Package 'countgmifs'

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Title Discrete Response Regression for High-Dimensional Data

Version 0.0.2

Description Provides a function for fitting Poisson and negative binomial regression models when the number of parameters exceeds the sample size, using the the generalized monotone incremental forward stagewise method.

Depends R (>= 3.5.0), MASS

License GPL (>= 2)

Encoding UTF-8

LazyData true

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Contents

countgmifs-package *Discrete Response Regression for High-Dimensional Data: Discrete Response Generalized Monotone Incremental Forward Stagewise Regression*

Description

This package provides a function that fits a Poisson or negative binomial model when the number of parameters exceeds the sample size, using the the generalized monotone incremental forward stagewise method.

Details

The DESCRIPTION file:

Package:	countgmifs
Title:	Discrete Response Regression for High-Dimensional Data
Version:	0.0.2
Authors@R:	person("Kellie", "Archer", email = "archer.43@osu.edu", role = c("aut", "cre"))
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This package contains functions for fitting a penalized discrete response model (either negative binomial or Poisson) and extracting estimated coefficients, predictions, and plots. The model and

methods can be used when the response to be predicted is discrete, and is particularly relevant when there are more covariates than observations.

Author(s)

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References

Makowski M., Archer K.J. (2015) Generalized monotone incremental forward stagewise method for modeling count data: application predicting micronuclei frequency. *Cancer Informatics*, 14(Suppl 2), 97–105.

`coef.countgmifs` *Extract Model Coefficients.*

Description

A generic function which extracts the model coefficients from a fitted model object fit using `countgmifs`

Usage

```
## S3 method for class 'countgmifs'
coef(object, model.select = "BIC", ...)
```

Arguments

`object`	an `countgmifs` fitted object.
`model.select`	when `x` is specified any model along the solution path can be selected. The default is `model.select="BIC"` which calculates the predicted values using the coefficients from the model having the lowest BIC. Other options are `model.select="AIC"` or any numeric value from the solution path.
`...`	other arguments.

See Also

See Also `countgmifs`, `predict.countgmifs`, `summary.countgmifs`, `plot.countgmifs`

countgmifs *Discrete Response Generalized Monotone Incremental Forward Stagewise Regression.*

Description

This function can fit a Poisson or negative binomial model when the number of parameters exceeds the sample size, using the the generalized monotone incremental forward stagewise method.

Usage

```
countgmifs(formula, data, x = NULL, offset, subset, epsilon = 0.001,
  tol = 1e-05, scale = TRUE, verbose = FALSE, family = "nb", ...)
```

Arguments

formula	an object of class "formula" (or one that can be coerced to that class): a symbolic description of the model to be fitted. The left side of the formula is the ordinal outcome while the variables on the right side of the formula are the covariates that are not included in the penalization process. Note that if all variables in the model are to be penalized, an intercept only model formula should be specified.
data	an optional data frame, list or environment (or object coercible by as.data.frame to a data frame) containing the variables in the model.
x	an optional matrix of predictors that are to be penalized in the model fitting process.
offset	this can be used to specify an a priori known component to be included during fitting (e.g., denominator term). This should be NULL or a numeric vector of length equal to the number of cases.
subset	an optional vector specifying a subset of observations to be used in the fitting process.
epsilon	small incremental amount used to update a coefficient at a given step.
tol	the iterative process stops when the difference between successive log-likelihoods is less than this specified level of tolerance.
scale	logical, if TRUE (default) the penalized predictors are centered and scaled.
verbose	logical, if TRUE the step number is printed to the console (default is FALSE).
family	the type of count response model to be fit. Default is 'nb' for negative binomial; user can also specify 'poisson'.
...	other arguments.

See Also

See Also coef.countgmifs, summary.countgmifs, predict.countgmifs, plot.countgmifs

Examples

```
set.seed(26)
n <- 50 # Sample size
p <- 500 # Number of covariates
intercept<- .5
#True parameter values for the 500 covariates
beta<- c(log(1.5), log(1.5), -log(1.5), -log(1.5), -log(1.5), rep(0,495))
alpha<- 0.5 # Intercept
x<- matrix(rnorm(n*p,0,1), nrow=n, ncol=p, byrow=TRUE) #Covariate values
colnames(x)<- paste("Var",1:p, sep="")
mu<- exp(intercept + crossprod(t(x),beta))
y<- rnbinom(n=n, size=1/alpha ,mu=mu) # Discrete response
data<- data.frame(y,x)
nb<-countgmifs(y ~ 1 , data=data, offset=NULL, x=x, epsilon=0.01, tol=0.001,
       scale=TRUE, verbose=FALSE)
coef.AIC<-coef(nb, model.select="AIC")
coef.AIC[coef.AIC!=0]
predict(nb, model.select="AIC")
plot(predict(nb, model.select="AIC"), y)
plot(nb)
```

`plot.countgmifs` *Plot Solution Path for a Count GMIFS Fitted Model.*

Description

This function plots either the coefficient path, the AIC, or the log-likelihood for a fitted `countgmifs` object.

Usage

```
## S3 method for class 'countgmifs'
plot(x, type = "trace", xlab = NULL, ylab = NULL,
  main = NULL, ...)
```

Arguments

`x`	a `countgmifs` object.
`type`	default is `"trace"` which plots the coefficient path for the fitted object. Also available are `"AIC"`, `"BIC"`, and `"logLik"`.
`xlab`	a default x-axis label will be used which can be changed by specifying a user-defined x-axis label.
`ylab`	a default y-axis label will be used which can be changed by specifying a user-defined y-axis label.
`main`	a default main title will be used which can be changed by specifying a user-defined main title.
`...`	other arguments.

See Also

See Also countgmifs, coef.countgmifs, summary.countgmifs, predict.countgmifs

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predict.countgmifs *Predict Outcome for Count GMIFS Fitted Model.*

Description

This function returns a numeric vector that is the predicted response from the countgmifs fitted object.

Usage

```
## S3 method for class 'countgmifs'
predict(object, neww = NULL, newdata, newx = NULL,
  model.select = "BIC", newoffset=NULL, ...)
```

Arguments

object	an ordinalgmifs fitted object.
neww	an optional formula that includes the unpenalized variables to use for predicting the response. If omitted, the training data are used.
newdata	an optional data.frame that minimally includes the unpenalized variables to use for predicting the response. If omitted, the training data are used.
newx	an optional matrix of penalized variables to use for predicting the response. If omitted, the training data are used.
model.select	when x is specified any model along the solution path can be selected. The default is model.select="BIC" which calculates the predicted values using the coefficients from the model having the lowest BIC. Other options are model.select="AIC" or any numeric value from the solution path.
newoffset	If an offset is used in the fit, then one must be supplied for making predictions.
...	other arguments.

See Also

See Also countgmifs, coef.countgmifs, summary.countgmifs, plot.countgmifs

print.countgmifs *Print the Contents of a Count GMIFS Fitted Object.*

Description

This function prints the names of the list objects from an countgmifs fitted model

Usage

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

Arguments

x	an countgmifs fitted object.
...	other arguments.

See Also

See Also countgmifs, coef.countgmifs, summary.countgmifs, plot.countgmifs

summary.countgmifs *Summarize a Count GMIFS Object.*

Description

Prints the following items extracted from the fitted countgmifs object: the family used and model parameter estimates. For models that include x, the parameter estimates, AIC, BIC, and log-likelihood are printed for indicated model.select step or if model.select is not supplied the step at which the minimum BIC was observed.

Usage

```
## S3 method for class 'countgmifs'
summary(object, model.select = "BIC", ...)
```

Arguments

object	an countgmifs fitted object.
model.select	when x is specified any model along the solution path can be selected. The default is model.select="BIC" which calculates the predicted values using the coefficients from the model having the lowest BIC. Other options are model.select="AIC" or any numeric value from the solution path.
...	other arguments.

See Also

See Also countgmifs, coef.countgmifs, predict.countgmifs, plot.countgmifs

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