

Package ‘sudokuAlt’

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Type Package

Title Tools for Making and Spoiling Sudoku Games

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Suggests sudoku

Imports graphics, magrittr

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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

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| | |
|-----------|--|
| as.sudoku | <i>Generic Sudoku Game Constructor</i> |
|-----------|--|

Description

Construct a Sudoku Game Object

Usage

```
as.sudoku(x, ...)
```

Arguments

| | |
|-----|---|
| x | an $n^2 \times n^2$ 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 $n^2 \times n^2$ 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))
M[1:4, 1:4] <- matrix(LETTERS[1:16], 4, 4, byrow = TRUE)
sM <- solve(M)
plot(sM)
```

as.sudoku.matrix *as.sudoku.matrix*

Description

Construct a Sudoku Game Object

Usage

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

Arguments

| | |
|-----|-------------------------------------|
| x | An $n^2 \times n^2$ 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

as.sudoku.sudoku *Construct a Sudoku Game Object*

Description

Identity function for sudoku objects

Usage

```
## 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

Format a Past Date

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
```

| | |
|-----------|--------------------------------|
| emptyGame | <i>Construct an empty game</i> |
|-----------|--------------------------------|

Description

Construct a Vacant Game Structure

Usage

```
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

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

| | |
|-------------|---|
| fetchAUGame | <i>Retrieve a Sudoku from the AU Site</i> |
|-------------|---|

Description

Retrieve a Sudoku Game

Usage

```
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> 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:
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

```
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> 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 = 5)
```

Arguments

| | |
|-------|---|
| n | Size of the game, $n^2 \times n^2$ |
| gaps | Number of holes to leave for the solution |
| maxit | Number of tries before giving up. |

Details

Constructs a sudoku game for given n, $2 \leq n \leq 5$. $n = 5$ can be problematical.

Value

a sudoku game

Author(s)

Bill Venables

Examples

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

originalGame

Retrieve the Original from a Solved Game

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

```
## S3 method for class 'sudoku'  
plot(x, ..., cex = 2 - (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

```
set.seed(1234)  
seedGame(4) %>% solve %>% plot -> sg
```

| | |
|--------------|------------------------------|
| print.sudoku | <i>Print a Sudoku Object</i> |
|--------------|------------------------------|

Description

Print a Sudoku Object

Usage

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

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

| | |
|----------|--|
| seedGame | <i>Starting Point to Make a Random Sudoku Game</i> |
|----------|--|

Description

Generate a random sudoku game starting point

Usage

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

Arguments

| | |
|---|------------------------------------|
| n | Size of the game, $n^2 \times n^2$ |
|---|------------------------------------|

Details

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

Value

A sparse unsolved sudoku game

Author(s)

Bill Venables

Examples

```
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

```
## 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

```
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 $n^2 \times n^2$ 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.

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)
```

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