Package 'syt'

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Type Package

Title Standard Young Tableaux

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Description Deals with standard Young tableaux (field of combinatorics).
Performs enumeration, counting, random generation, the
Robinson-Schensted correspondence, and conversion to and from paths on
the Young lattice. Also performs enumeration and counting of
semistandard Young tableaux.

License GPL-3

URL https://github.com/stla/syt

BugReports https://github.com/stla/syt/issues

Imports Matrix, partitions, utils

Suggests testthat

Encoding UTF-8

RoxygenNote 7.2.3

NeedsCompilation no

Repository CRAN

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R topics documented:

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all_ssytx   *Enumeration of semistandard Young tableaux*

Description

Generates all semistandard Young tableaux of a given shape and filled with integers between 1 and a given n.

Usage

```
all_ssytx(lambda, n)
```

Arguments

lambda	an integer partition, the shape
n	an integer, the maximum value of the entries (the minimum value is 1)

Value

List of all semistandard Young tableaux with shape lambda and filled with integers between 1 and n.

Examples

```
all_ssytx(c(2, 1), 3)
```

---

all_sytx *Enumeration of standard Young tableaux*

Description

Generates all standard Young tableaux of a given shape.

Usage

```
all_sytx(lambda)
```

Arguments

lambda   shape, an integer partition

Value

A list of standard Young tableaux.

Examples

```
all_sytx(c(5,2))
```

---

ballot2syt *Tableau as ballot sequence*

Description

Converts a ballot sequence to its corresponding standard Young tableau.

Usage

```
ballot2syt(a)
```

Arguments

a   ballot sequence

Value

A standard Young tableau.

See Also

[syt2ballot](#)

Examples

```
a <- c(1,1,2,3,2,1)
ballot2syt(a)
```

---

count_ssytx   *Number of semistandard Young tableaux*

Description

Number of semistandard Young tableaux of a given shape and filled with integers between 1 and a given n.

Usage

```
count_ssytx(lambda, n)
```

Arguments

lambda	an integer partition, the shape
n	an integer, the maximum value of the entries (the minimum value is 1)

Value

The number of semistandard Young tableaux with shape lambda and filled with integers between 1 and n.

Examples

```
count_ssytx(c(4, 3, 3, 2), 5)
```

---

count_sytx   *Number of standard Young tableaux*

Description

Number of standard Young tableaux of a given shape.

Usage

```
count_sytx(lambda)
```

Arguments

lambda	an integer partition, the shape

Value

An integer, the number of standard Young tableaux of shape `lambda`.

See Also

all_sytx

Examples

```
count_sytx(c(5,4,1))
length(all_sytx(c(5,4,1)))
```

---

dualsyt	*Dual tableau*

Description

The dual standard Young tableau of a standard Young tableau.

Usage

```
dualsyt(syt)
```

Arguments

syt   standard Young tableau

Value

A standard Young tableau.

Examples

```
syt <- list(c(1,2,6), c(3,5), 4)
dualsyt(syt)
```

---

firstsyt   *First tableau of a given shape*

Description

Returns the "first" standard Young tableau of a given shape.

Usage

```
firstsyt(lambda)
```

Arguments

lambda   the shape, an integer partition

Value

A standard Young tableau.

Examples

```
firstsyt(c(4,2,1))
```

---

gprocess2syt   *Growth process to tableau*

Description

Converts a growth process of integer partitions to its corresponding standard Young tableau.

Usage

```
gprocess2syt(path)
```

Arguments

path   a path of the Young graph from the root vertex, given as a list of integer partitions

Value

A standard Young tableau.

See Also

syt2gprocess

Examples

```
path <- list(1, 2, c(2,1), c(3,1), c(3,1,1))
gprocess2syt(path)
```

---

hooklengths	*Hook lengths*

Description

Hook lengths of a given integer partition.

Usage

```
hooklengths(lambda)
```

Arguments

lambda   an integer partition

Value

The hook lengths of the partition, given in a list.

See Also

hooks

Examples

```
hooklengths(c(4,2))
```

---

hooks	*Hooks*

Description

Hooks of a given integer partition.

Usage

```
hooks(lambda)
```

Arguments

lambda   integer partition

Value

The hooks of the partition in a list.

See Also

hooklengths

Examples

```
hooks(c(4,2))
```

---

matrix2syt   *Standard Young tableau from a matrix*

Description

Converts a matrix to a standard Young tableau.

Usage

```
matrix2syt(M)
```

Arguments

M   a matrix

Value

A standard Young tableau.

See Also

syt2matrix

Examples

```
M <- rbind(c(1,2,6), c(3,5,0), c(4,0,0))
matrix2syt(M)
```

---

nextsyt *Next tableau*

Description

Given a standard Young tableau, returns the "next" one having the same shape.

Usage

```
nextsyt(syt)
```

Arguments

syt   a standard Young tableau

Value

A standard Young tableau of the same shape as `syt`, or `NULL` if `syt` is the last standard Young tableau of this shape.

Examples

```
syt <- firstsyt(c(4,2,1))
nextsyt(syt)
```

---

rgprocess *Plancherel growth process*

Description

Samples a path of the Young graph according to the Plancherel growth process.

Usage

```
rgprocess(n)
```

Arguments

n   the size of the path to be sampled

Value

The path as a list, starting from the root vertex `1`.

See Also

gprocess2syt and syt2gprocess to convert a Young path to a standard Young tableau and conversely.

Examples

```
rgprocess(7)
```

RS   *Robinson-Schensted correspondence*

Description

Pair of standard Young tableaux given from a permutation by the Robinson-Schensted correspondence.

Usage

```
RS(sigma)
```

Arguments

sigma   a permutation given as a vector of integers

Value

A list of two standard Young tableaux.

Examples

```
RS(c(1, 3, 6, 4, 7, 5, 2))
```

---

rsyt   *Random standard Young tableau*

Description

Uniform sampling of a standard Young tableau of a given shape.

Usage

```
rsyt(lambda)
```

Arguments

lambda   shape, an integer partition

Value

A standard Young tableau of shape `lambda`.

Examples

```
rsyt(c(7,3,1))
```

---

syt2ballot   *Tableau as ballot sequence*

Description

Converts a standard Young tableau to its corresponding ballot sequence.

Usage

```
syt2ballot(syt)
```

Arguments

syt   standard Young tableau

Value

A ballot sequence.

See Also

ballot2syt

Examples

```
syt <- list(c(1,2,6), c(3,5), 4)
syt2ballot(syt)
```

---

syt2gprocess   *Tableau as growth process*

Description

Converts a standard Young tableau to its corresponding growth process of partitions.

Usage

```
syt2gprocess(syt)
```

Arguments

syt   standard Young tableau

Value

A list of integer partitions, representing a path of the Young graph starting from the root vertex.

See Also

gprocess2syt

Examples

```
syt <- list(c(1,2,4), 3, 5)
syt2gprocess(syt)
```

---

syt2matrix   *Standard Young tableau as sparse matrix*

Description

Representation of a standard Young tableau as a sparse matrix.

Usage

```
syt2matrix(syt)
```

Arguments

syt   a standard Young tableau

Value

A sparse matrix.

See Also

matrix2syt

Examples

```
syt <- list(c(1,2,6), c(3,5), 4)
syt2matrix(syt)
```

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