Package: rbc (via r-universe)

November 7, 2024

Title Regression by Composition

Version 0.1.0

Description Flexible statistical modelling using a modular framework for regression, in which groups of transformations are composed together and act on probability distributions.

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Depends R (>= 2.10)

Imports Formula, R6

Suggests testthat (>= 3.0.0)

Config/testthat/edition 3

Encoding UTF-8

LazyData true

RoxygenNote 7.3.2

NeedsCompilation no

Author Daniel Farewell [aut, cre, cph] (<https://orcid.org/0000-0002-8871-1653>), Simon Schoenbuchner [ctb] (<https://orcid.org/0000-0003-4892-2170>)

Maintainer Daniel Farewell <farewelld@cardiff.ac.uk>

Repository CRAN

Date/Publication 2024-11-06 21:00:01 UTC

Contents

`AIC.RegressionByComposition` *Compute Akaike Information Criterion from a regression by composition*

Description

Compute Akaike Information Criterion from a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
AIC(object, ..., k = 2)
```

Arguments

`object`	a RegressionByComposition object; usually the result of a call to rbc()
`...`	ignored
`k`	numeric, the *penalty* per parameter to be used; 'k = 2' is the classical AIC.

append_flow *Append a flow to a CompositeFamily object*

Description

Append a flow to a CompositeFamily object

Usage

```
append_flow(family, flow)
```

Arguments

family	a CompositeFamily object
flow	a Flow object

Value

a new CompositeFamily object

Examples

```
append_flow(Normal(0, 1), Translate)

Reduce(append_flow, list(Scale, Translate), init = Normal(0, 1))
```

Bernoulli *Bernoulli distribution as a CompositeFamily*

Description

Bernoulli distribution as a CompositeFamily

Usage

```
Bernoulli(prob = 0.5)
```

Arguments

prob	the probability of a success

Value

a new BinaryFamily object

Examples

```
dist <- Bernoulli()
dist$probability()
```

`coef.RegressionByComposition` *Extract regression coefficients from a regression by composition*

Description

Extract regression coefficients from a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
coef(object, ...)
```

Arguments

`object`	a RegressionByComposition object; usually the result of a call to rbc()
`...`	ignored

`fitted.RegressionByComposition` *Compute fitted values from a regression by composition*

Description

Compute fitted values from a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
fitted(object, ...)
```

Arguments

`object`	a RegressionByComposition object; usually the result of a call to rbc()
`...`	further arguments passed to the R6 method $fitted() associated with the model's CompositeFamily

logLik.RegressionByComposition *Extract log-likelihood from a regression by composition*

Description

Extract log-likelihood from a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
logLik(object, ...)
```

Arguments

object	a RegressionByComposition object; usually the result of a call to rbc()
...	ignored

LogNormal *Lognormal distribution as a CompositeFamily*

Description

Lognormal distribution as a CompositeFamily

Usage

```
LogNormal(meanlog = 0, sdlog = 1)
```

Arguments

meanlog	the mean of the logarithm
sdlog	the standard deviation of the logarithm

Value

a new ContinuousFamily object

Examples

```
dist <- LogNormal()
log(dist$quantile(0.95))
```

Moebius *Moebius flow*

Description

Moebius flow

Usage

```
Moebius
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

Normal *Normal distribution as a CompositeFamily*

Description

Normal distribution as a CompositeFamily

Usage

```
Normal(mean = 0, sd = 1)
```

Arguments

`mean`	the mean
`sd`	the standard deviation

Value

a new ContinuousFamily object

Examples

```
dist <- Normal()
dist$quantile(0.95)
```

Power *Power flow*

Description

Power flow

Usage

```
Power
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

predict.RegressionByComposition *Compute predicted values from a regression by composition*

Description

Compute predicted values from a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
predict(object, newdata, ...)
```

Arguments

`object`	a RegressionByComposition object; usually the result of a call to rbc()
`newdata`	data.frame containing new data
`...`	further arguments passed to the R6 method $fitted() associated with the model's CompositeFamily

rbc *Fit a regression by composition model*

Description

Fit a regression by composition model

Usage

```
rbc(formula, init, flows, family, data, par, hessian = TRUE)
```

Arguments

formula	a formula object, with model components separated by 'I'
init	the initial distribution
flows	a list of flows
family	(optional) an object of class 'CompositeFamily'; if supplied, 'init' and 'flows' are ignored
data	a data frame
par	a vector of starting values
hessian	logical; use Hessian matrix in model fitting?

Value

an rbc object

Examples

```
## Annette Dobson (1990)
## "An Introduction to Generalized Linear Models".
## Page 9: Plant Weight Data.
ctl <- c(4.17, 5.58, 5.18, 6.11, 4.50, 4.61, 5.17, 4.53, 5.33, 5.14)
trt <- c(4.81, 4.17, 4.41, 3.59, 5.87, 3.83, 6.03, 4.89, 4.32, 4.69)
dobson <- data.frame(
  weight = c(ctl, trt),
  group = gl(2, 10, 20, labels = c("Ctl", "Trt"))
)
dobson_fit <- rbc(weight ~ 1 | 1 + group,
  init = Normal(0, 1),
  flows = list(Scale, Translate),
  data = dobson
)

starr_fit <- rbc(
  height ~ 1 | 0 + I((280 + age)^(-1)) | 1 | 1,
  init = LogNormal(),
  flows = list(Power, Moebius, Scale, Translate),
```

```
  data = subset(starr, id %in% unique(id)[1:10])
)
```

`residuals.RegressionByComposition` *Compute 'residuals' from a regression by composition*

Description

Compute 'residuals' from a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
residuals(object, ...)
```

Arguments

`object`	a RegressionByComposition object; usually the result of a call to rbc()
`...`	ignored

Value

a vector of probabilities of the same length as the data

`Scale` *Scale flow*

Description

Scale flow

Usage

```
Scale
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

ScaleOdds *ScaleOdds flow*

Description

ScaleOdds flow

Usage

```
ScaleOdds
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

ScaleRisk0 *ScaleRisk0 flow*

Description

ScaleRisk0 flow

Usage

```
ScaleRisk0
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

ScaleRisk1 *ScaleRisk1 flow*

Description

ScaleRisk1 flow

Usage

```
ScaleRisk1
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

starr *Growth from birth to 3 years in healthy babies in the US*

Description

Growth from birth to 3 years in healthy babies in the US

Usage

```
starr
```

Format

`starr`:
A data frame with 104,798 rows and 5 columns:

id Anonymized identifier
sex Sex of baby
age Age of baby, in days
height Jittered height of baby, in cm
weight Jittered weight of baby, in kg ...

Source

doi:10.5061/dryad.4j0zpc8jf

References

doi:10.1186/s12874024021451

summary.RegressionByComposition *Summary of a regression by composition*

Description

Summary of a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
summary(object, compact = FALSE, ...)
```

Arguments

`object`	a RegressionByComposition object; usually the result of a call to rbc()
`compact`	logical; should coefficients from all flows be compressed into a single matrix?
`...`	ignored

Translate *Translate flow*

Description

Translate flow

Usage

```
Translate
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

TranslateRisk1 *TranslateRisk1 flow*

Description

TranslateRisk1 flow

Usage

```
TranslateRisk1
```

Format

An object of class `Flow` (inherits from `R6`) of length 6.

vcov.RegressionByComposition *Extract variance-covariance matrix from a regression by composition*

Description

Extract variance-covariance matrix from a regression by composition

Usage

```
## S3 method for class 'RegressionByComposition'
vcov(object, ...)
```

Arguments

`object`	a RegressionByComposition object; usually the result of a call to rbc()
`...`	ignored

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