qpp

0.1

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Chapter 1

Namespace Index

1.1 Namespace List

Here is a list of all namespaces with brief descriptions:

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Chapter 2

Class Index

2.1 Class List

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

qpp::stat::DiscreteDistribution 29
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Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

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Chapter 4

Namespace Documentation

4.1 qpp Namespace Reference

Namespaces

- ct
- gt
- internal
- stat
- types

Functions

- template<typename MatrixType >
  double shannon (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  double renyi (const double alpha, const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  double renyi_inf (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat funm (const types::EigenExpression< MatrixType > &A, types::cplx(*f)(const types::cplx &))
- template<typename MatrixType >
  types::cmat absm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat expm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat logm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat sqrtm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat sinm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat cosm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat powm (const types::EigenExpression< MatrixType > &A, const types::cplx z)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > powm_int (const types::EigenExpression< MatrixType > &A, size_t n)
- template<typename MatrixType >
  void disp (const types::EigenExpression< MatrixType > &A, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)

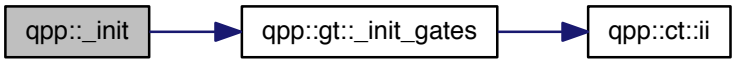
- template<>
  void disp (const types::EigenExpression< types::cmat > &A, unsigned int precision, double chop, std::ostream &os)
- template<typename MatrixType >
  void displn (const types::EigenExpression< MatrixType > &A, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)
- void disp (const types::cplx c, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)
- void displn (const types::cplx c, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)
- template<typename MatrixType >
  void save (const types::EigenExpression< MatrixType > &A, const std::string &fname)
- template<typename MatrixType >
  MatrixType load (const std::string &fname)
- template<typename MatrixType >
  MatrixType loadMATLAB (const std::string &mat_file, const std::string &var_name)
- template<>
  types::dmat loadMATLAB (const std::string &mat_file, const std::string &var_name)
- template<>
  types::cmat loadMATLAB (const std::string &mat_file, const std::string &var_name)
- template<typename MatrixType >
  void saveMATLAB (const types::EigenExpression< MatrixType > &A, const std::string &mat_file, const std::string &var_name, const std::string &mode)
- template<>
  void saveMATLAB (const types::EigenExpression< types::cmat > &A, const std::string &mat_file, const std::string &var_name, const std::string &mode)
- int _init ()
- types::dmat rand (size_t rows, size_t cols)
- types::dmat rand (size_t rows)
- types::dmat randn (size_t rows, size_t cols)
- types::dmat randn (size_t rows)
- types::cmat rand_unitary (size_t size)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > transpose (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > conjugate (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > adjoint (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  MatrixType::Scalar trace (const types::EigenExpression< MatrixType > &A)
- template<typename FunctionInputType , typename FunctionOutputType , typename MatrixInputType >
  Eigen::Matrix
  < FunctionOutputType,
  Eigen::Dynamic, Eigen::Dynamic > fun (const types::EigenExpression< MatrixInputType > &A, FunctionOutputType(*f)(const FunctionInputType &))
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > abs (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  double norm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat evals (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat evects (const types::EigenExpression< MatrixType > &A)

- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > kron (const types::EigenExpression< MatrixType > &A, const types::EigenExpression< MatrixType > &B)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > kron_list (const std::vector< MatrixType > &list)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > kron_pow (const types::TemplatedEigenMatrix< MatrixType > &A, size_t n)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > reshape (const types::EigenExpression< MatrixType > &A, size_t rows, size_t cols)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > syspermute (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > perm, const std::vector< size_t > &dims)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > ptrace2 (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > dims)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > ptrace (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > &subsys, const std::vector< size_t > &dims)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > ptranspose (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > &subsys, const std::vector< size_t > &dims)

4.1.1 Function Documentation

4.1.1.1 int qpp::_init ( )

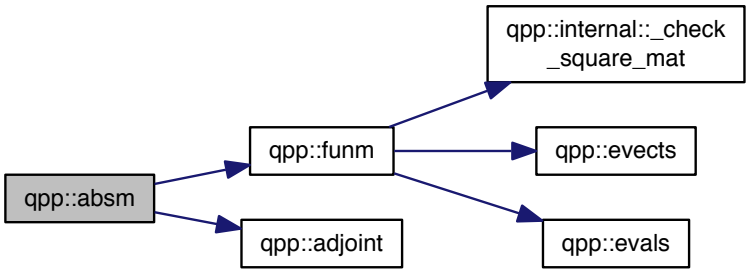
Here is the call graph for this function:



4.1.1.2 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::abs (const types::EigenExpression< MatrixType > & *A*)

4.1.1.3 template<typename MatrixType > types::cmat qpp::absm (const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:

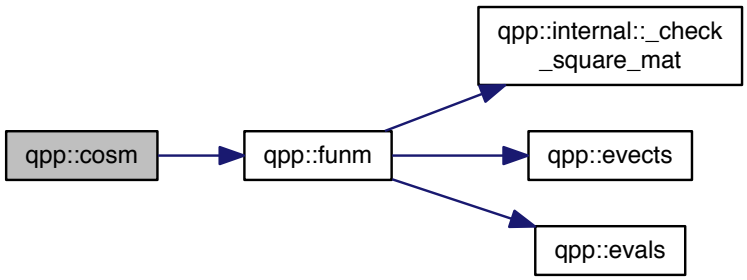


4.1.1.4 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::adjoint (const types::EigenExpression< MatrixType > & *A*)

4.1.1.5 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::conjugate (const types::EigenExpression< MatrixType > & *A*)

4.1.1.6 template<typename MatrixType > types::cmat qpp::cosm (const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:



4.1.1.7 template<typename MatrixType > void qpp::disp (const types::EigenExpression< MatrixType > & *A*, unsigned int *precision* = `4`, double *chop* = `ct::chop`, std::ostream & *os* = `std::cout`)

4.1.1.8 template<> void qpp::disp (const types::EigenExpression< types::cmat > & *A*, unsigned int *precision*, double *chop*, std::ostream & *os*) [inline]

Here is the call graph for this function:

4.1.1.9 void qpp::disp (const types::cplx *c*, unsigned int *precision* = 4, double *chop* = ct::chop, std::ostream & *os* = std::cout) [inline]

Here is the call graph for this function:

4.1.1.10 template<typename MatrixType > void qpp::displn (const types::EigenExpression< MatrixType > & *A*, unsigned int *precision* = 4, double *chop* = ct::chop, std::ostream & *os* = std::cout)

Here is the call graph for this function:

4.1.1.11 void qpp::displn (const types::cplx *c*, unsigned int *precision* = `4`, double *chop* = `ct::chop`, std::ostream & *os* = `std::cout`) `[inline]`

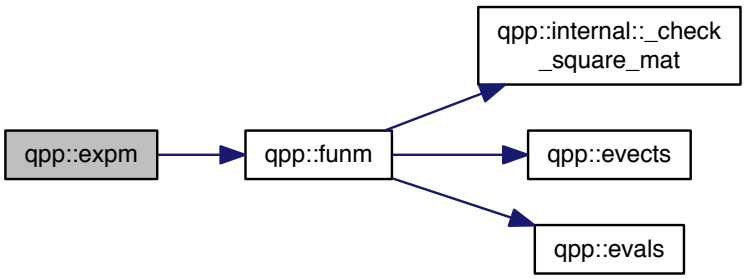
Here is the call graph for this function:

4.1.1.12 template<typename MatrixType > types::cmat qpp::evals (const types::EigenExpression< MatrixType > & *A*)

4.1.1.13 template<typename MatrixType > types::cmat qpp::evects (const types::EigenExpression< MatrixType > & *A*)

4.1.1.14 template<typename MatrixType > types::cmat qpp::expm (const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:



4.1.1.15 template<typename FunctionInputType , typename FunctionOutputType , typename MatrixInputType > Eigen::Matrix<FunctionOutputType, Eigen::Dynamic, Eigen::Dynamic> qpp::fun (const types::EigenExpression< MatrixInputType > & *A*, FunctionOutputType(∗)(const FunctionInputType &) *f*)

4.1.1.16 template<typename MatrixType > types::cmat qpp::funm (const types::EigenExpression< MatrixType > & *A*, types::cplx(∗)(const types::cplx &) *f*)

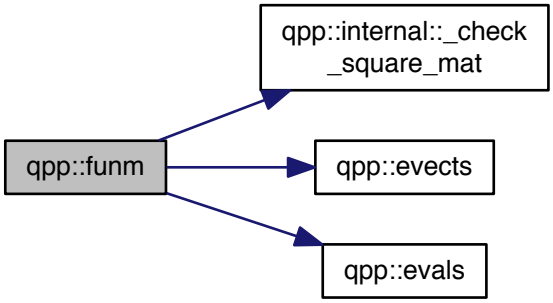
Parameters

A	input matrix
f	function pointer

Returns

types::cmat

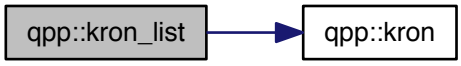
Here is the call graph for this function:



4.1.1.17 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::kron (const types::EigenExpression< MatrixType > & *A*, const types::EigenExpression< MatrixType > & *B*)

4.1.1.18 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::kron_list (const std::vector< MatrixType > & *list*)

Here is the call graph for this function:



4.1.1.19 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::kron_pow (const types::TemplatedEigenMatrix< MatrixType > & *A*, size_t *n*)

Here is the call graph for this function:

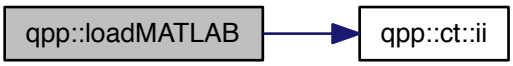
4.1.1.20 template<typename MatrixType > MatrixType qpp::load (const std::string & *fname*)

4.1.1.21 template<typename MatrixType > MatrixType qpp::loadMATLAB (const std::string & *mat_file,* const std::string & *var_name*)

4.1.1.22 template<> types::dmat qpp::loadMATLAB (const std::string & *mat_file,* const std::string & *var_name*) [inline]

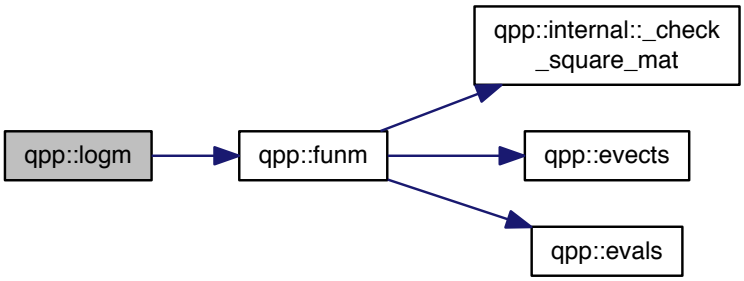
4.1.1.23 template<> types::cmat qpp::loadMATLAB (const std::string & *mat_file,* const std::string & *var_name*) [inline]

Here is the call graph for this function:



4.1.1.24 template<typename MatrixType > types::cmat qpp::logm (const types::EigenExpression< MatrixType > & *A*)

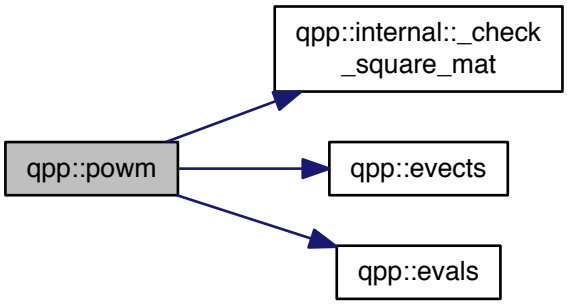
Here is the call graph for this function:



4.1.1.25 template<typename MatrixType > double qpp::norm (const types::EigenExpression< MatrixType > & *A*)

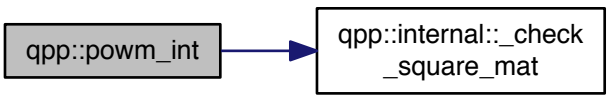
4.1.1.26 template<typename MatrixType > types::cmat qpp::powm (const types::EigenExpression< MatrixType > & *A*, const types::cplx *z*)

Here is the call graph for this function:



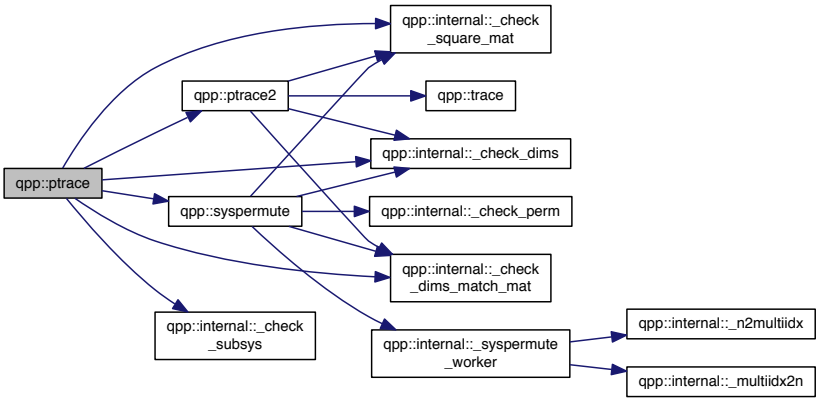
4.1.1.27 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::powm_int (const types::EigenExpression< MatrixType > & *A*, size_t *n*)

Here is the call graph for this function:



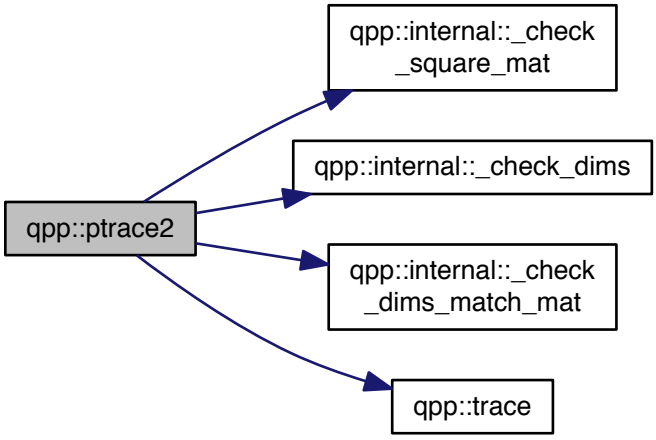
4.1.1.28 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::ptrace (const types::EigenExpression< MatrixType > & *A*, const std::vector< size_t > & *subsys*, const std::vector< size_t > & *dims*)

Here is the call graph for this function:



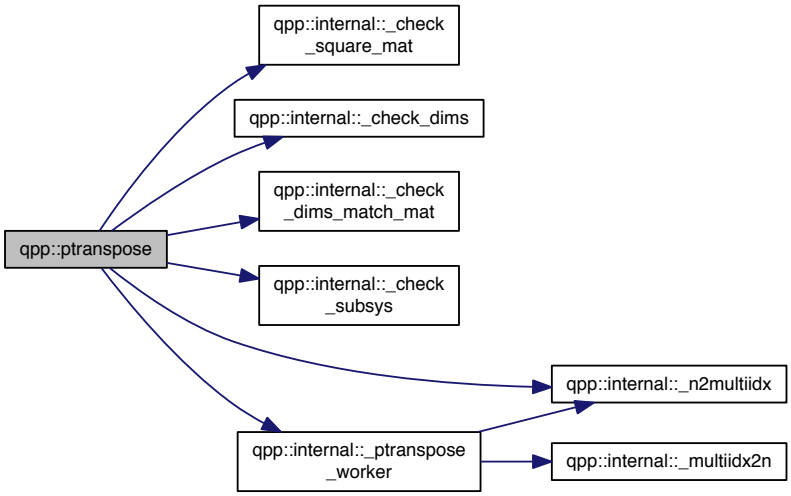
4.1.1.29 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::ptrace2 (const types::EigenExpression< MatrixType > & *A*, const std::vector< size_t > *dims*)

Here is the call graph for this function:



4.1.1.30 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::ptranspose (const types::EigenExpression< MatrixType > & *A*, const std::vector< size_t > & *subsys*, const std::vector< size_t > & *dims*)

Here is the call graph for this function:



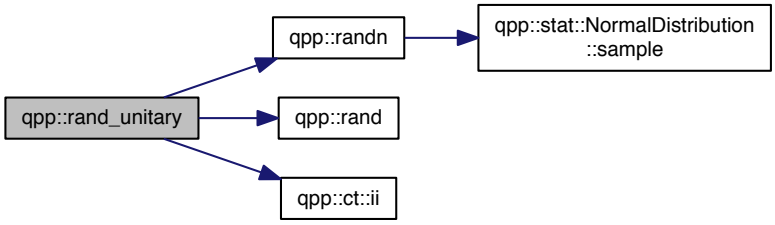
4.1.1.31 types::dmat qpp::rand (size_t *rows*, size_t *cols*) [inline]

4.1.1.32 types::dmat qpp::rand (size_t *rows*) [inline]

Here is the call graph for this function:

4.1.1.33 types::cmat qpp::rand_unitary (size_t *size*) [inline]

Here is the call graph for this function:

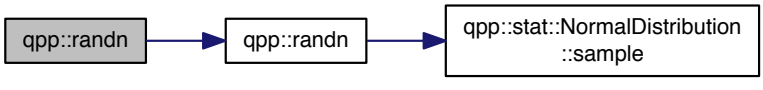


4.1.1.34 types::dmat qpp::randn (size_t *rows*, size_t *cols*) [inline]

Here is the call graph for this function:

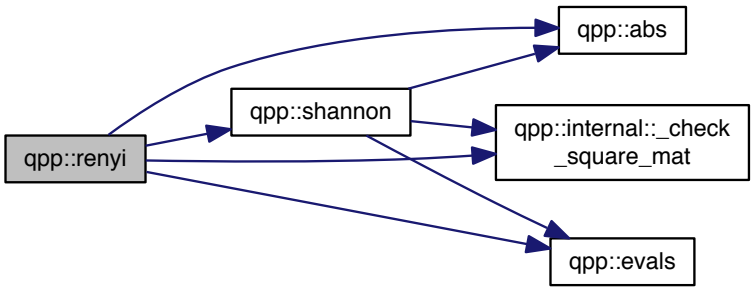
4.1.1.35 types::dmat qpp::randn (size_t *rows*) [inline]

Here is the call graph for this function:



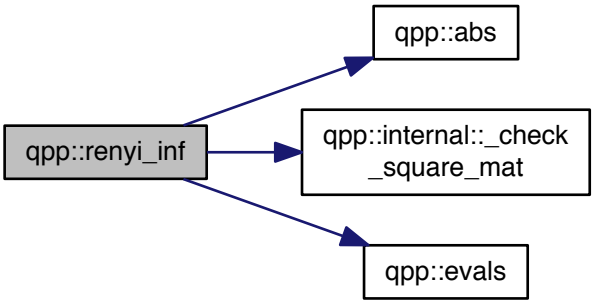
4.1.1.36 template<typename MatrixType > double qpp::renyi (const double *alpha*, const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:



4.1.1.37 template<typename MatrixType > double qpp::renyi_inf (const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:



4.1.1.38 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::reshape (const types::EigenExpression< MatrixType > & *A*, size_t *rows*, size_t *cols*)

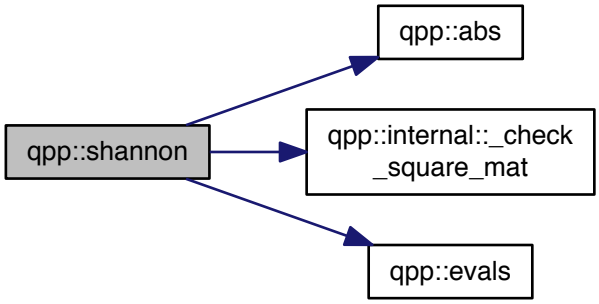
4.1.1.39 template<typename MatrixType > void qpp::save (const types::EigenExpression< MatrixType > & *A*, const std::string & *fname*)

4.1.1.40 template<typename MatrixType > void qpp::saveMATLAB (const types::EigenExpression< MatrixType > & *A*, const std::string & *mat_file*, const std::string & *var_name*, const std::string & *mode*)

4.1.1.41 template<> void qpp::saveMATLAB (const types::EigenExpression< types::cmat > & *A*, const std::string & *mat_file*, const std::string & *var_name*, const std::string & *mode*) [inline]

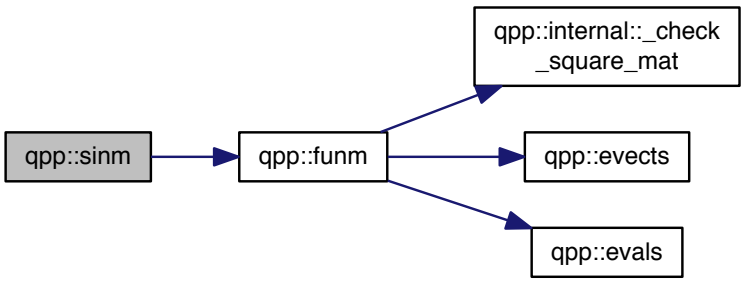
4.1.1.42 template<typename MatrixType > double qpp::shannon (const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:



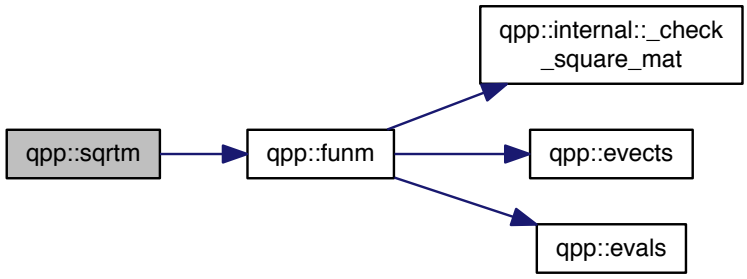
4.1.1.43 template<typename MatrixType > types::cmat qpp::sinm (const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:



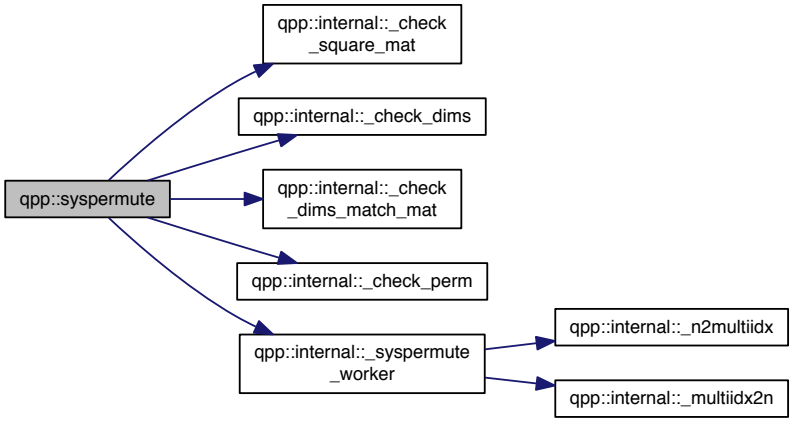
4.1.1.44 template<typename MatrixType > types::cmat qpp::sqrtm (const types::EigenExpression< MatrixType > & *A*)

Here is the call graph for this function:



4.1.1.45 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::syspermute (const types::EigenExpression< MatrixType > & *A*, const std::vector< size_t > *perm*, const std::vector< size_t > & *dims*)

Here is the call graph for this function:



4.1.1.46 template<typename MatrixType > MatrixType::Scalar qpp::trace (const types::EigenExpression< MatrixType > & *A*)

4.1.1.47 template<typename MatrixType > types::TemplatedEigenMatrix<MatrixType> qpp::transpose (const types::EigenExpression< MatrixType > & *A*)

4.2 qpp::ct Namespace Reference

Functions

- const types::cplx ii (0, 1)
- types::cplx omega (size_t D)

Variables

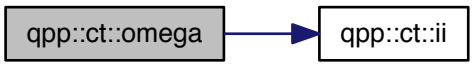
- const double chop = 1e-10
- const double pi = 3.14159265358979323846264338327950288 4
- const double ee = 2.71828182845904523536028747135266249 7

4.2.1 Function Documentation

4.2.1.1 const types::cplx qpp::ct::ii (0 , 1)

4.2.1.2 types::cplx qpp::ct::omega (size_t *D*) [inline]

Here is the call graph for this function:



4.2.2 Variable Documentation

4.2.2.1 const double qpp::ct::chop = 1e-10

4.2.2.2 const double qpp::ct::ee = 2.71828182845904523536028747135266249 7

4.2.2.3 const double qpp::ct::pi = 3.14159265358979323846264338327950288 4

4.3 qpp::gt Namespace Reference

Functions

- void _init_gates ()
- types::cmat Rtheta (double theta)
- types::cmat CU (const types::cmat &U)
- types::cmat Zd (size_t D)
- types::cmat Fd (size_t D)
- types::cmat Xd (size_t D)
- types::cmat CUd (const types::cmat &U)
- types::cmat TOF (8, 8)

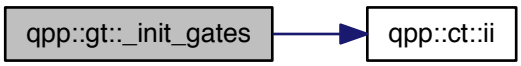
Variables

- types::cmat H
- types::cmat Id2
- types::cmat X
- types::cmat Y
- types::cmat Z
- types::cmat S
- types::cmat T
- types::cmat CNOT
- types::cmat CP
- types::cmat TOF

4.3.1 Function Documentation

4.3.1.1 void qpp::gt::_init_gates ( ) [inline]

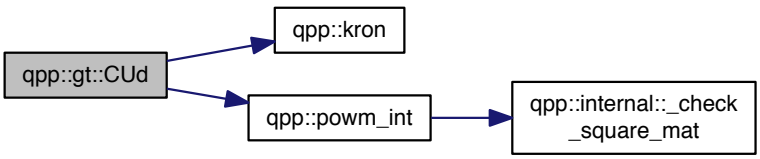
Here is the call graph for this function:



4.3.1.2 types::cmat qpp::gt::CU (const types::cmat & *U*) [inline]

4.3.1.3 types::cmat qpp::gt::CUd (const types::cmat & *U*) [inline]

Here is the call graph for this function:

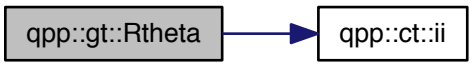


4.3.1.4 types::cmat qpp::gt::Fd (size_t *D*) [inline]

Here is the call graph for this function:

4.3.1.5 types::cmat qpp::gt::Rtheta (double *theta*) [inline]

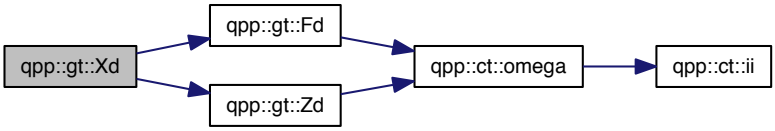
Here is the call graph for this function:



4.3.1.6 types::cmat qpp::gt::TOF (8 , 8)

4.3.1.7 types::cmat qpp::gt::Xd (size_t *D*) [inline]

Here is the call graph for this function:



4.3.1.8 types::cmat qpp::gt::Zd (size_t *D*) [inline]

Here is the call graph for this function:

4.3.2 Variable Documentation

4.3.2.1 types::cmat qpp::gt::CNOT

4.3.2.2 types::cmat qpp::gt::CP

4.3.2.3 types::cmat qpp::gt::H

4.3.2.4 types::cmat qpp::gt::Id2

4.3.2.5 types::cmat qpp::gt::S

4.3.2.6 types::cmat qpp::gt::T

4.3.2.7 types::cmat qpp::gt::TOF

4.3.2.8 types::cmat qpp::gt::X

4.3.2.9 types::cmat qpp::gt::Y

4.3.2.10 types::cmat qpp::gt::Z

4.4 qpp::internal Namespace Reference

Functions

- template<typename T >
  void _disp_container (const T &x)
- void _n2multiidx (size_t n, size_t numdims, const size_t *dims, size_t *result)
- size_t _multiidx2n (const size_t *midx, size_t numdims, const size_t *dims)
- template<typename MatrixType >
  bool _check_square_mat (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  bool _check_dims_match_mat (const std::vector< size_t > &dims, const types::EigenExpression< MatrixType > &A)
- bool _check_dims (const std::vector< size_t > &dims)
- bool _check_eq_dims (const std::vector< size_t > &dims, size_t dim)
- bool _check_subsys (const std::vector< size_t > &subsys, const std::vector< size_t > &dims)
- bool _check_perm (const std::vector< size_t > &perm, const std::vector< size_t > &dims)

- template<typename MatrixType >
  void _syspermute_worker (size_t numdims, const size_t *cdims, const size_t *cperm, size_t i, size_t j, size_t &iperm, size_t &jperm, const types::EigenExpression< MatrixType > &A, types::EigenExpression< MatrixType > &result)
- template<typename MatrixType >
  void _ptranspose_worker (const size_t *midxrow, size_t numdims, size_t numsubsys, const size_t *cdims, const size_t *csubsys, size_t i, size_t j, size_t &iperm, size_t &jperm, const types::EigenExpression< MatrixType > &A, types::EigenExpression< MatrixType > &result)

4.4.1 Function Documentation

4.4.1.1 bool qpp::internal::_check_dims (const std::vector< size_t > & *dims*) [inline]

4.4.1.2 template<typename MatrixType > bool qpp::internal::_check_dims_match_mat (const std::vector< size_t > & *dims*, const types::EigenExpression< MatrixType > & *A*)

4.4.1.3 bool qpp::internal::_check_eq_dims (const std::vector< size_t > & *dims*, size_t *dim*) [inline]

4.4.1.4 bool qpp::internal::_check_perm (const std::vector< size_t > & *perm*, const std::vector< size_t > & *dims*) [inline]

4.4.1.5 template<typename MatrixType > bool qpp::internal::_check_square_mat (const types::EigenExpression< MatrixType > & *A*)

4.4.1.6 bool qpp::internal::_check_subsys (const std::vector< size_t > & *subsys*, const std::vector< size_t > & *dims*) [inline]

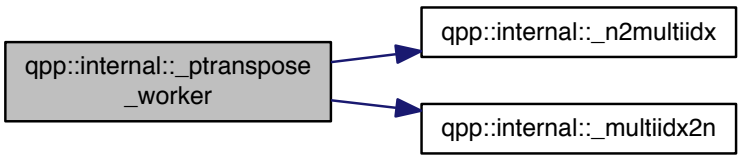
4.4.1.7 template<typename T > void qpp::internal::_disp_container (const T & *x*)

4.4.1.8 size_t qpp::internal::_multiidx2n (const size_t * *midx*, size_t *numdims*, const size_t * *dims*) [inline]

4.4.1.9 void qpp::internal::_n2multiidx (size_t *n*, size_t *numdims*, const size_t * *dims*, size_t * *result*) [inline]

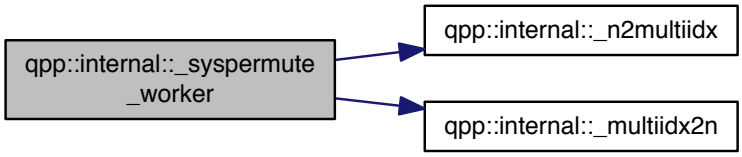
4.4.1.10 template<typename MatrixType > void qpp::internal::_ptranspose_worker (const size_t * *midxrow*, size_t *numdims*, size_t *numsubsys*, const size_t * *cdims*, const size_t * *csubsys*, size_t *i*, size_t *j*, size_t & *iperm*, size_t & *jperm*, const types::EigenExpression< MatrixType > & *A*, types::EigenExpression< MatrixType > & *result*) [inline]

Here is the call graph for this function:



4.4.1.11 template<typename MatrixType > void qpp::internal::_syspermute_worker (size_t *numdims*, const size_t * *cdims*, const size_t * *cperm*, size_t *i*, size_t *j*, size_t & *iperm*, size_t & *jperm*, const types::EigenExpression< MatrixType > & *A*, types::EigenExpression< MatrixType > & *result*) [inline]

Here is the call graph for this function:



4.5 qpp::stat Namespace Reference

Classes

- class NormalDistribution
- class UniformRealDistribution
- class DiscreteDistribution
- class DiscreteDistributionFromComplex

Variables

- std::random_device _rd
- std::mt19937 _rng

4.5.1 Variable Documentation

4.5.1.1 std::random_device qpp::stat::_rd

4.5.1.2 std::mt19937 qpp::stat::_rng

4.6 qpp::types Namespace Reference

Typedefs

- typedef std::complex< double > cplx
- typedef Eigen::MatrixXcd cmat
- typedef Eigen::MatrixXd dmat
- typedef Eigen::MatrixXf fmat
- typedef Eigen::MatrixXi imat
- template<typename Derived >
  using EigenExpression = Eigen::MatrixBase< Derived >
- template<typename MatrixType >
  using TemplatedEigenMatrix = Eigen::Matrix< typename MatrixType::Scalar, Eigen::Dynamic, Eigen::Dynamic >

4.6.1 Typedef Documentation

4.6.1.1 typedef Eigen::MatrixXcd qpp::types::cmat

4.6.1.2 typedef std::complex<double> qpp::types::cplx

4.6.1.3 typedef Eigen::MatrixXd qpp::types::dmat

4.6.1.4 template<typename Derived > using qpp::types::EigenExpression = typedef Eigen::MatrixBase<Derived>

4.6.1.5 typedef Eigen::MatrixXf qpp::types::fmat

4.6.1.6 typedef Eigen::MatrixXi qpp::types::imat

4.6.1.7 template<typename MatrixType > using qpp::types::TemplatedEigenMatrix = typedef Eigen::Matrix<typename MatrixType::Scalar, Eigen::Dynamic, Eigen::Dynamic>

Chapter 5

Class Documentation

5.1 qpp::stat::DiscreteDistribution Class Reference

`#include <stat.h>`

Public Member Functions

- DiscreteDistribution (std::initializer_list< double > weights)
- template<typename InputIterator >
  DiscreteDistribution (InputIterator first, InputIterator last)
- DiscreteDistribution (std::vector< double > weights)
- size_t sample ()

Public Attributes

- std::discrete_distribution
  < size_t > _d

5.1.1 Constructor & Destructor Documentation

5.1.1.1 qpp::stat::DiscreteDistribution::DiscreteDistribution (std::initializer_list< double > *weights*) [inline]

5.1.1.2 template<typename InputIterator > qpp::stat::DiscreteDistribution::DiscreteDistribution (InputIterator *first*, InputIterator *last*) [inline]

5.1.1.3 qpp::stat::DiscreteDistribution::DiscreteDistribution (std::vector< double > *weights*) [inline]

5.1.2 Member Function Documentation

5.1.2.1 size_t qpp::stat::DiscreteDistribution::sample ( ) [inline]

5.1.3 Member Data Documentation

5.1.3.1 std::discrete_distribution<size_t> qpp::stat::DiscreteDistribution::_d

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

- include/stat.h

5.2 qpp::stat::DiscreteDistributionFromComplex Class Reference

`#include <stat.h>`

Public Member Functions

- DiscreteDistributionFromComplex (std::initializer_list< types::cplx > amplitudes)
- template<typename InputIterator >
  DiscreteDistributionFromComplex (InputIterator first, InputIterator last)
- DiscreteDistributionFromComplex (std::vector< double > weights)
- size_t sample ()

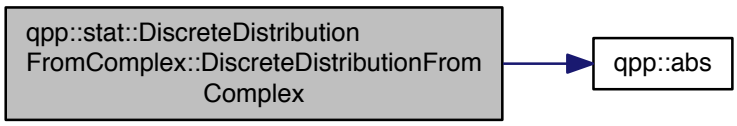
Public Attributes

- std::discrete_distribution
  < size_t > _d

5.2.1 Constructor & Destructor Documentation

5.2.1.1 qpp::stat::DiscreteDistributionFromComplex::DiscreteDistributionFromComplex (std::initializer_list< types::cplx > *amplitudes*) [inline]

Here is the call graph for this function:



5.2.1.2 template<typename InputIterator > qpp::stat::DiscreteDistributionFromComplex::DiscreteDistributionFromComplex (InputIterator *first,* InputIterator *last*) [inline]

5.2.1.3 qpp::stat::DiscreteDistributionFromComplex::DiscreteDistributionFromComplex (std::vector< double > *weights*) [inline]

5.2.2 Member Function Documentation

5.2.2.1 size_t qpp::stat::DiscreteDistributionFromComplex::sample ( ) [inline]

5.2.3 Member Data Documentation

5.2.3.1 std::discrete_distribution<size_t> qpp::stat::DiscreteDistributionFromComplex::_d

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

- include/stat.h

5.3 qpp::stat::NormalDistribution Class Reference

`#include <stat.h>`

Public Member Functions

- NormalDistribution (double mean=0, double sigma=1)
- double sample ()

Public Attributes

- std::normal_distribution _d

5.3.1 Constructor & Destructor Documentation

5.3.1.1 qpp::stat::NormalDistribution::NormalDistribution (double *mean* = `0`, double *sigma* = `1`) [inline]

5.3.2 Member Function Documentation

5.3.2.1 double qpp::stat::NormalDistribution::sample ( ) [inline]

5.3.3 Member Data Documentation

5.3.3.1 std::normal_distribution qpp::stat::NormalDistribution::_d

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

- include/stat.h

5.4 qpp::stat::UniformRealDistribution Class Reference

`#include <stat.h>`

Public Member Functions

- UniformRealDistribution (double a=0, double b=1)
- double sample ()

Public Attributes

- std::uniform_real_distribution _d

5.4.1 Constructor & Destructor Documentation

5.4.1.1 qpp::stat::UniformRealDistribution::UniformRealDistribution (double *a* = `0`, double *b* = `1`) [inline]

5.4.2 Member Function Documentation

5.4.2.1 double qpp::stat::UniformRealDistribution::sample ( ) [inline]

5.4.3 Member Data Documentation

5.4.3.1 std::uniform_real_distribution qpp::stat::UniformRealDistribution::_d

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

- include/stat.h

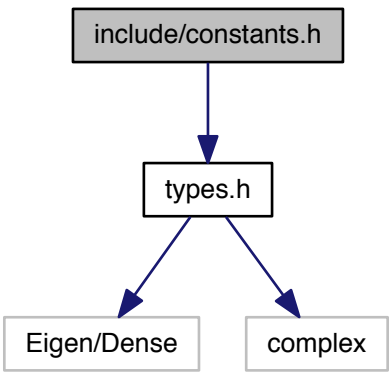
Chapter 6

File Documentation

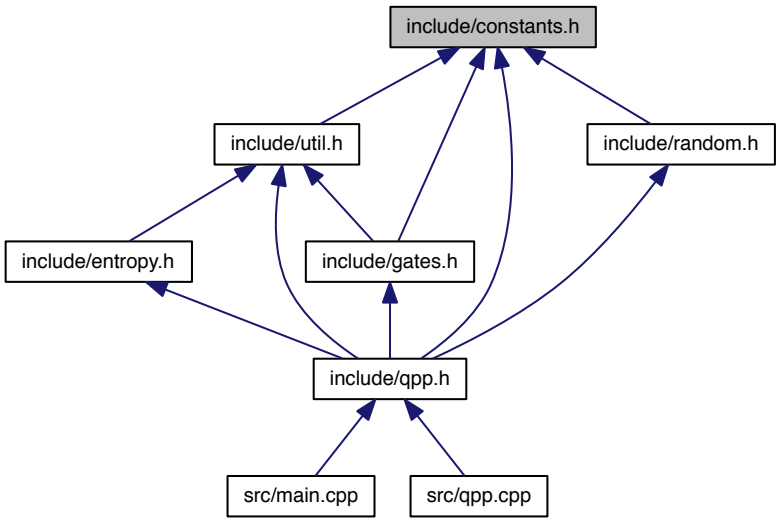
6.1 include/constants.h File Reference

```
#include "types.h"
```

Include dependency graph for constants.h:



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



Namespaces

- qpp
- qpp::ct

Functions

- const types::cplx qpp::ct::ii (0, 1)
- types::cplx qpp::ct::omega (size_t D)

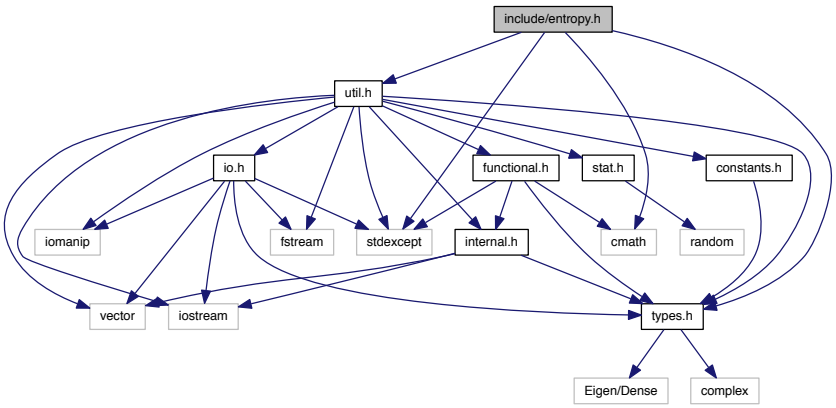
Variables

- const double qpp::ct::chop = 1e-10
- const double qpp::ct::pi = 3.14159265358979323846264338327950288 4
- const double qpp::ct::ee = 2.71828182845904523536028747135266249 7

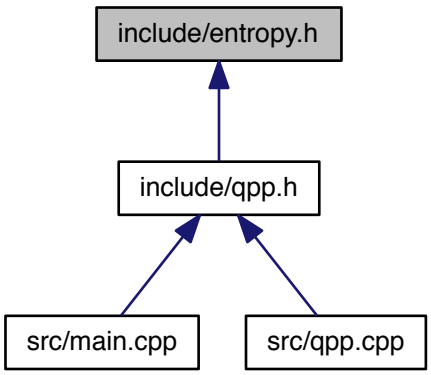
6.2 include/entropy.h File Reference

```
#include <cmath>
#include <stdexcept>
#include "types.h"
#include "util.h"
```

Include dependency graph for entropy.h:



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



Namespaces

- qpp

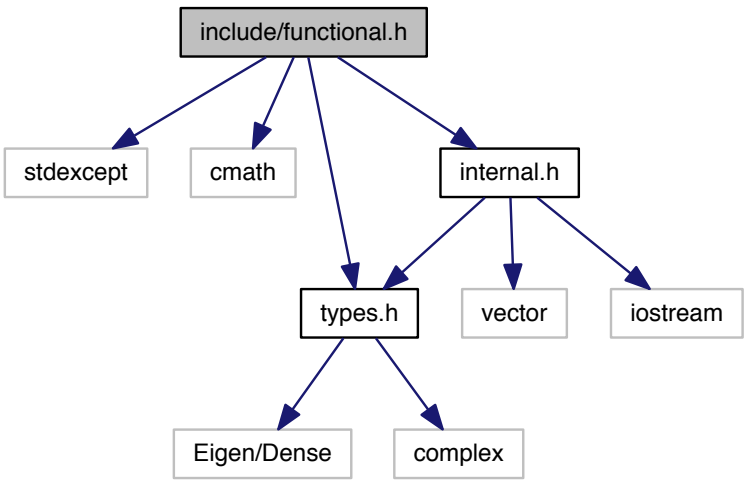
Functions

- template<typename MatrixType >
  double qpp::shannon (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  double qpp::renyi (const double alpha, const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  double qpp::renyi_inf (const types::EigenExpression< MatrixType > &A)

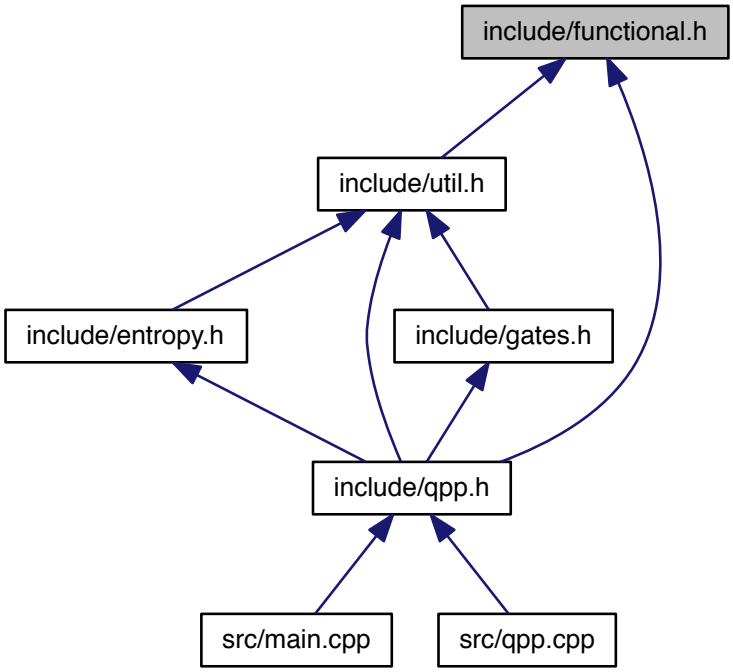
6.3 include/functional.h File Reference

```
#include <stdexcept>
#include <cmath>
#include "types.h"
#include "internal.h"
```

Include dependency graph for functional.h:



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



Namespaces

- qpp

Functions

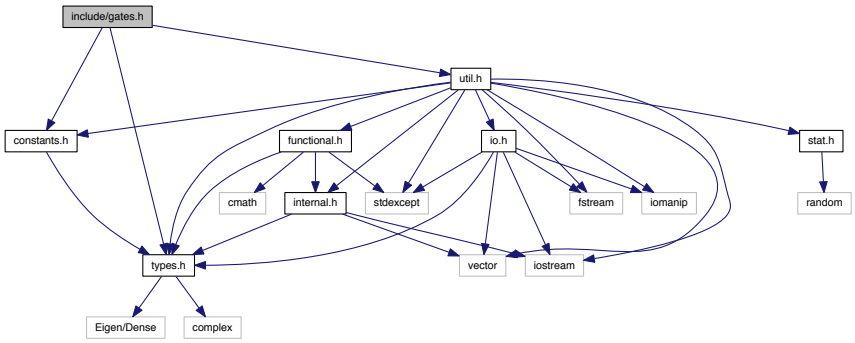
- template<typename MatrixType >
  types::cmat qpp::funm (const types::EigenExpression< MatrixType > &A, types::cplx(*f)(const types::cplx &))
- template<typename MatrixType >
  types::cmat qpp::absm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::expm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::logm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::sqrtm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::sinm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::cosm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::powm (const types::EigenExpression< MatrixType > &A, const types::cplx z)

- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::powm_int (const types::EigenExpression< MatrixType > &A, size_t n)

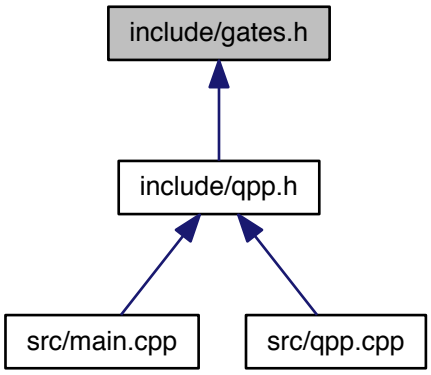
6.4 include/gates.h File Reference

```
#include "types.h"
#include "constants.h"
#include "util.h"
```

Include dependency graph for gates.h:



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



Namespaces

- qpp
- qpp::gt

Functions

- void qpp::gt::_init_gates ()
- types::cmat qpp::gt::Rtheta (double theta)
- types::cmat qpp::gt::CU (const types::cmat &U)
- types::cmat qpp::gt::Zd (size_t D)
- types::cmat qpp::gt::Fd (size_t D)
- types::cmat qpp::gt::Xd (size_t D)
- types::cmat qpp::gt::CUd (const types::cmat &U)

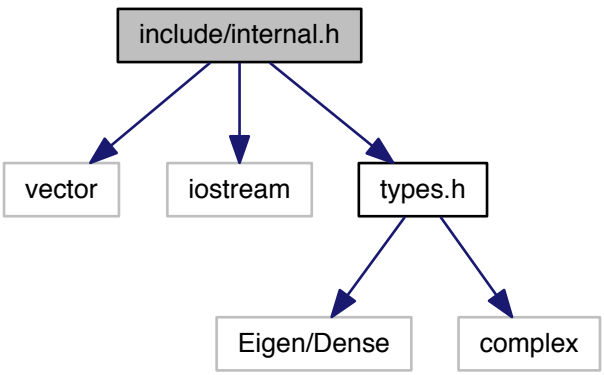
Variables

- types::cmat qpp::gt::H
- types::cmat qpp::gt::Id2
- types::cmat qpp::gt::X
- types::cmat qpp::gt::Y
- types::cmat qpp::gt::Z
- types::cmat qpp::gt::S
- types::cmat qpp::gt::T
- types::cmat qpp::gt::CNOT
- types::cmat qpp::gt::CP
- types::cmat qpp::gt::TOF

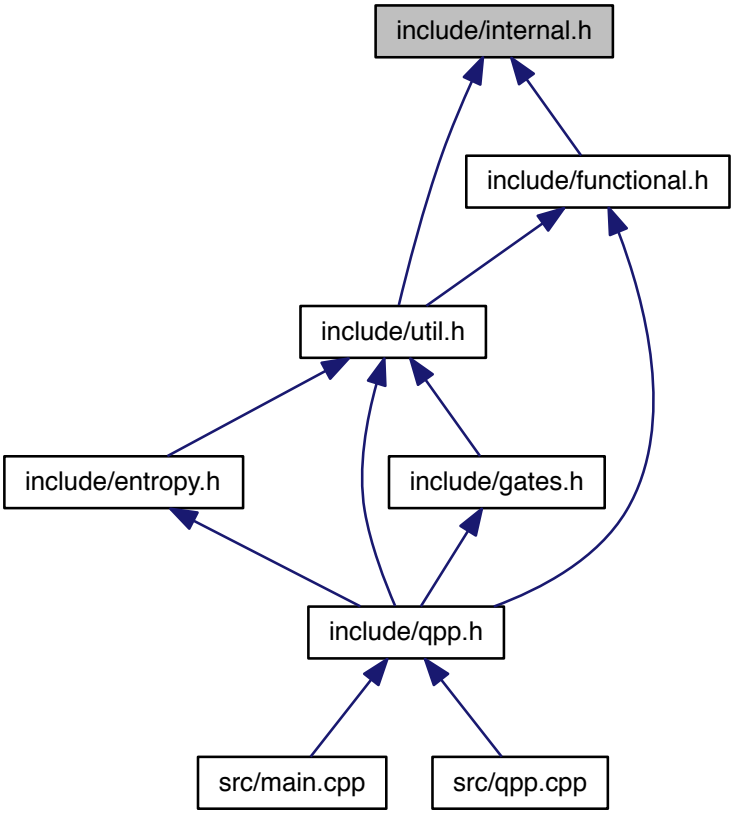
6.5 include/internal.h File Reference

```
#include <vector>
#include <iostream>
#include "types.h"
```

Include dependency graph for internal.h:



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



Namespaces

- qpp
- qpp::internal

Functions

- template<typename T >
  void qpp::internal::_disp_container (const T &x)
- void qpp::internal::_n2multiidx (size_t n, size_t numdims, const size_t *dims, size_t *result)
- size_t qpp::internal::_multiidx2n (const size_t *midx, size_t numdims, const size_t *dims)
- template<typename MatrixType >
  bool qpp::internal::_check_square_mat (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  bool qpp::internal::_check_dims_match_mat (const std::vector< size_t > &dims, const types::EigenExpression< MatrixType > &A)
- bool qpp::internal::_check_dims (const std::vector< size_t > &dims)
- bool qpp::internal::_check_eq_dims (const std::vector< size_t > &dims, size_t dim)
- bool qpp::internal::_check_subsys (const std::vector< size_t > &subsys, const std::vector< size_t > &dims)
- bool qpp::internal::_check_perm (const std::vector< size_t > &perm, const std::vector< size_t > &dims)

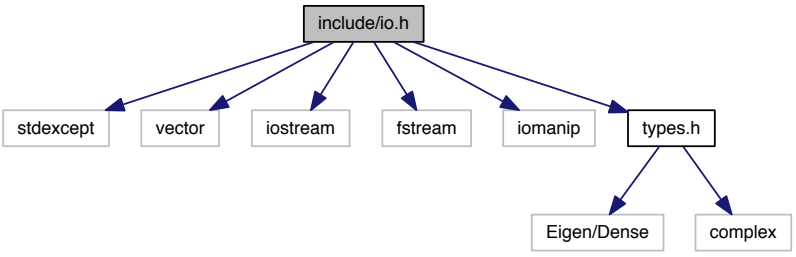
- template<typename MatrixType >
  void qpp::internal::_syspermute_worker (size_t numdims, const size_t *cdims, const size_t *cperm, size_t i, size_t j, size_t &iperm, size_t &jperm, const types::EigenExpression< MatrixType > &A, types::EigenExpression< MatrixType > &result)

- template<typename MatrixType >
  void qpp::internal::_ptranspose_worker (const size_t *midxrow, size_t numdims, size_t numsubsys, const size_t *cdims, const size_t *csubsys, size_t i, size_t j, size_t &iperm, size_t &jperm, const types::EigenExpression< MatrixType > &A, types::EigenExpression< MatrixType > &result)

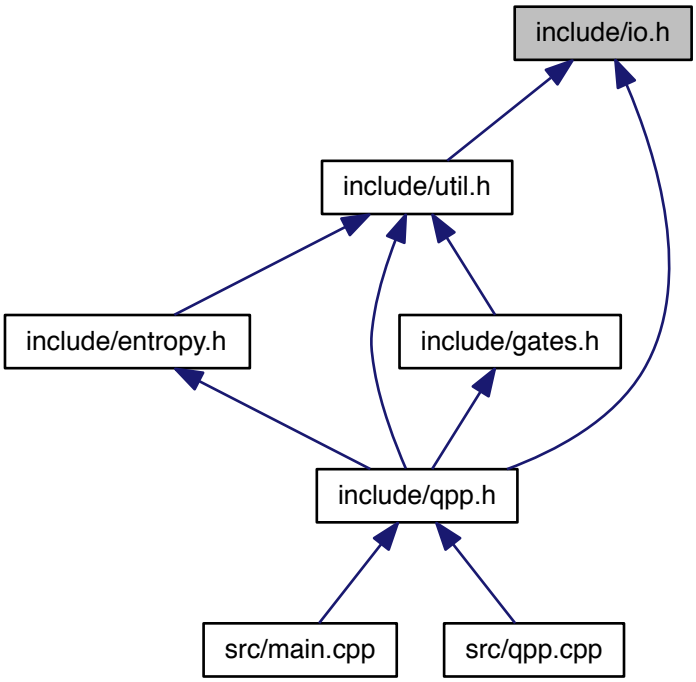
6.6 include/io.h File Reference

```
#include <stdexcept>
#include <vector>
#include <iostream>
#include <fstream>
#include <iomanip>
#include "types.h"
```

Include dependency graph for io.h:



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



Namespaces

- qpp

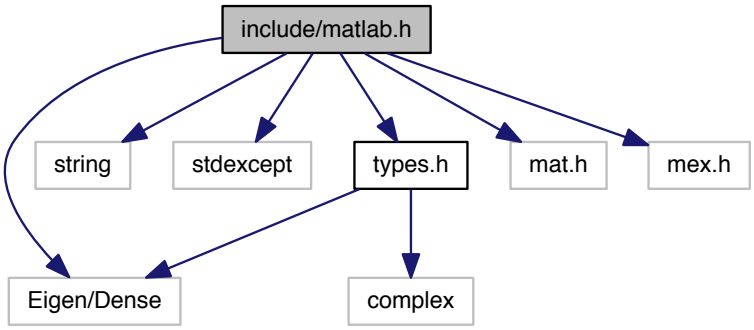
Functions

- template<typename MatrixType >
  void qpp::disp (const types::EigenExpression< MatrixType > &A, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)
- template<>
  void qpp::disp (const types::EigenExpression< types::cmat > &A, unsigned int precision, double chop, std::ostream &os)
- template<typename MatrixType >
  void qpp::displn (const types::EigenExpression< MatrixType > &A, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)
- void qpp::disp (const types::cplx c, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)
- void qpp::displn (const types::cplx c, unsigned int precision=4, double chop=ct::chop, std::ostream &os=std::cout)
- template<typename MatrixType >
  void qpp::save (const types::EigenExpression< MatrixType > &A, const std::string &fname)
- template<typename MatrixType >
  MatrixType qpp::load (const std::string &fname)

6.7 include/matlab.h File Reference

```
#include <Eigen/Dense>
#include <string>
#include <stdexcept>
#include "types.h"
#include "mat.h"
#include "mex.h"
```

Include dependency graph for matlab.h:



Namespaces

- qpp

Functions

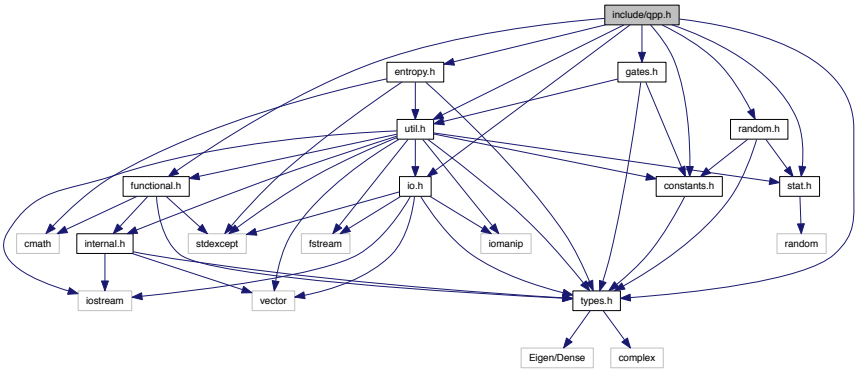
- template<typename MatrixType >
  MatrixType qpp::loadMATLAB (const std::string &mat_file, const std::string &var_name)
- template<>
  types::dmat qpp::loadMATLAB (const std::string &mat_file, const std::string &var_name)
- template<>
  types::cmat qpp::loadMATLAB (const std::string &mat_file, const std::string &var_name)
- template<typename MatrixType >
  void qpp::saveMATLAB (const types::EigenExpression< MatrixType > &A, const std::string &mat_file, const std::string &var_name, const std::string &mode)
- template<>
  void qpp::saveMATLAB (const types::EigenExpression< types::cmat > &A, const std::string &mat_file, const std::string &var_name, const std::string &mode)

6.8 include/qpp.h File Reference

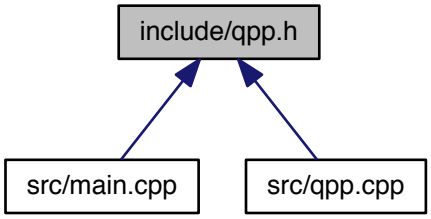
```
#include "types.h"
```

```
#include "util.h"
#include "constants.h"
#include "gates.h"
#include "stat.h"
#include "functional.h"
#include "random.h"
#include "entropy.h"
#include "io.h"
```

Include dependency graph for qpp.h:



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



Namespaces

- qpp

Functions

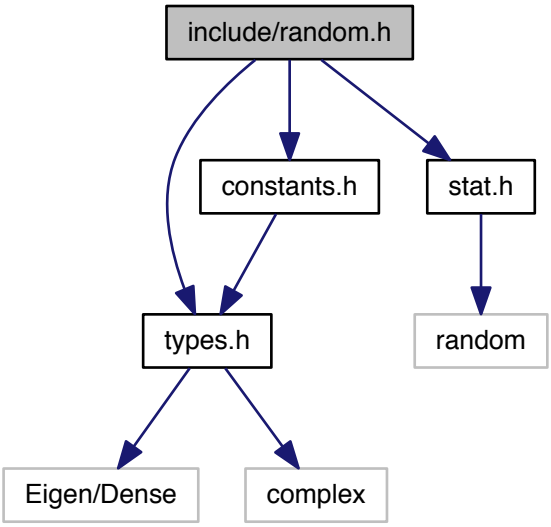
- int qpp::_init ()

6.9 include/random.h File Reference

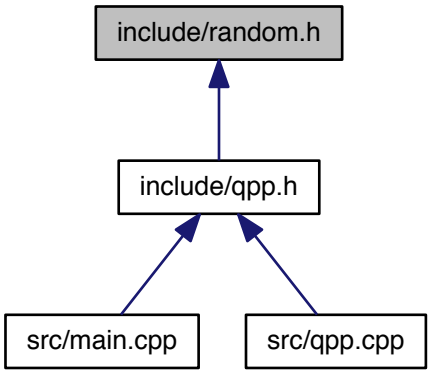
```
#include "types.h"
```

```
#include "stat.h"
#include "constants.h"
```

Include dependency graph for random.h:



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



Namespaces

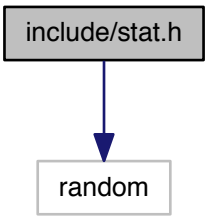
- qpp

Functions

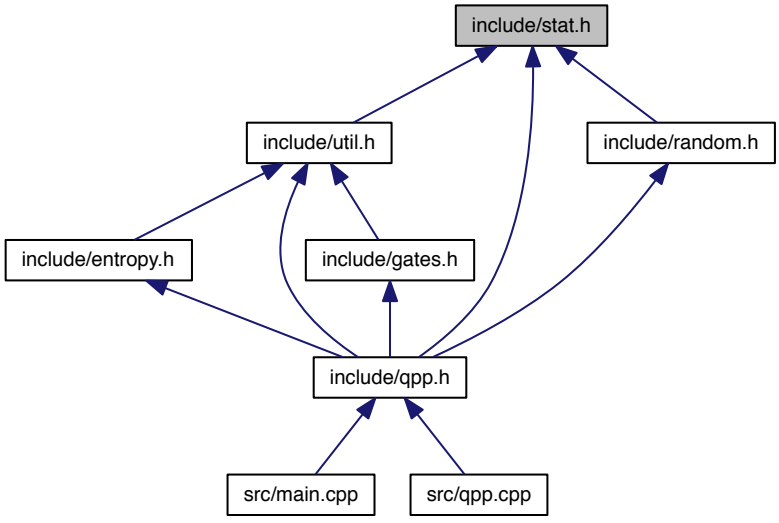
- types::dmat qpp::rand (size_t rows, size_t cols)
- types::dmat qpp::rand (size_t rows)
- types::dmat qpp::randn (size_t rows, size_t cols)
- types::dmat qpp::randn (size_t rows)
- types::cmat qpp::rand_unitary (size_t size)

6.10 include/stat.h File Reference

`#include <random>`
Include dependency graph for stat.h:



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



Classes

- class qpp::stat::NormalDistribution
- class qpp::stat::UniformRealDistribution
- class qpp::stat::DiscreteDistribution
- class qpp::stat::DiscreteDistributionFromComplex

Namespaces

- qpp
- qpp::stat

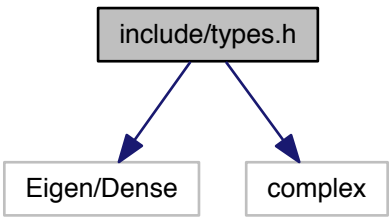
Variables

- std::random_device qpp::stat::_rd
- std::mt19937 qpp::stat::_rng

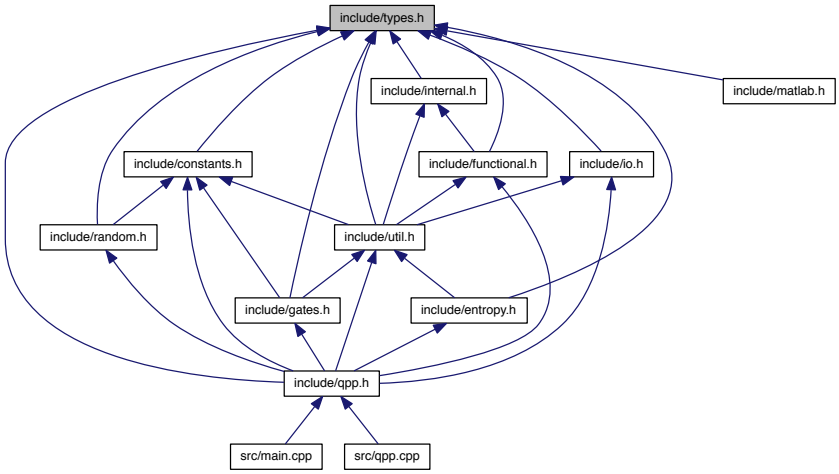
6.11 include/types.h File Reference

```
#include <Eigen/Dense>
#include <complex>
```

Include dependency graph for types.h:



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



Namespaces

- qpp
- qpp::types

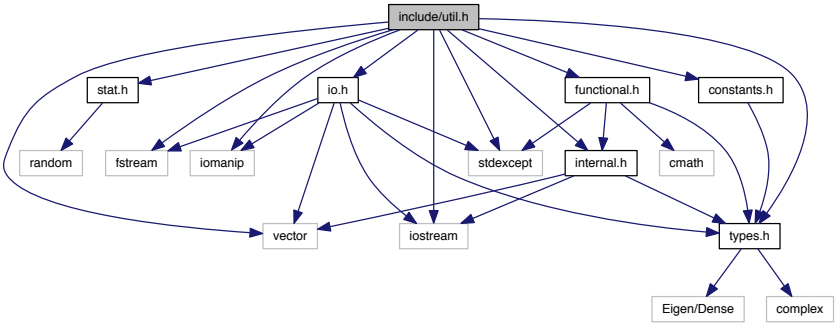
Typedefs

- typedef std::complex< double > qpp::types::cplx
- typedef Eigen::MatrixXcd qpp::types::cmat
- typedef Eigen::MatrixXd qpp::types::dmat
- typedef Eigen::MatrixXf qpp::types::fmat
- typedef Eigen::MatrixXi qpp::types::imat
- template<typename Derived >
  using qpp::types::EigenExpression = Eigen::MatrixBase< Derived >
- template<typename MatrixType >
  using qpp::types::TemplatedEigenMatrix = Eigen::Matrix< typename MatrixType::Scalar, Eigen::Dynamic, Eigen::Dynamic >

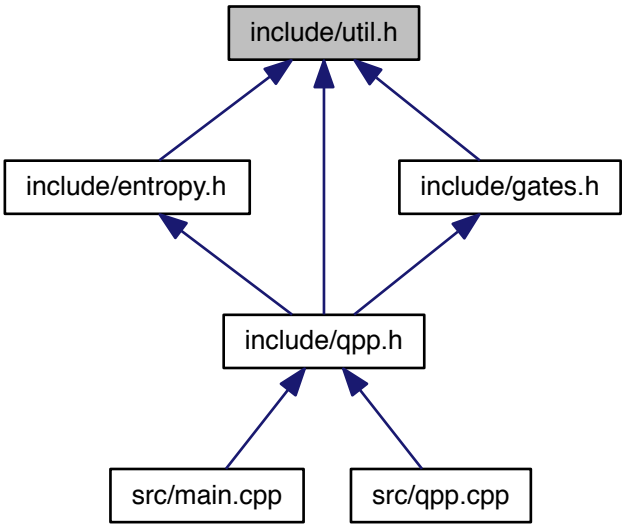
6.12 include/util.h File Reference

```
#include <stdexcept>
#include <vector>
#include <iostream>
#include <fstream>
#include <iomanip>
#include "types.h"
#include "constants.h"
#include "internal.h"
#include "stat.h"
#include "io.h"
#include "functional.h"
```

Include dependency graph for util.h:



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



Namespaces

- qpp

Functions

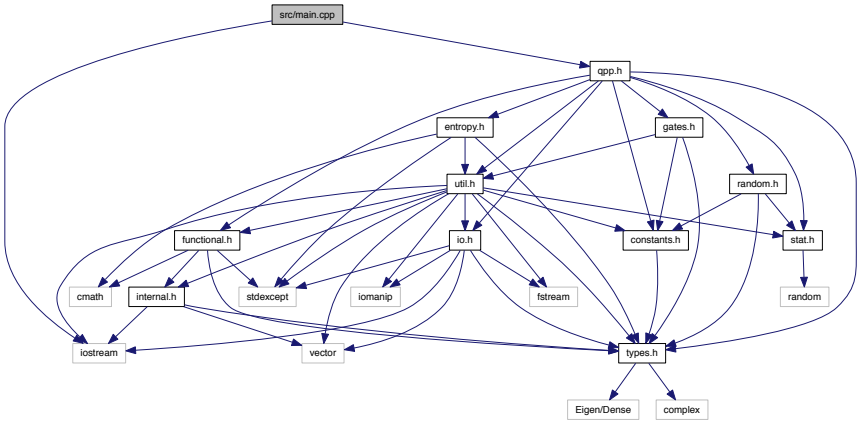
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::transpose (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::conjugate (const types::EigenExpression< MatrixType > &A)

- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::adjoint (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  MatrixType::Scalar qpp::trace (const types::EigenExpression< MatrixType > &A)
- template<typename FunctionInputType , typename FunctionOutputType , typename MatrixInputType >
  Eigen::Matrix
  < FunctionOutputType,
  Eigen::Dynamic, Eigen::Dynamic > qpp::fun (const types::EigenExpression< MatrixInputType > &A, FunctionOutputType(*f)(const FunctionInputType &))
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::abs (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  double qpp::norm (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::evals (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::cmat qpp::evects (const types::EigenExpression< MatrixType > &A)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::kron (const types::EigenExpression< MatrixType > &A, const types::EigenExpression< MatrixType > &B)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::kron_list (const std::vector< MatrixType > &list)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::kron_pow (const types::TemplatedEigenMatrix< MatrixType > &A, size_t n)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::reshape (const types::EigenExpression< MatrixType > &A, size_t rows, size_t cols)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::syspermute (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > perm, const std::vector< size_t > &dims)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::ptrace2 (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > dims)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::ptrace (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > &subsys, const std::vector< size_t > &dims)
- template<typename MatrixType >
  types::TemplatedEigenMatrix
  < MatrixType > qpp::ptranspose (const types::EigenExpression< MatrixType > &A, const std::vector< size_t > &subsys, const std::vector< size_t > &dims)

6.13 src/main.cpp File Reference

```
#include <iostream>
#include "qpp.h"
```

Include dependency graph for main.cpp:



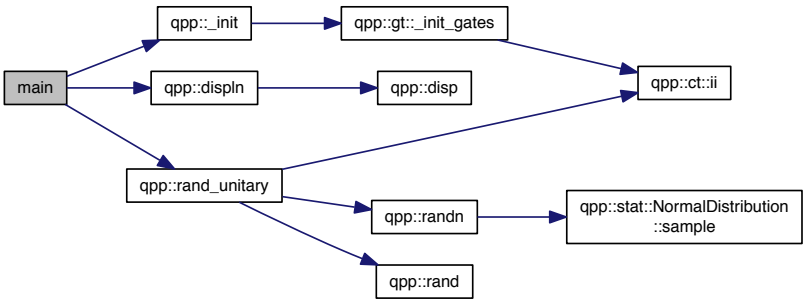
Functions

- int main ()

6.13.1 Function Documentation

6.13.1.1 int main ( )

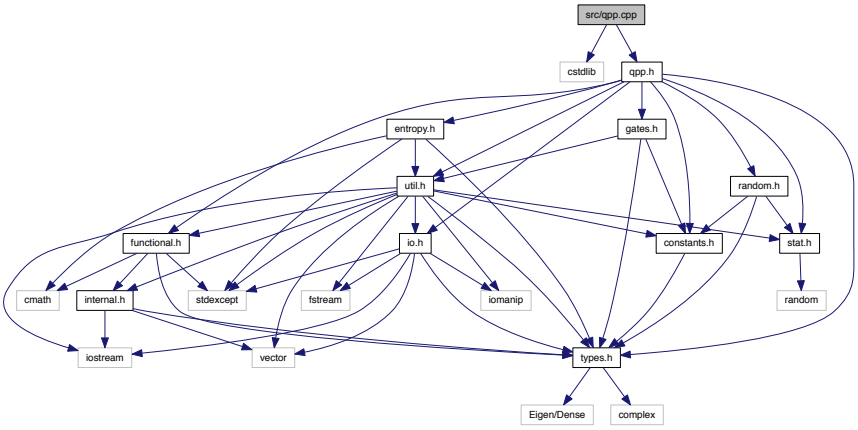
Here is the call graph for this function:



6.14 src/qpp.cpp File Reference

```
#include <cstdlib>
#include "qpp.h"
```

Include dependency graph for qpp.cpp:



Namespaces

- qpp
- qpp::gt

Functions

- types::cmat qpp::gt::TOF (8, 8)
- int qpp::_init ()