Package 'SolMultinomClass'

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Type Package

Title Solar Radiation Classification Using Nonparametric Multinomial Mixture Modeling

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Description daily clearness index is coded as a vector of integers called occupation numbers. Afterwards the classification algorithm is performed on the vectors of occupation numbers and infer the correct variable number of classes by assuming Dirichlet process as a nonparametric prior on the parameters in a model.

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R topics documented:

`SolMultinomClass-package`

Solar Radiation Classification Using Nonparametric Multinomial Mixture Modeling

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`codingData` *Clearness index Multinomial distribution*

Description

daily clearness index is coded as a vector of integers called occupation numbers.

Usage

```
codingData(meas, Emeas, nBin)
```

Arguments

`meas`	matrix of global horizontal solar radiation
`Emeas`	matrix of extraterrestrial radiation for same given site of meas (output of rayExt() function)
`nBin`	number of bins wanted

Value

an object of class matrix, each line represents one daily multinomial distribution and each column represents one bin

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Examples

```
# see the example in multinomDirClass function
```

dayLength *calculation of the day length*

Description

function that calculates the day length knowing the latitude and number of the day during the year

Usage

```
dayLength(nj = 1, phi = 0)
```

Arguments

nj	number of the day during the year (example: for 10 february, nj = 41)
phi	latitude of the considered site

Value

An object of class numeric(1) represents the day length.

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Examples

```
# calculate the day length by hours for a given site (latitude = 15, and day 45)
dlen <- dayLength(nj = 45, phi = 15)
dlen
```

multinomDirClass *Nonparametric Multinomial Mixture Modeling*

Description

Nonparametric Dirichlet-Multinomial classification to rows of a data matrix without specifying the number of classes (nonparametric), is also a random variable.

Usage

```
multinomDirClass(measures, n.it = 10000, n.B.in = 3000, zi = rep(1, N),
alf = 3, seed = 2308.2202, talk = T)
```

Arguments

measures	matrix(), of data, each row as multinomial vector, can be the output of the function codinData()
n.it	numeric(1), number of iterations
n.B.in	numeric(1), number of burn-in iterations (ignored iterations)
zi	vector(), initialization of indicator variable.
alf	numeric(1), concentration parameter
seed	numeric(1), reproducibility of the results (same results with the same seed)
talk	logical, shows the classification evolution in real time, if talk is true.

Value

An object of class list, with elements:

`likely class sequence`
: vector of the class indicators sequence

`likely parameters`
: list of parameters of each class

`likely hyperpameter`
: parameter of the hyperprior

`likely concentration parameter`
: most likely concentration parameter

`Sampling sequence of concentration parameters`
: if you want to see the posterior alfa distribution

`sequence of class numbers`
: if you want to see the posterior class number distribution

`number of elements in the likely class`
: counts at each combination of factor levels within likely class sequence

`calculation time`
: the duration of calculates

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Examples

```
# load needed library
library("SolMultinomClass")

# load data
data("OregonUData")
```

```
# calculate the extraterrestrial radiation for the given site
mat2 <- rayExt(phi = 43.12, lg = -121.06, tStep = 300) # tStep = 5 minutes

#In accordance with considered data, 12 hours of measurements by 5 min, from 6h to 18h.
mat2 <- mat2[,73:216] #

# now, coding the data as multinomial distribution of the clearness index (mat2/mat1)
mat <- codingData(OregonUData, mat2, 8) # 8 bins

# finally, carry out the classification, number of iterations must be large (15000 only fo example)
classification <- multinomDirClass(measures = mat, n.it = 15000, n.B.in = 3000)

# save the classification results to a file
save(classification, file = "classificationResults.RData")
```

`OregonUData` *measured global horizontal solar radiation*

Description

files containing 5-minute global horizontal solar radiation data for a single year 2015

Usage

```
data("OregonUData")
```

Details

An object of class data, each line represents one day and each column represents one time-step

Source

University of Oregon, Solar Radiation Monitoring Laboratory,
URL http://solardat.uoregon.edu, accessed November 25, 2017.

Examples

```
# load data
data("OregonUData")

# plot a random day example
plot(1:144, OregonUData[sample(1:365, 1), ], type = "l")
```

rayExt *calculation of extraterrestrial radiation*

Description

function that calculates the extraterstrial radiation knowing the latitude, longitude and the time-step wanted

Usage

```
rayExt(phi = 0, lg = 0, tStep = 300)
```

Arguments

phi	latitude of the considered site
lg	longitude of the considered site
tStep	time-step wanted, gived by second (example: for 5min; tStep = 300)

Value

An object of class matrix, each line represents one day and each column represents one time-step

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Examples

```
# calculate the extraterrestrial radiation for a given site (latitude = 15, longitude = 15)
# with a time-step of 1 minute
matr <- rayExt(phi = 15, lg = 15, tStep = 60)

# plot a random day example
plot(1:(60*24), matr[sample(1:366, 1), ], type = "l")
```

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