Package ‘glm.predict’

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Type Package

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Description Functions to calculate predicted values and the difference between the two cases with confidence interval for lm() [linear model], glm() [generalised linear model], glm.nb() [negative binomial model], polr() [ordinal logistic model], multinom() [multinomial model] and tobit() [tobit model], svyglm() [survey-weighted generalised linear models], lmer() [linear multilevel models] using Monte Carlo simulations or bootstrap. Reference: Bennet A. Zelner (2009) <doi:10.1002/smj.783>.

License GPL (>= 2)

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**glm.predict-package**  
*Predicted Values and Discrete Changes for GLM*

**Description**

This package provides functions to calculate predicted values and the difference between two cases with confidence interval.

**Author(s)**

Benjamin Schlegel

Maintainer: Benjamin Schlegel <kontakt@benjaminschlegel.ch>


**basepredict**

**predicted value**

**Description**

The generic function calculates the predicted value with the confidence interval. It can be used for any `lm()`, `glm()`, `glm.nb()`, `polr()`, `tobit()` or `multinom()` model.

**Usage**

```r
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL, 
            type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

**Arguments**

- `model`: the model Object generated with `glm()`, `glm.nb()`, `polr()` or `multinom()`
- `values`: the values of the case as vector in the order how they appear in the `summary(model)` Estimate
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: `vcov(model)`
- `set.seed`: OPTIONAL set a seed for the random number generator
- `type`: OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- `summary`: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

**Details**

The function makes a simulation for the two cases and compares them to each other.

**Value**

The output is a matrix have in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

**Author(s)**

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

**Examples**

```r
model1 = glm(Sex ~ Height + Smoke + Pulse, data=MASS::survey, family=binomial(link=logit))
summary(model1)
# predicted probability of a non smoking person with height 150 and average pulse
basepredict(model1, c(1,150,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)))
```
basepredict.glm

Description

The function calculates the predicted value with the confidence interval. It can be used for any glm model.

Usage

## S3 method for class 'glm'
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL, type = c("any", "simulation", "bootstrap"), summary = TRUE)

Arguments

- **model**: the model Object generated with glm() or glm.nb()
- **values**: the values of the case as vector in the order how they appear in the summary(model) Estimate
- **sim.count**: OPTIONAL numbers of simulations to be done by the function. default: 1000
- **conf.int**: OPTIONAL the confidence interval used by the function. default: 0.95
- **sigma**: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- **set.seed**: OPTIONAL set a seed for the random number generator
- **type**: OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- **summary**: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a 3x3 matrix having in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>
Examples

```R
model1 = glm(Sex ~ Height + Smoke + Pulse, data=MASS::survey, family=binomial(link=logit))
summary(model1)
# predicted probability of a non smoking person with height 150 and average pulse
basepredict(model1, c(1,150,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)))
```

**Description**

The function calculates the predicted value with the confidence interval for a lm model.

**Usage**

```R
## S3 method for class 'lm'
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL,
            type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

**Arguments**

- `model`: the model Object generated with lm()
- `values`: the values of the case as vector in the order how they appear in the summary(model) Estimate
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed`: OPTIONAL set a seed for the random number generator
- `type`: OPTIONAL choose between simulation and bootstrap. "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- `summary`: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

**Details**

The function makes a simulation for the two cases and compares them to each other.

**Value**

The output is a 3x3 matrix having in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.
Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
model1 = lm(Pulse ~ Height + Smoke, data=MASS::survey)
summary(model1)
# predicted pulse value of a non smoking person with height 150
basepredict(model1, c(1,150,1,0,0))
```

Description

The function calculates the (average) predicted value with the confidence interval for a lmer model.

Usage

```r
## S3 method for class 'lmerMod'
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL,
            type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

Arguments

- `model`: the model Object generated with lmer()
- `values`: the values of the case as vector in the order how they appear in the summary(model)
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed`: OPTIONAL set a seed for the random number generator
- `type`: OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- `summary`: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a 3x3 matrix having in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.
**Author(s)**

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

**Examples**

```r
model1 = lme4::lmer(lr_self ~ age + gender + (1 | canton), data=selects2015)
summary(model1)
# predicted left-right position of a 18 year old woman.
basepredict(model1, c(1,18,1))
```

**Description**

The function calculates the predicted value with the confidence interval. It can be used for any `mlogit` model.

**Usage**

```r
## S3 method for class 'mlogit'
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL,
type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

**Arguments**

- `model`: the model Object generated with `mlogit()`
- `values`: the values of the case as vector in the order how they appear in the summary(model) Estimate
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix. can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed`: OPTIONAL set a seed for the random number generator
- `type`: type is ignored as only simulation is implemented
- `summary`: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

**Details**

The function makes a simulation for the two cases and compares them to each other.

**Value**

The output is a matrix have in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.
Author(s)
Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
## Not run:
# devtools::install_github("benjaminschlegel/schlegel")
df_selects = schlegel::selects2015
df_selects_withoutNA = df_selects
  filter(vote_choice != "other")
  mutate(vote_choice = factor(vote_choice))
  select(age, gender, vote_choice, starts_with("lr_"))
  na.omit()

mlogit_data = dfidx::dfidx(df_selects_withoutNA, varying = 5:11,
  sep = ",", shape = "wide",
  choice = "vote_choice")

mlogit_data$distance = abs(mlogit_data$lr - mlogit_data$lr_self)

model1 = mlogit::mlogit(vote_choice ~ distance | lr_self +
  gender, data = mlogit_data)

summary(model1)
# predicted probability of a left male person with a distance of 2
basepredict(model1, c(1, 2, 0, 0))

## End(Not run)
```

---

**basepredict.multinom**  
**predicted value**

Description

The function calculates the predicted value with the confidence interval. It can be used for any multinom model.

Usage

```r
## S3 method for class 'multinom'
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL,
  type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

Arguments

- `model`  
The model Object generated with multinom()

- `values`  
The values of the case as vector in the order how they appear in the summary(model) Estimate

- `sim.count`  
OPTIONAL numbers of simulations to be done by the function. default: 1000

- `conf.int`  
OPTIONAL the confidence interval used by the function. default: 0.95
**basepredict.polr**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>sigma</strong></td>
<td>OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)</td>
</tr>
<tr>
<td><strong>set.seed</strong></td>
<td>OPTIONAL set a seed for the random number generator</td>
</tr>
<tr>
<td><strong>type</strong></td>
<td>OPTIONAL choose between simulation and bootstrap, &quot;any&quot; chooses between those two according to the number of cases (bootstrap if n &lt; 1000)</td>
</tr>
<tr>
<td><strong>summary</strong></td>
<td>OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)</td>
</tr>
</tbody>
</table>

**Details**

The function makes a simulation for the two cases and compares them to each other.

**Value**

The output is a matrix have in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

**Author(s)**

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

**Examples**

```r
## Not run:
model1 = nnet::multinom(Clap ~ Height + Smoke + Pulse, data=MASS::survey)
summary(model1)
# predicted probability of a non smoking person with height 150 and average pulse
basepredict(model1, c(1,150,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)))
## End(Not run)
```

---

**Description**

The function calculates the predicted value with the confidence interval. It can be used for any polr model.

**Usage**

```r
## S3 method for class 'polr'
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL, type = c("any", "simulation", "bootstrap"), summary = TRUE)
```
Arguments

model the model Object generated with polr()
values the values of the case as vector in the order how they appear in the summary(model)

sim.count OPTIONAL numbers of simulations to be done by the function. default: 1000
conf.int OPTIONAL the confidence interval used by the function. default: 0.95
sigma OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
set.seed OPTIONAL set a seed for the random number generator
type OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
summary OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a matrix have in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
## Not run:
data = MASS::survey
data$Smoke = ordered(data$Smoke, levels = c("Never", "Occas", "Regul", "Heavy"))
model1 = polr(Smoke ~ Height + Pulse, data=data)
summary(model1)
# predicted probability of smoking of a person with height 170 and an average pulse
basepredict(model1, c(170,mean(MASS::survey$Pulse,na.rm=TRUE)))

## End(Not run)
```
Description

The function calculates the predicted value with the confidence interval for a tobit model.

Usage

```r
## S3 method for class 'tobit'
basepredict(model, values, sim.count=1000, conf.int=0.95, sigma=NULL, set.seed=NULL,
  type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

Arguments

- `model`: the model Object generated with tobit()
- `values`: the values of the case as vector in the order how they appear in the summary(model)
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed`: OPTIONAL set a seed for the random number generator
- `type`: OPTIONAL only simulation is supported for tobit()
- `summary`: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a 3x3 matrix having in the first column the predicted value, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>
Examples

```r
library(AER)
model1 = tobit(Age ~ Height + Pulse, right = 65, data=MASS::survey)
summary(model1)
# Person with a height of 160 and a pulse of 80
basepredict(model1, values = c(1,160,80))
```

---

**dc**  
*predicted values and discrete change*

**Description**

The generic function calculates the predicted values and the difference of two cases with the confidence interval. It can be used for any lm(), glm(), glm.nb(), polr(), tobit() or multinom() model.

**Usage**

```r
dc(model, values = NULL, sim.count = 1000, conf.int = 0.95,
sigma = NULL, set.seed = NULL, values1 = NULL, values2 = NULL,
type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

**Arguments**

- `model`: the model-Object generated with glm(), glm.nb(), polr() or multinom()
- `values`: the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed`: OPTIONAL set a seed for the random number generator
- `values1`: the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- `values2`: the values of case 2 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- `type`: OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- `summary`: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

**Details**

The function makes a simulation for the two cases and compares them to each other.
Value

The output is a matrix having in the first column the predicted values, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
model1 = glm(Sex ~ Height + Smoke + Pulse, data=MASS::survey, family=binomial(link=logit))
summary(model1)
# comparing a person with the height 150cm to 151cm
dc(model1, values1 = c(1,150,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)),
    values2 = c(1,151,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)))
# the higher person has a greater probability to be a man
# the difference is significant, because the confidence interval
# does not include the 0
```

dc.glm  predicted values and discrete change

Description

The function calculates the predicted values and the difference of two cases with the confidence interval. It can be used for any glm model.

Usage

```r
## S3 method for class 'glm'
dc(model, values = NULL, sim.count = 1000, conf.int = 0.95,
    sigma = NULL, set.seed = NULL, values1 = NULL, values2 = NULL,
    type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

Arguments

- **model**: the model-Object generated with glm() or glm.nb()
- **values**: the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.
- **sim.count**: OPTIONAL numbers of simulations to be done by the function. default: 1000
- **conf.int**: OPTIONAL the confidence interval used by the function. default: 0.95
- **sigma**: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- **set.seed**: OPTIONAL set a seed for the random number generator
values1 the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.

values2 the values of case 2 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.

type OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)

summary OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a matrix have in the first column the predicted values, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

model1 = glm(Sex ~ Height + Smoke + Pulse, data=MASS::survey, family=binomial(link=logit))
summary(model1)

# comparing a person with the height 150cm to 151cm
dc(model1, values1 = c(1,150,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)),
    values2 = c(1,151,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)))

# the higher person has a greater probability to be a man
# the difference is significant, because the confidence interval
# does not include the 0

dc.lm predicted values and discrete change

Description

The function calculates the predicted values and the difference of two cases with the confidence interval for a lm model.

Usage

## S3 method for class 'lm'
dc(model, values = NULL, sim.count = 1000, conf.int = 0.95,
    sigma = NULL, set.seed = NULL, values1 = NULL, values2 = NULL,
    type = c("any", "simulation", "bootstrap"), summary = TRUE)
Arguments

- **model**
  the model-Object generated with lm()

- **values**
  the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.

- **sim.count**
  OPTIONAL numbers of simulations to be done by the function. default: 1000

- **conf.int**
  OPTIONAL the confidence interval used by the function. default: 0.95

- **sigma**
  OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)

- **set.seed**
  OPTIONAL set a seed for the random number generator

- **values1**
  the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.

- **values2**
  the values of case 2 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.

- **type**
  OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)

- **summary**
  OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a matrix have in the first column the predicted values, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
model1 = lm(Pulse ~ Height + Smoke, data=MASS::survey)
summary(model1)
# comparing a person with the height 150cm to 151cm
dc(model1, values1 = c(1,150,1,0,0),
    values2 = c(1,151,1,0,0))
# the difference is not significant, because the confidence interval # includes the 0
```
Description

The function calculates the predicted values and the difference of two cases with the confidence interval for a lm model.

Usage

```r
## S3 method for class 'lmerMod'
dc(model, values = NULL, sim.count = 1000, conf.int = 0.95, sigma = NULL, set.seed = NULL, values1 = NULL, values2 = NULL, type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

Arguments

- `model`: the model-Object generated with lmer()
- `values`: the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed`: OPTIONAL set a seed for the random number generator
- `values1`: the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- `values2`: the values of case 2 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- `type`: OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- `summary`: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a matrix have in the first column the predicted values, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.
dc.mlogit

Author(s)
Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples
model1 = lme4::lmer(lr_self ~ age + gender + (1 | canton), data=selects2015)
summary(model1)
# comparing a 20 year old woman with a 20 year old man considering their left-right position
dc(model1, values1 = c(1,20,1),
    values2 = c(1,20,0))

dc.mlogit  predicted values and discrete change

Description
The function calculates the predicted values and the difference of two cases with the confidence interval. It can be used for a mlogit model.

Usage
## S3 method for class 'mlogit'
dc(model, values = NULL, sim.count = 1000, conf.int = 0.95,
    sigma = NULL, set.seed = NULL, values1 = NULL, values2 = NULL,
    type = c("any", "simulation", "bootstrap"), summary = TRUE)

Arguments
model the model-Object generated with mlogit()
values the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.
sim.count OPTIONAL numbers of simulations to be done by the function. default: 1000
conf.int OPTIONAL the confidence interval used by the function. default: 0.95
sigma OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
set.seed OPTIONAL set a seed for the random number generator
values1 the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
values2 the values of case 2 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
type type is ignored as only simulation is implemented
summary OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)
dc.multinom

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a matrix have in the first column the predicted values, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
## Not run:
# devtools::install_github("benjaminschlegel/schlegel")
df_selects = schlegel::selects2015
df_selects_withoutNA = df_selects
  filter(vote_choice != "other")
  mutate(vote_choice = factor(vote_choice))
  select(age, gender, vote_choice, starts_with("lr_"))
na.omit()

mlogit_data = dfidx::dfidx(df_selects_withoutNA, varying = 5:11,
  sep = ".", shape = "wide",
  choice = "vote_choice")

mlogit_data$distance = abs(mlogit_data$lr - mlogit_data$lr_self)

model1 = mlogit::mlogit(vote_choice ~ distance | lr_self +
  gender, data = mlogit_data)
summary(model1)
# predicted probability of a left male person with a distance of 2
dc(model1, c(1, 2, 0, 0, 1, 2, 10, 0))

## End(Not run)
```
Arguments

- **model**: the model-Object generated with `multinom()
- **values**: the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.
- **sim.count**: OPTIONAL numbers of simulations to be done by the function. default: 1000
- **conf.int**: OPTIONAL the confidence interval used by the function. default: 0.95
- **sigma**: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcv. default: `vcov(model)
- **set.seed**: OPTIONAL set a seed for the random number generator
- **values1**: the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- **values2**: the values of case 2 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- **type**: OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- **summary**: OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a matrix have in the first column the predicted values, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.

Author(s)

Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
## Not run:
model1 = nnet::multinom(Clap ~ Height + Smoke + Pulse, data=MASS::survey)
summary(model1)
dc(model1, values1 = c(1,150,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)),
values2 = c(1,151,1,0,0,mean(MASS::survey$Pulse,na.rm=TRUE)))
# the higher person has a greater probability to be left clapping
# the difference is significant, because the confidence interval
# does not include the 0
## End(Not run)
```
dc.polr

predicted values and discrete change

Description

The function calculates the predicted values and the difference of two cases with the confidence interval. It can be used for a polr model.

Usage

```r
## S3 method for class 'polr'
dc(model, values = NULL, sim.count = 1000, conf.int = 0.95, 
sigma = NULL, set.seed = NULL, values1 = NULL, values2 = NULL, 
type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

Arguments

- `model` the model-Object generated with polr()
- `values` the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.
- `sim.count` OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int` OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma` OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed` OPTIONAL set a seed for the random number generator
- `values1` the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- `values2` the values of case 2 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
- `type` OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 1000)
- `summary` OPTIONAL if mean/quantiles should be return or all simulated values (default: TRUE)

Details

The function makes a simulation for the two cases and compares them to each other.

Value

The output is a matrix have in the first column the predicted values, in the second column the lower value of the confidence interval and in the third column the upper value of the confidence interval.
dc.tobit

Author(s)
Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples

```r
## Not run:
data = MASS::survey
data$Smoke = ordered(data$Smoke, levels = c("Never", "Occas", "Regul", "Heavy"))
model1 = polr(Smoke ~ Height + Pulse, data=data)
summary(model1)
dc(model1, values1 = c(150,mean(MASS::survey$Pulse,na.rm=TRUE)),
   values2 = c(151,mean(MASS::survey$Pulse,na.rm=TRUE)))
# all differences are significant as the confidence intervals do not include 0
## End(Not run)
```

---

**Description**

The function calculates the predicted values and the difference of two cases with the confidence interval for a tobit model.

**Usage**

```r
## S3 method for class 'tobit'
dc(model, values = NULL, sim.count = 1000, conf.int = 0.95,
   sigma = NULL, set.seed = NULL, values1 = NULL, values2 = NULL,
   type = c("any", "simulation", "bootstrap"), summary = TRUE)
```

**Arguments**

- `model`: the model-Object generated with tobit()
- `values`: the values of case 1 and 2 as vector in the order how they appear in the summary(model) Estimate. Values is if values1 and values2 are specified after each other in the same vector. Either values or values1 and values2 have to be specified.
- `sim.count`: OPTIONAL numbers of simulations to be done by the function. default: 1000
- `conf.int`: OPTIONAL the confidence interval used by the function. default: 0.95
- `sigma`: OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)
- `set.seed`: OPTIONAL set a seed for the random number generator
- `values1`: the values of case 1 as vector in the order how they appear in the summary(model) Estimate. Has to be defined if values is not defined.
The function calculates the predicted values and the difference of a range of cases with the confidence interval. It can be used for any glm, polr or multinom model.

Usage

```r
predicts(model, values, position = NULL, sim.count = 1000, conf.int = 0.95, sigma = NULL, set.seed = NULL, doPar = FALSE, type = c("any", "simulation", "bootstrap"))
```
Arguments

model
the model-Object generated with glm(), glm.nb(), polr(), multinom(), mlogit() or tobit()

values
The values of cases as character in the order how they appear in the summary(model) Estimate. The values must be in the following way: "value1;value2;value3;...". Each one of the values can be one of the following:
- "all": takes all unique values of that variable
- "mean": takes the mean of that variable (can only be used when the variable is numeric)
- "median": takes the median of that variable (assumes for factors that they are correctly ordered)
- "mode": takes the mode of that variable
- "Q4": takes the quartiles (0,0.25,0.5,0.75,1) of that variable (other number for other quantiles)
- "min": takes the minimum of that variable
- "max": takes the maximum of that variable
- from-to,by: takes all values from "from" to "to" with the distance "by" (for example: "160-180,5" -> 160,165,170,175,180)
- from-to: same as from-to,by with by=1 (for example: "2-8" -> 2,3,4,5,6,7,8); also works for factors and takes the given levels form their position
- value1,value2,value3,...: takes the given values (for example: "160,180" -> 160,180); also works for factors and takes the given levels form their position
- value1: takes the given value (for example: "5.34" -> 5.34); also works for factors and takes the given level form its position
- log(from-to,by): takes the log of all values from "from" to "to" with the distance "by" (for example: "160-180,5" -> 160,165,170,175,180)
- log(from-to): same as log(from-to,by) with by=1 (for example: "2-8" -> 2,3,4,5,6,7,8)
- log(value1,value2,value3,...): takes the log of the given values (for example: "160,180" -> 160,180)
- log(value1): takes the log of the given value (for example: "5.34" -> 5.34)
- "F": takes all values of a factor/character
- "F(1,4,7)"': takes the first, fourth and seventh level of a factor/character
- "F(2)"': takes the second level of a factor/character

position
OPTIONAL which variable should be taken for the discrete change, the variable must have at least two values. default: only predicted probabilities

sim.count
OPTIONAL numbers of simulations to be done by the function. default: 1000

conf.int
OPTIONAL the confidence interval used by the function. default: 0.95

sigma
OPTIONAL the variance-covariance matrix, can be changed when having for example robust or clustered vcov. default: vcov(model)

set.seed
OPTIONAL set a seed for the random number generator

doPar
OPTIONAL if the code should run parallel if more than 2 cores are detected

type
OPTIONAL choose between simulation and bootstrap, "any" chooses between those two according to the number of cases (bootstrap if n < 500)
Details
The function makes a simulation for the all combination of cases and compares them to each other.

Value
The output is a data.frame with the predicted values and discrete changes.

Author(s)
Benjamin Schlegel, <kontakt@benjaminschlegel.ch>

Examples
```r
## Not run:
model1 = glm(Sex ~ Height + Smoke + Pulse, data=MASS::survey, family=binomial(link=logit))
summary(model1)
# comparing person with height 150 to 160, 160 to 170, 170 to 180, 180 to 190
# with all combination of (non-)smokers and a median of pulse
predicts(model1, "150-190,10;F;median", position = 1, doPar = FALSE)
## End(Not run)
```

selects2015
Swiss Electoral Studies (Selects) 2015 - Post-electoral study

Description
A simplified dataset of the Selects 2015 data. Selects 2015 was conducted after the elections to the national council in Switzerland on October 2015.

Usage
```r
selects2015
```

Format
A data frame with 5337 rows and 15 variables:

- **gender** the gender of the participant
- **age** the age of the participant
- **canton** the canton where the participant lives
- **education** the highest education of the participant
- **participation** Indicates if the participant participated in the national election or not
- **vote_choice** The party the participant mainly voted for: SVP, FDP, CVP, SP, GPS, GLP, BDP, other
- **political_interest** political interest of the participant, self declaration
- **lr_self** left right self placement
lr_SVP  left right placement of SVP
lr_FDP  left right placement of FDP
lr_CVP  left right placement of CVP
lr_SP   left right placement of SP
lr_GPS  left right placement of GPS
lr_GLPI left right placement of GLP
lr_BDP  left right placement of BDP

knowscale  political knowledge scale between 0 and 4

opinion_social_expenses  opinion about social expense

opinion_eu_membership  opinion if Switzerland should join the EU

opinion_foreigners_swiss_equal  opinion if foreigners should be treated equal to Swiss

opinion_environment_economy  opinion if environment or economy is more important

opinion_nuclear_energy  opinion on nuclear energy

opinion_high_income_taxes  opinion on high income taxes

weight_total  A weight to make the survey representative (design weight * turnout * vote_choice)

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