Package ‘BCEA’

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Type Package

Title Bayesian Cost Effectiveness Analysis

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Suggests MASS

Description Produces an economic evaluation of a Bayesian model in the form of MCMC simulations. Given suitable variables of cost and effectiveness / utility for two or more interventions, BCEA computes the most cost-effective alternative and produces graphical summaries and probabilistic sensitivity analysis

License GPL (>= 2)

NeedsCompilation no

Repository CRAN

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## BCEA-package

A package to post-process the results of a Bayesian health economic model and produce standardised output for the analysis of the results

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Given the results of a Bayesian model (possibly based on MCMC) in the form of simulations from the posterior distributions of suitable variables of costs and clinical benefits for two or more interventions, produces a health economic evaluation. Compares one of the interventions (the "reference") to the others ("comparators"). Produces many summary and plots to analyse the results.

**Author(s)**

Gianluca Baio

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

**References**


---

**bcea**  
*Bayesian Cost-Effectiveness Analysis*

**Description**

Cost-effectiveness analysis based on the results of a simulation model for a variable of clinical benefits (e) and of costs (c). Produces results to be post-processed to give the health economic analysis. The output is stored in an object of the class "bcea".

**Usage**

```r
bcea(e, c, ref = 1, interventions = NULL, Kmax = 50000)
```

**Arguments**

- `e`: An object containing nsim simulations for the variable of clinical effectiveness for each intervention being considered. In general it is a matrix with nsim rows and nint columns.
- `c`: An object containing nsim simulations for the variable of cost for each intervention being considered. In general it is a matrix with nsim rows and nint columns.
- `ref`: Defines which interventions (columns of e or c) is considered to be the reference intervention. The default value is that the intervention associated with the first column of e or c is the reference and the one(s) associated with the other column(s) is(are) the comparators.
- `interventions`: Defines the labels to be associated with each intervention. By default and if NULL, assigns labels in the form "Intervention1", ..., "Intervention T".
- `Kmax`: Maximum value of the willingness to pay to be considered. Default value is k=50000. The willingness to pay is then approximated on a discrete grid in the interval (0,Kmax), using steps of 100, i.e. [0,100,200,...,Kmax-100,Kmax].
Value

An object of the class "bcea" containing the following elements

- **n.sim**: Number of simulations produced by the Bayesian model
- **n.comparators**: Number of interventions being analysed
- **n.comparisons**: Number of possible pairwise comparisons
- **delta.e**: For each possible comparison, the differential in the effectiveness measure
- **delta.c**: For each possible comparison, the differential in the cost measure
- **ICER**: The value of the Incremental Cost Effectiveness Ratio
- **Kmax**: The maximum value assumed for the willingness to pay threshold
- **k**: The vector of values for the grid approximation of the willingness to pay
- **ceac**: The value for the Cost Effectiveness Acceptability Curve, as a function of the willingness to pay
- **ib**: The distribution of the Incremental Benefit, for a given willingness to pay
- **eib**: The value for the Expected Incremental Benefit, as a function of the willingness to pay
- **kstar**: The grid approximation of the break even point (ICER)
- **best**: A vector containing the numeric label of the intervention that is the most cost-effective for each value of the willingness to pay in the selected grid approximation
- **U**: An array including the value of the expected utility for each simulation from the Bayesian model, for each value of the grid approximation of the willingness to pay and for each intervention being considered
- **vi**: An array including the value of information for each simulation from the Bayesian model and for each value of the grid approximation of the willingness to pay
- **Ustar**: An array including the maximum "known-distribution" utility for each simulation from the Bayesian model and for each value of the grid approximation of the willingness to pay
- **ol**: An array including the opportunity loss for each simulation from the Bayesian model and for each value of the grid approximation of the willingness to pay
- **evi**: The vector of values for the Expected Value of Information, as a function of the willingness to pay
- **interventions**: A vector of labels for all the interventions considered
- **ref**: The numeric index associated with the intervention used as reference in the analysis
- **comp**: The numeric index(es) associated with the intervention(s) used as comparator(s) in the analysis
- **step**: The step used to form the grid approximation to the willingness to pay

Author(s)

Gianluca Baio
References


Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c,
  ref=2,
  interventions=treats,
  Kmax=50000
)

---

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

c is a matrix of simulations from the posterior distribution of the overall costs associated with the two treatments

Source

References


Examples

data(Vaccine)

ceac.plot

Description

Produces a plot of the CEAC against the willingness to pay threshold

Usage

ceac.plot(he,pos="bottomright")

Arguments

he A "bcea" object containing the results of the Bayesian modelling and the economic evaluation

pos The position of the legend to be included in the plot. Default value is "topleft", but can be changed by the user (only relevant for multiple interventions, ie more than 2 interventions being compared)

Value

The function produces a plot of the cost-effectiveness acceptability curve against the discrete grid of possible values for the willingness to pay parameter. Values of the CEAC closer to 1 indicate that uncertainty in the cost-effectiveness of the reference intervention is very low. Similarly, values of the CEAC closer to 0 indicate that uncertainty in the cost-effectiveness of the comparator is very low

Author(s)

Gianluca Baio

References


See Also

bcea
Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
effectiveness and cost
ref=2, # selects the 2nd row of (e,c)
interventions=treats, # defines the labels to be associated
with each intervention
Kmax=50000 # maximum value possible for the willingness
to pay threshold; implies that k is chosen
in a grid from the interval (0,Kmax)
)
#
# Produces a plot of the CEAC against a grid of values for the
# willingness to pay threshold
ceac.plot(m)

---

**ceplane.plot**  
*Cost-effectiveness plane plot*

**Description**

Produces a scatter plot of the cost-effectiveness plane, together with the sustainability area, as a function of the selected willingness to pay threshold

**Usage**

```r
ceplane.plot(he, comparison = NULL, wtp = 25000)
```

**Arguments**

- **he**  
  A "bcea" object containing the results of the Bayesian modelling and the economic evaluation

- **comparison**  
  Selects the comparator, in case of more than two interventions being analysed. Default as NULL chooses the first possible.

- **wtp**  
  The value of the willingness to pay parameter
Value

The function produces a plot of the cost-effectiveness plane. Grey dots show the simulated values for the joint distribution of the effectiveness and cost differentials. The red larger dot shows the ICER and the grey area identifies the sustainability area, i.e., the part of the plan for which the simulated values are below the willingness to pay threshold. The proportion of points in the sustainability area effectively represents the CEAC for a given value of the willingness to pay. If the comparators are more than 2 and no pairwise comparison is specified, all scatterplots are graphed using different colors.

Author(s)

Gianluca Baio

References


See Also

bcea

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c,
    ref=2,
    interventions=treats,
    Kmax=50000)

# plots the Cost-Effectiveness plane
ceplane.plot(m, comparison=1, wtp=25000)
Cost-effectiveness analysis including a parameter of risk aversion

Description

Extends the standard cost-effectiveness analysis to modify the utility function so that risk aversion of the decision maker is accounted for explicitly.

Usage

CEriskav(he, r = NULL, comparison = 1)

## S3 method for class 'fn'
CEriskav(he, r = NULL, comparison = 1)

## Default S3 method:
CEriskav(he, r = NULL, comparison = 1)

Arguments

he  
A "bcea" object containing the results of the Bayesian modelling and the economic evaluation

r  
A vector of values for the risk aversion parameter. If NULL, default values are assigned by R. The first (smallest) value (r -> 0) produces the standard analysis with no risk aversion

comparison  
In case of more than 2 interventions being analysed, selects which plot should be made. By default chooses the first possible as the comparator

Value

An object of the class "CEriskav" containing the following elements

Ur  
An array containing the simulated values for all the "known-distribution" utilities for all interventions, all the values of the willingness to pay parameter and for all the possible values of r

Urstar  
An array containing the simulated values for the maximum "known-distribution" expected utility for all the values of the willingness to pay parameter and for all the possible values of r

IBr  
An array containing the simulated values for the distribution of the Incremental Benefit for all the values of the willingness to pay and for all the possible values of r

eibr  
An array containing the Expected Incremental Benefit for each value of the willingness to pay parameter and for all the possible values of r

vir  
An array containing all the simulations for the Value of Information for each value of the willingness to pay parameter and for all the possible values of r

evir  
An array containing the Expected Value of Information for each value of the willingness to pay parameter and for all the possible values of r
The number of possible values for the parameter of risk aversion, \( r \)

The vector containing all the possible values for the parameter of risk aversion, \( r \)

**Author(s)**

Gianluca Baio

**References**


**See Also**

bcea

**Examples**

```r
# See Baio G., Dawid A.P. (2/zero.noslash/2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
effectiveness and cost
ref=2, # selects the 2nd row of (e,c)
# as containing the reference intervention
interventions=treats, # defines the labels to be associated
# with each intervention
Kmax=50000 # maximum value possible for the willingness
# to pay threshold; implies that k is chosen
# in a grid from the interval (0,Kmax)
)
#
# Define the vector of values for the risk aversion parameter, r, eg:
r <- c(0.000000000001,0.005,0.020,0.035)
#
# Run the cost-effectiveness analysis accounting for risk aversion
cr <- CEriskav(m, # uses the results of the economic evaluation
# (a "bcea" object)
r=r, # defines the vector of values for the risk
# aversion parameter
comparison=1 # if more than 2 interventions, selects the
# pairwise comparison
)
```
Description

Produces a scatterplot of the cost-effectiveness plane, with a contour-plot of the bivariate density of
the differentials of cost (y-axis) and effectiveness (x-axis)

Usage

```r
## S3 method for class 'bcea'
contour(x, comparison = 1, scale = 0.5, levels = NULL, nlevels = 4, ...)
```

Arguments

- `x`: A "bcea" object containing the results of the Bayesian modelling and the economic evaluation
- `comparison`: In case of more than 2 interventions being analysed, selects which plot should be made. By default chooses the first possible as the comparator
- `scale`: Scales the plot as a function of the observed standard deviation
- `levels`: Numeric vector of levels at which to draw contour lines
- `nlevels`: Number of levels to be plotted in the contour
- `...`: Additional arguments to `plot.window`, 'title', 'Axis' and 'box', typically graphical parameters such as 'cex.axis'

Value

Plots the cost-effectiveness plane with a scatterplot of all the simulated values from the (posterior)
bivariate distribution of (Delta_e,Delta_c), the differentials of effectiveness and costs; superimposes
a contour of the distribution and prints the estimated value of the probability of each quadrant
(combination of positive/negative values for both Delta_e and Delta_c)

Author(s)

Gianluca Baio

References


See Also

- `bcea ceplane.plot`
Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e, c=c, # defines the variables of
    ref=2, # selects the 2nd row of (e,c)
    interventions=treats, # defines the labels to be associated
    Kmax=50000 # maximum value possible for the willingness
to pay threshold; implies that k is chosen
    in a grid from the interval (0,Kmax)
)

# Plots the contour and scatterplot of the bivariate
# distribution of (Delta_e, Delta_c)
contour(m, # uses the results of the economic evaluation
    comparison=1, # if more than 2 interventions, selects the
    nlevels=4, # selects the number of levels to be
    levels=NULL, # specifies the actual levels to be plotted
    scale=0.5 # scales the bandwidths for both x- and
    y-axis (default=0.5)
)

---

contour2 

Specialised contour plot for objects in the class “bcea”

Description

Produces a scatterplot of the cost-effectiveness plane, with a contour-plot of the bivariate density
of the differentials of cost (y-axis) and effectiveness (x-axis). Also adds the sustainability area (ie
below the selected value of the willingness-to-pay threshold).

Usage

contour2(he, wtp=25000, xl=NULL, yl=NULL, comparison=1)
Arguments

he A "bcea" object containing the results of the Bayesian modelling and the economic evaluation
wtp The selected value of the willingness-to-pay. Default is 25000
xl Limits on the x-axis (default=NULL, so that R will select appropriate limits)
yl Limits on the y-axis (default=NULL, so that R will select appropriate limits)
comparison The comparison being plotted (default to 1). Not relevant if head-to-head comparison

Value

Plots the cost-effectiveness plane with a scatterplot of all the simulated values from the (posterior) bivariate distribution of (Delta_e,Delta_c), the differentials of effectiveness and costs; superimposes a contour of the distribution and prints the value of the ICER, together with the sustainability area

Author(s)

Gianluca Baio

References


See Also

bcea ceplane.plot

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
effectiveness and cost
ref=2, # selects the 2nd row of (e,c)
interventions=treats, # as containing the reference intervention
# defines the labels to be associated
Kmax=50000 # maximum value possible for the willingness
to pay threshold; implies that k is chosen in a grid from the interval (0,Kmax)
)

#
# Plots the contour and scatterplot of the bivariate distribution of (Δ_e, Δ_c)
contour2(m, # uses the results of the economic evaluation
      wtp=25000, # selects the willingness-to-pay threshold
      xl=NULL, # assumes default values
      yl=NULL  # assumes default values
)

---

### cost.GP

**Bayesian model for the cost-effectiveness of influenza vaccination**

**Description**

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

**Usage**

```r
data(Vaccine)
```

**Format**

(cost.GP is a matrix of simulations from the posterior distribution of the costs for GP visits associated with the two treatments)

**Source**


**References**


**Examples**

```r
data(Vaccine)
```
cost.hosp

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

cost.hosp is a matrix of simulations from the posterior distribution of the costs for hospitalisations associated with the two treatments

Source


References


Examples

data(Vaccine)

cost.otc

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)
Format
cost.otc is a matrix of simulations from the posterior distribution of the costs for over-the-counter medications associated with the two treatments

Source

References

Examples
data(Vaccine)

cost.time.off Bayesian model for the cost-effectiveness of influenza vaccination

Description
This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage
data(Vaccine)

Format
cost.time.off is a matrix of simulations from the posterior distribution of the costs for time off work associated with the two treatments

Source

References
Examples

data(Vaccine)

---

**cost.time.vac**

*Bayesian model for the cost-effectiveness of influenza vaccination*

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

cost.time.vac is a matrix of simulations from the posterior distribution of the costs for time needed to get the vaccination associated with the two treatments.

Source


References


Examples

data(Vaccine)
Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

cost.travel is a matrix of simulations from the posterior distribution of the costs for travel to get vaccination associated with the two treatments

Source


References


Examples

data(Vaccine)
Format

cost.trt2 is a matrix of simulations from the posterior distribution of the overall costs for second line of treatment associated with the two interventions

Source


References


Examples

data(Vaccine)

cost.trt2

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

cost.trt2

Bayesian model for the cost-effectiveness of influenza vaccination

Format

cost.trt2 is a matrix of simulations from the posterior distribution of the overall costs for second line of treatment associated with the two interventions

Source


References

Examples

data(Vaccine)

cost.vac

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

cost.vac is a matrix of simulations from the posterior distribution of the costs for vaccination

Source


References


Examples

data(Vaccine)
**Format**

e is a matrix of simulations from the posterior distribution of the clinical benefits associated with the two treatments

**Source**


**References**


**Examples**

data(Vaccine)

eib.plot

---

**Description**

Plots the Expected Incremental Benefit as a function of the willingness to pay

**Usage**

eib.plot(he,pos="topleft")

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>he</td>
<td>A &quot;bcea&quot; object containing the results of the Bayesian modelling and the economic evaluation</td>
</tr>
<tr>
<td>pos</td>
<td>The position of the legend to be included in the plot. Default value is &quot;topleft&quot;, but can be changed by the user</td>
</tr>
</tbody>
</table>

**Value**

The function produces a plot of the Expected Incremental Benefit as a function of the discrete grid approximation of the willingness to pay parameter. The break even point (ie the point in which the EIB=0, ie when the optimal decision changes from one intervention to another) is also showed. The value k* is the discrete grid approximation of the ICER

**Author(s)**

Gianluca Baio
References


See Also

bcea, ib.plot, ceplane.plot

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c,  
  ref=2,  
  interventions=treats,  
  Kmax=50000)

# Plots the Expected Incremental Benefit for the "bcea" object m
eib.plot(m)

---

evi.plot

Expected Value of Information plot

Description

Plots the Expected Value of Information against the willingness to pay

Usage

evi.plot(he)

Arguments

he A "bcea" object containing the results of the Bayesian modelling and the economic evaluation
Value

The function produces a plot of the Expected Value of Information as a function of the discrete grid approximation of the willingness to pay parameter. The break even point (ie the point in which the EIB=0, ie when the optimal decision changes from one intervention to another) is also showed.

Author(s)

Gianluca Baio

References


See Also

bcea, ceac.plot, ceplane.plot

Examples

# See Baio G., Dawid A.P. (2/zero.noslash/2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
    ref=2, # selects the 2nd row of (e,c)
    interventions=treats, # defines the labels to be associated
    Kmax=50000 # maximum value possible for the willingness
    # to pay threshold; implies that k is chosen
    # in a grid from the interval (0,Kmax)
)
#
# Plots the Expected Value of Information for the "bcea" object m
evi.plot(m)

ib.plot

Incremental Benefit distribution plot

Description

Plots the distribution of the Incremental Benefit for a given value of the willingness to pay threshold, k.
ib.plot

Usage

ib.plot(he, comparison = NULL, wtp = 25000, bw = nbw, n = 512, xlim = NULL)

Arguments

he A "bcea" object containing the results of the Bayesian modelling and the economic evaluation

comparison In the case of multiple interventions, specifies the one to be used in comparison with the reference. Default value of NULL forces R to consider the first non-reference intervention as the comparator

wtp The value of the willingness to pay threshold. Default value at 25000

bw Identifies the smoothing bandwidth used to construct the kernel estimation of the IB density.

n The number of equally spaced points at which the density is to be estimated

xlim The limits of the plot on the x-axis

Value

The function produces a plot of the distribution of the Incremental Benefit for a given value of the willingness to pay parameter. The dashed area indicates the positive part of the distribution (i.e., when the reference is more cost-effective than the comparator)

Author(s)

Gianluca Baio

References


See Also

bcea, ib.plot, ceplane.plot

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
    ref=2, # selects the 2nd row of (e,c)
mixedAn

Cost-effectiveness analysis when multiple (possibly non cost-effective) interventions are present on the market

Description

Runs the cost-effectiveness analysis, but accounts for the fact that more than one intervention is present on the market

Usage

mixedAn(he, mkt.shares = NULL)

## S3 method for class 'fn'
mixedAn(he, mkt.shares = NULL)

## Default S3 method:
mixedAn(he, mkt.shares = NULL)

Arguments

he A "bcea" object containing the results of the Bayesian modelling and the economic evaluation

mkt.shares A vector of market shares associated with the interventions. Its size is the same as the number of possible comparators. By default, assumes uniform distribution for each intervention

Value

Creates an object in the class "mixedAn" which contains the results of the health economic evaluation in the mixed analysis case
mixedAn

Ubar
An array with the simulations of the "known-distribution" mixed utilities, for each value of the discrete grid approximation of the willingness to pay parameter

OL.star
An array with the simulations of the distribution of the Opportunity Loss for the mixed strategy, for each value of the discrete grid approximation of the willingness to pay parameter

evi.star
The Expected Value of Information for the mixed strategy, for each value of the discrete grid approximation of the willingness to pay parameter

k
The discrete grid approximation of the willingness to pay parameter used for the mixed strategy analysis

Kmax
The maximum value of the discrete grid approximation for the willingness to pay parameter

step
The step used to form the grid approximation to the willingness to pay

ref
The numeric index associated with the intervention used as reference in the analysis

comp
The numeric index(es) associated with the intervention(s) used as comparator(s) in the analysis

mkt.shares
The vector of market shares associated with each available intervention

n.comparisons
The total number of pairwise comparisons available

interventions
A vector of labels for all the interventions considered

evi
The vector of values for the "optimal" Expected Value of Information, as a function of the willingness to pay

The function produces also a graph showing the difference between the "optimal" version of the EVPI (when only the most cost-effective intervention is included in the market) and the mixed strategy one (when more than one intervention is considered in the market)

Author(s)

Gianluca Baio

References


See Also

bcea
Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
# effectiveness and cost
  ref=2, # selects the 2nd row of (e,c)
  interventions=treats, # defines the labels to be associated
  Kmax=50000 # maximum value possible for the willingness
            # to pay threshold; implies that k is chosen
            # in a grid from the interval (0,Kmax)
)
#
ma <- mixedAn(m, # uses the results of the mixed strategy
  # analysis (a "mixedAn" object)
  mkt.shares=NULL # the vector of market shares can be defined
                   # externally. If NULL, then each of the T
                   # interventions will have 1/T market share
)

---

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

N is the number of subjects in the reference population

Source

References


Examples

data(Vaccine)

<table>
<thead>
<tr>
<th>N.outcomes</th>
<th>Bayesian model for the cost-effectiveness of influenza vaccination</th>
</tr>
</thead>
</table>

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

N.outcomes is the number of clinical outcomes analysed

Source


References


Examples

data(Vaccine)
N.resources

Bayesian model for the cost-effectiveness of influenza vaccination

Description
This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage
data(Vaccine)

Format
N.resources is the number of health-care resources under study

Source

References

Examples
data(Vaccine)

plot.bcea

Summary plot of the health economic analysis

Description
Plots in a single graph the Cost-Effectiveness plane, the Expected Incremental Benefit, the CEAC and the EVPI

Usage
## S3 method for class 'bcea'
plot(x,...)
Arguments

x  A "bcea" object containing the results of the Bayesian modelling and the economic evaluation

... Arguments to be passed to methods, such as graphical parameters (see ’par’)

Value

The function produces a plot with four graphical summaries of the health economic evaluation

Author(s)

Gianluca Baio

References


See Also

bcea, ceplane.plot, ceac.plot, evi.plot

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e, c=c, # defines the variables of effectiveness and cost
           ref=2, # selects the 2nd row of (e,c)
           interventions=treats, # defines the labels to be associated with each intervention
           Kmax=50000 # maximum value possible for the willingness to pay threshold; implies that k is chosen in a grid from the interval (0,Kmax)
)
#
# Plots the summary plots for the "bcea" object m
plot(m)
plot.CEriskav

Summary plot of the health economic analysis when risk aversion is included

Description

Plots the EIB and the EVPI when risk aversion is included in the utility function

Usage

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

Arguments

x An object of the class "CEriskav", containing the results of the economic analysis performed accounting for a risk aversion parameter (obtained as output of the function CEriskav)
...
Arguments to be passed to methods, such as graphical parameters (see ’par’)

Value

The function produces two plots for the risk aversion analysis. The first one is the EIB as a function of the discrete grid approximation of the willingness parameter for each of the possible values of the risk aversion parameter, r. The second one is a similar plot for the EVPI

Author(s)

Gianluca Baio

References


See Also

bcea, CEriskav
Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c,
  ref=2,
  interventions=treats,
  Kmax=50000)

# Define the vector of values for the risk aversion parameter, r, eg:
r <- c(0.000000000001,0.005,0.020,0.035)

# Run the cost-effectiveness analysis accounting for risk aversion
cr <- CEriskav(m,
  r=r,
  comparison=1)

# Now produce the plots
plot(cr)

plot.mixedAn

Summary plot of the health economic analysis when the mixed analysis
is considered

Description

Compares the optimal scenario to the mixed case in terms of the EVPI

Usage

## S3 method for class 'mixedAn'
plot(x, y.limits = NULL, ...)

Arguments

x        An object of the class "mixedAn", given as output of the call to the function mixedAn()

y.limits Range of the y-axis for the graph. The default value is NULL, in which case the maximum range between the optimal and the mixed analysis scenarios is considered

...    Arguments to be passed to methods, such as graphical parameters (see 'par')

Value

The function produces a graph showing the difference between the "optimal" version of the EVPI (when only the most cost-effective intervention is included in the market) and the mixed strategy one (when more than one intervention is considered in the market)

Author(s)

Gianluca Baio

References


See Also

bcea, mixedAn

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the # Bayesian model and economic problem # # Load the processed results of the MCMC simulation model data(Vaccine) # # Runs the health economic evaluation using BCEA m <- bcea(e=e,c=c, # defines the variables of # effectiveness and cost ref=2, # selects the 2nd row of (e,c) interventions=treats, # defines the labels to be associated # with each intervention Kmax=50000 # maximum value possible for the willingness to pay threshold; implies that k is chosen # in a grid from the interval (0,Kmax) )
QALYs.adv <- mixedAn(m, # uses the results of the mixed strategy
                   # analysis (a "mixedAn" object)
mkt.shares=NULL # the vector of market shares can be defined
                   # externally. If NULL, then each of the T
                   # interventions will have 1/T market share
}

# Can also plot the summary graph
plot(ma)

---

QALYs.adv

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

QALYs.adv is a vector from the posterior distribution of the QALYs associated with advert events

Source


References


Examples

data(Vaccine)
QALYs.death

Bayesian model for the cost-effectiveness of influenza vaccination

Description
This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage
data(Vaccine)

Format
QALYs.death is a vector from the posterior distribution of the QALYs associated with death

Source

References

Examples
data(Vaccine)

QALYs.hosp

Bayesian model for the cost-effectiveness of influenza vaccination

Description
This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage
data(Vaccine)

Format
QALYs.hosp is a vector from the posterior distribution of the QALYs associated with hospitalisation
Source

References

Examples
data(Vaccine)

QALYs.inf

Bayesian model for the cost-effectiveness of influenza vaccination

Description
This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage
data(Vaccine)

Format
QALYs.inf is a vector from the posterior distribution of the QALYs associated with influenza infection.

Source

References

Examples
data(Vaccine)
QALYs.pne

Bayesian model for the cost-effectiveness of influenza vaccination

Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

QALYs.pne is a vector from the posterior distribution of the QALYs associated with pneumonia

Source


References


Examples

data(Vaccine)

sim.table

Table of simulations for the health economic model

Description

Using the input in the form of MCMC simulations and after having run the health economic model, produces a summary table of the simulations from the cost-effectiveness analysis

Usage

sim.table(he, wtp = 25000)
Arguments

he A "bcea" object containing the results of the Bayesian modelling and the economic evaluation
wtp The value of the willingness to pay threshold to be used in the summary table

Value

Produces the following elements

Table A table with the simulations from the economic model
names.cols A vector of labels to be associated with each column of the table
wtp The selected value of the willingness to pay
ind.table The index associated with the selected value of the willingness to pay threshold in the grid used to run the analysis

Author(s)

Gianluca Baio

References


See Also

bcea

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
    ref=2, # selects the 2nd row of (e,c)
    interventions=treats, # as containing the reference intervention
    Kmax=50000 # maximum value possible for the willingness
    # to pay threshold; implies that k is chosen
    # in a grid from the interval (0,Kmax)
)
# Now can save the simulation exercise in an object using sim.table()

```
st <- sim.table(m, # uses the results of the economic evaluation
                   # (a "bcea" object)
                   wtp=25000 # selects the particular value for k
)
```

# The table can be explored. For example, checking the
# element 'Table' of the object 'st'

---

**summary.bcea**

*Summary method for objects in the class "bcea"*

### Description

Produces a table printout with some summary results of the health economic evaluation

### Usage

```
## S3 method for class 'bcea'
summary(object, wtp = 25000, ...)
```

### Arguments

- **object**: A "bcea" object containing the results of the Bayesian modelling and the economic evaluation
- **wtp**: The value of the willingness to pay threshold to be used in the summary table
- **...**: Additional arguments affecting the summary produced

### Value

Prints a summary table with some information on the health economic output and synthetic information on the economic measures (EIB, CEAC, EVPI)

### Author(s)

Gianluca Baio

### References


### See Also

*bcea*
Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the
# Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e,c=c, # defines the variables of
    ref=2, # selects the 2nd row of (e,c)
    interventions=treats, # defines the labels to be associated
    Kmax=50000 # maximum value possible for the willingness
to pay threshold; implies that k is chosen
    in a grid from the interval (0,Kmax)
)
#
summary(m, # uses the results of the economic evaluation
    wtp=25000 # selects the particular value for k
)

summary.mixedAn

Summary methods for objects in the class "mixedAn" (mixed analysis)

Description

Prints a summary table for the results of the mixed analysis for the economic evaluation of a given model

Usage

## S3 method for class 'mixedAn'
summary(object, wtp = 25000,...)

Arguments

object An object of the class "mixedAn", which is the results of the function mixedAn(), generating the economic evaluation of a set of interventions, considering given market shares for each option
wtp The value of the willingness to pay choosen to present the analysis
... Additional arguments affecting the summary produced
Value

Produces a table with summary information on the loss in expected value of information generated by the inclusion of non-cost-effective interventions in the market

Author(s)

Gianluca Baio

References


See Also

bcea, mixedAn

Examples

# See Baio G., Dawid A.P. (2011) for a detailed description of the # Bayesian model and economic problem
#
# Load the processed results of the MCMC simulation model
data(Vaccine)
#
# Runs the health economic evaluation using BCEA
m <- bcea(e=e, c=c, # defines the variables of # effectiveness and cost
  ref=2, # selects the 2nd row of (e, c)
  interventions=treats, # defines the labels to be associated # with each intervention
  Kmax=50000 # maximum value possible for the willingness # to pay threshold; implies that k is chosen # in a grid from the interval (0, Kmax)
)
#
ma <- mixedAn(m, # uses the results of the mixed strategy # analysis (a "mixedAn" object)
  mkt.shares=NULL # the vector of market shares can be defined # externally. If NULL, then each of the T # interventions will have 1/T market share
)
#
# Prints a summary of the results
summary(ma, # uses the results of the mixed strategy analysis # (a "mixedAn" object)
  wtp=25000 # selects the relevant willingness to pay
Description

This data set contains the results of the Bayesian analysis used to model the clinical output and the costs associated with an influenza vaccination.

Usage

data(Vaccine)

Format

treats is a vector of labels associated with the two treatments

Source


References


Examples

data(Vaccine)
Source

References

Examples
data(Vaccine)
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