Package ‘catdata’

January 25, 2024

Type Package
Title Categorical Data
Version 1.2.4
Date 2024-01-23
Encoding UTF-8
Depends MASS
Suggests knitr, rms, qvcalc, glmmML, nnet, pscl, VGAM, gee, mlogit, Ecdat, geepack, mgcv, rpart, party, ordinal, lme4, vcdExtra, glmnet, mboost, class, e1071, flexmix, lpSolve, penalized
Author Gunther Schauberger, Gerhard Tutz
Maintainer Gunther Schauberger <gunther.schauberger@tum.de>
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
VignetteBuilder knitr
NeedsCompilation no
Repository CRAN
Date/Publication 2024-01-25 13:50:05 UTC

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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,
ais,
birth,
children,
deathpenalty,
dust,
encephalitis,
foodstamp,
insolvency,
knee,
elleukoplakia,
medcare,
reader,
recovery,
rent,
rethinopathy,
teratology,
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: Example 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-beta-blocker: 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)

Gerhard Tutz and Gunther Schauberger with contributions from Sarah Maierhofer and Marcus Groß
Maintainer:
Gunther Schauberger <gunther.schauberger@tum.de>
Gerhard Tutz <gerhard.tutz@stat.uni-muenchen.de>
addiction

References


Examples

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

---

**addiction**  
*Are addicted weak-willed, diseased 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) diseased(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

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

## End(Not run)
**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 membranes 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

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

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  Believing 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
deathpenalty

Examples

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

## End(Not run)
```

data(deathpenalty)

Description

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


References


Examples

```r
## 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**

```r
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**

```r
## 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 occurrence of herpes encephalitis in children. It was observed in Bavaria and Lower Saxony between 1980 and 1993.

**Usage**

```r
data(encephalitis)
```
**foodstamp**

**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**


**Examples**

```r
## 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**

```r
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**

Examples

```r
## 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


References

heart

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
Examples

```r
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")}
```

## Example of analysis:

### Description

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

### Usage

```r
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

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

## End(Not run)
```
**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 occurring 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**

```r
# 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 occurring 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 occurring during knee movement was observed. The data set is a transformed version of knee for fitting a sequential logit model.

Usage
data(knee)
**leukoplakia**

**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**

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

---

**Description**

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

**Usage**

```r
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

```r
## 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 med-care, a public insurance program.

- **Usage**
  ```r
data(medcare)
```

- **Format**
  A data frame with 4406 observations on the following 9 variables.
  ```r
  ofp  number of physician office visits  
hosp number of hospital stays  
healthpoor individual has a poor health (reference: average health)  
healthexcellent individual has a excellent health  
numchron number of chronic conditions  
male  female = 0, male = 1  
age  age of individual (centered around 60)  
marrried married = 1, else = 0  
school  years of education
  ```

- **Source**
  ```r
  https://www.econ.queensu.ca
  ```

- **References**
  US National Medical Expenditure Survey in 1987/88
Examples

```r
## 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 referring to a specific woman’s journal.

Usage

```r
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
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

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

```r
data(rent)
```

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 address, yes = 1, no = 0
- `best`: best address, 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

Data Archive Department of Statistics, LMU Munich


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


Examples

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

## End(Not run)```
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


Examples

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

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.

\[
\begin{align*}
\text{y} & \quad \text{dead }= 1, \text{ living } = 0 \\
\text{Rat} & \quad \text{Number of animal} \\
\text{Grp} & \quad \text{treatment group}
\end{align*}
\]

References

Examples
```r
## Not run:
data(teratology2)
if(interactive())(vignette("altbin-teratology"))
## End(Not run)
```

<table>
<thead>
<tr>
<th>unemployment</th>
<th>long term/short term unemployment</th>
</tr>
</thead>
</table>

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.

\[
\begin{align*}
\text{age} & \quad \text{age of the person in years (from 16 to 61)} \\
\text{durbin} & \quad \text{short term (1) or long-term (2) unemployment}
\end{align*}
\]

Source
Socio-economic panel 1995
vaso

Examples

```r
## 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**

*Vasoconstriction 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) occurred 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**

```r
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**


Examples

## Not run:

## look for:

if(interactive())(vignette("binary-vaso"))

## End(Not run)
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