Package 'catdata'

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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

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R topics documented:

`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

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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 (yij = 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)
```

Index