Package: rngWELL (via r-universe)

September 8, 2024

Type Package

Title Toolbox for WELL Random Number Generators

Version 0.10-9

Author C code by F. Panneton [aut], P. L'Ecuyer [aut], M. Matsumoto [aut] and R port by Christophe Dutang [cre, aut], Petr Savicky [aut] <savicky@cs.cas.cz>

Maintainer Christophe Dutang <dutangc@gmail.com>

Description It is a dedicated package to WELL pseudo random generators, which were introduced in Panneton et al. (2006), ``Improved Long-Period Generators Based on Linear Recurrences Modulo 2'', see <doi:10.1145/1132973.1132974>. But this package is not intended to be used directly, you are strongly __encouraged__ to use the 'randtoolbox' package, which depends on this package.

Depends R (>= 3.0.0)

License BSD_3_clause + file LICENSE

NeedsCompilation yes

Date/Publication 2023-01-16 23:20:02 UTC

Repository https://dutangc.r-universe.dev

RemoteUrl https://github.com/cran/rngWELL

RemoteRef HEAD

RemoteSha 8bc7ff2002f29dfa8dab2b0f6491d8b43c0430c6

Contents

| `pseudo.rngWELL` | *Toolbox for pseudo and quasi random number generation* |

Description

General linear congruential generators such as Park Miller sequence, generalized feedback shift register such as SF-Mersenne Twister algorithm and WELL generator; and a quasi random generator (pseudo random generators) and the Torus algorithm (quasi random generation).

Usage

```
WELL2test(n, dim = 1, order = 512, temper = FALSE, version = "a")
setSeed4WELL(seed)

doinitMT2002(seed, n, state)
doputRngWELL(order, version, state)
dogetRngWELL(order, version, state)
```

Arguments

n	number of observations. If length(n) > 1, the length is taken to be the required number.
dim	dimension of observations (must be <=100 000, default 1).
seed	a single value, interpreted as a positive integer for the seed. e.g. append your day, your month and your year of birth.
order	a positive integer for the order of the characteristic polynomial. see details
temper	a logical if you want to do a tempering stage. see details
version	a character either "a","b" or "c". see details
state	the state as output of putRngWELL, getRngWELL.

Details

The currently available generator are given below.

WELL generator: The WELL (which stands for Well Equidistributed Long-period Linear) is in a sentence a generator with better equidistribution than Mersenne Twister algorithm but this gain of quality has to be paid by a slight higher cost of time. See Panneton et al. (2006) for details.

The order argument of WELL generator is the order of the characteristic polynomial, which is denoted by k in Paneton F., L'Ecuyer P. and Matsumoto M. (2006). Possible values for order are 512, 521, 607, 1024 where no tempering are needed (thus possible). Order can also be 800, 19937, 21071, 23209, 44497 where a tempering stage is possible through the temper argument. Furthermore a possible 'b' version of WELL RNGs are possible for the following order 521, 607, 1024, 800, 19937, 23209 with the version argument.

All the C code for WELL generator used in this package is the code of P. L'Ecuyer (cf. http://www.iro.umontreal.ca/~lecuyer/), except some C code, we add, to *interface* with R.

See the pdf vignette for details.

Value

`WELL2test` generates random variables in [0,1[. It returns a $nxdim$ matrix, when `dim>1` otherwise a vector of length n.

`setSeed4WELL` set the seed of the `rngWELL` package (i.e. for the `WELL2test` functions).

Author(s)

Christophe Dutang and Petr Savicky

References

Paneton F., L'Ecuyer P. and Matsumoto M. (2006), *Improved Long-Period Generators Based on Linear Recurrences Modulo 2*, ACM Transactions on Mathematical Software. (preprint available online)

See Also

`.Random.seed` for what is done in R about random number generation.

Examples

```
# (1) WELL generator
#

# 'basic' calls
# WELL512
WELL2test(10, order = 512)
# WELL1024
WELL2test(10, order = 1024)
# WELL19937
WELL2test(10, order = 19937)
# WELL44497
WELL2test(10, order = 44497)
# WELL19937 with tempering
WELL2test(10, order = 19937, temper = TRUE)
# WELL44497 with tempering
WELL2test(10, order = 44497, temper = TRUE)

# tempering vs no tempering
setSeed4WELL(08082008)
WELL2test(10, order =19937)
setSeed4WELL(08082008)
WELL2test(10, order =19937, temper=TRUE)


# (2) other tests
#
doinitMT2002(1, 10, 10)
```

Index