; ++i)
00969     {
00970         k = (simulation + i) * optimize->nvariables;
00971         b = optimize->simulation_best[0] * optimize->
nvariables;
00972     #if DEBUG_OPTIMIZE
00973         fprintf (stderr, "optimize_step_direction: simulation=%u best=%u\n",
simulation + i, optimize->simulation_best[0]);
00974     #endif
00975         for (j = 0; j < optimize->nvariables; ++j, ++k, ++b)
00976         {
00977             #if DEBUG_OPTIMIZE
00978             fprintf (stderr,
"optimize_step_direction: estimate=%u best%u=%.14le\n",
00979                     i, j, optimize->value[b]);
00980             #endif
00981             optimize->value[k]
= optimize->value[b] + optimize_estimate_direction (j,
i);
00982             optimize->value[k] = fmin (fmax (optimize->value[k],
optimize->rangeminabs[j]),
optimize->rangemaxabs[j]);
00983         #if DEBUG_OPTIMIZE
00984             fprintf (stderr,
"optimize_step_direction: estimate=%u variable%u=%.14le\n",
00985                     i, j, optimize->value[k]);
00986         #endif
00987     }
00988     if (nthreads_direction == 1)
00989         optimize_direction_sequential (simulation);
00990     else
00991     {
00992         for (i = 0; i <= nthreads_direction; ++i)
00993         {
00994             optimize->thread_direction[i]
= simulation + optimize->nstart_direction
+ i * (optimize->wend_direction - optimize->
nstart_direction)
/ nthreads_direction;
00995         #if DEBUG_OPTIMIZE
00996         fprintf (stderr,
"optimize_step_direction: i=%u thread_direction=%u\n",
00997                 i, optimize->thread_direction[i]);
00998         #endif
00999     }
01000     for (i = 0; i < nthreads_direction; ++i)
01001     {
01002         data[i].thread = i;
01003         thread[i] = g_thread_new
(NULL, (void (*) ) optimize_direction_thread, &data[i]);
01004     }
01005     for (i = 0; i < nthreads_direction; ++i)
01006         g_thread_join (thread[i]);
01007 }
01008 #if DEBUG_OPTIMIZE
01009 fprintf (stderr, "optimize_step_direction: end\n");
01010 #endif
01011 }

```

Here is the call graph for this function:



#### 5.19.2.17 void\* optimize\_thread ( ParallelData \* data )

Function to optimize on a thread.

##### Parameters

<i>data</i>	Function data.
-------------	----------------

##### Returns

NULL

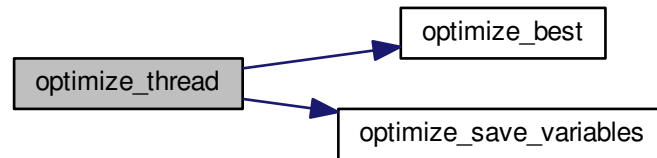
Definition at line 539 of file [optimize.c](#).

```

00540 {
00541     unsigned int i, thread;
00542     double e;
00543     #if DEBUG_OPTIMIZE
00544         fprintf (stderr, "optimize_thread: start\n");
00545     #endif
00546     thread = data->thread;
00547     #if DEBUG_OPTIMIZE
00548         fprintf (stderr, "optimize_thread: thread=%u start=%u end=%u\n", thread,
00549                 optimize->thread[thread], optimize->thread[thread + 1]);
00550     #endif
00551     for (i = optimize->thread[thread]; i < optimize->thread[thread + 1]; ++i)
00552     {
00553         e = optimize_norm (i);
00554         g_mutex_lock (mutex);
00555         optimize_best (i, e);
00556         optimize_save_variables (i, e);
00557         if (e < optimize->threshold)
00558             optimize->stop = 1;
00559         g_mutex_unlock (mutex);
00560         if (optimize->stop)
00561             break;
00562     #if DEBUG_OPTIMIZE
00563         fprintf (stderr, "optimize_thread: i=%u e=%lg\n", i, e);
00564     #endif
00565     }
00566     #if DEBUG_OPTIMIZE
00567         fprintf (stderr, "optimize_thread: end\n");
00568     #endif
00569     g_thread_exit (NULL);
00570     return NULL;
00571 }

```

Here is the call graph for this function:



## 5.20 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 2012-2016, 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
00032 #ifndef OPTIMIZE__H
00033 #define OPTIMIZE__H 1
00034
00035 typedef struct
00036 {
00037     GMappedFile **file[MAX_NINPUTS];
00038     char **experiment;
00039     char **label;
00040     gsl_rng *rng;
00041     GeneticVariable *genetic_variable;
00042     FILE *file_result;
00043     FILE *file_variables;
00044     char *result;
00045     char *variables;
00046     char *simulator;
00047     char *evaluator;
00048     double *value;
00049     double *rangemin;
00050     double *rangemax;
00051     double *rangeminabs;
00052     double *rangemaxabs;
00053     double *error_best;
00054     double *weight;
00055     double *step;
00056     double *direction;
00057     double *value_old;
00058     double *error_old;
00059     unsigned int *precision;
  
```

```

00075 unsigned int *nsweeps;
00076 unsigned int *nbits;
00078 unsigned int *thread;
00080 unsigned int *thread_direction;
00083 unsigned int *simulation_best;
00084 double tolerance;
00085 double mutation_ratio;
00086 double reproduction_ratio;
00087 double adaptation_ratio;
00088 double relaxation;
00089 double calculation_time;
00090 double p;
00091 double threshold;
00092 unsigned long int seed;
00094 unsigned int nvariables;
00095 unsigned int nexperiments;
00096 unsigned int ninputs;
00097 unsigned int nsimulations;
00098 unsigned int nsteps;
00100 unsigned int nestimates;
00102 unsigned int algorithm;
00103 unsigned int nstart;
00104 unsigned int nend;
00105 unsigned int nstart_direction;
00107 unsigned int nend_direction;
00109 unsigned int niterations;
00110 unsigned int nbest;
00111 unsigned int nsaveds;
00112 unsigned int stop;
00113 #if HAVE_MPI
00114 int mpi_rank;
00115 #endif
00116 } Optimize;
00117
00122 typedef struct
00123 {
00124 unsigned int thread;
00125 } ParallelData;
00126
00127 // Global variables
00128 extern int ntasks;
00129 extern unsigned int nthreads;
00130 extern unsigned int nthreads_direction;
00131 extern GMutex mutex[1];
00132 extern void (*optimize_algorithm) ();
00133 extern double (*optimize_estimate_direction) (unsigned int variable,
00134                                              unsigned int estimate);
00135 extern double (*optimize_norm) (unsigned int simulation);
00136 extern Optimize optimize[1];
00137
00138 // Public functions
00139 void optimize_input (unsigned int simulation, char *input,
00140                    GMappedFile * template);
00141 double optimize_parse (unsigned int simulation, unsigned int experiment);
00142 double optimize_norm_euclidian (unsigned int simulation);
00143 double optimize_norm_maximum (unsigned int simulation);
00144 double optimize_norm_p (unsigned int simulation);
00145 double optimize_norm_taxicab (unsigned int simulation);
00146 void optimize_print ();
00147 void optimize_save_variables (unsigned int simulation, double error);
00148 void optimize_best (unsigned int simulation, double value);
00149 void optimize_sequential ();
00150 void *optimize_thread (ParallelData * data);
00151 void optimize_merge (unsigned int nsaveds, unsigned int *simulation_best,
00152                    double *error_best);
00153 #if HAVE_MPI
00154 void optimize_synchronise ();
00155 #endif
00156 void optimize_sweep ();
00157 void optimize_MonteCarlo ();
00158 void optimize_best_direction (unsigned int simulation, double value);
00159 void optimize_direction_sequential (unsigned int simulation);
00160 void *optimize_direction_thread (ParallelData * data);
00161 double optimize_estimate_direction_random (unsigned int variable,
00162                                           unsigned int estimate);
00163 double optimize_estimate_direction_coordinates (unsigned int
00164                                              variable,
00165                                              unsigned int estimate);
00166 void optimize_step_direction (unsigned int simulation);
00167 void optimize_direction ();
00168 double optimize_genetic_objective (Entity * entity);
00169 void optimize_genetic ();
00170 void optimize_save_old ();
00171 void optimize_merge_old ();
00172 void optimize_refine ();
00173 void optimize_step ();
00174 void optimize_iterate ();

```

```

00174 void optimize_free ();
00175 void optimize_open ();
00176
00177 #endif

```

## 5.21 utils.c File Reference

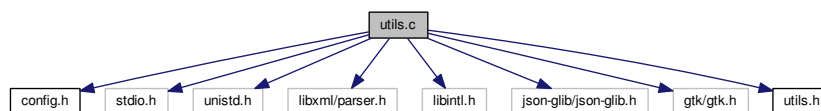
Source file to define some useful functions.

```

#include "config.h"
#include <stdio.h>
#include <unistd.h>
#include <libxml/parser.h>
#include <libintl.h>
#include <json-glib/json-glib.h>
#include <gtk/gtk.h>
#include "utils.h"

```

Include dependency graph for utils.c:



## Functions

- void [show\\_pending](#) ()  
*Function to show events on long computation.*
- void [show\\_message](#) (char \*title, char \*msg, int type)  
*Function to show a dialog with a message.*
- void [show\\_error](#) (char \*msg)  
*Function to show a dialog with an error message.*
- int [xml\\_node\\_get\\_int](#) (xmlNode \*node, const xmlChar \*prop, int \*error\_code)  
*Function to get an integer number of a XML node property.*
- 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.*
- 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.*
- 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.*
- 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.*
- void [xml\\_node\\_set\\_int](#) (xmlNode \*node, const xmlChar \*prop, int value)  
*Function to set an integer number in a XML node property.*
- 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.*
- void [xml\\_node\\_set\\_float](#) (xmlNode \*node, const xmlChar \*prop, double value)  
*Function to set a floating point number in a XML node property.*



- int [json\\_object\\_get\\_int](#) (JsonObject \*object, const char \*prop, int \*error\_code)  
*Function to get an integer number of a JSON object property.*
- 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.*
- 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.*
- 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.*
- 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.*
- void [json\\_object\\_set\\_int](#) (JsonObject \*object, const char \*prop, int value)  
*Function to set an integer number in a JSON object property.*
- 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.*
- void [json\\_object\\_set\\_float](#) (JsonObject \*object, const char \*prop, double value)  
*Function to set a floating point number in a JSON object property.*
- int [cores\\_number](#) ()  
*Function to obtain the cores number.*
- unsigned int [gtk\\_array\\_get\\_active](#) (GtkRadioButton \*array[], unsigned int n)  
*Function to get the active GtkRadioButton.*

## Variables

- GtkWidget \* [main\\_window](#)  
*Main GtkWidget.*
- char \* [error\\_message](#)  
*Error message.*

### 5.21.1 Detailed Description

Source file to define some useful functions.

#### Authors

Javier Burguete and Borja Latorre.

#### Copyright

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Definition in file [utils.c](#).

### 5.21.2 Function Documentation

#### 5.21.2.1 int [cores\\_number](#) ( )

Function to obtain the cores number.

**Returns**

Cores number.

Definition at line 537 of file [utils.c](#).

```
00538 {
00539     #ifdef G_OS_WIN32
00540         SYSTEM_INFO sysinfo;
00541         GetSystemInfo (&sysinfo);
00542         return sysinfo.dwNumberOfProcessors;
00543     #else
00544         return (int) sysconf (_SC_NPROCESSORS_ONLN);
00545     #endif
00546 }
```

**5.21.2.2 unsigned int gtk\_array\_get\_active ( GtkRadioButton \* array[], unsigned int n )**

Function to get the active GtkRadioButton.

**Parameters**

<i>array</i>	Array of GtkRadioButtons.
<i>n</i>	Number of GtkRadioButtons.

**Returns**

Active GtkRadioButton.

Definition at line 561 of file [utils.c](#).

```
00562 {
00563     unsigned int i;
00564     for (i = 0; i < n; ++i)
00565         if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (array[i])))
00566             break;
00567     return i;
00568 }
```

**5.21.2.3 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.

**Parameters**

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>error_code</i>	Error code.

**Returns**

Floating point number value.

Definition at line 427 of file [utils.c](#).

```
00428 {
00429     const char *buffer;
00430     double x = 0.;
00431     buffer = json_object_get_string_member (object, prop);
00432     if (!buffer)
00433         *error_code = 1;
00434     else
00435     {
00436         if (sscanf (buffer, "%lf", &x) != 1)
00437             *error_code = 2;
00438         else
00439             *error_code = 0;
00440     }
00441     return x;
00442 }
```

#### 5.21.2.4 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.

##### Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

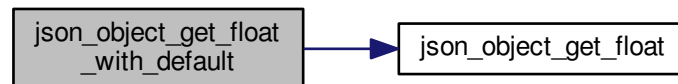
##### Returns

Floating point number value.

Definition at line 460 of file [utils.c](#).

```
00462 {  
00463     double x;  
00464     if (json_object_get_member (object, prop))  
00465         x = json_object_get_float (object, prop, error_code);  
00466     else  
00467     {  
00468         x = default_value;  
00469         *error_code = 0;  
00470     }  
00471     return x;  
00472 }
```

Here is the call graph for this function:



#### 5.21.2.5 int json\_object\_get\_int ( JsonObject \* *object*, const char \* *prop*, int \* *error\_code* )

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

##### Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>error_code</i>	Error code.

##### Returns

Integer number value.

Definition at line 337 of file [utils.c](#).

```
00338 {  
00339     const char *buffer;
```

```

00340     int i = 0;
00341     buffer = json_object_get_string_member (object, prop);
00342     if (!buffer)
00343         *error_code = 1;
00344     else
00345     {
00346         if (sscanf (buffer, "%d", &i) != 1)
00347             *error_code = 2;
00348         else
00349             *error_code = 0;
00350     }
00351     return i;
00352 }

```

#### 5.21.2.6 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.

##### Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>error_code</i>	Error code.

##### Returns

Unsigned integer number value.

Definition at line [367](#) of file [utils.c](#).

```

00368 {
00369     const char *buffer;
00370     unsigned int i = 0;
00371     buffer = json_object_get_string_member (object, prop);
00372     if (!buffer)
00373         *error_code = 1;
00374     else
00375     {
00376         if (sscanf (buffer, "%u", &i) != 1)
00377             *error_code = 2;
00378         else
00379             *error_code = 0;
00380     }
00381     return i;
00382 }

```

#### 5.21.2.7 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.

##### Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

##### Returns

Unsigned integer number value.

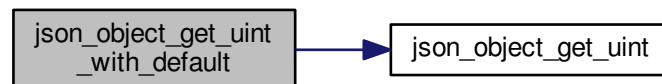
Definition at line [400](#) of file [utils.c](#).

```

00402 {
00403     unsigned int i;
00404     if (json_object_get_member (object, prop))
00405         i = json_object_get_uint (object, prop, error_code);
00406     else
00407     {
00408         i = default_value;
00409         *error_code = 0;
00410     }
00411     return i;
00412 }

```

Here is the call graph for this function:



#### 5.21.2.8 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

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>value</i>	Floating point number value.

Definition at line [524](#) of file [utils.c](#).

```

00525 {
00526     char buffer[64];
00527     snprintf (buffer, 64, "%.14lg", value);
00528     json_object_set_string_member (object, prop, buffer);
00529 }

```

#### 5.21.2.9 void json\_object\_set\_int ( JsonObject \* *object*, const char \* *prop*, int *value* )

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

##### Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>value</i>	Integer number value.

Definition at line [486](#) of file [utils.c](#).

```

00487 {
00488     char buffer[64];
00489     snprintf (buffer, 64, "%d", value);
00490     json_object_set_string_member (object, prop, buffer);
00491 }

```

5.21.2.10 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

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>value</i>	Unsigned integer number value.

Definition at line 505 of file [utils.c](#).

```
00506 {
00507     char buffer[64];
00508     snprintf (buffer, 64, "%u", value);
00509     json_object_set_string_member (object, prop, buffer);
00510 }
```

### 5.21.2.11 void show\_error ( char \* msg )

Function to show a dialog with an error message.

## Parameters

<i>msg</i>	Error message.
------------	----------------

Definition at line 110 of file [utils.c](#).

```
00111 {
00112     show_message (gettext ("ERROR!"), msg, ERROR_TYPE);
00113 }
```

Here is the call graph for this function:



### 5.21.2.12 void show\_message ( char \* title, char \* msg, int type )

Function to show a dialog with a message.

## Parameters

<i>title</i>	Title.
<i>msg</i>	Message.
<i>type</i>	Message type.

Definition at line 80 of file [utils.c](#).

```
00081 {
00082     #if HAVE_GTK
00083     GtkMessageDialog *dlg;
00084
00085     // Creating the dialog
00086     dlg = (GtkMessageDialog *) gtk_message_dialog_new
00087         (main_window, GTK_DIALOG_MODAL, type, GTK_BUTTONS_OK, "%s", msg);
00088
00089     // Setting the dialog title
00090     gtk_window_set_title (GTK_WINDOW (dlg), title);
00091 }
```

```

00092 // Showing the dialog and waiting response
00093 gtk_dialog_run (GTK_DIALOG (dlg));
00094
00095 // Closing and freeing memory
00096 gtk_widget_destroy (GTK_WIDGET (dlg));
00097
00098 #else
00099     printf ("%s: %s\n", title, msg);
00100 #endif
00101 }

```

#### 5.21.2.13 double xml\_node\_get\_float ( xmlDoc \* node, const xmlChar \* prop, int \* error\_code )

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

##### Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>error_code</i>	Error code.

##### Returns

Floating point number value.

Definition at line 220 of file [utils.c](#).

```

00221 {
00222     double x = 0.;
00223     xmlChar *buffer;
00224     buffer = xmlGetProp (node, prop);
00225     if (!buffer)
00226         *error_code = 1;
00227     else
00228     {
00229         if (sscanf ((char *) buffer, "%lf", &x) != 1)
00230             *error_code = 2;
00231         else
00232             *error_code = 0;
00233         xmlFree (buffer);
00234     }
00235     return x;
00236 }

```

#### 5.21.2.14 double xml\_node\_get\_float\_with\_default ( xmlDoc \* 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.

##### Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

##### Returns

Floating point number value.

Definition at line 254 of file [utils.c](#).

```

00256 {
00257     double x;
00258     if (xmlHasProp (node, prop))
00259         x = xml_node_get_float (node, prop, error_code);

```

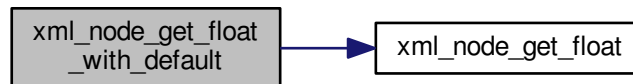


```

00260     else
00261     {
00262         x = default_value;
00263         *error_code = 0;
00264     }
00265     return x;
00266 }

```

Here is the call graph for this function:



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

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

#### Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>error_code</i>	Error code.

#### Returns

Integer number value.

Definition at line [128](#) of file [utils.c](#).

```

00129 {
00130     int i = 0;
00131     xmlChar *buffer;
00132     buffer = xmlGetProp (node, prop);
00133     if (!buffer)
00134         *error_code = 1;
00135     else
00136     {
00137         if (sscanf ((char *) buffer, "%d", &i) != 1)
00138             *error_code = 2;
00139         else
00140             *error_code = 0;
00141         xmlFree (buffer);
00142     }
00143     return i;
00144 }

```

**5.21.2.16** `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.

**Parameters**

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>error_code</i>	Error code.

**Returns**

Unsigned integer number value.

Definition at line 159 of file [utils.c](#).

```

00160 {
00161     unsigned int i = 0;
00162     xmlChar *buffer;
00163     buffer = xmlGetProp (node, prop);
00164     if (!buffer)
00165         *error_code = 1;
00166     else
00167     {
00168         if (sscanf ((char *) buffer, "%u", &i) != 1)
00169             *error_code = 2;
00170         else
00171             *error_code = 0;
00172         xmlFree (buffer);
00173     }
00174     return i;
00175 }

```

**5.21.2.17** `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.

**Parameters**

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

**Returns**

Unsigned integer number value.

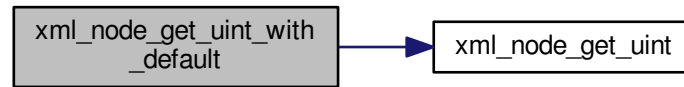
Definition at line 193 of file [utils.c](#).

```

00195 {
00196     unsigned int i;
00197     if (xmlHasProp (node, prop))
00198         i = xml_node_get_uint (node, prop, error_code);
00199     else
00200     {
00201         i = default_value;
00202         *error_code = 0;
00203     }
00204     return i;
00205 }

```

Here is the call graph for this function:



#### 5.21.2.18 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

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>value</i>	Floating point number value.

Definition at line 317 of file [utils.c](#).

```

00318 {
00319     xmlChar buffer[64];
00320     snprintf ((char *) buffer, 64, "%.14lg", value);
00321     xmlSetProp (node, prop, buffer);
00322 }
```

#### 5.21.2.19 void xml\_node\_set\_int ( xmlNode \* *node*, const xmlChar \* *prop*, int *value* )

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

##### Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>value</i>	Integer number value.

Definition at line 279 of file [utils.c](#).

```

00280 {
00281     xmlChar buffer[64];
00282     snprintf ((char *) buffer, 64, "%d", value);
00283     xmlSetProp (node, prop, buffer);
00284 }
```

#### 5.21.2.20 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

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>value</i>	Unsigned integer number value.

Definition at line 298 of file [utils.c](#).

```
00299 {
00300     xmlChar buffer[64];
00301     snprintf ((char *) buffer, 64, "%u", value);
00302     xmlSetProp (node, prop, buffer);
00303 }
```

## 5.22 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 2012-2016, 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
00032 #define _GNU_SOURCE
00033 #include "config.h"
00034 #include <stdio.h>
00035 #include <unistd.h>
00036 #include <libxml/parser.h>
00037 #include <libintl.h>
00038 #include <json-glib/json-glib.h>
00039 #if HAVE_GTK
00040 #include <gtk/gtk.h>
00041 #endif
00042 #include "utils.h"
00043
00044 #if HAVE_GTK
00045 GtkWidget *main_window;
00046 #endif
00047
00048 char *error_message;
00049
00050 void
00051 show_pending ()
00052 {
00053     #if HAVE_GTK
00054     while (gtk_events_pending ())
00055         gtk_main_iteration ();
00056     #endif
00057 }
00058
00059 void
00060 show_message (char *title, char *msg, int type)
00061 {
00062     #if HAVE_GTK
00063     GtkMessageDialog *dlg;
00064
00065     // Creating the dialog
00066     dlg = (GtkMessageDialog *) gtk_message_dialog_new
00067         (main_window, GTK_DIALOG_MODAL, type, GTK_BUTTONS_OK, "%s", msg);
```

```

00088
00089 // Setting the dialog title
00090 gtk_window_set_title (GTK_WINDOW (dlg), title);
00091
00092 // Showing the dialog and waiting response
00093 gtk_dialog_run (GTK_DIALOG (dlg));
00094
00095 // Closing and freeing memory
00096 gtk_widget_destroy (GTK_WIDGET (dlg));
00097
00098 #else
00099     printf ("%s: %s\n", title, msg);
00100 #endif
00101 }
00102
00109 void
00110 show_error (char *msg)
00111 {
00112     show_message (gettext ("ERROR!"), msg, ERROR_TYPE);
00113 }
00114
00127 int
00128 xml_node_get_int (xmlNode * node, const xmlChar * prop, int *error_code)
00129 {
00130     int i = 0;
00131     xmlChar *buffer;
00132     buffer = xmlGetProp (node, prop);
00133     if (!buffer)
00134         *error_code = 1;
00135     else
00136     {
00137         if (sscanf ((char *) buffer, "%d", &i) != 1)
00138             *error_code = 2;
00139         else
00140             *error_code = 0;
00141         xmlFree (buffer);
00142     }
00143     return i;
00144 }
00145
00158 unsigned int
00159 xml_node_get_uint (xmlNode * node, const xmlChar * prop, int *error_code)
00160 {
00161     unsigned int i = 0;
00162     xmlChar *buffer;
00163     buffer = xmlGetProp (node, prop);
00164     if (!buffer)
00165         *error_code = 1;
00166     else
00167     {
00168         if (sscanf ((char *) buffer, "%u", &i) != 1)
00169             *error_code = 2;
00170         else
00171             *error_code = 0;
00172         xmlFree (buffer);
00173     }
00174     return i;
00175 }
00176
00192 unsigned int
00193 xml_node_get_uint_with_default (xmlNode * node, const xmlChar * prop,
                                unsigned int default_value, int *error_code)
00194 {
00195     unsigned int i;
00196     if (xmlHasProp (node, prop))
00197         i = xml_node_get_uint (node, prop, error_code);
00198     else
00199     {
00200         i = default_value;
00201         *error_code = 0;
00202     }
00203     return i;
00204 }
00205
00206
00219 double
00220 xml_node_get_float (xmlNode * node, const xmlChar * prop, int *error_code)
00221 {
00222     double x = 0.;
00223     xmlChar *buffer;
00224     buffer = xmlGetProp (node, prop);
00225     if (!buffer)
00226         *error_code = 1;
00227     else
00228     {
00229         if (sscanf ((char *) buffer, "%lf", &x) != 1)
00230             *error_code = 2;
00231         else

```

```

00232         *error_code = 0;
00233         xmlFree (buffer);
00234     }
00235     return x;
00236 }
00237
00253 double
00254 xml_node_get_float_with_default (xmlNode * node, const xmlChar * prop,
00255                                 double default_value, int *error_code)
00256 {
00257     double x;
00258     if (xmlHasProp (node, prop))
00259         x = xml_node_get_float (node, prop, error_code);
00260     else
00261     {
00262         x = default_value;
00263         *error_code = 0;
00264     }
00265     return x;
00266 }
00267
00278 void
00279 xml_node_set_int (xmlNode * node, const xmlChar * prop, int value)
00280 {
00281     xmlChar buffer[64];
00282     snprintf ((char *) buffer, 64, "%d", value);
00283     xmlSetProp (node, prop, buffer);
00284 }
00285
00297 void
00298 xml_node_set_uint (xmlNode * node, const xmlChar * prop, unsigned int value)
00299 {
00300     xmlChar buffer[64];
00301     snprintf ((char *) buffer, 64, "%u", value);
00302     xmlSetProp (node, prop, buffer);
00303 }
00304
00316 void
00317 xml_node_set_float (xmlNode * node, const xmlChar * prop, double value)
00318 {
00319     xmlChar buffer[64];
00320     snprintf ((char *) buffer, 64, "%.14lg", value);
00321     xmlSetProp (node, prop, buffer);
00322 }
00323
00336 int
00337 json_object_get_int (JsonObject * object, const char *prop, int *error_code)
00338 {
00339     const char *buffer;
00340     int i = 0;
00341     buffer = json_object_get_string_member (object, prop);
00342     if (!buffer)
00343         *error_code = 1;
00344     else
00345     {
00346         if (sscanf (buffer, "%d", &i) != 1)
00347             *error_code = 2;
00348         else
00349             *error_code = 0;
00350     }
00351     return i;
00352 }
00353
00366 unsigned int
00367 json_object_get_uint (JsonObject * object, const char *prop, int *error_code)
00368 {
00369     const char *buffer;
00370     unsigned int i = 0;
00371     buffer = json_object_get_string_member (object, prop);
00372     if (!buffer)
00373         *error_code = 1;
00374     else
00375     {
00376         if (sscanf (buffer, "%u", &i) != 1)
00377             *error_code = 2;
00378         else
00379             *error_code = 0;
00380     }
00381     return i;
00382 }
00383
00399 unsigned int
00400 json_object_get_uint_with_default (JsonObject * object, const char *prop,
00401                                   unsigned int default_value, int *error_code)
00402 {
00403     unsigned int i;
00404     if (json_object_get_member (object, prop))

```

```

00405     i = json_object_get_uint (object, prop, error_code);
00406     else
00407     {
00408         i = default_value;
00409         *error_code = 0;
00410     }
00411     return i;
00412 }
00413
00426 double
00427 json_object_get_float (JsonObject * object, const char *prop, int *error_code)
00428 {
00429     const char *buffer;
00430     double x = 0.;
00431     buffer = json_object_get_string_member (object, prop);
00432     if (!buffer)
00433         *error_code = 1;
00434     else
00435     {
00436         if (sscanf (buffer, "%lf", &x) != 1)
00437             *error_code = 2;
00438         else
00439             *error_code = 0;
00440     }
00441     return x;
00442 }
00443
00459 double
00460 json_object_get_float_with_default (JsonObject * object, const char *prop
00461                                     ,
00462                                     double default_value, int *error_code)
00463 {
00464     double x;
00465     if (json_object_get_member (object, prop))
00466         x = json_object_get_float (object, prop, error_code);
00467     else
00468     {
00469         x = default_value;
00470         *error_code = 0;
00471     }
00472     return x;
00473 }
00485 void
00486 json_object_set_int (JsonObject * object, const char *prop, int value)
00487 {
00488     char buffer[64];
00489     snprintf (buffer, 64, "%d", value);
00490     json_object_set_string_member (object, prop, buffer);
00491 }
00492
00504 void
00505 json_object_set_uint (JsonObject * object, const char *prop, unsigned int value)
00506 {
00507     char buffer[64];
00508     snprintf (buffer, 64, "%u", value);
00509     json_object_set_string_member (object, prop, buffer);
00510 }
00511
00523 void
00524 json_object_set_float (JsonObject * object, const char *prop, double value)
00525 {
00526     char buffer[64];
00527     snprintf (buffer, 64, "%.14lg", value);
00528     json_object_set_string_member (object, prop, buffer);
00529 }
00530
00536 int
00537 cores_number ()
00538 {
00539     #ifdef G_OS_WIN32
00540         SYSTEM_INFO sysinfo;
00541         GetSystemInfo (&sysinfo);
00542         return sysinfo.dwNumberOfProcessors;
00543     #else
00544         return (int) sysconf (_SC_NPROCESSORS_ONLN);
00545     #endif
00546 }
00547
00548 #if HAVE_GTK
00549
00560 unsigned int
00561 gtk_array_get_active (GtkRadioButton * array[], unsigned int n)
00562 {
00563     unsigned int i;
00564     for (i = 0; i < n; ++i)
00565         if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (array[i])))

```

```

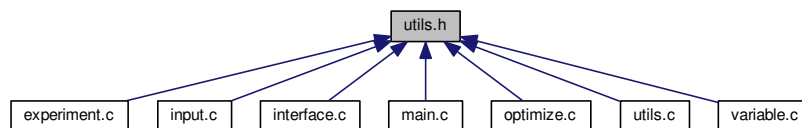
00566         break;
00567     return i;
00568 }
00569
00570 #endif

```

## 5.23 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_pending ()`  
Function to show events on long computation.
- void `show_message (char *title, char *msg, int type)`  
Function to show a dialog with a message.
- void `show_error (char *msg)`  
Function to show a dialog with an error message.
- int `xml_node_get_int (xmlNode *node, const xmlChar *prop, int *error_code)`  
Function to get an integer number of a XML node property.
- 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.
- 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.
- 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.
- 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.
- void `xml_node_set_int (xmlNode *node, const xmlChar *prop, int value)`  
Function to set an integer number in a XML node property.
- 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.



- void [xml\\_node\\_set\\_float](#) (xmlNode \*node, const xmlChar \*prop, double value)  
*Function to set a floating point number in a XML node property.*
- int [json\\_object\\_get\\_int](#) (JsonObject \*object, const char \*prop, int \*error\_code)  
*Function to get an integer number of a JSON object property.*
- 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.*
- 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.*
- 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.*
- 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.*
- void [json\\_object\\_set\\_int](#) (JsonObject \*object, const char \*prop, int value)  
*Function to set an integer number in a JSON object property.*
- 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.*
- void [json\\_object\\_set\\_float](#) (JsonObject \*object, const char \*prop, double value)  
*Function to set a floating point number in a JSON object property.*
- int [cores\\_number](#) ()  
*Function to obtain the cores number.*
- unsigned int [gtk\\_array\\_get\\_active](#) (GtkRadioButton \*array[], unsigned int n)  
*Function to get the active GtkRadioButton.*

## Variables

- GtkWidget \* [main\\_window](#)  
*Main GtkWidget.*
- char \* [error\\_message](#)  
*Error message.*

### 5.23.1 Detailed Description

Header file to define some useful functions.

#### Authors

Javier Burguete.

#### Copyright

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Definition in file [utils.h](#).

## 5.23.2 Function Documentation

### 5.23.2.1 int cores\_number ( )

Function to obtain the cores number.

#### Returns

Cores number.

Definition at line 537 of file [utils.c](#).

```
00538 {
00539     #ifdef G_OS_WIN32
00540         SYSTEM_INFO sysinfo;
00541         GetSystemInfo (&sysinfo);
00542         return sysinfo.dwNumberOfProcessors;
00543     #else
00544         return (int) sysconf (_SC_NPROCESSORS_ONLN);
00545     #endif
00546 }
```

### 5.23.2.2 unsigned int gtk\_array\_get\_active ( GtkWidget \* array[], unsigned int n )

Function to get the active GtkWidget.

#### Parameters

<i>array</i>	Array of GtkWidget.
<i>n</i>	Number of GtkWidget.

#### Returns

Active GtkWidget.

Definition at line 561 of file [utils.c](#).

```
00562 {
00563     unsigned int i;
00564     for (i = 0; i < n; ++i)
00565         if (gtk_toggle_button_get_active (GTK_TOGGLE_BUTTON (array[i])))
00566             break;
00567     return i;
00568 }
```

### 5.23.2.3 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.

#### Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>error_code</i>	Error code.

#### Returns

Floating point number value.

Definition at line 427 of file [utils.c](#).

```

00428 {
00429     const char *buffer;
00430     double x = 0.;
00431     buffer = json_object_get_string_member (object, prop);
00432     if (!buffer)
00433         *error_code = 1;
00434     else
00435     {
00436         if (sscanf (buffer, "%lf", &x) != 1)
00437             *error_code = 2;
00438         else
00439             *error_code = 0;
00440     }
00441     return x;
00442 }

```

#### 5.23.2.4 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.

##### Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

##### Returns

Floating point number value.

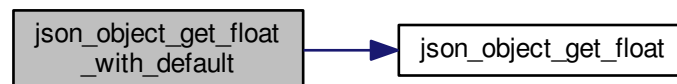
Definition at line 460 of file [utils.c](#).

```

00462 {
00463     double x;
00464     if (json_object_get_member (object, prop))
00465         x = json_object_get_float (object, prop, error_code);
00466     else
00467     {
00468         x = default_value;
00469         *error_code = 0;
00470     }
00471     return x;
00472 }

```

Here is the call graph for this function:



#### 5.23.2.5 int json\_object\_get\_int ( JsonObject \* *object*, const char \* *prop*, int \* *error\_code* )

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

**Parameters**

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>error_code</i>	Error code.

**Returns**

Integer number value.

Definition at line 337 of file [utils.c](#).

```

00338 {
00339     const char *buffer;
00340     int i = 0;
00341     buffer = json_object_get_string_member (object, prop);
00342     if (!buffer)
00343         *error_code = 1;
00344     else
00345     {
00346         if (sscanf (buffer, "%d", &i) != 1)
00347             *error_code = 2;
00348         else
00349             *error_code = 0;
00350     }
00351     return i;
00352 }
```

#### 5.23.2.6 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.

**Parameters**

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>error_code</i>	Error code.

**Returns**

Unsigned integer number value.

Definition at line 367 of file [utils.c](#).

```

00368 {
00369     const char *buffer;
00370     unsigned int i = 0;
00371     buffer = json_object_get_string_member (object, prop);
00372     if (!buffer)
00373         *error_code = 1;
00374     else
00375     {
00376         if (sscanf (buffer, "%u", &i) != 1)
00377             *error_code = 2;
00378         else
00379             *error_code = 0;
00380     }
00381     return i;
00382 }
```

#### 5.23.2.7 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.

## Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

## Returns

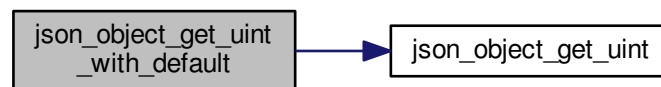
Unsigned integer number value.

Definition at line 400 of file [utils.c](#).

```

00402 {
00403     unsigned int i;
00404     if (json_object_get_member (object, prop))
00405         i = json_object_get_uint (object, prop, error_code);
00406     else
00407     {
00408         i = default_value;
00409         *error_code = 0;
00410     }
00411     return i;
00412 }
```

Here is the call graph for this function:



#### 5.23.2.8 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

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>value</i>	Floating point number value.

Definition at line 524 of file [utils.c](#).

```

00525 {
00526     char buffer[64];
00527     snprintf (buffer, 64, "%.14lg", value);
00528     json_object_set_string_member (object, prop, buffer);
00529 }
```

#### 5.23.2.9 void json\_object\_set\_int ( JsonObject \* *object*, const char \* *prop*, int *value* )

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

## Parameters

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>value</i>	Integer number value.

Definition at line 486 of file [utils.c](#).

```
00487 {
00488     char buffer[64];
00489     snprintf (buffer, 64, "%d", value);
00490     json_object_set_string_member (object, prop, buffer);
00491 }
```

#### 5.23.2.10 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

<i>object</i>	JSON object.
<i>prop</i>	JSON property.
<i>value</i>	Unsigned integer number value.

Definition at line 505 of file [utils.c](#).

```
00506 {
00507     char buffer[64];
00508     snprintf (buffer, 64, "%u", value);
00509     json_object_set_string_member (object, prop, buffer);
00510 }
```

#### 5.23.2.11 void show\_error ( char \* *msg* )

Function to show a dialog with an error message.

## Parameters

<i>msg</i>	Error message.
------------	----------------

Definition at line 110 of file [utils.c](#).

```
00111 {
00112     show_message (gettext ("ERROR!"), msg, ERROR_TYPE);
00113 }
```

Here is the call graph for this function:



#### 5.23.2.12 void show\_message ( char \* *title*, char \* *msg*, int *type* )

Function to show a dialog with a message.

## Parameters

<i>title</i>	Title.
<i>msg</i>	Message.
<i>type</i>	Message type.

Definition at line 80 of file [utils.c](#).

```

00081 {
00082 #if HAVE_GTK
00083     GtkMessageDialog *dlg;
00084
00085     // Creating the dialog
00086     dlg = (GtkMessageDialog *) gtk_message_dialog_new
00087         (main_window, GTK_DIALOG_MODAL, type, GTK_BUTTONS_OK, "%s", msg);
00088
00089     // Setting the dialog title
00090     gtk_window_set_title (GTK_WINDOW (dlg), title);
00091
00092     // Showing the dialog and waiting response
00093     gtk_dialog_run (GTK_DIALOG (dlg));
00094
00095     // Closing and freeing memory
00096     gtk_widget_destroy (GTK_WIDGET (dlg));
00097
00098 #else
00099     printf ("%s: %s\n", title, msg);
00100 #endif
00101 }
```

### 5.23.2.13 double xml\_node\_get\_float ( xmlDoc \* node, const xmlChar \* prop, int \* error\_code )

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

## Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>error_code</i>	Error code.

## Returns

Floating point number value.

Definition at line 220 of file [utils.c](#).

```

00221 {
00222     double x = 0.;
00223     xmlChar *buffer;
00224     buffer = xmlGetProp (node, prop);
00225     if (!buffer)
00226         *error_code = 1;
00227     else
00228     {
00229         if (sscanf ((char *) buffer, "%lf", &x) != 1)
00230             *error_code = 2;
00231         else
00232             *error_code = 0;
00233         xmlFree (buffer);
00234     }
00235     return x;
00236 }
```

### 5.23.2.14 double xml\_node\_get\_float\_with\_default ( xmlDoc \* 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.

**Parameters**

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

**Returns**

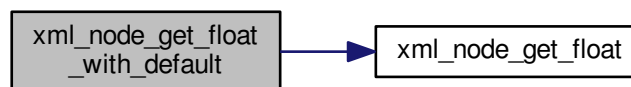
Floating point number value.

Definition at line 254 of file [utils.c](#).

```

00256 {
00257     double x;
00258     if (xmlHasProp (node, prop))
00259         x = xml_node_get_float (node, prop, error_code);
00260     else
00261     {
00262         x = default_value;
00263         *error_code = 0;
00264     }
00265     return x;
00266 }
```

Here is the call graph for this function:



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

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

**Parameters**

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>error_code</i>	Error code.

**Returns**

Integer number value.

Definition at line 128 of file [utils.c](#).

```

00129 {
00130     int i = 0;
00131     xmlChar *buffer;
00132     buffer = xmlGetProp (node, prop);
00133     if (!buffer)
00134         *error_code = 1;
00135     else
00136     {
00137         if (sscanf ((char *) buffer, "%d", &i) != 1)
```



```

00138         *error_code = 2;
00139     else
00140         *error_code = 0;
00141     xmlFree (buffer);
00142 }
00143 return i;
00144 }

```

#### 5.23.2.16 unsigned int xml\_node\_get\_uint ( xmlDoc \* node, const xmlChar \* prop, int \* error\_code )

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

##### Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>error_code</i>	Error code.

##### Returns

Unsigned integer number value.

Definition at line 159 of file [utils.c](#).

```

00160 {
00161     unsigned int i = 0;
00162     xmlChar *buffer;
00163     buffer = xmlGetProp (node, prop);
00164     if (!buffer)
00165         *error_code = 1;
00166     else
00167     {
00168         if (sscanf ((char *) buffer, "%u", &i) != 1)
00169             *error_code = 2;
00170         else
00171             *error_code = 0;
00172         xmlFree (buffer);
00173     }
00174     return i;
00175 }

```

#### 5.23.2.17 unsigned int xml\_node\_get\_uint\_with\_default ( xmlDoc \* 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.

##### Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>default_value</i>	default value.
<i>error_code</i>	Error code.

##### Returns

Unsigned integer number value.

Definition at line 193 of file [utils.c](#).

```

00195 {
00196     unsigned int i;
00197     if (xmlHasProp (node, prop))
00198         i = xml_node_get_uint (node, prop, error_code);
00199     else
00200     {
00201         i = default_value;

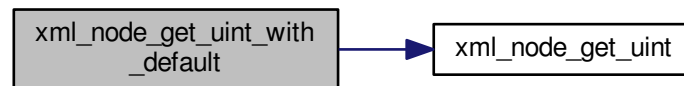
```

```

00202     *error_code = 0;
00203     }
00204     return i;
00205 }

```

Here is the call graph for this function:



#### 5.23.2.18 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

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>value</i>	Floating point number value.

Definition at line 317 of file [utils.c](#).

```

00318 {
00319     xmlChar buffer[64];
00320     snprintf ((char *) buffer, 64, "%.14lg", value);
00321     xmlSetProp (node, prop, buffer);
00322 }

```

#### 5.23.2.19 void xml\_node\_set\_int ( xmlNode \* *node*, const xmlChar \* *prop*, int *value* )

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

##### Parameters

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>value</i>	Integer number value.

Definition at line 279 of file [utils.c](#).

```

00280 {
00281     xmlChar buffer[64];
00282     snprintf ((char *) buffer, 64, "%d", value);
00283     xmlSetProp (node, prop, buffer);
00284 }

```

#### 5.23.2.20 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

<i>node</i>	XML node.
<i>prop</i>	XML property.
<i>value</i>	Unsigned integer number value.

Definition at line 298 of file [utils.c](#).

```
00299 {
00300     xmlChar buffer[64];
00301     snprintf ((char *) buffer, 64, "%u", value);
00302     xmlSetProp (node, prop, buffer);
00303 }
```

## 5.24 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 2012-2016, 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
00032 #ifndef UTILS__H
00033 #define UTILS__H 1
00034
00035 #if HAVE_GTK
00036 #define ERROR_TYPE GTK_MESSAGE_ERROR
00037 #define INFO_TYPE GTK_MESSAGE_INFO
00038 extern GtkWidget *main_window;
00039 #else
00040 #define ERROR_TYPE 0
00041 #define INFO_TYPE 0
00042 #endif
00043
00044 extern char *error_message;
00045
00046 // Public functions
00047 void show_pending ();
00048 void show_message (char *title, char *msg, int type);
00049 void show_error (char *msg);
00050 int xml_node_get_int (xmlNode * node, const xmlChar * prop, int *error_code);
00051 unsigned int xml_node_get_uint (xmlNode * node, const xmlChar * prop,
00052                                int *error_code);
00053 unsigned int xml_node_get_uint_with_default (xmlNode * node,
00054                                             const xmlChar * prop,
00055                                             unsigned int default_value,
00056                                             int *error_code);
00057 double xml_node_get_float (xmlNode * node, const xmlChar * prop,
00058                           int *error_code);
00059 double xml_node_get_float_with_default (xmlNode * node, const xmlChar * prop,
00060                                         double default_value, int *error_code);
00061 void xml_node_set_int (xmlNode * node, const xmlChar * prop, int value);
00062 void xml_node_set_uint (xmlNode * node, const xmlChar * prop,
00063                        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 unsigned int gtk_array_get_active (GtkRadioButton * array[], unsigned int n);
00099 #endif
00100
00101 #endif

```

## 5.25 variable.c File Reference

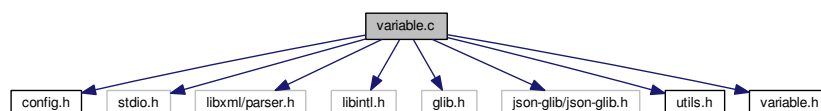
Source file to define the variable data.

```

#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 _GNU_SOURCE`
- `#define DEBUG_VARIABLE 0`  
Macro to debug variable functions.

### Functions

- void `variable_new` (`Variable *variable`)  
Function to create a new `Variable` struct.
- void `variable_free` (`Variable *variable`, unsigned int type)  
Function to free the memory of a `Variable` struct.
- void `variable_error` (`Variable *variable`, char \*message)

Function to print a message error opening an [Variable](#) struct.

- int [variable\\_open\\_xml](#) ([Variable](#) \*variable, xmlNode \*node, unsigned int algorithm, unsigned int nsteps)

Function to open the variable file.

- int [variable\\_open\\_json](#) ([Variable](#) \*variable, JsonNode \*node, unsigned int algorithm, unsigned int nsteps)

Function to open the variable file.

## Variables

- const char \* [format](#) [[NPRECISIONS](#)]

Array of C-strings with variable formats.

- const double [precision](#) [[NPRECISIONS](#)]

Array of variable precisions.

### 5.25.1 Detailed Description

Source file to define the variable data.

#### Authors

Javier Burguete and Borja Latorre.

#### Copyright

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Definition in file [variable.c](#).

### 5.25.2 Function Documentation

#### 5.25.2.1 void [variable\\_error](#) ( [Variable](#) \* *variable*, char \* *message* )

Function to print a message error opening an [Variable](#) struct.

##### Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
<i>message</i>	Error message.

Definition at line 110 of file [variable.c](#).

```
00111 {
00112     char buffer[64];
00113     if (!variable->name)
00114         snprintf (buffer, 64, "%s: %s", gettext ("Variable"), message);
00115     else
00116         snprintf (buffer, 64, "%s %s: %s", gettext ("Variable"), variable->name,
00117                 message);
00118     error\_message = g_strdup (buffer);
00119 }
```

#### 5.25.2.2 void [variable\\_free](#) ( [Variable](#) \* *variable*, unsigned int *type* )

Function to free the memory of a [Variable](#) struct.

## Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
<i>type</i>	Type of input file.

Definition at line 87 of file [variable.c](#).

```

00088 {
00089 #if DEBUG_VARIABLE
00090     fprintf (stderr, "variable_free: start\n");
00091 #endif
00092     if (type == INPUT_TYPE_XML)
00093         xmlFree (variable->name);
00094     else
00095         g_free (variable->name);
00096 #if DEBUG_VARIABLE
00097     fprintf (stderr, "variable_free: end\n");
00098 #endif
00099 }
```

### 5.25.2.3 void variable\_new ( Variable \* variable )

Function to create a new [Variable](#) struct.

## Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
-----------------	----------------------------------

Definition at line 67 of file [variable.c](#).

```

00068 {
00069 #if DEBUG_VARIABLE
00070     fprintf (stderr, "variable_new: start\n");
00071 #endif
00072     variable->name = NULL;
00073 #if DEBUG_VARIABLE
00074     fprintf (stderr, "variable_new: end\n");
00075 #endif
00076 }
```

### 5.25.2.4 int variable\_open\_json ( Variable \* variable, JsonNode \* node, unsigned int algorithm, unsigned int nsteps )

Function to open the variable file.

## Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
<i>node</i>	XML node.
<i>algorithm</i>	Algorithm type.
<i>nsteps</i>	Number of steps to do the direction search method.

## Returns

1 on success, 0 on error.

Definition at line 302 of file [variable.c](#).

```

00304 {
00305     JsonObject *object;
00306     const char *label;
00307     int error_code;
00308 #if DEBUG_VARIABLE
00309     fprintf (stderr, "variable_open_json: start\n");
00310 #endif
00311     object = json_node_get_object (node);
00312     label = json_object_get_string_member (object, LABEL_NAME);
00313     if (!label)
00314     {
```

```

00315     variable_error (variable, gettext ("no name"));
00316     goto exit_on_error;
00317 }
00318 variable->name = g_strdup (label);
00319 if (json_object_get_member (object, LABEL_MINIMUM))
00320 {
00321     variable->rangemin
00322     = json_object_get_float (object, LABEL_MINIMUM, &error_code);
00323     if (error_code)
00324     {
00325         variable_error (variable, gettext ("bad minimum"));
00326         goto exit_on_error;
00327     }
00328     variable->rangeminabs
00329     = json_object_get_float_with_default (object,
00330     LABEL_ABSOLUTE_MINIMUM,
00331     -G_MAXDOUBLE, &error_code);
00332     if (error_code)
00333     {
00334         variable_error (variable, gettext ("bad absolute minimum"));
00335         goto exit_on_error;
00336     }
00337     if (variable->rangemin < variable->rangeminabs)
00338     {
00339         variable_error (variable, gettext ("minimum range not allowed"));
00340         goto exit_on_error;
00341     }
00342 }
00343 else
00344 {
00345     variable_error (variable, gettext ("no minimum range"));
00346     goto exit_on_error;
00347 }
00348 if (json_object_get_member (object, LABEL_MAXIMUM))
00349 {
00350     variable->rangemax
00351     = json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00352     if (error_code)
00353     {
00354         variable_error (variable, gettext ("bad maximum"));
00355         goto exit_on_error;
00356     }
00357     variable->rangemaxabs
00358     = json_object_get_float_with_default (object,
00359     LABEL_ABSOLUTE_MAXIMUM,
00360     G_MAXDOUBLE, &error_code);
00361     if (error_code)
00362     {
00363         variable_error (variable, gettext ("bad absolute maximum"));
00364         goto exit_on_error;
00365     }
00366     if (variable->rangemax > variable->rangemaxabs)
00367     {
00368         variable_error (variable, gettext ("maximum range not allowed"));
00369         goto exit_on_error;
00370     }
00371     if (variable->rangemax < variable->rangemin)
00372     {
00373         variable_error (variable, gettext ("bad range"));
00374         goto exit_on_error;
00375     }
00376 }
00377 else
00378 {
00379     variable_error (variable, gettext ("no maximum range"));
00380     goto exit_on_error;
00381 }
00382 variable->precision
00383 = json_object_get_uint_with_default (object,
00384 LABEL_PRECISION,
00385     DEFAULT_PRECISION, &error_code);
00386 if (error_code || variable->precision >= NPRECISIONS)
00387 {
00388     variable_error (variable, gettext ("bad precision"));
00389     goto exit_on_error;
00390 }
00391 if (algorithm == ALGORITHM_SWEEP)
00392 {
00393     if (json_object_get_member (object, LABEL_NSWEEPS))
00394     {
00395         variable->nsweeps
00396         = json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00397         if (error_code || !variable->nsweeps)
00398         {
00399             variable_error (variable, gettext ("bad sweeps"));
00400             goto exit_on_error;
00401         }
00402     }
00403 }

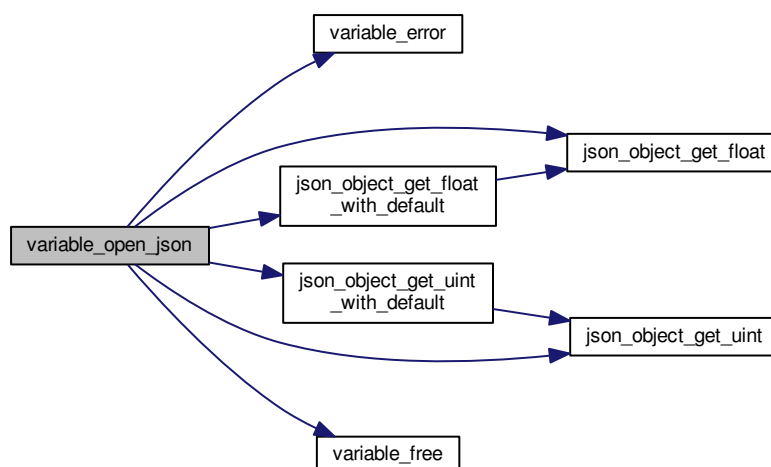
```

```

00399     }
00400     else
00401     {
00402         variable_error (variable, gettext ("no sweeps number"));
00403         goto exit_on_error;
00404     }
00405 #if DEBUG_VARIABLE
00406     fprintf (stderr, "variable_open_json: nsweeps=%u\n", variable->nsweeps);
00407 #endif
00408 }
00409 if (algorithm == ALGORITHM_GENETIC)
00410 {
00411     // Obtaining bits representing each variable
00412     if (json_object_get_member (object, LABEL_NBITS))
00413     {
00414         variable->nbits
00415         = json_object_get_uint (object, LABEL_NBITS, &error_code);
00416         if (error_code || !variable->nbits)
00417         {
00418             variable_error (variable, gettext ("invalid bits number"));
00419             goto exit_on_error;
00420         }
00421     }
00422     else
00423     {
00424         variable_error (variable, gettext ("no bits number"));
00425         goto exit_on_error;
00426     }
00427 }
00428 else if (nsteps)
00429 {
00430     variable->step = json_object_get_float (object,
00431     LABEL_STEP, &error_code);
00432     if (error_code || variable->step < 0.)
00433     {
00434         variable_error (variable, gettext ("bad step size"));
00435         goto exit_on_error;
00436     }
00437 }
00438 #if DEBUG_VARIABLE
00439     fprintf (stderr, "variable_open_json: end\n");
00440 #endif
00441 return 1;
00442 exit_on_error:
00443     variable_free (variable, INPUT_TYPE_JSON);
00444 #if DEBUG_VARIABLE
00445     fprintf (stderr, "variable_open_json: end\n");
00446 #endif
00447 return 0;
00448 }

```

Here is the call graph for this function:





## 5.25.2.5 int variable\_open\_xml ( Variable \* variable, xmlNode \* node, unsigned int algorithm, unsigned int nsteps )

Function to open the variable file.

## Parameters

<i>variable</i>	Variable struct.
<i>node</i>	XML node.
<i>algorithm</i>	Algorithm type.
<i>nsteps</i>	Number of steps to do the direction search method.

## Returns

1 on success, 0 on error.

Definition at line 136 of file [variable.c](#).

```

00138 {
00139     int error_code;
00140
00141     #if DEBUG_VARIABLE
00142         fprintf (stderr, "variable_open_xml: start\n");
00143     #endif
00144
00145     variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00146     if (!variable->name)
00147     {
00148         variable_error (variable, gettext ("no name"));
00149         goto exit_on_error;
00150     }
00151     if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00152     {
00153         variable->rangemin
00154             = xml_node_get_float (node, (const xmlChar *)
00155 LABEL_MINIMUM,
00156                                     &error_code);
00157         if (error_code)
00158         {
00159             variable_error (variable, gettext ("bad minimum"));
00160             goto exit_on_error;
00161         }
00162         variable->rangeminabs = xml_node_get_float_with_default
00163             (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, -G_MAXDOUBLE,
00164             &error_code);
00165         if (error_code)
00166         {
00167             variable_error (variable, gettext ("bad absolute minimum"));
00168             goto exit_on_error;
00169         }
00170         if (variable->rangemin < variable->rangeminabs)
00171         {
00172             variable_error (variable, gettext ("minimum range not allowed"));
00173             goto exit_on_error;
00174         }
00175     }
00176     else
00177     {
00178         variable_error (variable, gettext ("no minimum range"));
00179         goto exit_on_error;
00180     }
00181     if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00182     {
00183         variable->rangemax
00184             = xml_node_get_float (node, (const xmlChar *)
00185 LABEL_MAXIMUM,
00186                                     &error_code);
00187         if (error_code)
00188         {
00189             variable_error (variable, gettext ("bad maximum"));
00190             goto exit_on_error;
00191         }
00192         variable->rangemaxabs = xml_node_get_float_with_default
00193             (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, G_MAXDOUBLE,
00194             &error_code);
00195         if (error_code)
00196         {
00197             variable_error (variable, gettext ("bad absolute maximum"));
00198             goto exit_on_error;
00199         }
00200         if (variable->rangemax > variable->rangemaxabs)

```

```

00199     {
00200         variable_error (variable, gettext ("maximum range not allowed"));
00201         goto exit_on_error;
00202     }
00203     if (variable->rangemax < variable->rangemin)
00204     {
00205         variable_error (variable, gettext ("bad range"));
00206         goto exit_on_error;
00207     }
00208 }
00209 else
00210 {
00211     variable_error (variable, gettext ("no maximum range"));
00212     goto exit_on_error;
00213 }
00214 variable->precision
00215 = xml_node_get_uint_with_default (node, (const xmlChar *)
LABEL_PRECISION,
                                DEFAULT_PRECISION, &error_code);
00216 if (error_code || variable->precision >= NPRECISIONS)
00217 {
00218     variable_error (variable, gettext ("bad precision"));
00219     goto exit_on_error;
00220 }
00221 if (algorithm == ALGORITHM_SWEEP)
00222 {
00223     if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00224     {
00225         variable->nsweeps
00226         = xml_node_get_uint (node, (const xmlChar *)
LABEL_NSWEEPS,
                                &error_code);
00227         if (error_code || !variable->nsweeps)
00228         {
00229             variable_error (variable, gettext ("bad sweeps"));
00230             goto exit_on_error;
00231         }
00232     }
00233     else
00234     {
00235         variable_error (variable, gettext ("no sweeps number"));
00236         goto exit_on_error;
00237     }
00238 }
00239 #if DEBUG_VARIABLE
00240     fprintf (stderr, "variable_open_xml: nsweeps=%u\n", variable->nsweeps);
00241 #endif
00242 if (algorithm == ALGORITHM_GENETIC)
00243 {
00244     // Obtaining bits representing each variable
00245     if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00246     {
00247         variable->nbits
00248         = xml_node_get_uint (node, (const xmlChar *)
LABEL_NBITS,
                                &error_code);
00249         if (error_code || !variable->nbits)
00250         {
00251             variable_error (variable, gettext ("invalid bits number"));
00252             goto exit_on_error;
00253         }
00254     }
00255     else
00256     {
00257         variable_error (variable, gettext ("no bits number"));
00258         goto exit_on_error;
00259     }
00260 }
00261 else if (nsteps)
00262 {
00263     variable->step
00264     = xml_node_get_float (node, (const xmlChar *)
LABEL_STEP, &error_code);
00265     if (error_code || variable->step < 0.)
00266     {
00267         variable_error (variable, gettext ("bad step size"));
00268         goto exit_on_error;
00269     }
00270 }
00271 #if DEBUG_VARIABLE
00272     fprintf (stderr, "variable_open_xml: end\n");
00273 #endif
00274 return 1;
00275 exit_on_error:
00276 variable_free (variable, INPUT_TYPE_XML);
00277 #if DEBUG_VARIABLE

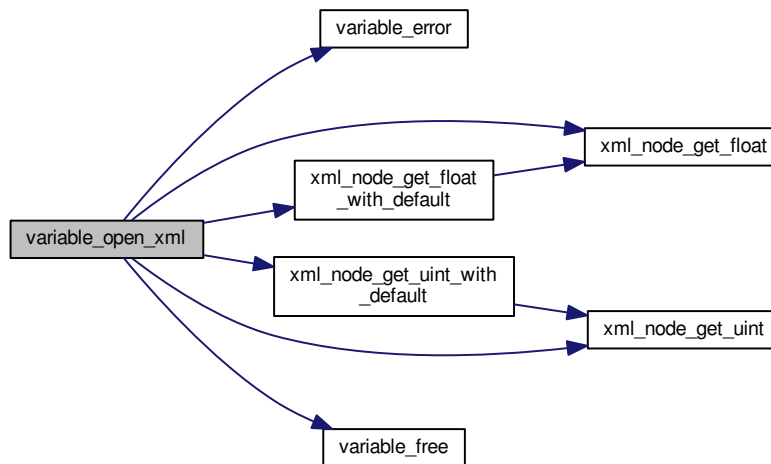
```

```

00282     fprintf (stderr, "variable_open_xml: end\n");
00283 #endif
00284     return 0;
00285 }

```

Here is the call graph for this function:



## 5.25.3 Variable Documentation

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

**Initial value:**

```

= {
    "%.01f", "%.11f", "%.21f", "%.31f", "%.41f", "%.51f", "%.61f", "%.71f",
    "%.81f", "%.91f", "%.101f", "%.111f", "%.121f", "%.131f", "%.141f"
}

```

Array of C-strings with variable formats.

Definition at line 50 of file [variable.c](#).

### 5.25.3.2 `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](#).

## 5.26 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 2012-2016, 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
00032 #define _GNU_SOURCE
00033 #include "config.h"
00034 #include <stdio.h>
00035 #include <libxml/parser.h>
00036 #include <libintl.h>
00037 #include <glib.h>
00038 #include <json-glib/json-glib.h>
00039 #include "utils.h"
00040 #include "variable.h"
00041
00042 #define DEBUG_VARIABLE 0
00043
00044 const char *format[NPRECISIONS] = {
00045     "%.0lf", "%.1lf", "%.2lf", "%.3lf", "%.4lf", "%.5lf", "%.6lf", "%.7lf",
00046     "%.8lf", "%.9lf", "%.10lf", "%.11lf", "%.12lf", "%.13lf", "%.14lf"
00047 };
00048
00049 const double precision[NPRECISIONS] = {
00050     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,
00051     1e-13, 1e-14
00052 };
00053
00054 void
00055 variable_new (Variable * variable)
00056 {
00057     #if DEBUG_VARIABLE
00058         fprintf (stderr, "variable_new: start\n");
00059     #endif
00060     variable->name = NULL;
00061     #if DEBUG_VARIABLE
00062         fprintf (stderr, "variable_new: end\n");
00063     #endif
00064 }
00065
00066 void
00067 variable_free (Variable * variable, 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
00081 void
00082 variable_error (Variable * variable, char *message)
00083 {
00084     char buffer[64];
00085     if (!variable->name)
00086         snprintf (buffer, 64, "%s: %s", gettext ("Variable"), message);
00087     else
00088         snprintf (buffer, 64, "%s %s: %s", gettext ("Variable"), variable->name,

```

```

00117         message);
00118     error_message = g_strdup (buffer);
00119 }
00120
00125 int
00136 variable_open_xml (Variable * variable, xmlNode * node, unsigned int algorithm,
00137                   unsigned int nsteps)
00138 {
00139     int error_code;
00140
00141     #if DEBUG_VARIABLE
00142     fprintf (stderr, "variable_open_xml: start\n");
00143     #endif
00144
00145     variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00146     if (!variable->name)
00147     {
00148         variable_error (variable, gettext ("no name"));
00149         goto exit_on_error;
00150     }
00151     if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00152     {
00153         variable->rangemin
00154         = xml_node_get_float (node, (const xmlChar *)
00155 LABEL_MINIMUM,
00156                             &error_code);
00157         if (error_code)
00158         {
00159             variable_error (variable, gettext ("bad minimum"));
00160             goto exit_on_error;
00161         }
00162         variable->rangeminabs = xml_node_get_float_with_default
00163         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, -G_MAXDOUBLE,
00164         &error_code);
00165         if (error_code)
00166         {
00167             variable_error (variable, gettext ("bad absolute minimum"));
00168             goto exit_on_error;
00169         }
00170         if (variable->rangemin < variable->rangeminabs)
00171         {
00172             variable_error (variable, gettext ("minimum range not allowed"));
00173             goto exit_on_error;
00174         }
00175     }
00176     else
00177     {
00178         variable_error (variable, gettext ("no minimum range"));
00179         goto exit_on_error;
00180     }
00181     if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00182     {
00183         variable->rangemax
00184         = xml_node_get_float (node, (const xmlChar *)
00185 LABEL_MAXIMUM,
00186                             &error_code);
00187         if (error_code)
00188         {
00189             variable_error (variable, gettext ("bad maximum"));
00190             goto exit_on_error;
00191         }
00192         variable->rangemaxabs = xml_node_get_float_with_default
00193         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, G_MAXDOUBLE,
00194         &error_code);
00195         if (error_code)
00196         {
00197             variable_error (variable, gettext ("bad absolute maximum"));
00198             goto exit_on_error;
00199         }
00200         if (variable->rangemax > variable->rangemaxabs)
00201         {
00202             variable_error (variable, gettext ("maximum range not allowed"));
00203             goto exit_on_error;
00204         }
00205         if (variable->rangemax < variable->rangemin)
00206         {
00207             variable_error (variable, gettext ("bad range"));
00208             goto exit_on_error;
00209         }
00210     }
00211     else
00212     {
00213         variable_error (variable, gettext ("no maximum range"));
00214         goto exit_on_error;
00215     }
00216     variable->precision
00217     = xml_node_get_uint_with_default (node, (const xmlChar *)

```

```

    LABEL_PRECISION,
00216                                     DEFAULT_PRECISION, &error_code);
00217     if (error_code || variable->precision >= NPRECISIONS)
00218     {
00219         variable_error (variable, gettext ("bad precision"));
00220         goto exit_on_error;
00221     }
00222     if (algorithm == ALGORITHM_SWEEP)
00223     {
00224         if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00225         {
00226             variable->nsweeps
00227             = xml_node_get_uint (node, (const xmlChar *)
00228 LABEL_NSWEEPS,
00229                                     &error_code);
00229             if (error_code || !variable->nsweeps)
00230             {
00231                 variable_error (variable, gettext ("bad sweeps"));
00232                 goto exit_on_error;
00233             }
00234         }
00235         else
00236         {
00237             variable_error (variable, gettext ("no sweeps number"));
00238             goto exit_on_error;
00239         }
00240 #if DEBUG_VARIABLE
00241         fprintf (stderr, "variable_open_xml: nsweeps=%u\n", variable->nsweeps);
00242 #endif
00243     }
00244     if (algorithm == ALGORITHM_GENETIC)
00245     {
00246         // Obtaining bits representing each variable
00247         if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00248         {
00249             variable->nbits
00250             = xml_node_get_uint (node, (const xmlChar *)
00251 LABEL_NBITS,
00252                                     &error_code);
00253             if (error_code || !variable->nbits)
00254             {
00255                 variable_error (variable, gettext ("invalid bits number"));
00256                 goto exit_on_error;
00257             }
00258         }
00259         else
00260         {
00261             variable_error (variable, gettext ("no bits number"));
00262             goto exit_on_error;
00263         }
00264     }
00265     else if (nsteps)
00266     {
00267         variable->step
00268         = xml_node_get_float (node, (const xmlChar *)
00269 LABEL_STEP, &error_code);
00270         if (error_code || variable->step < 0.)
00271         {
00272             variable_error (variable, gettext ("bad step size"));
00273             goto exit_on_error;
00274         }
00275     }
00276 #if DEBUG_VARIABLE
00277     fprintf (stderr, "variable_open_xml: end\n");
00278 #endif
00279     return 1;
00280 exit_on_error:
00281     variable_free (variable, INPUT_TYPE_XML);
00282 #if DEBUG_VARIABLE
00283     fprintf (stderr, "variable_open_xml: end\n");
00284 #endif
00285     return 0;
00286 }
00287
00301 int
00302 variable_open_json (Variable * variable, JsonNode * node,
00303                     unsigned int algorithm, unsigned int nsteps)
00304 {
00305     JsonObject *object;
00306     const char *label;
00307     int error_code;
00308 #if DEBUG_VARIABLE
00309     fprintf (stderr, "variable_open_json: start\n");
00310 #endif
00311     object = json_node_get_object (node);
00312     label = json_object_get_string_member (object, LABEL_NAME);

```

```

00313     if (!label)
00314     {
00315         variable_error (variable, gettext ("no name"));
00316         goto exit_on_error;
00317     }
00318     variable->name = g_strdup (label);
00319     if (json_object_get_member (object, LABEL_MINIMUM))
00320     {
00321         variable->rangemin
00322         = json_object_get_float (object, LABEL_MINIMUM, &error_code);
00323         if (error_code)
00324         {
00325             variable_error (variable, gettext ("bad minimum"));
00326             goto exit_on_error;
00327         }
00328         variable->rangeminabs
00329         = json_object_get_float_with_default (object,
00330 LABEL_ABSOLUTE_MINIMUM,
00331                                             -G_MAXDOUBLE, &error_code);
00332         if (error_code)
00333         {
00334             variable_error (variable, gettext ("bad absolute minimum"));
00335             goto exit_on_error;
00336         }
00337         if (variable->rangemin < variable->rangeminabs)
00338         {
00339             variable_error (variable, gettext ("minimum range not allowed"));
00340             goto exit_on_error;
00341         }
00342     }
00343     else
00344     {
00345         variable_error (variable, gettext ("no minimum range"));
00346         goto exit_on_error;
00347     }
00348     if (json_object_get_member (object, LABEL_MAXIMUM))
00349     {
00350         variable->rangemax
00351         = json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00352         if (error_code)
00353         {
00354             variable_error (variable, gettext ("bad maximum"));
00355             goto exit_on_error;
00356         }
00357         variable->rangemaxabs
00358         = json_object_get_float_with_default (object,
00359 LABEL_ABSOLUTE_MAXIMUM,
00360                                             G_MAXDOUBLE, &error_code);
00361         if (error_code)
00362         {
00363             variable_error (variable, gettext ("bad absolute maximum"));
00364             goto exit_on_error;
00365         }
00366         if (variable->rangemax > variable->rangemaxabs)
00367         {
00368             variable_error (variable, gettext ("maximum range not allowed"));
00369             goto exit_on_error;
00370         }
00371         if (variable->rangemax < variable->rangemin)
00372         {
00373             variable_error (variable, gettext ("bad range"));
00374             goto exit_on_error;
00375         }
00376     }
00377     else
00378     {
00379         variable_error (variable, gettext ("no maximum range"));
00380         goto exit_on_error;
00381     }
00382     variable->precision
00383     = json_object_get_uint_with_default (object,
00384 LABEL_PRECISION,
00385                                         DEFAULT_PRECISION, &error_code);
00386     if (error_code || variable->precision >= NPRECISIONS)
00387     {
00388         variable_error (variable, gettext ("bad precision"));
00389         goto exit_on_error;
00390     }
00391     if (algorithm == ALGORITHM_SWEEP)
00392     {
00393         if (json_object_get_member (object, LABEL_NSWEEPS))
00394         {
00395             variable->nsweeps
00396             = json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00397             if (error_code || !variable->nsweeps)
00398             {
00399                 variable_error (variable, gettext ("bad sweeps"));
00400             }
00401         }
00402     }

```

```

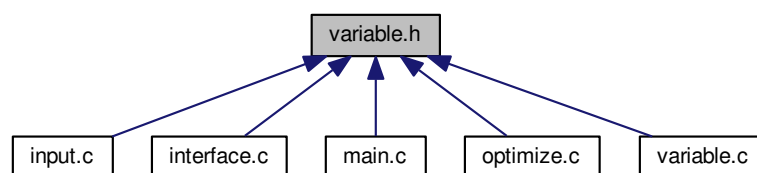
00397         goto exit_on_error;
00398     }
00399 }
00400 else
00401 {
00402     variable_error (variable, gettext ("no sweeps number"));
00403     goto exit_on_error;
00404 }
00405 #if DEBUG_VARIABLE
00406     fprintf (stderr, "variable_open_json: nsweeps=%u\n", variable->nsweeps);
00407 #endif
00408 }
00409 if (algorithm == ALGORITHM_GENETIC)
00410 {
00411     // Obtaining bits representing each variable
00412     if (json_object_get_member (object, LABEL_NBITS))
00413     {
00414         variable->nbits
00415         = json_object_get_uint (object, LABEL_NBITS, &error_code);
00416         if (error_code || !variable->nbits)
00417         {
00418             variable_error (variable, gettext ("invalid bits number"));
00419             goto exit_on_error;
00420         }
00421     }
00422     else
00423     {
00424         variable_error (variable, gettext ("no bits number"));
00425         goto exit_on_error;
00426     }
00427 }
00428 else if (nsteps)
00429 {
00430     variable->step = json_object_get_float (object,
00431     LABEL_STEP, &error_code);
00432     if (error_code || variable->step < 0.)
00433     {
00434         variable_error (variable, gettext ("bad step size"));
00435         goto exit_on_error;
00436     }
00437 }
00438 #if DEBUG_VARIABLE
00439     fprintf (stderr, "variable_open_json: end\n");
00440 #endif
00441     return 1;
00442 exit_on_error:
00443     variable_free (variable, INPUT_TYPE_JSON);
00444 #if DEBUG_VARIABLE
00445     fprintf (stderr, "variable_open_json: end\n");
00446 #endif
00447     return 0;
00448 }

```

## 5.27 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 }

*Enum to define the algorithms.*

## Functions

- void [variable\\_new](#) ([Variable](#) \*variable)  
*Function to create a new [Variable](#) struct.*
- void [variable\\_free](#) ([Variable](#) \*variable, unsigned int type)  
*Function to free the memory of a [Variable](#) struct.*
- void [variable\\_error](#) ([Variable](#) \*variable, char \*message)  
*Function to print a message error opening an [Variable](#) struct.*
- int [variable\\_open\\_xml](#) ([Variable](#) \*variable, xmlNode \*node, unsigned int algorithm, unsigned int nsteps)  
*Function to open the variable file.*
- int [variable\\_open\\_json](#) ([Variable](#) \*variable, JsonNode \*node, unsigned int algorithm, unsigned int nsteps)  
*Function to open the variable file.*

## Variables

- const char \* [format](#) [[NPRECISIONS](#)]  
*Array of C-strings with variable formats.*
- const double [precision](#) [[NPRECISIONS](#)]  
*Array of variable precisions.*

### 5.27.1 Detailed Description

Header file to define the variable data.

#### Authors

Javier Burguete.

#### Copyright

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Definition in file [variable.h](#).

### 5.27.2 Enumeration Type Documentation

#### 5.27.2.1 enum [Algorithm](#)

Enum to define the algorithms.

## Enumerator

**ALGORITHM\_MONTE\_CARLO** Monte-Carlo algorithm.

**ALGORITHM\_SWEEP** Sweep algorithm.

**ALGORITHM\_GENETIC** Genetic algorithm.

Definition at line 45 of file [variable.h](#).

```
00046 {
00047     ALGORITHM_MONTE_CARLO = 0,
00048     ALGORITHM_SWEEP = 1,
00049     ALGORITHM_GENETIC = 2
00050 };
```

## 5.27.3 Function Documentation

### 5.27.3.1 void variable\_error ( Variable \* variable, char \* message )

Function to print a message error opening an [Variable](#) struct.

#### Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
<i>message</i>	Error message.

Definition at line 110 of file [variable.c](#).

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

### 5.27.3.2 void variable\_free ( Variable \* variable, unsigned int type )

Function to free the memory of a [Variable](#) struct.

#### Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
<i>type</i>	Type of input file.

Definition at line 87 of file [variable.c](#).

```
00088 {
00089     #if DEBUG_VARIABLE
00090         fprintf (stderr, "variable_free: start\n");
00091     #endif
00092     if (type == INPUT_TYPE_XML)
00093         xmlFree (variable->name);
00094     else
00095         g_free (variable->name);
00096     #if DEBUG_VARIABLE
00097         fprintf (stderr, "variable_free: end\n");
00098     #endif
00099 }
```

### 5.27.3.3 void variable\_new ( Variable \* variable )

Function to create a new [Variable](#) struct.

## Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
-----------------	----------------------------------

Definition at line 67 of file [variable.c](#).

```

00068 {
00069     #if DEBUG_VARIABLE
00070         fprintf (stderr, "variable_new: start\n");
00071     #endif
00072     variable->name = NULL;
00073     #if DEBUG_VARIABLE
00074         fprintf (stderr, "variable_new: end\n");
00075     #endif
00076 }
```

#### 5.27.3.4 int variable\_open\_json ( Variable \* variable, JsonNode \* node, unsigned int algorithm, unsigned int nsteps )

Function to open the variable file.

## Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
<i>node</i>	XML node.
<i>algorithm</i>	Algorithm type.
<i>nsteps</i>	Number of steps to do the direction search method.

## Returns

1 on success, 0 on error.

Definition at line 302 of file [variable.c](#).

```

00304 {
00305     JsonObject *object;
00306     const char *label;
00307     int error_code;
00308     #if DEBUG_VARIABLE
00309         fprintf (stderr, "variable_open_json: start\n");
00310     #endif
00311     object = json_node_get_object (node);
00312     label = json_object_get_string_member (object, LABEL_NAME);
00313     if (!label)
00314     {
00315         variable_error (variable, gettext ("no name"));
00316         goto exit_on_error;
00317     }
00318     variable->name = g_strdup (label);
00319     if (json_object_get_member (object, LABEL_MINIMUM))
00320     {
00321         variable->rangemin
00322             = json_object_get_float (object, LABEL_MINIMUM, &error_code);
00323         if (error_code)
00324         {
00325             variable_error (variable, gettext ("bad minimum"));
00326             goto exit_on_error;
00327         }
00328         variable->rangeminabs
00329             = json_object_get_float_with_default (object,
00330 LABEL_ABSOLUTE_MINIMUM,
00331                                                     -G_MAXDOUBLE, &error_code);
00332         if (error_code)
00333         {
00334             variable_error (variable, gettext ("bad absolute minimum"));
00335             goto exit_on_error;
00336         }
00337         if (variable->rangemin < variable->rangeminabs)
00338         {
00339             variable_error (variable, gettext ("minimum range not allowed"));
00340             goto exit_on_error;
00341         }
00342     }
00343     else
00344     {
00345         variable_error (variable, gettext ("no minimum range"));
00346     }
00347 }
```

```

00345     goto exit_on_error;
00346 }
00347 if (json_object_get_member (object, LABEL_MAXIMUM))
00348 {
00349     variable->rangemax
00350     = json_object_get_float (object, LABEL_MAXIMUM, &error_code);
00351     if (error_code)
00352     {
00353         variable_error (variable, gettext ("bad maximum"));
00354         goto exit_on_error;
00355     }
00356     variable->rangemaxabs
00357     = json_object_get_float_with_default (object,
00358     LABEL_ABSOLUTE_MAXIMUM,
00359     G_MAXDOUBLE, &error_code);
00360     if (error_code)
00361     {
00362         variable_error (variable, gettext ("bad absolute maximum"));
00363         goto exit_on_error;
00364     }
00365     if (variable->rangemax > variable->rangemaxabs)
00366     {
00367         variable_error (variable, gettext ("maximum range not allowed"));
00368         goto exit_on_error;
00369     }
00370     if (variable->rangemax < variable->rangemin)
00371     {
00372         variable_error (variable, gettext ("bad range"));
00373         goto exit_on_error;
00374     }
00375     else
00376     {
00377         variable_error (variable, gettext ("no maximum range"));
00378         goto exit_on_error;
00379     }
00380     variable->precision
00381     = json_object_get_uint_with_default (object,
00382     LABEL_PRECISION,
00383     DEFAULT_PRECISION, &error_code);
00384     if (error_code || variable->precision >= NPRECISIONS)
00385     {
00386         variable_error (variable, gettext ("bad precision"));
00387         goto exit_on_error;
00388     }
00389     if (algorithm == ALGORITHM_SWEEP)
00390     {
00391         if (json_object_get_member (object, LABEL_NSWEEPS))
00392         {
00393             variable->nsweeps
00394             = json_object_get_uint (object, LABEL_NSWEEPS, &error_code);
00395             if (error_code || !variable->nsweeps)
00396             {
00397                 variable_error (variable, gettext ("bad sweeps"));
00398                 goto exit_on_error;
00399             }
00400         }
00401         else
00402         {
00403             variable_error (variable, gettext ("no sweeps number"));
00404             goto exit_on_error;
00405         }
00406         #if DEBUG_VARIABLE
00407         fprintf (stderr, "variable_open_json: nsweeps=%u\n", variable->nsweeps);
00408         #endif
00409         if (algorithm == ALGORITHM_GENETIC)
00410         {
00411             // Obtaining bits representing each variable
00412             if (json_object_get_member (object, LABEL_NBITS))
00413             {
00414                 variable->nbits
00415                 = json_object_get_uint (object, LABEL_NBITS, &error_code);
00416                 if (error_code || !variable->nbits)
00417                 {
00418                     variable_error (variable, gettext ("invalid bits number"));
00419                     goto exit_on_error;
00420                 }
00421             }
00422             else
00423             {
00424                 variable_error (variable, gettext ("no bits number"));
00425                 goto exit_on_error;
00426             }
00427         }
00428         else if (nsteps)
00429         {

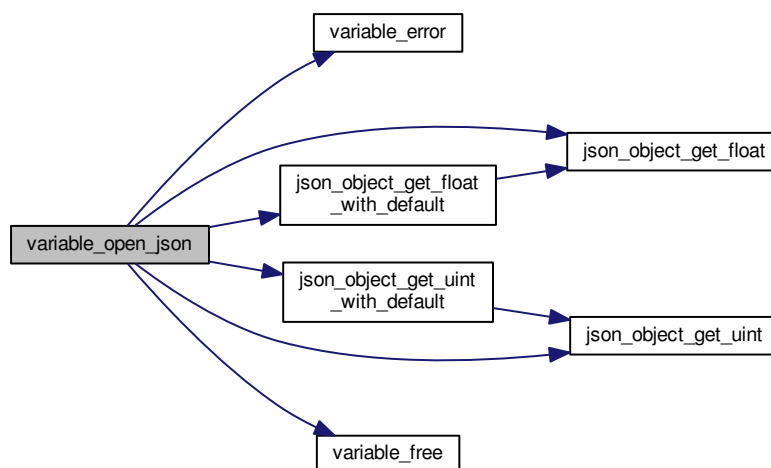
```

```

00430     variable->step = json_object_get_float (object,
00431     LABEL_STEP, &error_code);
00431     if (error_code || variable->step < 0.)
00432     {
00433         variable_error (variable, gettext ("bad step size"));
00434         goto exit_on_error;
00435     }
00436 }
00437
00438 #if DEBUG_VARIABLE
00439 fprintf (stderr, "variable_open_json: end\n");
00440 #endif
00441 return 1;
00442 exit_on_error:
00443     variable_free (variable, INPUT_TYPE_JSON);
00444 #if DEBUG_VARIABLE
00445 fprintf (stderr, "variable_open_json: end\n");
00446 #endif
00447 return 0;
00448 }

```

Here is the call graph for this function:



#### 5.27.3.5 int variable\_open\_xml ( Variable \* variable, xmlNode \* node, unsigned int algorithm, unsigned int nsteps )

Function to open the variable file.

##### Parameters

<i>variable</i>	<a href="#">Variable</a> struct.
<i>node</i>	XML node.
<i>algorithm</i>	Algorithm type.
<i>nsteps</i>	Number of steps to do the direction search method.

##### Returns

1 on success, 0 on error.

Definition at line 136 of file [variable.c](#).

```

00138 {
00139     int error_code;

```

```

00140
00141 #if DEBUG_VARIABLE
00142     fprintf (stderr, "variable_open_xml: start\n");
00143 #endif
00144
00145     variable->name = (char *) xmlGetProp (node, (const xmlChar *) LABEL_NAME);
00146     if (!variable->name)
00147     {
00148         variable_error (variable, gettext ("no name"));
00149         goto exit_on_error;
00150     }
00151     if (xmlHasProp (node, (const xmlChar *) LABEL_MINIMUM))
00152     {
00153         variable->rangemin
00154         = xml_node_get_float (node, (const xmlChar *)
00155 LABEL_MINIMUM,
00156                             &error_code);
00157         if (error_code)
00158         {
00159             variable_error (variable, gettext ("bad minimum"));
00160             goto exit_on_error;
00161         }
00162         variable->rangeminabs = xml_node_get_float_with_default
00163         (node, (const xmlChar *) LABEL_ABSOLUTE_MINIMUM, -G_MAXDOUBLE,
00164         &error_code);
00165         if (error_code)
00166         {
00167             variable_error (variable, gettext ("bad absolute minimum"));
00168             goto exit_on_error;
00169         }
00170         if (variable->rangemin < variable->rangeminabs)
00171         {
00172             variable_error (variable, gettext ("minimum range not allowed"));
00173             goto exit_on_error;
00174         }
00175     }
00176     else
00177     {
00178         variable_error (variable, gettext ("no minimum range"));
00179         goto exit_on_error;
00180     }
00181     if (xmlHasProp (node, (const xmlChar *) LABEL_MAXIMUM))
00182     {
00183         variable->rangemax
00184         = xml_node_get_float (node, (const xmlChar *)
00185 LABEL_MAXIMUM,
00186                             &error_code);
00187         if (error_code)
00188         {
00189             variable_error (variable, gettext ("bad maximum"));
00190             goto exit_on_error;
00191         }
00192         variable->rangemaxabs = xml_node_get_float_with_default
00193         (node, (const xmlChar *) LABEL_ABSOLUTE_MAXIMUM, G_MAXDOUBLE,
00194         &error_code);
00195         if (error_code)
00196         {
00197             variable_error (variable, gettext ("bad absolute maximum"));
00198             goto exit_on_error;
00199         }
00200         if (variable->rangemax > variable->rangemaxabs)
00201         {
00202             variable_error (variable, gettext ("maximum range not allowed"));
00203             goto exit_on_error;
00204         }
00205         if (variable->rangemax < variable->rangemin)
00206         {
00207             variable_error (variable, gettext ("bad range"));
00208             goto exit_on_error;
00209         }
00210     }
00211     else
00212     {
00213         variable_error (variable, gettext ("no maximum range"));
00214         goto exit_on_error;
00215     }
00216     variable->precision
00217     = xml_node_get_uint_with_default (node, (const xmlChar *)
00218 LABEL_PRECISION,
00219                                     DEFAULT_PRECISION, &error_code);
00220     if (error_code || variable->precision >= NPRECISIONS)
00221     {
00222         variable_error (variable, gettext ("bad precision"));
00223         goto exit_on_error;
00224     }
00225     if (algorithm == ALGORITHM_SWEEP)
00226     {

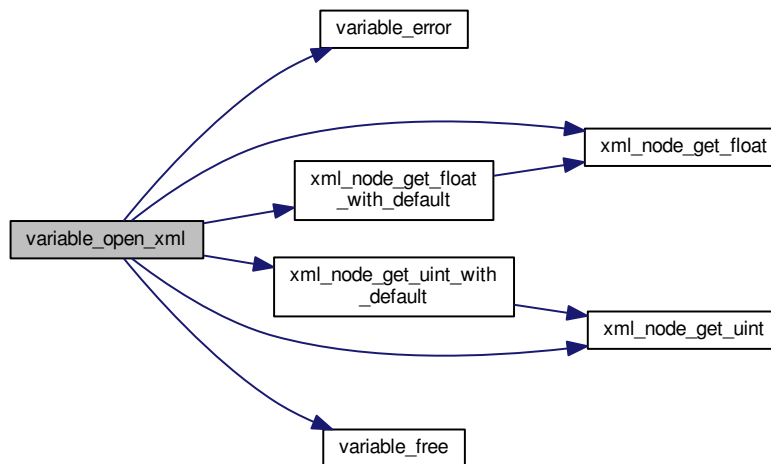
```

```

00224     if (xmlHasProp (node, (const xmlChar *) LABEL_NSWEEPS))
00225     {
00226         variable->nsweeps
00227         = xml_node_get_uint (node, (const xmlChar *)
00228 LABEL_NSWEEPS,
00229                             &error_code);
00229         if (error_code || !variable->nsweeps)
00230         {
00231             variable_error (variable, gettext ("bad sweeps"));
00232             goto exit_on_error;
00233         }
00234     }
00235     else
00236     {
00237         variable_error (variable, gettext ("no sweeps number"));
00238         goto exit_on_error;
00239     }
00240 #if DEBUG_VARIABLE
00241     fprintf (stderr, "variable_open_xml: nsweeps=%u\n", variable->nsweeps);
00242 #endif
00243 }
00244 if (algorithm == ALGORITHM_GENETIC)
00245 {
00246     // Obtaining bits representing each variable
00247     if (xmlHasProp (node, (const xmlChar *) LABEL_NBITS))
00248     {
00249         variable->nbits
00250         = xml_node_get_uint (node, (const xmlChar *)
00251 LABEL_NBITS,
00252                             &error_code);
00253         if (error_code || !variable->nbits)
00254         {
00255             variable_error (variable, gettext ("invalid bits number"));
00256             goto exit_on_error;
00257         }
00258     }
00259     else
00260     {
00261         variable_error (variable, gettext ("no bits number"));
00262         goto exit_on_error;
00263     }
00264     else if (nsteps)
00265     {
00266         variable->step
00267         = xml_node_get_float (node, (const xmlChar *)
00268 LABEL_STEP, &error_code);
00269         if (error_code || variable->step < 0.)
00270         {
00271             variable_error (variable, gettext ("bad step size"));
00272             goto exit_on_error;
00273         }
00274     }
00275 #if DEBUG_VARIABLE
00276     fprintf (stderr, "variable_open_xml: end\n");
00277 #endif
00278     return 1;
00279 exit_on_error:
00280     variable_free (variable, INPUT_TYPE_XML);
00281 #if DEBUG_VARIABLE
00282     fprintf (stderr, "variable_open_xml: end\n");
00283 #endif
00284     return 0;
00285 }

```

Here is the call graph for this function:



## 5.28 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 2012-2016, AUTHORS.
00009
00010 Redistribution and use in source and binary forms, with or without modification,
00011 are permitted provided that the following conditions are met:
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00013     1. Redistributions of source code must retain the above copyright notice,
00014        this list of conditions and the following disclaimer.
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00020 THIS SOFTWARE IS PROVIDED BY AUTHORS ``AS IS'' AND ANY EXPRESS OR IMPLIED
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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
00032 #ifndef VARIABLE__H
00033 #define VARIABLE__H 1
00034
00035 enum Algorithm
00036 {
00037     ALGORITHM_MONTE_CARLO = 0,
00038     ALGORITHM_SWEEP = 1,
00039     ALGORITHM_GENETIC = 2
00040 };
00041
00042 typedef struct
00043 {
00044     char *name;
00045     double rangemin;
00046     double rangemax;
00047     double rangeminabs;
00048 }

```



```
00062 double rangemaxabs;
00063 double step;
00064 unsigned int precision;
00065 unsigned int nsweeps;
00066 unsigned int nbits;
00067 } Variable;
00068
00069 extern const char *format[NPRECISIONS];
00070 extern const double precision[NPRECISIONS];
00071
00072 // Public functions
00073 void variable_new (Variable * variable);
00074 void variable_free (Variable * variable, unsigned int type);
00075 void variable_error (Variable * variable, char *message);
00076 int variable_open_xml (Variable * variable, xmlNode * node,
00077                       unsigned int algorithm, unsigned int nsteps);
00078 int variable_open_json (Variable * variable, JsonNode * node,
00079                       unsigned int algorithm, unsigned int nsteps);
00080
00081 #endif
```



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