Package ‘rngwell19937’

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Title Random number generator WELL19937a with 53 or 32 bit output
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Description Long period linear random number generator WELL19937a by
F. Panneton, P. L’Ecuyer and M. Matsumoto. The initialization
algorithm allows to seed the generator with a numeric vector of an arbitrary length and uses MRG32k5a by
P. L’Ecuyer to achieve good quality of the initialization. The
output function may be set to provide numbers from the interval
(0,1) with 53 (the default) or 32 random bits. WELL19937a is of
similar type as Mersenne Twister and has the same period.
WELL19937a is slightly slower than Mersenne Twister, but has
better equidistribution and “bit-mixing” properties and faster
recovery from states with prevailing zeros than Mersenne
Twister. All WELL generators with orders 512, 1024, 19937 and
44497 can be found in randtoolbox package.

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set.initialization

Description

After loading the package, the default random number generator in R is replaced by the long period linear generator WELL19937a by F. Panneton, P. L’Ecuyer and M. Matsumoto with a transformation to produce numbers in \((0, 1)\) with 53 (the default) or 32 random bits. In particular, the functions \texttt{set.seed()}, \texttt{runif()} and the object \texttt{.Random.seed} refer to WELL19937a.

A call of \texttt{detach("package: rngwell19937", unload=TRUE)} restores the default random number generator in R.

References


See Also

\texttt{set.resolution, set.initialization, set.vector.seed, well19937.validate}

set.initialization

Description

The function allows to specify the initialization algorithm used by the function \texttt{set.seed()}.

Usage

\texttt{set.initialization(initialization)}

Arguments

\texttt{initialization} Character, either "mrg32k5a" or "sfmt". The required initialization algorithm.

Details

Initialization "mrg32k5a" uses the generator MRG32k5a by P. L’Ecuyer, see the citation below. Initialization "sfmt" is the same as in SFMT generator by Mutsuo Saito (Hiroshima University) and Makoto Matsumoto (Hiroshima University).

Value

\texttt{NULL} invisibly.
References


set.resolution

Set the resolution of the output numbers

Description

The function allows to choose between resolution 53 and 32 bits. The resolution is the number of random bits in the numbers produced by runif().

Usage

set.resolution(resolution)

Arguments

resolution Numeric, 53 or 32. The required number of bits.

Details

The new setting of the resolution is valid for the next calls to runif().

Generating a random number with the resolution 53 requires two iterations of the internal 32 bit generator and their outputs are combined to a single number. The slow down of 53 bit resolution compared to 32 bit resolution is about 20 percent, since an R call to runif() performs also other actions besides calling the internal generator and these actions are run only once.

Value

NULL invisibly.

set.vector.seed

Seeding the generator with a numeric vector

Description

The function allows to seed the generator with a numeric vector of an arbitrary length.

Usage

set.vector.seed(seed)
Arguments

seed A numeric or integer vector, whose components have integer values in the interval [0, 2^{32}-1].

Details

Function set.vector.seed() generalizes the initialization "mrg32k5a" for longer seeds.

The input numbers should have integer values in the interval [0, \, 2^{32} - 1]. They may be represented by numeric data type (double precision). If some of the components of the vector seed is at least 2^31, then the numeric type is necessary.

If seed has length 1 and 0 <= seed <= 2^{31} - 1, then set.vector.seed(seed) with "mrg32k5a" initialization is equivalent to set.seed(seed). If seed has length 1 and 2^{31} + 1 <= seed <= 2^{32} - 1, then set.vector.seed(seed) with "mrg32k5a" initialization is equivalent to set.seed(seed - 2^{32}).

Every two different input vectors of length at most 3 produce different initial states of WELL19937a. The bit pattern of the seed is not important. In particular, the seeds 0, 1, or 2 are not worse than any other seed and produce unrelated sequences.

Value

NULL invisibly.

Description

The generator is run with a fixed seed and its output is compared to stored precomputed values.

Usage

well19937.validate()

Details

Loading the package rngwell19937 sets RNGkind("user-supplied"). If this setting is changed by the user before calling well19937.validate(), the function resets RNGkind("user-supplied").

Value

The function prints the result of the test. The output value is NULL invisibly.

Examples

well19937.validate()
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