Package 'prob.4.2.comp.stats'

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Title Solution for Problem 4.2 in Computation Statistics by Givens

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Description Implements EM point estimator and its covariance estimator for problem 4.2 in Computation Statistics by Givens.

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`em.counts_to_responses`

Convert counts to individual responses

Description

There are many ways to represent the same data. In problem 4.2, the data is given in the form of counts. This is the inverse of em.counts_to_responses, e.g.,

```
xs <- em.counts_to_responses(counts)
em.responses_to_counts(xs) == counts
em.counts_to_responses(em.responses_to_counts(xs)) == xs.
```

Usage

```
em.counts_to_responses(counts)
```

Arguments

counts	count data

Value

the count data converted to response data, say counts = (379,299,...), then 379 responded 0 encounters, 299 responded 1 encounter, ...

Examples

```
# let counts be the count data
counts[j] # denotes number of respondents with j risky sexual encounters.
xs <- em.counts_to_responses(counts)
xs[k] # denotes the response of the i-th person
```

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em.cov.bs *Bootstrap covariance estimator of EM point estimator*

Description

Bootstrap covariance estimator of EM point estimator

Usage

```
em.cov.bs(theta.em, counts, m = 2000, em.eps = 1e-06, debug = F)
```

Arguments

theta.em	An EM point estimator of theta given observed counts
counts	observed count data (n0,n1,...,n16)
m	maximum bootstrap replicates
em.eps	EM algorithm epsilon stopping condition
debug	whether to print out debugging info while running

em.cov.info — *Covariance matrix of EM point estimator based on the observed information matrix*

Description

Covariance matrix of EM point estimator based on the observed information matrix

Usage

```
em.cov.info(theta.em, counts)
```

Arguments

theta.em	An EM point estimator of theta given observed responses
data	Observed sample of responses

em.estimator — *EM algorithm*

Description

EM algorithm estimator for problem 4.2

Usage

```
em.estimator(theta, counts, eps = 1e-06, debug = T)
```

Arguments

theta	a starting guess for theta = (alpha,beta,mu,lambda)
counts	observed count data (n0,n1,...,n16)
eps	stopping condition
debug	whether to print out debugging info while running

em.loglike *log-likelihood function for problem 4.2*

Description

log-likelihood function for problem 4.2

Usage

```
em.loglike(theta, data)
```

Arguments

theta	evaluated at theta = (alpha,beta,mu,lambda)
data	observed response data

em.observed_info *Observed information of EM point estimator based on an observed sample*

Description

Observed information of EM point estimator based on an observed sample

Usage

```
em.observed_info(theta.em, data)
```

Arguments

theta.em	An EM point estimator of theta given observed counts
data	Observed sample of responses

`em.pdf` *probability density function (pdf) for problem 4.2*

Description

probability density function (pdf) for problem 4.2

Usage

```
em.pdf(x, theta)
```

Arguments

`x`	density evaluated at x given index theta
`theta`	index of indexed family of density functions, theta = (alpha,beta,mu,lambda)

`em.responses_to_counts` *Convert individual response data to count data*

Description

This is the inverse of em.counts_to_responses, e.g., em.responses_to_counts(em.counts_to_responses(counts)) == counts and em.counts_to_responses(em.responses_to_counts(data)) == data.

Usage

```
em.responses_to_counts(data)
```

Arguments

`data`	response data

Value

response data converted to count data

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