Package 'Diel.Niche'

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Type Package

Title Diel niche modeing via multinomial inequalities

Description Functions to simulate data, fit and compare models, and plot results relating to estimating probabilties of diel modality.

Version 0.0.1.0

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RoxygenNote 7.2.0

Encoding UTF-8

License GPL-3

Depends R (>= 3.4)

Imports stats (>= 4.2.0),
MASS (>= 7.3-56),
utils (>= 4.2.0),
coda (>= 0.19-4),
multinomineq (>= 0.2.3),
plotly (>= 4.10.0)

Suggests knitr (>= 1.39),
rmarkdown (>= 2.14),
bayesplot (>= 1.9.0),
ggplot2 (>= 3.3.6)

VignetteBuilder knitr

R topics documented:

`diel.fit` *Diel Modeling*

Description

Diel model hypotheses evaluation and parameter estimation. This is essentially a wrapper function for functions provided by the package multinomineq.

Usage

```
diel.fit(
  y,
  hyp.set,
  bf.fit = TRUE,
  diel.setup = NULL,
  prior = NULL,
  n.mcmc = 50000,
  burnin = 10000,
  prints = TRUE,
  alt.optim = FALSE
)
```

Arguments

y	a matrix of frequencies of animal detections. Each row is a replicate dataset. Rows should be limited when using P-s hyps (1 or 2). The matrix should always be three columns in this order: twilight, day, night.
hyp.set	Vector of diel hypotheses names representing hypotheses set or individual hypotheses.
bf.fit	If TRUE, will calculate bayes factors for the model sit. Default is TRUE.
diel.setup	A list of multinomial inequalities (Matrix A and vector b), representing diel hypotheses setup using the function 'diel.ineq'. If not provided, it will use the defaults of the diel.ineq function.
prior	Prior probabilities for models used in bayes factors. Defaults to equal among models.
n.mcmc	Number of mcmc iterations.
burnin	Burn-in number of mcmc iterations.
prints	Whether to print messages about model fitting.
alt.optim	Default is FALSE. If TRUE, uses an alternative approach to derive the bayes factors. It can be more stable, but takes a bit longer.

Value

A list of outputs, including bayes factors for a model set, model bayes factor inputs, posterior samples, warning indicator, and posterior predictive checks.

A list of outputs

bf.table	Bayes factor for hyopthesis set
bf	A list of ordered individual model bayes factor inputs
post.samp	A list of ordered matrices for model posterior distributions
ms.model	The name of the most supported model detrerminded by the maximum probability of support from the bayes factors
ppc	A list of ordered model posterior predictive check output
ms.ppc	Posterior predictive check output from the most supported model
post.samp.ms.model	Posterior distributions of the most supported model

Required libraries: multinomineq, retry, MASS

diel.ineq *Inequality Setup*

Description

Multinomial model inequalities for diel hypotheses

Usage

```
diel.ineq(
  e = NULL,
  e.D = NULL,
  e.Dn = NULL,
  e.Dcr = NULL,
  e.N = NULL,
  e.Nd = NULL,
  e.Ncr = NULL,
  e.CR = NULL,
  e.CRd = NULL,
  e.CRn = NULL,
  e.EC = NULL,
  e.AC = NULL,
  xi.D = NULL,
  xi.Dn = NULL,
  xi.Dcr = NULL,
  xi.N = NULL,
  xi.Nd = NULL,
  xi.Ncr = NULL,
  xi.CR = NULL,
  xi.CRd = NULL,
  xi.CRn = NULL,
  xi.EC = NULL,
  p.avail = NULL
)
```

Arguments

e	Default is 0.05. A single value of variation for probabilities. If specified, it will be applied to all hypotheses, regardless of whether individual epsilon hypotheses values are specified.
e.D	Default is 0.05. A single value of variation for the Diurnal hypothesis.
e.Dn	Default is 0.05. A single value of variation for the Diurnal-nocturnal hypothesis.
e.Dcr	Default is 0.05. A single value of variation for the Diurnal-crepuscular hypothesis.
e.N	Default is 0.05. A single value of variation for the Nocturnal hypothesis.
e.Nd	Default is 0.05. A single value of variation for the Nocturnal-diurnal hypothesis.
e.Ncr	Default is 0.05. A single value of variation for the Nocturnal-crepuscular hypothesis.
e.CR	Default is 0.05. A single value of variation for the Crepuscular hypothesis.

e.CRd	Default is 0.05. A single value of variation for the Crepuscular-diurnal hypothesis.
e.CRn	Default is 0.05. A single value of variation for the Crepuscular-nocturnal hypothesis.
e.EC	Default is 0.05. A single value of variation for the Evan Cathemeral hypothesis.
e.AC	Default is 0.10. A single value of variation for the Available Cathemeral hypothesis.
xi.D	Default c(0.90,0.95). A vector of the lower threshold value and the most likely value, respectively for the Diurnal hypothesis.
xi.Dn	Default c(0.80,0.20,0.90,0.10). A vector of the lower threshold value for the primary probability, upper threshold value of the secondary probability, most likely primary probability, and most likely secondary probability value, respectively for the Diurnal-nocturnal hypothesis.
xi.Dcr	Default c(0.80,0.2,0.90,0.10). A vector of the lower threshold value for the primary probability, upper threshold value of the secondary probability, most likely primary probability, and most likely secondary probability value, respectively for the Diurnal-crepuscular hypothesis.
xi.N	Default c(0.80,0.90). A vector of the lower threshold value and most likely value,, respectively for the Nocturnal hypothesis.
xi.Nd	Default c(0.80,0.2,0.90,0.10). A vector of the lower threshold value for the primary probability, upper threshold value of the secondary probability, most likely primary probability, and most likely secondary probability value, respectively for the Nocturnal-diurnal hypothesis.
xi.Ncr	Default c(0.80,0.2,0.90,0.10). A vector of the lower threshold value for the primary probability, upper threshold value of the secondary probability, most likely primary probability, and most likely secondary probability value, respectively for the Nocturnal-crepuscular hypothesis.
xi.CR	Default c(0.80,0.90). A vector of the lower threshold value and most likely value,, respectively for the Crepuscular hypothesis.
xi.CRd	Default c(0.80,0.2,0.90,0.10). A vector of the lower threshold value for the primary probability, upper threshold value of the secondary probability, most likely primary probability, and most likely secondary probability value, respectively for the Nocturnal-crepuscular hypothesis.
xi.CRn	Default c(0.80,0.2,0.90,0.10). A vector of the lower threshold value for the primary probability, upper threshold value of the secondary probability, most likely primary probability, and most likely secondary probability value, respectively for the Crepuscular-nocturnal hypothesis.
xi.EC	Default c(0.33). A single value of the available amount of time in all three diel periods.
p.avail	Default c(0.166666,0.4166667). A vector of the available time in the periods of crepuscular and diurnal. Nighttime availability is found by subtraction.

Value

diel.hyp A list of diel hypotheses as multinomial inequalities.

inputs	Includes all inputted values; epsilon, xi, and p.avail.
D.th, D.max, D.var, Dn.th, Dn.max, Dn.var, Dc.max, Dcr.th, Dcr.max,Dcr.var, N.th, N.max, N.var, Nd.th,	Each is a list of three elements: Hypotheis Descriptive Name, A matrix, and b vector.

diel.plot *Plot Diel Hypotheis*

Description

Plots the diel niche space and posterior disribution of a fitted model.

Usage

```
diel.plot(hyp, diel.setup = NULL, posteriors = NULL)
```

Arguments

hyp	hypothesis code name to use
diel.setup	Defaults to using diel.ineq function. A list of multinomial inequalities (Matrix A and vector b), representing diel hypotheses setup using the function 'diel.ineq'.
posteriors	A single models MCMC output from the function 'diel.hypotheses.func'.

Value

A plotly 3d plot

find.prob.hyp *Inequality Setup*

Description

Function that inputs a given hypothesis and outputs as many possible probability sets that match the diel hypothesis (i.e., satisfies the inequality constrints).

Usage

```
find.prob.hyp(hyp, diel.setup = NULL)
```

Arguments

hyp	Hypothesis name: D.th, D.max, D.var, Dn.th, Dn.max, Dn.var, Dc.th, Dc.max, Dc.var, Dcr.th, Dcr.max,Dcr.var, N.th, N.max, N.var, Nd.th, Nd.max, Nd.var, Nc.th, Nc.max, Nc.var, Ncr.th, Ncr.max, Ncr.var, CR.th, CR.max, CR.var,CRd.th,' CRd.max, CRd.var, CRn.th, CRn.max, CRn.var, CRc.th, CRc.max, CRc.var,'EC.th, EC.var, AC.var.
diel.setup	A list of multinomial inequalities (Matrix A and vector b), representing diel hypotheses setup using the function 'diel.ineq'.

Value

A matrix of probabilities that match hypothesis in variable hyp

hyp.sets *Hypothesis Sets*

Description

Call defined hypotheses sets

Usage

```
hyp.sets(hyp.in = NULL)
```

Arguments

hyp.in	Hypothesis set code names

Value

Names of hypotheses for the set. If NULL, the names of all hypotheses sets are returned.

sim.diel *Simulate*

Description

Simulate diel data

Usage

```
sim.diel(n.sim = 1, reps = 1, n.sample = 100, hyp, diel.setup = NULL)
```

Arguments

n.sim	The number of simulated datasets
reps	The number of replicates of crepuscular, daytime, and nocturnal for each simulated dataset
n.sample	The number of total samples for a given simulation
hyp	The hypothesis to simulate data from
diel.setup	Multinomial inequalities for hypotheses setup using function 'diel.ineq'.

Value

A list of outputs

y	Matrix of simulated datasets
p	Probabilities used to simulate the data

Required libraries: stats

what.hyp *Hypothesis Codes*

Description

Call defined hypotheses sets

Usage

```
what.hyp(hyp.in = NULL)
```

Arguments

hyp.in	hypothesis code name, NULL, or ?

Value

Full name of hypothesis if code name is provided. If NULL a general description of hypotheses is provided. If ? then hypotheses code names are provided.