Package 'HazReg'

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Type Package

Title Parametric hazard-based regression models

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Description The HazReg R package implements the following parametric hazard-based regression models for survival data, in the overall and relative survival frameworks.

License What license is it under?

Encoding UTF-8

LazyData true

RoxygenNote 7.3.3

Imports numDeriv, matrixStats

Contents

`chew` *Power Exponentiated Weibull (EW) cumulative hazard function. https://rpubs.com/FJRubio/EWD*

Description

Power Exponentiated Weibull (EW) cumulative hazard function. https://rpubs.com/FJRubio/EWD

Usage

```
chew(t, sigma, nu, gamma)
```

Arguments

`t`	: positive argument
`sigma`	: scale parameter
`nu`	: shape parameter
`gamma`	: shape parameter

Value

the value of the EW cumulative hazard function

`chgamma` *Gamma (G) cumulative hazard function.*

Description

Gamma (G) cumulative hazard function.

Usage

```
chgamma(t, shape, scale)
```

Arguments

`t`	: positive argument
`shape`	: shape parameter
`scale`	: scale parameter
`log:`	log scale (TRUE or FALSE)

Value

the value of the Weibull hazard function

`chggamma` *Generalised Gamma (GG) cumulative hazard function. https://rpubs.com/FJRubio/GG*

Description

Generalised Gamma (GG) cumulative hazard function. https://rpubs.com/FJRubio/GG

Usage

```
chggamma(t, sigma, nu, gamma)
```

Arguments

`t`	: positive argument
`sigma`	: scale parameter
`nu`	: shape parameter
`gamma`	: shape parameter

Value

the value of the GG cumulative hazard function

`chllogis` *Log-logistic (LL) cumulative hazard function.*

Description

Log-logistic (LL) cumulative hazard function.

Usage

```
chllogis(t, mu, sigma)
```

Arguments

`t`	: positive argument
`mu`	: mean parameter in the log scale
`sigma`	: scale parameter in the log scale

Value

the value of the LL cumulative hazard function

chlnorm *Lognormal (LN) cumulative hazard function.*

Description

Lognormal (LN) cumulative hazard function.

Usage

```
chlnorm(t, mu, sigma)
```

Arguments

t	: positive argument
mu	: mean parameter in the log scale
sigma	: scale parameter in the log scale

Value

the value of the LN cumulative hazard function

chpgw *Power Generalised Weibull (PGW) cumulative hazard function. http://rpubs.com/FJRubio/PGW*

Description

Power Generalised Weibull (PGW) cumulative hazard function. http://rpubs.com/FJRubio/PGW

Usage

```
chpgw(t, sigma, nu, gamma)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter

Value

the value of the PGW cumulative hazard function

chweibull — *Weibull (W) cumulative hazard function.*

Description

Weibull (W) cumulative hazard function.

Usage

```
chweibull(t, sigma, nu)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter

Value

the value of the Weibull cumulative hazard function

Conf_Int — *Function to calculate the normal confidence intervals. The parameters indicated with "index" are transformed to the real line using log().*

Description

Function to calculate the normal confidence intervals. The parameters indicated with "index" are transformed to the real line using log().

Usage

```
Conf_Int(FUN, MLE, level = 0.95, index = NULL)
```

Arguments

FUN	: minus log-likelihood function to be used to calculate the confidence intervals
MLE	: maximum likelihood estimator of the parameters of interest
level	: confidence level
index	: position of the positive parameters under the original parameterisation

Value

a list containing the upper and lower conf.int limits, the transformed MLE, and std errors

dggamma *Generalised Gamma (GG) probability density function. https://rpubs.com/FJRubio/GG*

Description

Generalised Gamma (GG) probability density function. https://rpubs.com/FJRubio/GG

Usage

```
dggamma(t, sigma, nu, gamma, log = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter
log:	log scale (TRUE or FALSE)

Value

the value of the GG probability density function

dpgw *Power Generalised Weibull (PGW) probability density function. http://rpubs.com/FJRubio/PGW*

Description

Power Generalised Weibull (PGW) probability density function. http://rpubs.com/FJRubio/PGW

Usage

```
dpgw(t, sigma, nu, gamma, log = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter
log:	log scale (TRUE or FALSE)

Value

the value of the PGW probability density function

GEHMLE *Relative (Net) Survival models Log likelihood and MLE for the GH excess hazards model. Baseline hazards: Lognormal, Log-logistic, Gamma, PGW, EW, GG*

Description

Relative (Net) Survival models Log likelihood and MLE for the GH excess hazards model. Baseline hazards: Lognormal, Log-logistic, Gamma, PGW, EW, GG

Usage

```
GEHMLE(
  init,
  times,
  status,
  hp,
  hstr = NULL,
  dist = NULL,
  des = NULL,
  des_t = NULL,
  method = "Nelder-Mead",
  maxit = 100
)
```

Arguments

init	initial point for optimisation step
times	times to event
status	vital status indicators
hp	population hazard
hstr	hazard structure: "baseline", "AFT", "PH", "AH", or "GH"
dist	distribution for the baseline hazard: "PGW", "GenGamma", "EW", "Weibull", "Gamma", "LogNormal", "LogLogistic"
des	design matrix for hazard-level effects
des_t	design matrix for time-level effects
method	"nlminb" or optimisation method to be used in optim
maxit	maximum number of iterations

Value

It returns the output from optim or nlminb and the negative log likelihood function

GHMLE *GHMLE function: Hazard Regression Models with a parametric baseline hazard*

Description

GHMLE function: Hazard Regression Models with a parametric baseline hazard

Usage

```
GHMLE(
  init,
  times,
  status,
  hstr = NULL,
  dist = NULL,
  des = NULL,
  des_t = NULL,
  method = "Nelder-Mead",
  maxit = 100
)
```

Arguments

init	: initial point for optimisation step under the parameterisation (log(scale), log(shape1), log(shape2), alpha, beta) for scale-shape1-shape2 models or (mu, log(scale), alpha, beta) for log-location scale models.
times	: times to event
status	: vital status indicators (TRUE or 1 = observed, FALSE or 0 = censored)
hstr	: hazard structure: No covariates ("baseline"), AFT model with PGW baseline hazard ("AFT"), PH model with PGW baseline hazard ("PH"), AH model with PGW baseline hazard ("AH"), GH model with PGW baseline hazard ("GH") *GH is not available with Weibull dist
dist	: distribution for the baseline hazard: Power Generalised Weibull ("PGW") Generalised Gamma ("GenGamma")) Exponentiated Weibull ("EW") Weibull ("Weibull") Gamma ("Gamma") LogNormal ("LogNormal") LogLogistic ("LogLogistic")
des	: design matrix for hazard-level effects
des_t	: design matrix for time-level effects (it is recommended not to use splines here)
method	: "nlminb" or optimisation method to be used in optim (see ?optim)
maxit	: maximum number of iterations in optim or nlminb

Value

It returns the output from optim or nlminb for the selected model and the negative log likelihood function

hew — *Power Exponentiated Weibull (EW) hazard function. https://rpubs.com/FJRubio/EWD*

Description

Power Exponentiated Weibull (EW) hazard function. https://rpubs.com/FJRubio/EWD

Usage

```
hew(t, sigma, nu, gamma, log = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter
log:	log scale (TRUE or FALSE)

Value

the value of the EW hazard function

hgamma — *Gamma (G) hazard function.*

Description

Gamma (G) hazard function.

Usage

```
hgamma(t, shape, scale, log = FALSE)
```

Arguments

t	: positive argument
shape	: shape parameter
scale	: scale parameter
log:	log scale (TRUE or FALSE)

Value

the value of the Gamma hazard function

hggamma *Generalised Gamma (GG) hazard function. https://rpubs.com/FJRubio/GG*

Description

Generalised Gamma (GG) hazard function. https://rpubs.com/FJRubio/GG

Usage

```
hggamma(t, sigma, nu, gamma, log = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter
log:	log scale (TRUE or FALSE)

Value

the value of the GG hazard function

hllogis *Log-logistic (LL) hazard function.*

Description

Log-logistic (LL) hazard function.

Usage

```
hllogis(t, mu, sigma, log = FALSE)
```

Arguments

t	: positive argument
mu	: mean parameter in the log scale
sigma	: scale parameter in the log scale
log:	log scale (TRUE or FALSE)

Value

the value of the LL hazard function

hlnorm *Lognormal (LN) hazard function.*

Description

Lognormal (LN) hazard function.

Usage

```
hlnorm(t, mu, sigma, log = FALSE)
```

Arguments

t	: positive argument
mu	: mean parameter in the log scale
sigma	: scale parameter in the log scale
log:	log scale (TRUE or FALSE)

Value

the value of the LN hazard function

hpgw *Power Generalised Weibull (PGW) hazard function. http://rpubs.com/FJRubio/PGW*

Description

Power Generalised Weibull (PGW) hazard function. http://rpubs.com/FJRubio/PGW

Usage

```
hpgw(t, sigma, nu, gamma, log = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter
log:	log scale (TRUE or FALSE)

Value

the value of the PGW hazard function

hweibull *Weibull (W) hazard function.*

Description

Weibull (W) hazard function.

Usage

```
hweibull(t, sigma, nu, log = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
log:	log scale (TRUE or FALSE)

Value

the value of the Weibull hazard function

pggamma *Generalised Gamma (GG) cumulative distribution function. https://rpubs.com/FJRubio/GG*

Description

Generalised Gamma (GG) cumulative distribution function. https://rpubs.com/FJRubio/GG

Usage

```
pggamma(t, sigma, nu, gamma, log.p = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter
log.p:	log scale (TRUE or FALSE)

Value

the value of the GG cumulative distribution function

qew — *Power Exponentiated Weibull (EW) quantile function. https://rpubs.com/FJRubio/EWD*

Description

Power Exponentiated Weibull (EW) quantile function. https://rpubs.com/FJRubio/EWD

Usage

```
qew(p, sigma, nu, gamma)
```

Arguments

p	: probability. A value in (0,1)
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter

Value

the value of the EW quantile function

qggamma — *Generalised Gamma (GG) quantile function. https://rpubs.com/FJRubio/GG*

Description

Generalised Gamma (GG) quantile function. https://rpubs.com/FJRubio/GG

Usage

```
qggamma(p, sigma, nu, gamma)
```

Arguments

p	: probability. A value in (0,1)
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter

Value

the value of the GG quantile function

qllogis *Log-logistic (LL) quantile function.*

Description

Log-logistic (LL) quantile function.

Usage

```
qllogis(p, mu, sigma)
```

Arguments

p	: probability. A value in (0,1)
mu	: mean parameter in the log scale
sigma	: scale parameter in the log scale

Value

the value of the LL quantile function

qpgw *Power Generalised Weibull (PGW) quantile function. http://rpubs.com/FJRubio/PGW*

Description

Power Generalised Weibull (PGW) quantile function. http://rpubs.com/FJRubio/PGW

Usage

```
qpgw(p, sigma, nu, gamma)
```

Arguments

p	: probability. A value in (0,1)
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter

Value

the value of the PGW quantile function

`rggamma` *Generalised Gamma (GG) random number generation. https://rpubs.com/FJRubio/GG*

Description

Generalised Gamma (GG) random number generation. https://rpubs.com/FJRubio/GG

Usage

```
rggamma(n, sigma, nu, gamma)
```

Arguments

`n`	: number of observations
`sigma`	: scale parameter
`nu`	: shape parameter
`gamma`	: shape parameter

Value

generates random deviates

`rpgw` *Power Generalised Weibull (PGW) random number generation. http://rpubs.com/FJRubio/PGW*

Description

Power Generalised Weibull (PGW) random number generation. http://rpubs.com/FJRubio/PGW

Usage

```
rpgw(n, sigma, nu, gamma)
```

Arguments

`n`	: number of observations
`sigma`	: scale parameter
`nu`	: shape parameter
`gamma`	: shape parameter

Value

generates random deviates

`sggamma` *Generalised Gamma (GG) survival function. https://rpubs.com/FJRubio/GG*

Description

Generalised Gamma (GG) survival function. https://rpubs.com/FJRubio/GG

Usage

```
sggamma(t, sigma, nu, gamma, log.p = FALSE)
```

Arguments

`t`	: positive argument
`sigma`	: scale parameter
`nu`	: shape parameter
`gamma`	: shape parameter
`log.p:`	log scale (TRUE or FALSE)

Value

the value of the GG survival function

`simGH` *simGH function: Function to simulate times to event from a model with a GH structure for different parametric baseline hazards. Distributions: LogNormal, LogLogistic, GenGamma, Gamma, Weibull, PGW, EW. See: https://github.com/FJRubio67/HazReg*

Description

simGH function: Function to simulate times to event from a model with a GH structure for different parametric baseline hazards. Distributions: LogNormal, LogLogistic, GenGamma, Gamma, Weibull, PGW, EW. See: https://github.com/FJRubio67/HazReg

Usage

```
simGH(
  seed,
  n,
  des = NULL,
  des_h = NULL,
  des_t = NULL,
  theta,
  beta_h = NULL,
  beta_t = NULL,
  beta = NULL,
  hstr,
  baseline
)
```

Arguments

seed	: seed for simulation
n	: sample size (number of individuals)
des	: Design matrix for AFT, PH, and AH models
des_h	: Design matrix for GH model (hazard scale)
des_t	: Design matrix for GH model (time scale)
theta	: parameters of the baseline hazard
beta_h	: regression parameters multiplying the hazard for GH model
beta_t	: regression parameters multiplying the time scale for GH model
beta	: regression parameters for AFT, PH, and AH models
hstr	: hazard structure (AH, AFT, PH, GH)
baseline	: baseline hazard distribution

Value

a vector containing the simulated times to event

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spgw *Power Generalised Weibull (PGW) survival function. http://rpubs.com/FJRubio/PGW*

Description

Power Generalised Weibull (PGW) survival function. http://rpubs.com/FJRubio/PGW

Usage

```
spgw(t, sigma, nu, gamma, log.p = FALSE)
```

Arguments

t	: positive argument
sigma	: scale parameter
nu	: shape parameter
gamma	: shape parameter
log.p:	log scale (TRUE or FALSE)

Value

the value of the PGW survival function

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