



randomLHS {lhs}

R Documentation

Random Latin Hypercube

Description

Draws a Latin Hypercube Sample from a set of uniform distributions for use in creating a Latin Hypercube Design. This sample is taken in a random manner without regard to optimization.

Usage

```
randomLHS(n, k, preserveDraw)
```

Arguments

- `n` The number of partitions (simulations or design points)
- `k` The number of replications (variables)
- `preserveDraw` Default:FALSE. Ensures that two subsequent draws with the same `n`, but one with `k` and one with `m` variables ($k < m$), will have the same first `k` columns if the seed is the same.

Details

Latin hypercube sampling (LHS) was developed to generate a distribution of collections of parameter values from a multidimensional distribution. A square grid containing possible sample points is a Latin square iff there is only one sample in each row and each column. A Latin hypercube is the generalisation of this concept to an arbitrary number of dimensions. When sampling a function of k variables, the range of each variable is divided into n equally probable intervals. n sample points are then drawn such that a Latin Hypercube is created. Latin Hypercube sampling generates more efficient estimates of desired parameters than simple Monte Carlo sampling.

This program generates a Latin Hypercube Sample by creating random permutations of the first n integers in each of k columns and then transforming those integers into n sections of a standard uniform distribution. Random values are then sampled from within each of the n sections. Once the sample is generated, the uniform sample from a column can be transformed to any distribution by using the quantile functions, e.g. `qnorm()`. Different columns can have different distributions.

Value

An n by k Latin Hypercube Sample matrix with values uniformly distributed on $[0,1]$

Author (s)

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References

Stein, M. (1987) Large Sample Properties of Simulations Using Latin Hypercube Sampling. *Technometrics*. **29**, 143–151.

See Also

[geneticLHS](#), [improvedLHS](#), [maximinLHS](#), and [optimumLHS](#) to generate Latin Hypercube Samples. [optAugmentLHS](#), [optSeededLHS](#), and [augmentLHS](#) to modify and augment existing designs.

Examples

```
# draw a Latin hypercube
randomLHS(4, 3)

# transform a Latin hypercube
X <- randomLHS(5, 2)
Y <- matrix(0, nrow=5, ncol=2)
Y[,1] <- qnorm(X[,1], mean=3, sd=0.1)
Y[,2] <- qbeta(X[,2], shape1=2, shape2=3)

# check the preserveDraw option
set.seed(1976)
X <- randomLHS(6,3,preserveDraw=TRUE)
set.seed(1976)
Y <- randomLHS(6,5,preserveDraw=TRUE)
all(abs(X - Y[,1:3]) < 1E-12) # TRUE
```

Documentation for package 'lhs' version 0.10

- [DESCRIPTION file](#).
- [Overview of user guides and package vignettes](#); browse [directory](#).

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The Latin Hypercube Sample (lhs) Package

Augment a Latin Hypercube Design

Latin Hypercube Sampling with a Genetic Algorithm

Improved Latin Hypercube Sample

Random Latin Hypercube

The Latin Hypercube Sample (lhs) Package

Maximin Latin Hypercube Sample

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Random Latin Hypercube