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 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)
hp	: population hazard (for all individuals)
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

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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