

Master Thesis

Generated by Doxygen 1.8.4

Sun Jul 7 2013 15:26:06

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Chapter 1

Namespace Index

1.1 Namespace List

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

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Chapter 2

Hierarchical Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

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Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

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PRPSEvolution::Exceptions::Permutation::Calculation	11
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PRPSEvolution::System	20
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File Index

4.1 File List

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

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trunk/include/ PRPSEvolutionFIOExceptions.h	??
trunk/include/ PRPSEvolutionFIOExeptions.h	26
trunk/include/ PRPSEvolutionGeneralExceptions.h	??
trunk/include/ PRPSEvolutionGeneralExeptions.h	27
trunk/include/ PRPSEvolutionPermutationExceptions.h	??
trunk/include/ PRPSEvolutionPermutationExeptions.h	??
trunk/include/ PRPSEvolutionSolveExceptions.h	??
trunk/include/ PRPSEvolutionSolveExeptions.h	27
trunk/libCalibration/ calib.h	28
trunk/libNormalizer/ normalizer.h	28
trunk/libPermutate/ permute.h	29
trunk/libPRPSSystem/ prpsevolutionsystem.h	??
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trunk/libSolve/ solveresult.h	31
trunk/test/ AntennaConfiguration.cpp	32
trunk/test/ AntennaConfiguration.h	??

Chapter 5

Namespace Documentation

5.1 PRPSEvolution Namespace Reference

Classes

- struct [Normalizer](#)
- struct [Constants](#)
- struct [System](#)

Enumerations

- enum **NormalizatioMethodes** { **Native**, **B**, **CMPLX**, **RND** }

Variables

- const int **ANTENNA_AMOUNT** = 8
- const int **EXPECTED_LINES_CALIBRATION_FILE** = 4
- const int **EXPECTED_VALUES_CALIBRATION_FILE** = ANTENNA_AMOUNT
- const int **EXPECTED_LINES_COORD_FILE** = ANTENNA_AMOUNT
- const int **EXPECTED_VALUES_COORD_FILE** = 3
- const int **EXPECTED_LINES_SYSTEM_INI_FILE** = 2
- const int **MAT_ROWS** = 3
- const int **MAT_COLS** = 10
- const int **CALIBRATION_POINTS_AVAILABLE** = 4
- const int **EXPECTED_LINES_MEASUREMENT_FILE** = ANTENNA_AMOUNT
- const int **EXPECTED_VALUES_MEASUREMENT_FILE** = 2
- const int **DATA_NV** = 65535
- const int **DEFAULT_MIN_GROUP_SIZE** = 4

5.1.1 Detailed Description

This file contains structures and classes belonging to the system itself

Chapter 6

Class Documentation

6.1 PRPSEvolution::Permutate::AntennaPermutations< N_MAT, T > Struct Template Reference

Static Public Member Functions

- static void **dump_matrix** (NRmatrix< T > mat)
- static void **dump_matrix_2_file** (std::ofstream &f, NRmatrix< T > mat)

Public Attributes

- std::array< NRmatrix< T >, N_MAT > **mat**
- std::array< std::string, N_MAT > **names**

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

- trunk/libPermutate/[permutate.h](#)

6.2 PRPSEvolution::Exceptions::Permutation::Calculation Class Reference

Inheritance diagram for PRPSEvolution::Exceptions::Permutation::Calculation:

Collaboration diagram for PRPSEvolution::Exceptions::Permutation::Calculation:

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

- trunk/include/PRPSEvolutionPermutationExceptions.h

6.3 PRPSEvolution::Exceptions::Permutation::Calculation Class Reference

Inheritance diagram for PRPSEvolution::Exceptions::Permutation::Calculation:

Collaboration diagram for PRPSEvolution::Exceptions::Permutation::Calculation:

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

- trunk/include/PRPSEvolutionPermutationExceptions.h

6.4 PRPSEvolution::Constants Struct Reference

Public Member Functions

- **Constants** (const [PRPSEvolution::Constants](#) &c)

Public Attributes

- double **a_1**
- double **a_2**
- double **lambda**
- double **f_mess**
- double **c_0**

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

- trunk/libPRPSSystem/prpsevolutionsystem.h

6.5 PRPSEvolution::Positioning::CoordContainer< N, T > Struct Template Reference

Collaboration diagram for PRPSEvolution::Positioning::CoordContainer< N, T >:

Public Types

- typedef T **value_type**

Public Member Functions

- template<typename T1 >
CoordContainer (T1 init)
- T & **operator[]** (std::size_t i)

Public Attributes

- T **x_** [N]
- T **y_** [N]
- T **z_** [N]

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

- trunk/include/coords.h

6.6 PRPSEvolution::Exceptions::FileIO::FileNotFound Class Reference

Inheritance diagram for PRPSEvolution::Exceptions::FileIO::FileNotFound:

Collaboration diagram for PRPSEvolution::Exceptions::FileIO::FileNotFound:

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

- trunk/include/PRPSEvolutionFIOExceptions.h

6.7 PRPSEvolution::Exeptions::FileIO::FileNotFound Class Reference

Inheritance diagram for PRPSEvolution::Exeptions::FileIO::FileNotFound:

Collaboration diagram for PRPSEvolution::Exeptions::FileIO::FileNotFound:

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

- trunk/include/[PRPSEvolutionFIOExeptions.h](#)

6.8 PRPSEvolution::Exeptions::Permutation::Init Class Reference

Inheritance diagram for PRPSEvolution::Exeptions::Permutation::Init:

Collaboration diagram for PRPSEvolution::Exeptions::Permutation::Init:

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

- trunk/include/PRPSEvolutionPermutationExeptions.h

6.9 PRPSEvolution::Exeptions::Permutation::Init Class Reference

Inheritance diagram for PRPSEvolution::Exeptions::Permutation::Init:

Collaboration diagram for PRPSEvolution::Exeptions::Permutation::Init:

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

- trunk/include/PRPSEvolutionPermutationExeptions.h

6.10 PRPSEvolution::Exeptions::FileIO::MalformedInput Class Reference

Inheritance diagram for PRPSEvolution::Exeptions::FileIO::MalformedInput:

Collaboration diagram for PRPSEvolution::Exeptions::FileIO::MalformedInput:

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

- trunk/include/[PRPSEvolutionFIOExeptions.h](#)

6.11 PRPSEvolution::Exeptions::FileIO::MalformedInput Class Reference

Inheritance diagram for PRPSEvolution::Exeptions::FileIO::MalformedInput:

Collaboration diagram for PRPSEvolution::Exeptions::FileIO::MalformedInput:

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

- trunk/include/PRPSEvolutionFIOExeptions.h

6.12 PRPSEvolution::Normalizer< N, T > Struct Template Reference

Public Member Functions

- [Normalizer](#) (NormalizatioMethodes method)

- `std::array< T, N > complexNorm` (`const std::array< T, N > &p, const std::array< T, N > &a`)
- `std::array< T, N > randNorm` ()
- `std::array< T, N > normalize` (`std::array< T, N > phase, std::array< T, N > amp`)

Public Attributes

- NormalizationMethodes **Method**

6.12.1 Constructor & Destructor Documentation

6.12.1.1 `template<std::size_t N, typename T > PRPSEvolution::Normalizer< N, T >::Normalizer (NormalizationMethodes method) [inline]`

Constructor

Parameters

<i>in</i>	<i>method</i>	Selects the Normalization function
-----------	---------------	------------------------------------

6.12.2 Member Function Documentation

6.12.2.1 `template<std::size_t N, typename T > std::array<T, N> PRPSEvolution::Normalizer< N, T >::normalize (std::array< T, N > phase, std::array< T, N > amp) [inline]`

Calculates the normalizations

Parameters

<i>in</i>	<i>phase</i>	The measured phase data
<i>in</i>	<i>amp</i>	The measured amplitude data

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

- `trunk/libNormalizer/normalize.h`

6.13 PRPSEvolution::Exceptions::General::NotImplemented Struct Reference

```
#include <PRPSEvolutionGeneralExceptions.h>
```

Inheritance diagram for PRPSEvolution::Exceptions::General::NotImplemented:

Collaboration diagram for PRPSEvolution::Exceptions::General::NotImplemented:

Public Member Functions

- `const char * what () const noexcept`

6.13.1 Detailed Description

Throw this if a Method is not implemented

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

- `trunk/include/PRPSEvolutionGeneralExceptions.h`

6.14 PRPSEvolution::Exceptions::FileIO::Output Class Reference

Inheritance diagram for PRPSEvolution::Exceptions::FileIO::Output:

Collaboration diagram for PRPSEvolution::Exceptions::FileIO::Output:

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

- trunk/include/PRPSEvolutionFIOExceptions.h

6.15 PRPSEvolution::Exeptions::FileIO::Output Class Reference

Inheritance diagram for PRPSEvolution::Exeptions::FileIO::Output:

Collaboration diagram for PRPSEvolution::Exeptions::FileIO::Output:

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

- trunk/include/[PRPSEvolutionFIOExeptions.h](#)

6.16 PRPSEvolution::Calibration::performCalibration< N_ANTA, N_CALPOS, T > Struct Template Reference

```
#include <calib.h>
```

6.16.1 Detailed Description

```
template<std::size_t N_ANTA, std::size_t N_CALPOS, typename T>struct PRPSEvolution::Calibration::performCalibration< N_ANTA, N_CALPOS, T >
```

This will perform the calibration stuff

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

- trunk/libCalibration/[calib.h](#)

6.17 PRPSEvolution::Permutate::permuteAntennas< N_ANTA, N_ANTPERM, T > Struct Template Reference

```
#include <permutate.h>
```

Collaboration diagram for PRPSEvolution::Permutate::permuteAntennas< N_ANTA, N_ANTPERM, T >:

Public Member Functions

- **permuteAntennas** (const [PRPSEvolution::Constants](#) c)
- int **rCoordFile** ()
- int **computePermutations** (const [PRPSEvolution::Constants](#) &co)
- template<std::size_t NN, std::size_t MM>
const NRmatrix< T > **computeMatrix** (const int ref, const int a1, const int a2, const int a3, const [PRPSEvolution::Constants](#) &co)
- NRmatrix< T > **compute_d_k0_Mat** ()
- void **dumpConfigurationsToFile** ()
- void **dump_matrices_2_file** ()

Public Attributes

- int **ref**
- [PRPSEvolution::Constants](#) **systemConstants**
- [Positioning::CoordContainer](#)
< N_ANTA, T > **AntennaCoordinates**
- std::array
< [AntennaPermutations](#)
< N_ANTPERM, Doub >, N_ANTA > **configurations**
- NRmatrix< T > **d_k0_mat**

6.17.1 Detailed Description

```
template<std::size_t N_ANTA, std::size_t N_ANTPERM, typename T>struct PRPSEvolution::Permutate::permuteAntennas< N_ -
ANTA, N_ANTPERM, T >
```

This will collect some stuff for calculating the permutation of the antennas

6.17.2 Member Function Documentation

```
6.17.2.1 template<std::size_t N_ANTA, std::size_t N_ANTPERM, typename T > template<std::size_t NN, std::size_t MM>
const NRmatrix< T > PRPSEvolution::Permutate::permuteAntennas< N_ANTA, N_ANTPERM, T
>::computeMatrix ( const int ref, const int a1, const int a2, const int a3, const PRPSEvolution::Constants & co
)
```

This method will compute all the possible permutations based on the given reference antenna

See Also

[ref](#)

Parameters

in	<i>ref</i>	The reference antenna
in	<i>a1</i>	First antenna
in	<i>a2</i>	Second antenna
in	<i>a3</i>	Third antenna

```
6.17.2.2 template<std::size_t N_ANTA, std::size_t N_ANTPERM, typename T > int PRPSEvolution::Permutate-
::permuteAntennas< N_ANTA, N_ANTPERM, T >::computePermutations ( const PRPSEvolution::Constants
& co )
```

This method handles the computation of the antenna permutations

Parameters

in	<i>co</i>	Constant structure with the system constants we need
----	-----------	--

See Also

[PRPSEvolution::Constants](#)

```
6.17.2.3  template<std::size_t N_ANTA, std::size_t N_ANTPERM, typename T > void PRPSEvolution-
::Permutate::permuteAntennas< N_ANTA, N_ANTPERM, T >::dump_matrices_2_file (
)
```

This method will dump all the Antennas to an output file

```
6.17.2.4  template<std::size_t N_ANTA, std::size_t N_ANTPERM, typename T > int PRPSEvolution::Permutate-
::permuteAntennas< N_ANTA, N_ANTPERM, T >::rCoordFile ( )
```

Load the csv-file containing the coordinates and store it into the container.

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

- trunk/libPermutate/[permutate.h](#)

6.18 PRPSEvolution::Solve::PostProcessing Class Reference

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

- trunk/libSolve/[solve.h](#)

6.19 PRPSEvolution::Solve::PreProcessing< N_ANTA, N_Configs, T, T_Measure > Class Template Reference

Public Member Functions

- [PreProcessing](#) (const std::array< [AntennaPermutations](#)< Permutate::MAX_PERMUTATION_AMOUNT, Doub >, N_ANTA > &, const NRmatrix< T > &)

Public Attributes

- std::vector< NRmatrix< T > > [matricesForSolution](#)
- std::vector< NRvector< T > > [vectorsForSolution](#)
- std::vector< std::string > [ConfigurationNames](#)

6.19.1 Constructor & Destructor Documentation

```
6.19.1.1  template<std::size_t N_ANTA, std::size_t N_Configs, typename T , typename T_Measure >
PRPSEvolution::Solve::PreProcessing< N_ANTA, N_Configs, T, T_Measure >::PreProcessing ( const
std::array< AntennaPermutations< Permutate::MAX_PERMUTATION_AMOUNT, Doub >, N_ANTA > &
precalculatedMatrices, const NRmatrix< T > & d_k0s )
```

Construct the object an perform neccessary [PreProcessing](#) steps.

1. Read out the measurements from the given interface (e.g. a file)
2. Normalize everything
3. Select the matrices for further processing
4. Fill the matrices with the information

5. Precalculate the

$$c_{k0}$$

-Vector

6. Store matrices to make them available in the next steps

6.19.2 Member Data Documentation

6.19.2.1 `template<std::size_t N_ANTA, std::size_t N_Configs, typename T, typename T_Measure> std::vector<NRmatrix<T>
> PRPSEvolution::Solve::PreProcessing< N_ANTA, N_Configs, T, T_Measure >::matricesForSolution`

determines how many Configurations will solved for the Wavenumber

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

- trunk/libSolve/[solve.h](#)

6.20 PRPSEvolution::Solve::ProblemDimensions Struct Reference

Static Public Attributes

- static const int **WholeTomatoeApproach** = 7
- static const int **Sphere** = 10
- static const int **Rosenbrock** = 15

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

- trunk/libSolve/[solve.h](#)

6.21 PRPSEvolution::Solve::Process Class Reference

```
#include <solve.h>
```

Public Member Functions

- [Process](#) ()
- **Process** (const [Process](#) &p)
- double **getLastSolutionFitness** ()
- template<typename T >
T [findSolution](#) (const NRmatrix< Doub > &A_selected, const NRvector< Doub > &b_selected, ESStrategy
strategy, int seed)
- int **sq** (int i)
- void [setMinSolutionFitness](#) (double value)
- void **setSeed** (unsigned int value)

6.21.1 Detailed Description

Find solutions for the possible matrices

6.21.2 Constructor & Destructor Documentation

6.21.2.1 PRPSEvolution::Solve::Process::Process () [inline]

a Pointer to the object containing the fitness functions Constructor

6.21.3 Member Function Documentation

6.21.3.1 template<typename T> T PRPSEvolution::Solve::Process::findSolution (const NRmatrix< Doub > & A_selected, const NRvector< Doub > & b_selected, ESStrategy strategy, int seed) [inline]

Set the ES-Strategy

Parameters

in	<i>Strategy</i>	The selected strategy Find a Solution for a given pair of matrices
in	<i>A_selected</i>	The matrix A to use in this solution
in	<i>b_selected</i>	The c_k0' vector for this solution

Returns

The solution

6.21.3.2 void PRPSEvolution::Solve::Process::setMinSolutionFitness (double value) [inline]

Sets the min. solution fitness we want to achieve.

Parameters

in	<i>value</i>	The new value for the solution fitness
----	--------------	--

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

- [trunk/libSolve/solve.h](#)

6.22 PRPSEvolution::Solve::solveresult_t< T_Store, T_Return > Struct Template Reference

```
#include <solveresult.h>
```

Public Attributes

- T_Store [values](#)
- T_Return [fitness](#)
- int [iterations](#)
- int [duration](#)
- bool [converged](#)

6.22.1 Detailed Description

```
template<typename T_Store, typename T_Return>struct PRPSEvolution::Solve::solveresult_t< T_Store, T_Return >
```

Stores the final state of a solution

6.22.2 Member Data Documentation

6.22.2.1 `template<typename T_Store , typename T_Return > bool PRPSEvolution::Solve::solverresult_t< T_Store, T_Return >::converged`

Indicates whether the build in convergence criterium was applied, or not

6.22.2.2 `template<typename T_Store , typename T_Return > int PRPSEvolution::Solve::solverresult_t< T_Store, T_Return >::duration`

The processing time for this solution

6.22.2.3 `template<typename T_Store , typename T_Return > T_Return PRPSEvolution::Solve::solverresult_t< T_Store, T_Return >::fitness`

The fitness value

6.22.2.4 `template<typename T_Store , typename T_Return > int PRPSEvolution::Solve::solverresult_t< T_Store, T_Return >::iterations`

The amount of iterations needed for this result

6.22.2.5 `template<typename T_Store , typename T_Return > T_Store PRPSEvolution::Solve::solverresult_t< T_Store, T_Return >::values`

Whrere the result is stored

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

- [trunk/libSolve/solverresult.h](#)

6.23 PRPSEvolution::System Struct Reference

Collaboration diagram for PRPSEvolution::System:

Public Member Functions

- [System](#) (const [PRPSEvolution::System](#) &s)
- `int rPRPSIniFile ()`

Public Attributes

- [PRPSEvolution::Constants](#) **constants**
- `std::string fn`

6.23.1 Constructor & Destructor Documentation

6.23.1.1 `PRPSEvolution::System::System (const PRPSEvolution::System & s) [inline]`

copy constructor

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

- trunk/libPRPSSystem/prpsevolutionsystem.h

6.24 PRPSEvolution::Solve::Ueber9000< T > Struct Template Reference

```
#include <solve.h>
```

Public Member Functions

- [Ueber9000](#) ()
- **Ueber9000** (const [Ueber9000](#) &me)
- [Ueber9000](#) (const NRmatrix< T > A_selected, const NRvector< T > c_k0_selected)
- double [WholeTomatoeApproach](#) (const ChromosomeT< double > &x)
- double [WholeTomatoeApproach](#) (const NRmatrix< T > &A, const ChromosomeT< double > &x, const NRvector< T > &b)
- double [WavenumberVariation](#) (const ChromosomeT< double > &n)
- double [PositionVariation](#) (const ChromosomeT< double > &pos)
- double [fitnessSphere](#) (const ChromosomeT< double > &c)
- double [fitnessRosenbrock](#) (const ChromosomeT< double > &c)
- double [fitnessAckley](#) (const std::vector< double > &x)

Public Attributes

- double([Ueber9000](#)< double >::* **evaluate**)(const ChromosomeT< double > &)
- int **Dimension**
- NRmatrix< T > **A**
- NRvector< T > **c_k0**

6.24.1 Detailed Description

```
template<typename T>struct PRPSEvolution::Solve::Ueber9000< T >
```

Collect the fitness functions. Make sure they are static so we can function-pointer to them.

6.24.2 Constructor & Destructor Documentation

6.24.2.1 `template<typename T> PRPSEvolution::Solve::Ueber9000< T >::Ueber9000 () [inline]`

Default constructor

6.24.2.2 `template<typename T> PRPSEvolution::Solve::Ueber9000< T >::Ueber9000 (const NRmatrix< T > A_selected, const NRvector< T > c_k0_selected) [inline]`

Construct [Ueber9000](#) to use the WholeTomatoeApproach as fitness function

Parameters

in	<i>A_selected</i>	The matrix A for this Solution
in	<i>c_k0_selected</i>	The vector c_k0 for this Solution

6.24.3 Member Function Documentation

6.24.3.1 `template<typename T> double PRPSEvolution::Solve::Ueber9000< T >::fitnessAckley (const std::vector< double > & x) [inline]`

The infamous Ackley-function

6.24.3.2 `template<typename T> double PRPSEvolution::Solve::Ueber9000< T >::fitnessRosenbrock (const ChromosomeT< double > & c) [inline]`

The Rosenbrock implementation

6.24.3.3 `template<typename T> double PRPSEvolution::Solve::Ueber9000< T >::fitnessSphere (const ChromosomeT< double > & c) [inline]`

This ist the fitness function used in the EA algorithm

6.24.3.4 `template<typename T> double PRPSEvolution::Solve::Ueber9000< T >::PositionVariation (const ChromosomeT< double > & pos) [inline]`

Approach 3 based on the thoughts of by S. Winter

6.24.3.5 `template<typename T> double PRPSEvolution::Solve::Ueber9000< T >::WavenumberVariation (const ChromosomeT< double > & n) [inline]`

Approach 2 based on the thoughts of S. Winter. Here we want to optimize the wavenumbers

6.24.3.6 `template<typename T> double PRPSEvolution::Solve::Ueber9000< T >::WholeTomatoeApproach (const ChromosomeT< double > & x) [inline]`

This method basically wraps around the real WholeTomatoeApproach-function. Maps the function so that it can be used with the evaluate-method

Parameters

in	x	The vector x
----	---	--------------

6.24.3.7 `template<typename T> double PRPSEvolution::Solve::Ueber9000< T >::WholeTomatoeApproach (const NRmatrix< T > & A, const ChromosomeT< double > & x, const NRvector< T > & b) [inline]`

This approach will solve calculate the 10x3 matrix described in the Master-Thesis of C.Gnip Basically solves the linear equation

$$r = \mathbf{Ax} - \mathbf{b}$$

Parameters

in	A	The 10x3 Matrix that ist used in this solution
in	x	The vector containing the variables
in	b	Representing the vector b

Returns

The residuum of the equation system representing the "Fitness" of the given Solution in

See Also

x

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

- trunk/libSolve/[solve.h](#)

Chapter 7

File Documentation

7.1 trunk/include/PRPSError.h File Reference

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

Variables

- const int **PRPSError::FileIO::okay** = 0
- const int **PRPSError::FileIO::generalError** = -1
- const int **PRPSError::FileIO::fnf** = -2
- const int **PRPSError::FileIO::inputmalformed** = -3
- const int **PRPSError::okay** = 0
- const int **PRPSError::general** = -1
- const int **PRPSError::critical** = 10

7.1.1 Detailed Description

Date

2013|Jun|18 This file contains definitions belonging to the PRPSError-namespace. It is split into sub-namespaces for keeping thing nicely small.

7.2 trunk/include/PRPSEvolution.h File Reference

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

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

Variables

- `const int PRPSEvolution::ANTENNA_AMOUNT = 8`
- `const int PRPSEvolution::EXPECTED_LINES_CALIBRATION_FILE = 4`
- `const int PRPSEvolution::EXPECTED_VALUES_CALIBRATION_FILE = ANTENNA_AMOUNT`
- `const int PRPSEvolution::EXPECTED_LINES_COORD_FILE = ANTENNA_AMOUNT`
- `const int PRPSEvolution::EXPECTED_VALUES_COORD_FILE = 3`
- `const int PRPSEvolution::EXPECTED_LINES_SYSTEM_INI_FILE = 2`
- `const int PRPSEvolution::MAT_ROWS = 3`
- `const int PRPSEvolution::MAT_COLS = 10`
- `const int PRPSEvolution::CALIBRATION_POINTS_AVAILABLE = 4`
- `const int PRPSEvolution::EXPECTED_LINES_MEASUREMENT_FILE = ANTENNA_AMOUNT`
- `const int PRPSEvolution::EXPECTED_VALUES_MEASUREMENT_FILE = 2`
- `const int PRPSEvolution::DATA_NV = 65535`
- `const int PRPSEvolution::DEFAULT_MIN_GROUP_SIZE = 4`

7.2.1 Detailed Description

Date

2013|Jun|18 This file collects definitions belonging to the PRPSEvolution-namespace. Especially const. defines.

7.3 trunk/include/PRPSEvolutionFIOExeptions.h File Reference

```
#include <iostream>
```

```
#include <exception>
```

Include dependency graph for PRPSEvolutionFIOExeptions.h:

Classes

- class [PRPSEvolution::Exeptions::FileIO::FileNotFound](#)
- class [PRPSEvolution::Exeptions::FileIO::MalformedInput](#)
- class [PRPSEvolution::Exeptions::FileIO::Output](#)

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

Variables

- [PRPSEvolution::Exeptions::FileIO::FileNotFound](#) [PRPSEvolution::Exeptions::FileIO::FNFEception](#)
- [PRPSEvolution::Exeptions::FileIO::MalformedInput](#) [PRPSEvolution::Exeptions::FileIO::MalformedInput-Exeption](#)
- [PRPSEvolution::Exeptions::FileIO::Output](#) [PRPSEvolution::Exeptions::FileIO::OutputExeption](#)

7.3.1 Detailed Description

Exeptions of file IO

7.4 trunk/include/PRPSEvolutionGeneralExeptions.h File Reference

```
#include <iostream>
#include <exception>
#include <string>
Include dependency graph for PRPSEvolutionGeneralExeptions.h:
```

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

7.4.1 Detailed Description

Contains the exeption used in the [PRPSEvolution](#) - Project

7.5 trunk/include/PRPSEvolutionSolveExeptions.h File Reference

```
#include <iostream>
#include <exception>
Include dependency graph for PRPSEvolutionSolveExeptions.h:
```

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

7.5.1 Detailed Description

Contains the exeption used in the [PRPSEvolution](#) - Project

7.6 trunk/libCalibration/calib.h File Reference

```
#include "nr3/nr3.h"
#include "nr3/svd.h"
#include "../include/coords.h"
#include "../include/PRPSEvolution.h"
#include "../include/PRPSEvolutionCalibrationExceptions.h"
#include "../include/PRPSError.h"
#include "../libPRPSSystem/prpsevolutionssystem.h"
```

Include dependency graph for calib.h: This graph shows which files directly or indirectly include this file:

Classes

- struct [PRPSEvolution::Calibration::performCalibration< N_ANTA, N_CALPOS, T >](#)

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

7.6.1 Detailed Description

Date

2013|Jun|25

7.7 trunk/libNormalizer/normalizer.h File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <iostream>
#include "../include/PRPSEvolutionGeneralExceptions.h"
#include "../include/PRPSEvolutionFIOExceptions.h"
#include <complex>
#include <array>
#include <random>
```

Include dependency graph for normalizer.h: This graph shows which files directly or indirectly include this file:

Classes

- struct [PRPSEvolution::Normalizer< N, T >](#)

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

Enumerations

- enum **NormalizatioMethodes** { **Native**, **B**, **CMPLX**, **RND** }

7.7.1 Detailed Description

Collects normalizations for the input data

7.8 trunk/libPermutate/permutate.h File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <iterator>
#include <iostream>
#include <algorithm>
#include <array>
#include <string>
#include "../include/coords.h"
#include "../include/PRPSEvolution.h"
#include "../include/PRPSEvolutionPermutationExceptions.h"
#include "../include/PRPSEvolutionFIOExceptions.h"
#include "../include/PRPSError.h"
#include "../libPRPSSystem/prpsevolutionssystem.h"
#include "nr3/nr3.h"
#include "nr3/svd.h"
```

Include dependency graph for permutate.h: This graph shows which files directly or indirectly include this file:

Classes

- struct [PRPSEvolution::Permutate::AntennaPermutations< N_MAT, T >](#)
- struct [PRPSEvolution::Permutate::permuteAntennas< N_ANTA, N_ANTPERM, T >](#)

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

Functions

- int **PRPSEvolution::Permutate::Factorial** (int x)
- template<typename Iterator >
bool **PRPSEvolution::Permutate::next_combination** (const Iterator first, Iterator k, const Iterator last)

Variables

- const int **PRPSEvolution::Permutate::MAX_PERMUTATION_AMOUNT** = 35

7.8.1 Detailed Description

Date

2013|Jun|25

7.9 trunk/libSolve/solve.h File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <iterator>
#include <iostream>
#include <algorithm>
#include <array>
#include <chrono>
#include <string>
#include <random>
#include "../include/coords.h"
#include "../include/PRPSEvolution.h"
#include "../include/PRPSEvolutionSolveExceptions.h"
#include "../include/PRPSEvolutionFIOExceptions.h"
#include "../include/PRPSEvolutionGeneralExceptions.h"
#include "../include/PRPSError.h"
#include "../libPermutate/permutate.h"
#include "../libPRPSSystem/prpsevolutionssystem.h"
#include "../libNormalizer/normalizer.h"
#include "nr3/nr3.h"
#include "nr3/svd.h"
#include <EALib/ChromosomeCMA.h>
#include <SharkDefs.h>
#include <EALib/PopulationT.h>
#include <EALib/ObjectiveFunction.h>
#include "solverresult.h"
```

Include dependency graph for solve.h: This graph shows which files directly or indirectly include this file:

Classes

- struct [PRPSEvolution::Solve::ProblemDimensions](#)
- struct [PRPSEvolution::Solve::Ueber9000< T >](#)
- class [PRPSEvolution::Solve::PreProcessing< N_ANTA, N_Configs, T, T_Measure >](#)
- class [PRPSEvolution::Solve::Process](#)
- class [PRPSEvolution::Solve::PostProcessing](#)

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

Enumerations

- enum [SelectBy](#) { [ConditionNumber](#), [Random](#), [AllPossible](#) }

- enum **ESStrategy** { **PRPSEvolution::Solve::OnePlusOne**, **PRPSEvolution::Solve::MuPlusLambda**, **PRPSEvolution::Solve::MuCommaLambda** }

Variables

- const int **PRPSEvolution::Solve::nConfigsForProcessing** = 1

7.9.1 Detailed Description

Date

2013|Jun|25

7.10 trunk/libSolve/solverresult.h File Reference

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

Classes

- struct [PRPSEvolution::Solve::solverresult_t](#)< [T_Store](#), [T_Return](#) >

Namespaces

- [PRPSEvolution](#)

Constant Groups

- [PRPSEvolution](#)

7.10.1 Detailed Description

Date

2013|Jul|5

7.11 trunk/test/AntennaConfiguration.cpp File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include <array>
#include <iostream>
#include <exception>
#include <fstream>
#include <sstream>
#include <string>
#include <chrono>
#include <future>
#include <thread>
#include "AntennaConfiguration.h"
#include "../libPermutate/permutate.h"
#include "../libPRPSSystem/prpsevolutionssystem.h"
#include "../libCalibration/calib.h"
#include "../libSolve/solve.h"
#include "../libSolve/solveresult.h"
#include "../include/PRPSEvolutionGeneralExceptions.h"
#include <EALib/ChromosomeCMA.h>
```

Include dependency graph for AntennaConfiguration.cpp:

Functions

- int **main** (int argc, char *argv[])

Variables

- const int **SOLUTION_AMOUNT** = 100

7.11.1 Detailed Description

This File contains the main() of the AntennaApp-Project

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