Contents

Chapter 1

Basic Utilities

1.1 config – setting features

All constants in the module can be set in user's config file. See the User Settings section for more detailed description.

1.1.1 Default Settings

1.1.1.1 Dependencies

Some third party / platform dependent modules are possibly used, and they are configurable.

HAVE_MPMATH `mpmath` is a package providing multiprecision math. See its project page. This package is used in **ecpp** module.

HAVE_SQLITE3 `sqlite3` is the default database module for `Python` , but it need to be enabled at the build time.

HAVE_NET Some functions connect to the Net. When your machine is not connected to the network, if you set this false, processing may become rarely high-speed.

1.1.1.2 Plug-ins

PLUGIN_MATH `Python` standard float/complex types and math/cmath modules only provide fixed precision (double precision), but sometimes multi-precision floating point is needed.

1.1.1.3 Assumptions

Some conjectures are useful for assuring the validity of a faster algorithm.

All assumptions are default to `False`, but you can set them `True` if you believe them.

GRH Generalized Riemann Hypothesis. For example, primality test is $O((\log n)^2)$ if GRH is true while $O((\log n)^6)$ or something without it.

1.1.1.4 Files

DATADIR The directory where NZMATH (static) data files are stored. The default will be `os.path.join(sys.prefix, 'share', 'nzmath')` or `os.path.join(sys.prefix, 'Data', 'nzmath')` on Windows.

1.1.2 Automatic Configuration

The items above can be set automatically by testing the environment.

1.1.2.1 Checks

Here are check functions.

The constants accompanying the check functions which enable the check if it is `True`, can be overridden in user settings.

Both check functions and constants are not exposed.

check_mpmath() Check whether `mpmath` is available or not.
constant: `CHECK_MPMATH`

check_sqlite3() Check if `sqlite3` is importable or not. `pysqlite2` may be a substitution.
constant: `CHECK_SQLITE3`

check_net() Check the net connection by HTTP call.
constant: `CHECK_NET`

check_plugin_math() Check which math plug-in is available.
constant: `CHECK_PLUGIN_MATH`

default_datadir() Return default value for `DATADIR`.

This function selects the value from various candidates. If this function is called with `DATADIR` set, the value of (previously-defined) `DATADIR` is the first candidate to be returned. Other possibilities are, `sys.prefix + 'Data/nzmath'` on Windows, or `sys.prefix + 'share/nzmath'` on other platforms.

Be careful that all the above paths do not exist, the function returns `None`.
constant: `CHECK_DATADIR`

1.1.3 User Settings

The module tries to load the user's config file named *nzmathconf.py*. The search path is the following:

1. The directory which is specified by an environment variable `NZMATHCONFDIR`.
2. If the platform is Windows, then
   (a) If an environment variable `APPDATA` is set, `APPDATA/nzmath`.
   (b) If, alternatively, an environment variable `USERPROFILE` is set, `USERPROFILE/Application Data/nzmath`.
3. On other platforms, if an environment variable `HOME` is set, `HOME/.nzmath.d`.

nzmathconf.py is a `Python` script. Users can set the constants like `HAVE_MPMATH`, which will override the default settings. These constants, except assumption ones, are automatically set, unless constants accompanying the check functions are false (see the Automatic Configuration section above).