Package ‘ordDisp’

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**Type** Package

**Title** Separating Location and Dispersion in Ordinal Regression Models

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**Author** Moritz Berger

**Maintainer** Moritz Berger <moritz.berger@stat.uni-muenchen.de>

**Description** Estimate location-shift models or rating-scale models accounting for response styles (RSRS) for the regression analysis of ordinal responses.

**Depends** VGAM,methods

**License** GPL-2

**LazyLoad** yes

**RoxygenNote** 5.0.1

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**R topics documented:**

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ordDisp-class

Separating Location and Dispersion in Ordinal Regression Models

Description

A function to estimate the location-shift model or rating-scale model accounting for response styles (RSRS) for the regression analysis of ordinal responses. The model allows to account for differing variability in subgroups of the population. The model explicitly links varying dispersion (or response behaviour) to explanatory variables. The basic models are described in Tutz and Berger (2016a) and Tutz and Berger (2016b).

Usage

ordDisp(formula, data, family = c("cumulative", "acat"), scaling = TRUE,
middle = TRUE, m = NULL, ...)

Arguments

formula Object of class formula: a symbolic description of the model to be fitted. See details.
data Data.frame of class data.frame containing the variables of the model.
family Type of link function that is used to link the mean responses to the linear predictors of the model; ordDisp currently allows only one out of "cumulative" and "acat". See details.
scaling If true, the thresholds of the location-shift model are shifting by using scale values for the widening of the intervals between two thresholds.
middle If true, the model expects a symmetric response of the form 'strongly disagree', 'moderately disagree', ..., 'moderately agree', 'strongly agree'.
m Middle category of the (non-symmetric) response, chosen for the model. Only relevant, if middle=FALSE.
... Further arguments passed to or from other methods

Details

The formula has to have the form response ~ x-variables|z-variables, where response is the name of the ordinal response variable, x-variables are the terms that specify the location (or content-related) effects of the model and z-variables are the terms that specify the dispersion (or response-style) effects.

If all the variables are entered in both parts of the model, the right hand side of the formula can, for example, have the form x1+...+xp|x1+...+xp. If the second part is omitted, a simple model without dispersion (or response-style) effects is fitted.

Function ordDisp internally calls vglm from package VGAM. Argument family is passed to vglm. Currently two link functions are implemented.
• "cumulative" to estimate a cumulative model of the form

\[ P(y \leq r)/P(y > r) = \eta_r \]

• "acat" to estimate a adjacent-categories model of the form

\[ P(y = r + 1)/P(y = r) = \eta_r \]

Value

Object of class ordDisp which inherits from vglm. The object comprises all the slots of an "vglm"-object and in addition the following components:

\begin{itemize}
  \item \texttt{outercall} The matched call of \texttt{ordDisp}.
  \item \texttt{X} Design matrix of x-variables.
  \item \texttt{Z} Design matrix of z-variables.
\end{itemize}

All the methods implemented for objects of class \texttt{vglm}, like \texttt{print}, \texttt{summary}, \texttt{predict} and \texttt{plot} can be applied.

Author(s)

Moritz Berger <moritz.berger@stat.uni-muenchen.de>

\url{http://www.statistik.lmu.de/~mberger/}

References


See Also

\texttt{summaryvglm}, \texttt{predictvglm}, \texttt{plotordDisp}

Examples

\begin{verbatim}
data(reti)

mod <- ordDisp(RET~SM+DIAB+GH+BP|SM+DIAB, data=reti, family="cumulative")
summary(mod)
\end{verbatim}
plotordDisp

Visualization of Estimated Effects

Description

A function to visualize the estimated effects of the location-shift model or rating-scale model accounting for response styles (RSRS) obtained by ordDisp. The function returns a two-dimensional plot of the tuple \((\exp(\alpha), \exp(\beta))\). It is optional to include pointwise 95% confidence intervals represented by stars, where the horizontal and vertical length correspond to the confidence intervals of \(\exp(\alpha)\) (dispersion or response-style effect) and \(\exp(\beta)\) (location or content-related effect).

Usage

```r
plotordDisp(x, names, colorvec, reference = NULL, labels = NULL, cex = 2,
            KI = FALSE, KIfactor = 10/11, title = NULL, ...)
```

Arguments

- **x**: Object of class `ordDisp`
- **names**: Names of the variables that shall be plotted
- **colorvec**: Vector of colors that are used for plotting (same length as names)
- **reference**: Optional name of reference with estimate \((\alpha, \beta) = (0, 0)\) (for categorical covariates)
- **labels**: Optional names that are used as labels in the plot (same length as names)
- **cex**: Global argument to set the size of all the labels in the plot
- **KI**: If true, pointwise 95% confidence intervals are included in the plot
- **KIfactor**: Ratio that is used to plot the stars that represent confidence intervals (only if KI=TRUE)
- **title**: Optional title that is added to the plot
- **...**: Further arguments passed to or from other methods

Author(s)

Moritz Berger <moritz.berger@stat.uni-muenchen.de>
[http://www.statistik.lmu.de/~mberger/](http://www.statistik.lmu.de/~mberger/)

References


reti

See Also

ordDisp

Examples

data(reti)

mod <- ordDisp(RET~SM+DIAB+GH+BP|SM+DIAB,data=reti,family="cumulative")
plot(mod, names=c("SM","DIAB"), colorvec=c(1,2))
plotvglm(mod)


reti

Example Retinopathy

Description

The data set contains information about persons with retinopathy. In the 6-year followup study on
diabetes and retinopathy status the interesting question is how the retinopathy status is associated
with several risk factors.

Usage

data(reti)

Format

A data frame containing 613 observations on 5 variables:

RET retinopathy status (1:no retinopathy, 2:nonproliferative retinopathy, 3:advanced retinopathy or
blind)
SM smoker (1:yes, 0:no)
DIAB diabetes duration in years
GH glycosylated hemoglobin measured in percent
BP diastolic blood pressure in mmHg

References

Bender and Grouven (1998): Using binary logistic regression models for ordinal data with nonpro-

Examples

data(reti)
table(reti$RETI)
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