Package 'prob.4.2.comp.stats'

July 26, 2021

Title Solution for Problem 4.2 in Computation Statistics by Givens

Version 1.0.0.0

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

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Encoding UTF-8

LazyData true

Roxygen list(markdown = TRUE)

RoxygenNote 7.1.1.9001

R topics documented:

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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.
```

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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

Estimate the covariance of the EM point estimator for theta = (alpha,beta,mu,lamda)' using Bootstrapping.

Usage

```
em.cov.bs(theta.em, counts, m = 2000, 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

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

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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

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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, counts)
```

Arguments

theta.em   An EM point estimator of theta given observed counts

data   Observed sample of responses

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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)

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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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