Package 'BCEs0'

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Type Package

Title Bayesian Models for Cost-Effectiveness Analysis in the Presence of Structural Zero Costs

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Suggests R2jags

LazyData yes

Description Implements a full Bayesian cost-effectiveness analysis in the case where the cost variable is characterised by structural zeros. The package implements the Gamma, log-Normal and Normal models for the cost variable and the Gamma, Beta, Bernoulli and Normal models for the measure of clinical effectiveness.

License GPL (>= 2)

NeedsCompilation no

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R topics documented:

BCEs0-package *BCEs0. A R package to implement Bayesian models for cost-effectiveness analysis in the presence of structural zero costs*

Description

Implements a full Bayesian cost-effectiveness analysis in the case where the cost variable is characterised by structural zeros. The package implements the Gamma, log-Normal and Normal models for the cost variable and the Gamma, Beta, Bernoulli and Normal models for the measure of clinical effectiveness.

Details

Package:	BCEs0
Type:	Package
Version:	1.1-1
Date:	2015-08-07
License:	GPL (>=2)
LazyLoad:	yes

Author(s)

Gianluca Baio

Maintainer: Gianluca Baio <gianluca@stats.ucl.ac.uk>

References

Baio G. (2013). Bayesian models for cost-effectiveness analysis in the presence of structural zero costs. http://arxiv.org/pdf/1307.5243v1.pdf

Examples

```
## To be added here
```

bces0 *Bayesian Cost-Effectiveness models in the presence of structural zeros*

Description

Writes a model file encoding the distributional assumptions, calls JAGS in background and perform the Bayesian analysis of the selected model.

Usage

```
bces0(data,dist.c=c("gamma","logn","norm"),
dist.e=c("beta","gamma","bern","norm"),
w=1e-6,W=1e-6,n.iter=10000,n.burnin=5000,
n.chains=2,robust=TRUE,model.file="model.txt")

## Default S3 method:
bces0(data,dist.c=c("gamma","logn","norm"),
dist.e=c("beta","gamma","bern","norm"),
w=1e-6,W=1e-6,n.iter=10000,n.burnin=5000,
n.chains=2,robust=TRUE,model.file="model.txt")
```

Arguments

data	A named list including values for the variables e0 (measure of effectiveness for the subjects in treatment arm t=0), e1 (effectiveness for the subjects in t=1), c0 (individual costs in t=0), c1 (individual costs in t=1), H.psi and H.zeta (vectors of fixed hyperparameters for the prior in the positive cost groups. If only one value is passed as argument, then BCEs0 assumes that this is to be used for both treatments being considered). Additional optional elements are X0 (a matrix of covariates for t=0) and X1 (a matrix of covariates for t=1) that can be used to estimate the selection model for null costs
dist.c	A text string defining the selected distribution for the costs. Available options are Gamma ("gamma"), log-Normal ("logn") and Normal ("norm")
dist.e	A text string defining the selected distribution for the measure of effectiveness. Available options are Beta ("beta"), Gamma ("gamma"), Bernoulli ("bern") and Normal ("norm")
w	A parameter used to characterise the mean of the degenerate distribution for the structural zeros (default = 0.000001)
W	A parameter used to characterise the standard deviaiton of the degenerate distribution for the structural zeros (default = 0.000001)
n.iter	Number of iterations to be run in JAGS (default = 10000)
n.burnin	Number of iterations to be used as burn-in for the MCMC procedure (default = 5000)
n.chains	Number of Markov chains to be run (default = 2)
robust	A string indicating whether a robust model should be chosen for the patter model. If TRUE (default), then the regression coefficients are modelled using a Cauchy(0,2.5) distribution. If FALSE, then a vague Normal prior is used
model.file	A string with the name of the txt file to which the JAGS code is saved. Default is model.txt.

Value

An object containing the following elements

mod	A "rjags" objects with the results of the MCMC simulations run using JAGS

params	A vector including the parameters being monitored
dataJags	A list contaning the data needed to run the MCMC simulations
inits	A function used to initialise the random nodes in the model

Author(s)

Gianluca Baio

References

Baio G. (2013). Bayesian models for cost-effectiveness analysis in the presence of structural zero costs. http://arxiv.org/pdf/1307.5243v1.pdf

Examples

```
data(acupuncture)
m <- bces0(data,dist.c="gamma",dist.e="beta",n.iter=1000,n.burnin=500,n.chains=2)
print(m)
plot(m)
```

---

data *Bayesian model for the cost-effectiveness of acupuncture*

Description

This data set contains a sample of the data used in the Bayesian analysis used to model the cost-effectiveness of acupuncture in the management of chronic headache. Data consists in the measure of effectiveness (in terms of annual QALYs) for the two arms of the trial ($t=0$ indicates usual care, while $t=1$ indicates usual care and in addition up to 12 acupuncture treatments over three months from appropriately trained physiotherapists). Also, the dataset contains the values of the upper bounds for the average and standard deviation of the cost distribution.

Usage

```
data(acupuncture)
```

Format

The format is: chr "acupuncture"

Source

Adapted from Wonderling, D., A. Vickers, R. Grieve, and R. McCarney (2004). Cost effectiveness analysis of a randomised trial of acupuncture for chronic headache in primary care. British Medical Journal 328 (7442), 747-752

References

Baio G. (2013). Bayesian models for cost-effectiveness analysis in the presence of structural zero costs. http://arxiv.org/pdf/1307.5243v1.pdf

See Also

bces0

Examples

```
data(acupuncture)
```

`plot.bces0` *Plot method for objects in the class "bces0"*

Description

Produces a traceplot for the main nodes in the model

Usage

```
## S3 method for class 'bces0'
plot(x, ...)
```

Arguments

x	The object in the class "BCEs0" obtained by calling the function bces0
...	Additional arguments affecting the summary produced

Details

Returns a traceplot to assess convergence

Author(s)

Gianluca Baio

References

Baio G. (2013). Bayesian models for cost-effectiveness analysis in the presence of structural zero costs. http://arxiv.org/pdf/1307.5243v1.pdf

See Also

bces0

Examples

```
## To be added here
```

print.bces0 *Print method for objects in the class "bces0"*

Description

Specific method for objects in the class BCEs0

Usage

```
## S3 method for class 'bces0'
print(x, ...)
```

Arguments

x	The object in the class "BCEs0" obtained by calling the function bces0
...	Additional arguments affecting the summary produced

Details

Returns a summary table with selected statistics for all the nodes in the model that can be used to assess convergence

Author(s)

Gianluca Baio

References

Baio G. (2013). Bayesian models for cost-effectiveness analysis in the presence of structural zero costs. http://arxiv.org/pdf/1307.5243v1.pdf

See Also

bces0

Examples

```
## To be added here
```

writeModel *writeModel*

Description

This function selects suitable bits of JAGS code to build the model file encoding the selected distributional assumptions for the cost and effectiveness variables (and for the selection model)

Usage

```
writeModel(dist.c, dist.e, dist.d, model.file)
```

Arguments

dist.c	A text string defining the selected distribution for the costs. Available options are Gamma ("gamma"), log-Normal ("logn") and Normal ("norm")
dist.e	A text string defining the selected distribution for the measure of effectiveness. Available options are Beta ("beta"), Gamma ("gamma"), Bernoulli ("bern") and Normal ("norm")
dist.d	A text string defining the selection model. Possible choices are "cov.cauchy" or "cov.norm" (used when individual covariates are available and can be used to estimate the probability of zero costs) and "int" (when no covariate is available and an intercept-only model is fitted). The function writes a text file in the current working directory, including the relevant bits of code, that can be then passed to the call to the function jags to run the MCMC simulations in background
model.file	A string with the name of the model file to which the JAGS code is saved

Value

Writes out the file with the selected distributional assumptions to the file "model.txt" in the current working directory

Author(s)

Gianluca Baio

References

Baio G. (2013). Bayesian models for cost-effectiveness analysis in the presence of structural zero costs. http://arxiv.org/pdf/1307.5243v1.pdf

See Also

bces0

Examples

```
## To be added here
```

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