Package ‘sudokuAlt’

December 15, 2019

Type Package
Title Tools for Making and Spoiling Sudoku Games
Version 0.2-1
Date 2019-12-15
Depends R (>= 3.5.0), stats
Suggests sudoku, knitr, rmarkdown
Imports graphics, magrittr
Author Bill Venables <Bill.Venables@gmail.com>
Maintainer Bill Venables <Bill.Venables@gmail.com>
Description Tools for making, retrieving, displaying and solving sudoku games.
   This package is an alternative to the earlier sudoku-solver package, 'sudoku'. The present package uses a slightly different algorithm, has a simpler coding and presents a few more sugar tools, such as plot and print methods. Solved sudoku games are of some interest in Experimental Design as examples of Latin Square designs with additional balance constraints.
License GPL (>= 2)
NeedsCompilation no
Encoding UTF-8
RoxygenNote 7.0.2
VignetteBuilder knitr
Repository CRAN
Date/Publication 2019-12-15 06:50:02 UTC

R topics documented:

   as.sudoku .......................................................... 2
   as.sudoku.matrix .................................................. 3
   as.sudoku.sudoku .................................................. 3
   daysAgo ............................................................. 4
   designGame ......................................................... 5
as.sudoku

Generic Sudoku Game Constructor

Description

Construct a Sudoku Game Object

Usage

as.sudoku(x, ...)

Arguments

x

an n^2 x n^2 matrix object to represent the game

... Other additional arguments (currently ignored)

Details

Coerce an object to one that can be used as a sudoku game. IMPORTANT: games are represented as n^2xn^2 character matrices, using 1-9 for n=2 or 3, and LETTERS[1:(n^2)] for n = 4 or 5.

Value

An object of class 'sudoku'

Author(s)

Bill Venables

Examples

M <- as.sudoku(matrix("", 16, 16))
sM <- solve(M)
plot(sM)
Description

Construct a Sudoku Game Object

Usage

```r
## S3 method for class 'matrix'
as.sudoku(x, ...)
```

Arguments

- `x`: An n^2 x n^2 matrix
- `...`: other arguments (currently ignored)

Details

Coerce a matrix to an object that can be used as a sudoku game

Value

An object of class `sudoku`

Author(s)

Bill Venables

Description

Identity function for sudoku objects

Usage

```r
## S3 method for class 'sudoku'
as.sudoku(x, ...)
```

Arguments

- `x`: A sudoku object
- `...`: other arguments (ignored)
Value
the input sudoku object

Author(s)
Bill Venables

daysAgo

Description
Format a Date Relative to the Current Date

Usage
daysAgo(n = 0, warn = TRUE)

Arguments
n A positive integer for how many days ago
warn Issue a warning if n <= 0 or n > 30

Details
Internal function used by fetchUKGame().

Value
A character string of the form "dd/mm/yy"

Author(s)
Bill Venables

Examples
daysAgo() ## today
daysAgo(7) ## a week ago
**designGame**  

**Sudoku Design**

**Description**

Take a sudoku game and represent the information as a data frame giving the row, column, square and symbol for each entry. This is a useful form if the (complete) game is to be used as an experimental design.

**Usage**

```r
designGame(g, ...) # Default S3 method:
designGame(g, ...)
# S3 method for class 'sudoku'
designGame(g, ...)
```

**Arguments**

- `g` a sudoku game, presumably solved
- `...` currently ignored

**Value**

a data frame with four columns, `Row`, `Col`, `Square` and `Symbol`

**Examples**

```r
set.seed(2019)
d <- seedGame(4) %>% solve() %>%
    regulariseGame(target = "b") %>%
designGame()
rbind(head(d), tail(d))
```

---

**emptyGame**  

**Construct an empty game**

**Description**

Construct a Vacant Game Structure

**Usage**

```r
emptyGame(n = 3)
```
Arguments

n an integer value between 2 and 5 inclusive.

Details

Returns a vacant game structure to allow special patterns to be constructed, as shown in the example.

Value

An empty sudoku game structure

Author(s)

Bill Venables

Examples

```r
g <- emptyGame(4)
diag(g) <- LETTERS[1:16]
plot(g)
g %>% solve %>% plot -> sg %>% imported from magrittr
```

---

**fetchAUGame**

Retrieves a Sudoku from the AU Site

Description

Retrieve a Sudoku Game

Usage

```r
fetchAUGame(day = 0, difficulty = c("tough", "hard", "medium", "easy"))
```

Arguments

- **day** non-negative integer, how many days ago? zero for today’s game.
- **difficulty** character string, how hard would you like it?

Details

Connects to [http://www.sudoku.com.au](http://www.sudoku.com.au) and retrieves the sudoku game from `day` days ago. Based on a function from a related sudoku package, `sudoku::fetchSudokuUK` with minor changes.

Value

The published sudoku game as a sudoku object.
**fetchUKGame**

**Author(s)**

Bill Venables

**Examples**

```r
## Not run:
fetchAUGame() %>% solve %>% plot -> gau  # The 'tough' game for today
fetchAUGame(3, "easy") %>% solve %>% plot -> eau  # 'easy' game from 3 days ago

## End(Not run)
```

---

**fetchUKGame**  
*Retrieve a Sudoku from the UK Site*

**Description**

Retrieve a Sudoku Game

**Usage**

```r
fetchUKGame(day = NULL)
```

**Arguments**

- `day`
  - positive integer < 30, how many days ago? or NULL for the most recently published game.

**Details**

Connects to [http://www.sudoku.org.uk/DailySudoku.asp](http://www.sudoku.org.uk/DailySudoku.asp) and retrieves the sudoku game from `day` days ago. Based on a function from a related sudoku package, `sudoku::fetchSudokuUK` with minor changes.

**Value**

The published sudoku game as a sudoku object.

**Author(s)**

Bill Venables
Examples

## Not run:
(g0 <- fetchUKGame()) ## The game for today (according to GMT)
(g3 <- fetchUKGame(3)) ## game from 3 days ago (according to GMT)
if(require(sudoku)) {  ## the original solver
  g0a <- as.sudoku(fetchSudokuUK())
  identical(g0, g0a)  ## should be TRUE
}
g0 %>% solve %>% plot -> sg0  ## spoil the game
## End(Not run)

makeGame

### Make a New Sudoku Game

Description

Construct a Random Sudoku Game

Usage

makeGame(n = 3, gaps = ceiling(3 * n^4/4), maxit = 25)

Arguments

- **n**
  - Size of the game, n^2 x n^2
- **gaps**
  - Number of holes to leave for the solution
- **maxit**
  - Number of tries before giving up.

Details

Constructs a sudoku game for given n, 2 <= n <= 5. n = 5 can be problematical.

Value

- a sudoku game

Author(s)

Bill Venables

Examples

set.seed(54321)
makeGame() %>% solve %>% plot -> sg
originalGame(sg)
originalGame

Description

Retrieve the Original from a Solved Game

Usage

originalGame(x)

Arguments

x a sudoku object

Details

Convenience function for accessing an original from a solved game. If the game is unsolved, the object itself is returned.

Value

The original sudoku game corresponding to the solution, or object itself if the game is unsolved

Author(s)

Bill Venables

Examples

set.seed(666)
seedGame() %>% solve %>% plot -> sg ## %>% imported from magrittr
originalGame(sg)

plot.sudoku

Plot a Sudoku Game

Description

Plot a Sudoku Game
Usage

```r
## S3 method for class 'sudoku'
plot(
  x,
  ..., 
  cex = 1.5 - (n - 3)/2, 
colSolution = "grey", 
colGame = "fire brick"
)
```

Arguments

- `x` The sudoku game
- `...` additional arguments
- `cex` Character expansion factor
- `colSolution` colour to be used for the solution (if present)
- `colGame` colour to be used for the original game

Details

Present a graphical display of a sudoku game and its solution if the game is solved.

Value

The sudoku game `x`, invisibly.

Author(s)

Bill Venables

Examples

```r
set.seed(20191)
makeGame(4, gaps = 0) %>% plot(cex=1) -> sg
print.sudoku
```

Description

Print a Sudoku Object

Usage

```r
## S3 method for class 'sudoku'
print(x, ...)
```

print.sudoku

Print a Sudoku Object
regulariseGame

Arguments

- **x**: The sudoku game object
- ... extra arguments (ignored)

Details

Prints a sudoku object in an easily recognisable form.

Value

the object, invisibly

Author(s)

Bill Venables

Description

Put a solved sudoku game into a canonical form

Usage

```r
regulariseGame(g, ...)
```

## S3 method for class 'sudoku'
regulariseGame(g, target = c("block", "col", "row"), ...)

## Default S3 method:
regulariseGame(g, ...)

Arguments

- **g**: a solved sudoku game
- ... additional arguments to methods (currently not used)
- **target**: character; which section do you want to be in sorted order?

Details

If a solved sudoku game is to be used as an experimental design it is sometimes useful to re-arrange the symbols so that either the first row, first column or top left block symbols are in sorted order. This function accomplishes this task.
seedGame

Value

a regularised solved sudoku game

Examples

```r
set.seed(1234)
g <- makeGame() %>%
solve() %>%
regulariseGame(target = "b") %>%
plot()
plot(originalGame(g))
```

Description

Generate a random sudoku game starting point

Usage

```r
seedGame(n = 3)
```

Arguments

- `n` Size of the game, n^2 x n^2

Details

Generates a game with one instance of each symbol in random positions.

Value

A sparse unsolved sudoku game

Author(s)

Bill Venables

Examples

```r
set.seed(2345)
g <- seedGame(3)
sg <- solve(g) ## a completed random game
plot(sg)
```
solve.sudoku

Solve a Sudoku Puzzle

Description

Solve a Sudoku Puzzle

Usage

```r
## S3 method for class 'sudoku'
solve(a, ...)
```

Arguments

- `a` A sudoku game object to be solved
- `...` Extra arguments (currently ignored)

Details

An alternative front end to `solveGame` as a method for the base generic function `solve`.

Value

A solved game, or `NULL` if no solution exists.

Author(s)

Bill Venables

Examples

```r
set.seed(1234)
makeGame(3, gaps = 59) %>% solve %>% plot -> sg
originalGame(sg)

g <- emptyGame(4) # construct a patterned game
diag(g) <- LETTERS[1:16]
g %>% solve %>% plot -> sg
sg
```
solveGame

Solve a Sudoku Game

Description
Solve a Sudoku Game

Usage
solveGame(game)

Arguments
  game  The game to be solved

Details
Given a sudoku game to be solved, find the solution. IMPORTANT: games are represented as n^2 x n^2 character matrices, using 1-9 for n=2 or 3, and LETTERS[1:(n^2)] for n = 4 or 5.

Value
A solved sudoku game object if one found, or NULL if no solution exists. The original game is attached as an attribute if the game is solved.

Author(s)
Bill Venables

Examples
set.seed(1234)
makeGame(3, gaps = 60) %>% solve %>% plot -> sg
(g <- originalGame(sg))

g <- emptyGame(4) # construct a patterned game
diag(g) <- LETTERS[1:16]
sg <- solve(g)
plot(sg)
Index

as.sudoku, 2
as.sudoku.matrix, 3
as.sudoku.sudoku, 3
daysAgo, 4
designGame, 5
emptyGame, 5
fetchAUGame, 6
fetchUKGame, 7
makeGame, 8
originalGame, 9
plot.sudoku, 9
print.sudoku, 10
regulariseGame, 11
seedGame, 12
solve.sudoku, 13
solveGame, 14