Package: catdata (via r-universe)

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Description This R-package contains examples from the book ``Regression
for Categorical Data'', Tutz 2012, Cambridge University Press.
The names of the examples refer to the chapter and the data set
that is used.

License GPL-2

LazyLoad yes

Repository https://schaubert.r-universe.dev

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Contents

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catdata-package   *Categorical Data*

Description

This R-package contains examples from the book

Tutz (2012): Regression for Categorical Data, Cambridge University Press

The names of the examples refer to the chapter and the data set that is used.

The data sets are

addiction,
aids,
birth,
children,
deathpenalty,
dust,
encephalitis,
foodstamp,
insolvency,
knee,
leucoplakia,
medcare,
reader,
recovery,
rent,
rethinopathy,

teratology,
teratology2,
unemployment,
vaso.

The chapters are abbreviated in the following way

intro	Chapter 1	Introduction
binary	Chapter 2	Binary Regression: The Logit Model
glm	Chapter 3	Generalized Linear Models
modbin	Chapter 4	Modeling of Binary Data
altbin	Chapter 5	Alternative Binary Regression Models
regsel	Chapter 6	Regularization and Variable Selection for Parametric Models (vignettes were removed)
count	Chapter 7	Regression Analysis of Count Data
multinomial	Chapter 8	Multinomial Response Models
ordinal	Chapter 9	Ordinal Response Models
semiparametric	Chapter 10	Semi- and Nonparametric Generalized Regression
tree	Chapter 11	Tree-Based Methods
loglinear	Chapter 12	The Analysis of Contingency Tables
multivariate	Chapter 13	Multivariate Response Models
random	Chapter 14	Random Effects and Finite Mixtures
prediction	Chapter 15	Prediction and Classification

The examples are abbreviated by chaptername-dataset. Thus, for example,

modbin-dust

refers to Chapter 4 (Modeling of Binary Data) and the data set dust.

Overview of examples:

- Chapter 2:
    - binary-vaso: Example 2.2
    - binary-unemployment: Example 2.3
- Chapter 4:
    - modbin-unemployment: Example 4.3
    - modbin-foodstamp: Example 4.4
    - modbin-dust: Example 4.7
- Chapter 5:
    - altbin-teratology: Example 5.1
- Chapter 7:
    - count-children: Example 7.3
    - count-encephalitis: Example 7.4
    - count-insolvency: Example 7.5
    - count-medcare: Example 7.6
- Chapter 8:
    - multinomial-party1: Example 8.3

- multinomial-party2: Example 8.3
- multinomial-travel: Example 8.4
- multinomial-addiction1: Example 8.5
- multinomial-addiction2: Example 8.6
- Chapter 9:
  - ordinal-knee1: Example 9.3
  - ordinal-knee2: Example 9.4
  - ordinal-retinopathy1: Example 9.5
  - ordinal-retinopathy2: Example 9.6
  - ordinal-arthritis: Example 9.8
- Chapter 10:
  - semiparametric-unemployment: Example 10.2
  - semiparametric-dust: Example 10.3
  - semiparametric-children: Example 10.4
  - semiparametric-addiction: Example 10.5
- Chapter 11:
  - tree-unemployment: Example 11.1
  - tree-dust: Example 11.2
- Chapter 12:
  - loglinear-birth: Example 12.3
  - loglinear-leukoplakia: Example 12.5
- Chapter 13:
  - multivariate-birth1: Examlpe 13.3
  - multivariate-knee: Example 13.4
  - multivariate-birth2: Example 13.5
- Chapter 14:
  - random-knee1: Example 14.3
  - random-knee2: Example 14.4
  - random-aids: Example 14.6
  - random-betablocker: Example 14.7
  - random-knee3: Example 14.8
- Chapter 15:
  - prediction-glass: Example 15.4 (vignette was removed)
  - prediction-medcare: Example 15.8

Author(s)

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References

Gerhard Tutz (2012), *Regression for Categorical Data*, Cambridge University Press

Examples

```
## Not run:
if(interactive()){vignette("modbin-dust")}

## End(Not run)
```

---

addiction   *Are addicted weak-willed, deseased or both?*

Description

The addiction data stems from a survey comprising 712 respondents.

Usage

```
data(addiction)
```

Format

A data frame with 712 observations on the following 4 variables.

ill are addicted weak-willed(0) deseased(1) or both(2)

gender male = 0, female = 1

age age of surveyed person

university surveyed person is academician(1) or not(0)

Source

Data Archive Department of Statistics, LMU Munich

Examples

```
## Not run:
##look for:
if(interactive()){vignette("semiparametric-addiction")}
if(interactive()){vignette("multinomial-addiction1")}
if(interactive()){vignette("multinomial-addiction2")}


## End(Not run)
```

---

aids   *AIDS*

Description

The `aids` data was a survey around 369 men who were infected with HIV.

Usage

```
data(aids)
```

Format

A data frame with 2376 observations on the following 8 variables.

cd4 number of CD4 cells

time years since seroconversion

drugs recreational drug use (yes=1/no=0)

partners number of sexual partners

packs packs of cigarettes a day

cesd a mental illness score

age Age centered around 30

person Identification number

Source

Multicenter AIDS Cohort Study (MACS), see Zeger and Diggle (1994), Semi-parametric models for longitudinal data with application to CD4 cell numbers in HIV seroconverters, Biometrics, 50, 689–699.

Examples

```
## Not run:
##look for:
if(interactive()){vignette("random-aids")}

## End(Not run)
```

---

birth   *Birth*

Description

The birth data contain information about birth and pregnancy of 775 children that were born alive in the time from 1990 to 2004. The data were collected from internet users recruited on french-speaking pregnancy and birth websites

Usage

```
data(birth)
```

Format

A data frame with 775 observations on the following 25 variables.

IndexMother ID variable

Sex Sex of child: male = 1, female = 2

Weight Weight of child at the birth in grams

Height Height of child at the birth in centimeter

Head Head circumference of child at the birth in centimeter

Month Month of birth from 1 to 12

Year Year of birth

Country Country of birth: France (FR), Belgium (BE), Switzerland (CH), Canada (CA), Great Britain (GB), Germany (DE), Spain (ES), United States (US)

Term Term of pregnancy in weeks from the last menstruation

AgeMother Age of mother on the day of birth

Previous Number of pregnancies before

WeightBefore Weight of mother before the pregnancy

HeightMother Height of mother in centimeter

WeightEnd Weight of mother after the pregnancy

Twins Was the pregnancy a multiple birth? no = 0, yes = 1

Intensive Days that child spent in intensive care unit

Cesarean Has the child been born by cesarean section? no = 0, yes = 1

Planned Has the cesarean been planned? no = 0, yes = 1

Episiotomy Has an episiotomy been made? no = 0, yes = 1

Tear Did a perineal tear appear? no = 0, yes = 1

Operative Has an operative aid like delivery forceps or vakuum been used? no = 0, yes = 1

Induced Has the birth been induced artificially? no = 0, yes = 1

Membranes Did the membrans burst before the beginning of the throes? no = 0, yes = 1

Rest Has a strict bed rest been ordered to the mother for at least one month during the pregnancy?
no = 0, yes = 1

Presentation Presentation of the child before the birth? cephalic presentation = 1, pelvic presentation = 2, other presentation (e.g. across) = 3

Source

see Boulesteix (2006), Maximally selected chi-squared statistics for ordinal variables, Biometrical
Journal, 48, 451–462.

Examples

```
## Not run:
##look for:
if(interactive()){vignette("loglinear-birth")}
if(interactive()){vignette("multivariate-birth1")}
if(interactive()){vignette("multivariate-birth2")}

## End(Not run)
```

children	*Number of Children*

Description

The children data contains the information about the number of children of women.

Usage

```
data(children)
```

Format

A data frame with 3548 observations on the following 6 variables.

child number of children

age age of woman in years

dur years of education

nation nationality of the woman: 0 = German, 1 = otherwise

god Beliving in god: 1 = Strong agreement, 2 = Agreement 3 = No definite opinion, 4 = Rather no agreement, 5= No agreement at all 6= Never thougt about it

univ visited university: 0 = no, 1 = yes

Source

German General Social Survey Allbus

Examples

```
## Not run:
##example of analysis:
if(interactive()){vignette("count-children")}
if(interactive()){vignette("semiparametric-children")}

## End(Not run)
```

---

deathpenalty *Death-Penalty*

Description

The deathpenalty data is about the judgemt of defendants in cases of multiple murders in Florida between 1976 and 1987. They are classified with respect to death penalty, race of defendent and race of victim.

Usage

```
data(deathpenalty)
```

Format

A data frame with 8 observations on the following 4 variables. Considering the weighting variable "Freq", there are 674 cases.

DeathPenalty Was the judgment death penalty? yes = 1, no = 0

VictimRace The race of the victim: white = 1, black = 0

DefendantRace The race of the defendant: white = 1, black = 0

Freq Frequency of observation

Source

Agresti, A. (2002) *Categorical Data Analysis*. Wiley

References

Agresti, A. (2002) *Categorical Data Analysis*. Wiley

Examples

```
## Not run:
##look for:
data(deathpenalty)

## End(Not run)
```

---

dust   *Chronic Bronchial Reaction to Dust*

Description

The dust data was surveyed among the employees of a Munich factory.

Usage

```
data(dust)
```

Format

A data frame with 1246 observations on the following 4 variables.

bronch chronical bronchial reaction, no = 0, yes = 1

dust dust concentration (mg/cm^3) at working place

smoke employee smoker?, no = 1, yes = 2

years years of dust exposition

Source

Data Archive Department of Statistics, LMU Munich

Examples

```
## Not run:
##example of analysis:
if(interactive()){vignette("modbin-dust")}
if(interactive()){vignette("semiparametric-dust")}
if(interactive()){vignette("tree-dust")}

## End(Not run)
```

---

encephalitis   *Cases of Herpes Encephalitis in Bavaria and Saxony*

Description

The encephalitis data is based on a study on the occurence of herpes encephalitis in children. It was observed in Bavaria and Lower Saxony between 1980 and 1993.

Usage

```
data(encephalitis)
```

Format

A data frame with 26 observations containing the following variables

year years 1980 to 1993 (1 – 14)

country Bavaria = 1, Lower Saxony = 2

count number of cases with herpes encephalitis

References

Karimi, A., Windorfer, A., Dreesemann, J. (1980) Vorkommen von zentralvenösen Infektionen in europäischen Ländern. Technical report, Schriften des Niedersächsischen Landesgesundheitsamtes.

Examples

```
## Not run:
##look for:
if(interactive()){vignette("count-encephalitis")}

## End(Not run)
```

---

foodstamp *Food-Stamp Program*

Description

The foodstamp data stem from a survey on the federal food-stamp program, 150 persons were interviewed. The response indicates participation.

Usage

```
data(foodstamp)
```

Format

A data frame with 150 observations on the following 4 variables.

y participation in federal food-stamp program, yes = 1, no = 0

TEN tenancy, yes = 1, no = 0

SUP supplemental income, yes = 1, no = 0

INC log-transformed monthly income log(monthly income +1)

References

Künsch, H. R., Stefanski, L. A., Carroll, R. J. (1989) Conditionally unbiased bounded-influence estimation in general regression models, with applications to generalized linear models. Journal of American Statistical Association **84**, 460–466.

Examples

```
## Not run:
##look for:
if(interactive()){vignette("modbin-foodstamp")}

## End(Not run)
```

---

glass   *Glass Identification*

Description

A dataset coming from USA Forensic Science Service that distinguishes between six types of glass (four types of window glass, and three types nonwindow). Predictors are the refractive index and the oxide content of various minerals.

Usage

```
data(heart)
```

Format

A data frame with 214 observations on the following 10 variables.

RI Refractive index

Na Oxide content of sodium

Mg Oxide content of magnesium

Al Oxide content of aluminium

Si Oxide content of silicon

K Oxide content of potassium

Ca Oxide content of calcium

Ba Oxide content of barium

Fe Oxide content of iron

type Type of glass

Source

http://archive.ics.uci.edu/ml/datasets/Glass+Identification

References

Ripley, B. D. (1996), Pattern Recognition and Neural Networks, Cambridge University Press.

Examples

```
## Not run:
##example of analysis:
if(interactive()){vignette("prediction-glass")}

## End(Not run)
```

---

heart   *Heart Disease*

Description

A retrospective sample of males in a heart-disease high-risk region of the Western Cape, South Africa.

Usage

```
data(heart)
```

Format

A data frame with 462 observations on the following 10 variables.

y coronary heart disease (yes = 1, no = 0)

sbp systolic blood pressure

tobacco cumulative tobacco

ldl low density lipoprotein cholesterol

adiposity adiposity

famhist family history of heart disease

typea type-A behavior

obesity obesity

alcohol current alcohol consumption

age age at onset

References

South African Heart Disease dataset
Hastie, T., Tibshirani, R., and Friedman, J. (2001):
Elements of Statistical Learning; Data Mining, Inference, and Prediction, Springer-Verlag, New York

Examples

```
##example of analysis:
if(interactive()){vignette("regsel-heartdisease1")}
if(interactive()){vignette("regsel-heartdisease2")}
if(interactive()){vignette("regsel-heartdisease3")}
if(interactive()){vignette("regsel-heartdisease4")}
if(interactive()){vignette("regsel-heartdisease5")}
if(interactive()){vignette("regsel-heartdisease6")}
```

---

insolvency   *Insolvency of companies in Berlin*

Description

The insolvency data gives the number of insolvent companies per month in Berlin from 1994 to
1996.

Usage

```
data(dust)
```

Format

A data frame with 36 observations on the following 4 variables.

insolv number of insolvent companies

year years 1994-1996 (1–3)

month month (1-12)

case number of cases (1–36)

Examples

```
## Not run:
##example of analysis:
if(interactive()){vignette("count-insolvency")}

## End(Not run)
```

---

knee   *Knee Injuries*

Description

In a clinical study n=127 patients with sport related injuries have been treated with two different therapies (chosen by random design). After 3,7 and 10 days of treatment the pain occuring during knee movement was observed.

Usage

```
data(knee)
```

Format

A data frame with 127 observations on the following 8 variables.

N Patient's number

Th Therapy (placebo = 1, treatment = 2)

Age Age in years

Sex Gender (male = 0, female = 1)

R1 Pain before treatment (no pain = 1, severe pain = 5)

R2 Pain after three days of treatment

R3 Pain after seven days of treatment

R4 Pain after ten days of treatment

Examples

```
##example of analysis:
if(interactive()){vignette("ordinal-knee1")}
if(interactive()){vignette("ordinal-knee2")}
if(interactive()){vignette("multivariate-knee")}
if(interactive()){vignette("random-knee1")}
if(interactive()){vignette("random-knee3")}
```

---

kneecumulative   *Knee Injuries*

Description

In a clinical study n=127 patients with sport related injuries have been treated with two different therapies (chosen by random design). After 3,7 and 10 days of treatment the pain occuring during knee movement was observed. The data set is a transformed version of knee for fitting a cumulative logit model.

Usage

```
data(knee)
```

Format

A data frame with 127 observations on the following 8 variables.

y Response

Th Therapy (placebo = 1, treatment = 2)

Age Age in years

Age2 Squared age

Sex Gender (male = 0, female = 1)

Person Person

Examples

```
##example of analysis:
if(interactive()){vignette("random-knee2")}
```

---

kneesequential   *Knee Injuries*

Description

In a clinical study n=127 patients with sport related injuries have been treated with two different therapies (chosen by random design). After 3,7 and 10 days of treatment the pain occuring during knee movement was observed. The data set is a transformed version of knee for fitting a sequential logit model.

Usage

```
data(knee)
```

Format

A data frame with 127 observations on the following 8 variables.

y Response

Icept1 Intercept 1

Icept2 Intercept 2

Icept3 Intercept 3

Icept4 Intercept 4

Th Therapy (placebo = 1, treatment = 2)

Age Age in years

Age2 Squared age

Sex Gender (male = 0, female = 1)

Person Person

Examples

```
##example of analysis:
if(interactive()){vignette("random-knee2")}
```

---

leukoplakia   *Leukoplakia*

Description

The leukoplakia data is about occurence of oral leukoplakia with covariates smoking and alcohol consumption.

Usage

```
data(leukoplacia)
```

Format

A data frame with 16 observations on the following 4 variables. Considering the weighting variable "Freq", there are 212 cases.

Leukoplakia Has the person oral leukoplakia? yes = 1, no = 0

Alcohol How much alcohol did the person drink on average? no = 1, less then 40g = 2, less then 80g = 3, more then 80g = 4

Smoker Smoker? yes = 1, no = 0

Freq Frequency of observation

Source

Fahrmeir, Hamerle and Tutz (1996), Multivariate statistische Verfahren, Berlin: de Gruyter

Examples

```
## Not run:
##look for:
if(interactive()){vignette("loglinear-leukoplakia")}

## End(Not run)
```

---

medcare   *Number of Physician Office Visits*

Description

The medcare data was collected on 4406 individuals, aged 66 and over, that were covered by medcare, a public insurence program

Usage

```
data(medcare)
```

Format

A data frame with 4406 observations on the following 9 variables.

ofp number of physician office visits

hosp number of hospital stays

healthpoor indivudual has a poor health (reference: average health)

healthexcellent indivudual has a excellent health

numchron number of chronic conditions

male female = 0, male = 1

age age of individual (centered around 60)

married married = 1, else = 0

school years of education

Source

<https://www.econ.queensu.ca>

References

US National Medical Expenditure Survey in 1987/88

Examples

```
## Not run:
##example of analysis:
if(interactive()){vignette("count-medcare")}
if(interactive()){vignette("prediction-medcare")}

## End(Not run)
```

---

reader   *Who is a Regular Reader?*

Description

The reader data contains information on the reading behaviour of women refering to a specific woman's journal.

Usage

```
data(reader)
```

Format

A data frame with 48 observations on the following 5 variables. Considering the weighting variable "Freq", there are 941 observations.

RegularReader Is the woman a regular reader? yes = 1, no = 0

Working Is the woman working? yes = 1, no = 0

Age Age of the woman in categories (18–29 years = 1, 30–39 = 2, 40–49 = 3)

Education Level of education. L1 = 11, L2 = 12, L3 = 13, L4 = 14

Freq Frequency of the observation

Source

Fahrmeir, Hamerle and Tutz (1996), Multivariate statistische Verfahren, Berlin: de Gruyter

recovery	*Post-Surgery Recovery of Children*

Description

The `recovery` data contains information on 60 children after a surgery.

Usage

```
data(recovery)
```

Format

A data frame with 240 observations on the following 10 variables

y recovery score

Dos1 Dosage=15 (yes = 1, no = 0)

Dos2 Dosage=20 (yes = 1, no = 0)

Dos3 Dosage=25 (yes = 1, no = 0)

Age Age of child (in months)

Age2 Squared age

Dur Duration of surgery (in minutes)

Rep1 First repetition (yes = 1, no = 0)

Rep2 Second repetition (yes = 1, no = 0)

Rep3 Third repetition (yes = 1, no = 0)

Person ID-Variable for each child (1–60)

Details

In a randomized study 60 children undergoing surgery were treated with one of four dosages of an anaesthetic (15, 20, 25, 30). Upon admission to the recovery room and at minutes 5, 15 and 30 following admission, recovery scores were assigned on a categorical scale ranging from 1 (least favourable) to 6 (most favourable). Therefore one has four repetitions of a variable having 6 categories. One wants to model how recovery scores depend on covariables as dosage of the anaesthetic (four levels), duration of surgery (in minutes) and age of the child (in months).

References

Davis, C.S. (1991) Semi-parametric and Non-parametric Methods for the Analysis of Repeated Measurements with Applications to Clinical Trials. Statistics in Medicine **10**, 1959–1980

---

rent   *Rent in Munich*

Description

The rent data contains the rent index for Munich in 2003.

Usage

```
data(rent)
```

Format

A data frame with 2053 observations on the following 13 variables.

rent clear rent in euros

rentm clear rent per square meter in euros

size living space in square meter

rooms number of rooms

year year of construction

area municipality

good good adress, yes = 1, no =0

best best adress, yes = 1, no = 0

warm warm water, yes = 0, no = 1

central central heating, yes = 0, no = 1

tiles bathroom with tiles, yes = 0, no = 1

bathextra special furniture in bathroom, yes = 1, no = 0

kitchen upmarket kitchen, yes = 1, no = 0

Source

Data Archive Department of Statistics, LMU Munich

References

Fahrmeir, L., Künstler, R., Pigeot, I., Tutz, G. (2004) *Statistik: der Weg zur Datenanalyse*. 5. Auflage, Berlin: Springer-Verlag.

Examples

```
##example of analysis:
data(rent)
summary(rent)
```

---

retinopathy	*Retinopathy*

Description

The `retinopathy` data contains information on persons with retinopathy.

Usage

```
data(retinopathy)
```

Format

A data frame with 613 observations on the following 5 variables.

RET RET=1: no retinopathy, RET=2 nonproliferative retinopathy, RET=3 advanced retinopathy or blind

SM SM=1: smoker, SM=0: non-smoker

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 non-proportional odds, J. Clin. Epidemiol., 51, 809–816.

Examples

```
 ## Not run:
## look for
if(interactive()){vignette("ordinal-retinopathy1")}
if(interactive()){vignette("ordinal-retinopathy2")}

## End(Not run)
```

---

teratology	*Teratology*

Description

In a teratology experiment 58 rats on iron-deficient diets were assigned to four groups. In the first group only placebo injections were given, in the other groups iron supplements were given. The animals were made pregnant and sacrificed after three weeks. The response is the number of living and dead rats of a litter.

Usage

```
data(teratology)
```

Format

A data frame with 58 observations on the following 3 variables.

D number of deaths of rats litter

L number survived of rats litter

Grp group(Untreated = 1, Injections days 7 and 10 = 2, Injections days 0 and 7 = 3, Injections weekly = 4

References

Moore, D. F. and Tsiatis, A. (1991) Robust estimation of the variance in moment methods for extra-binomial and extra-poisson variation. Biometrics **47**, 383–401.

Examples

```
data(teratology)
summary(teratology)
## Not run:
if(interactive()){vignette("altbin-teratology")}

## End(Not run)
```

---

teratology2	*Teratology2*

Description

In a teratology experiment 58 rats on iron-deficient diets were assigned to four groups. In the first group only placebo injections were given, in the other groups iron supplements were given. The animals were made pregnant and sacrificed after three weeks. The response was whether the fetus was dead ($y_{ij} = 1$) for each fetus in each rats litter.

Usage

```
data(teratology2)
```

Format

A data frame with 607 observations on the following 3 variables.

y dead = 1, living = 0

Rat Number of animal

Grp treatment group

References

Moore, D. F. and Tsiatis, A. (1991) Robust estimation of the variance in moment methods for extra-binomial and extra-poisson variation. Biometrics **47**, 383–401.

Examples

```
## Not run:
data(teratology2)
if(interactive()){vignette("altbin-teratology")}

## End(Not run)
```

---

unemployment   *long term/short term unemployment*

Description

The unemployment data contains information on 982 unemployed persons.

Usage

```
data(unemployment)
```

Format

A data frame with 982 observations on the following 2 variables.

age age of the person in years (from 16 to 61)

durbin short term (1) or long-term (2) unemployment

Source

Socio-economic panel 1995

Examples

```
## Not run:
##look for:
if(interactive()){vignette("binary-unemployment")}
if(interactive()){vignette("modbin-unemployment1")}
if(interactive()){vignette("modbin-unemployment2")}
if(interactive()){vignette("semiparametric-unemployment")}
if(interactive()){vignette("tree-unemployment")}

## End(Not run)
```

---

vaso   *Vasoconstriciton and Breathing*

Description

The vaso data contains binary data. Three test persons inhaled a certain amount of air with different rates. In some cases a vasoconstriction (neural constriction of vasculature) occured at their skin. The goal of the study was to indicate a correlation between breathing and vasoconstriction. The test persons repeated the test 9, 8, 22 times. So the dataframe has 39 observations.

Usage

```
data(vaso)
```

Format

A data frame with 39 observations on the following 3 variables.

vol amount of air

rate rate of breathing

vaso condition of vasculature: no vasoconstriction = 1, vasoconstriction = 2

Source

Data Archive Department of Statistics, LMU Munich

References

Finney, D. J. (1971) *Probit Analysis*. 3rd edition. Cambridge University Press.

Pregibon, D. (1982) Resistant fits for some commonly used logistic models. Appl. Stat. **29**, 15–24.

Hastie, T. J. and Tibshirani, R. J. (1990) *Generalized Additve Models*. Chapman and Hall.

Examples

```
## Not run:
##look for:
if(interactive()){vignette("binary-vaso")}

## End(Not run)
```

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