Package: tweedieDistr (via r-universe)

July 15, 2026

Title Tweedie Distribution

Version 0.1.0

Description Provides density, distribution function, quantile function, and random generation for the Tweedie distribution under the compound Poisson-Gamma parameterisation with power parameter in (1, 2). The density is evaluated using the series expansion of Dunn and Smyth (2005) <doi:10.1007/s11222-005-4070-y>, implemented in C++ via 'Rcpp' and 'RcppArmadillo' for performance. A constructor compatible with the distributional package is also provided for use in tidy modelling workflows.

License LGPL (>= 3)

URL https://github.com/StefanoDamato/tweedieDistr

BugReports https://github.com/StefanoDamato/tweedieDistr/issues

Encoding UTF-8

RoxygenNote 7.3.3

Depends R (>= 4.1.0)

Imports distributional, Rcpp, rlang, stats

LinkingTo Rcpp, RcppArmadillo

Suggests ggdist, ggplot2, testthat (>= 3.0.0), tibble, tweedie

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NeedsCompilation yes

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Contents

`dist_tweedie` *Tweedie Distribution*

Description

Construct a Tweedie distribution object using the compound Poisson–Gamma parameterisation with power parameter in $(1, 2)$. The Tweedie family is a subclass of exponential dispersion models that naturally produces exact zeros (via the Poisson count component) mixed with continuous positive values (via the Gamma severity component), making it well suited to intermittent demand data.

Usage

```
dist_tweedie(mean = 1, dispersion = 1, power = 1.5)
```

Arguments

`mean`	Mean parameter $\mu > 0$.
`dispersion`	Dispersion parameter $\phi > 0$.
`power`	Power parameter $p \in (1, 2)$.

Details

The density is evaluated using the series expansion of Dunn & Smyth (2005), implemented in C++ for performance.

Value

A `distributional` distribution object of class `dist_tweedie`.

References

Dunn, P. K., & Smyth, G. K. (2005). Series evaluation of Tweedie exponential dispersion model densities. *Statistics and Computing*, 15(4), 267–280. doi:10.1007/s112220054070y.

Examples

```
d <- dist_tweedie(mean = 2, dispersion = 0.8, power = 1.5)
d |> mean()
d |> quantile(c(0.5, 0.9))
d |> density(c(0, 1.5, 3))
d |> distributional::variance()
d |> distributional::generate(10)
```

`tweedie` *Tweedie Distribution Functions*

Description

Density, distribution function, quantile function and random generation for the Tweedie distribution with mean equal to `mean`, dispersion equal to `dispersion`, and power equal to `power`.

Usage

```
rtweedie(n, mean = 1, dispersion = 1, power = 1.5)

dtweedie(x, mean = 1, dispersion = 1, power = 1.5, log = FALSE)

ptweedie(
  q,
  mean = 1,
  dispersion = 1,
  power = 1.5,
  lower.tail = TRUE,
  log.p = FALSE
)

qtweedie(
  p,
  mean = 1,
  dispersion = 1,
  power = 1.5,
  lower.tail = TRUE,
  log.p = FALSE
)
```

Arguments

`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.
`mean`	vector of means.
`dispersion`	vector of dispersion parameters.
`power`	vector of power parameters.
`x, q`	vector of quantiles.
`log, log.p`	logical; if `TRUE`, probabilities `p` are given as `log(p)`.
`lower.tail`	logical; if `TRUE` (default), probabilities are $P[X \leq x]$; otherwise, $P[X > x]$.
`p`	vector of probabilities.

Details

If `mean`, `dispersion`, or `power` are not specified they assume the default values of `1`, `1`, and `1.5`, respectively.

The Tweedie distribution used here follows the compound Poisson-Gamma parameterisation with power parameter in $(1, 2)$. It has $\mathbb{E}[X] = \mu$ and $\mathrm{Var}(X) = \phi\mu^p$, where μ is `mean`, ϕ is `dispersion`, and p is `power`.

Value

`dtweedie` gives the density, `ptweedie` gives the distribution function, `qtweedie` gives the quantile function, and `rtweedie` generates random samples.

The length of the result is determined by `n` for `rtweedie`, and is the maximum of the lengths of the numerical arguments for the other functions.

The numerical arguments other than `n` are recycled to the length of the result. Only the first elements of the logical arguments are used.

References

Dunn, P. K., & Smyth, G. K. (2005). Series evaluation of Tweedie exponential dispersion model densities. *Statistics and Computing*, 15(4), 267–280. doi:10.1007/s112220054070y.

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