Package ‘maxnet’

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Type Package

Title Fitting ‘Maxent’ Species Distribution Models with ‘glmnet’

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Author Steven Phillips

Maintainer Steven Phillips <mrmaxent@gmail.com>

Imports glmnet

Description Procedures to fit species distributions models from occurrence records and environmental variables, using ‘glmnet’ for model fitting. Model structure is the same as for the 'Maxent' Java package, version 3.4.0, with the same feature types and regularization options. See the 'Maxent' website <http://biodiversityinformatics.amnh.org/open_source/maxent> for more details.

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URL https://github.com/mrmaxent/maxnet

RoxygenNote 5.0.1

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Description

Maxent species distribution modeling using glmnet for model fitting

Details

Package: maxnet
Type: Package
Version: 0.1
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Create Maxent models for species distributions from presence and background data, using the glmnet package to do the model fitting. By default, feature sets and regularization are the same as the Maxent java application.

Author(s)

Steven Phillips <phillips@research.att.com>

References

Phillips & Dudik Fithian & Hastie Glmnet

bradypus

Occurrence records and background data for the brown-throated three-toed sloth, Bradypus variegatus

Description

A dataset containing environmental data at 116 Bradypus variegatus occurrence points and 1000 background points in South and Central America. Occurrence data are from Anderson and Handley (2001); see Phillips et al. (2006) for descriptions of the predictor variables.

Usage

bradypus

Format

An object of class data.frame with 1116 rows and 15 columns.
References


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hinge

Maxent feature classes

Description

Create and evaluate Maxent’s feature classes

Usage

hinge(x, nknots = 50)
thresholds(x, nknots=50)
categorical(x)

Arguments

x          a predictor: a factor for categorical, otherwise numeric.
nknots     number of knots.

Value

These functions are typically called by model.matrix rather than directly by a user. hinge, thresholds and categorical return a matrix with a column for each feature of the specified type. hinge creates 2*nknots-2 hinge features, half with min=min(x) and half with max=max(x), and knots evenly spaced between min(x) and max(x). A hinge feature h(min,knot) or h(knot,max) is 0 if the predictor is below the first argument, 1 if the predictor is above the second argument, and linearly interpolated inbetween. A threshold feature is 1 if the predictor is above the knot, 0 otherwise. A categorical feature is 1 if the predictor matches the category and 0 otherwise.

Author(s)

Steven Phillips

Examples

library(maxnet)
data(bradypus)
hinge(bradypus$ann,nknots=10)
categorical(bradypus$ecoreg)
maxnet  Maxent over glmnet

Description

Maxent species distribution modeling using glmnet for model fitting

Usage

maxnet(p, data, f = maxnet.formula(p, data), regmult = 1,
       regfun = maxnet.default.regularization, ...)
maxnet.default.regularization(p, m)

## S3 method for class 'maxnet'
predict(object, newdata, clamp=T, type=c("link","exponential","cloglog","logistic"), ...)
## S3 method for class 'formula'
maxnet(p, data, classes="default")

Arguments

p          a vector of 1 (for presence) or 0 (for background).
data       a matrix or data frame of predictor variables.
f         a formula to determine the features to be used.
regmult    a constant to adjust regularization.
regfun     a function to compute regularization constant for each feature.
object     an object of class "maxnet", i.e., a fitted model.
newdata    values of predictor variables to predict to.
m         a matrix of feature values.
clamp      if true, predictors and features are restricted to the range seen during model training.
type       type of response required.
classes    continuous feature classes desired, either "default" or any subset of "lqph" (for example, "lh").
...         not used.

Details

Using lp for the linear predictor and entropy for the entropy of the exponential model over the background data, the values plotted on the y-axis are:

lp if type is "link".
exp(lp) if type is "exponential".
1-exp(-exp(entropy+lp)) if type is "cloglog".
1/(1+exp(-entropy-lp)) if type is "logistic".
Value

Maxnet returns an object of class maxnet, which is a list consisting of a glmnet model with the following elements added:

- **betas**: nonzero coefficients of the fitted model
- **alpha**: constant offset making the exponential model sum to one over the background data
- **entropy**: entropy of the exponential model
- **penalty.factor**: the regularization constants used for each feature
- **featuremins**: minimum of each feature, to be used for clamping
- **featuremaxs**: maximum of each feature, to be used for clamping
- **varmin**: minimum of each predictor, to be used for clamping
- **varmax**: maximum of each predictor, to be used for clamping
- **samplemeans**: mean of each predictor over samples (majority for factors)
- **levels**: levels of each predictor that is a factor

Author(s)

Steven Phillips

Examples

```r
library(maxnet)
data(bradypus)
p <- bradypus$presence
data <- bradypus[, -1]
mod <- maxnet(p, data)
plot(mod, type = "cloglog")
mod <- maxnet(p, data, maxnet.formula(p, data, classes = "lq"))
plot(mod, "tmp6190_ann")
```

Description

Create response plots for each predictor in a maxnet model

Usage

```r
# S3 method for class 'maxnet'
plot(x, vars = names(x$samplemeans), common.scale = T,
     type = c("link", "exponential", "cloglog", "logistic"), ylab = NULL, ...)
response.plot(mod, v, type, mm = mod$samplemeans, min = mod$varmin[v], max = mod$varmax[v],
              levels = unlist(mod$levels[v]), plot = T, ylim=NULL, ylab=NULL)
```
Arguments

- **x**: an object of class `maxnet`, i.e., a fitted model.
- **vars**: vector of predictors for which response plots are desired.
- **common.scale**: if true, all plots use the same scale on the y-axis.
- **type**: type of response to plot on y-axis.
- **ylab**: label for y-axis.
- **mod**: a fitted model, must be of type `maxnet` if default values used for other arguments.
- **v**: name of variable to be plotted.
- **mm**: sample means (or majorities for factors) for predictors; predictors other than `v` are given these values.
- **min**: minimum value of `v`; determines range of x-axis
- **max**: maximum value of `v`; determines range of x-axis
- **levels**: if `v` is a factor, determines levels to be plotted
- **plot**: if false, don’t draw the plot
- **ylim**: passed to `plot()`
- **...**: not used

Value

If `plot` is false, return a vector of y values, one for each factor or 100 ranging from \( \text{min} - 0.1 \times (\text{max} - \text{min}) \) to \( \text{max} + 0.1 \times (\text{max} - \text{min}) \).

Author(s)

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