Package 'WeibullModiAMR'

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Type Package

Title Fit Modified Weibull-Type Distributions

Version 0.1.0

Description Provides maximum likelihood estimation methods for eight modified Weibull-type distributions. It returns parameter estimates, log-likelihood, AIC, and BIC, and also supports model fitting, validation, and comparison across different distributional forms. These methods can be applied to reliability, survival, and lifetime data analysis, making the package useful for researchers and practitioners in statistics, engineering, and medicine. The following distributions are included: Rangoli2023, Peng2014, Lai2003, Xie1996, Sarhan2009, Rangoli2025, Mustafa2012, and Alwasel2009.

License GPL-3

Encoding UTF-8

RoxygenNote 7.3.2

Imports stats

Suggests testthat (>= 3.0.0)

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Author Dr Ajaykumar Rangoli [aut, cre]

Maintainer Dr Ajaykumar Rangoli <drajaykumarmr1008@gmail.com>

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`WeibullModiAMR` *Fit Modified Weibull-Type Distributions*

Description

Fits eight modified Weibull-type distributions using maximum likelihood estimation. Returns estimates, log-likelihood, AIC, and BIC.

Usage

```
WeibullModiAMR(x, dist = "Alwasel2009")
```

Arguments

`x`	Numeric vector of positive data.
`dist`	Character; choose one of: `"Rangoli2023"`, `"Peng2014"`, `"Lai2003"`, `"Xie1996"`, `"Sarhan2009"`, `"Rangoli2025"`, `"Mustafa2012"`, `"Alwasel2009"`.

Value

A list containing:

`estimates`	Estimated parameters.
`loglik`	Maximized log-likelihood.
`AIC`	Akaike Information Criterion.
`BIC`	Bayesian Information Criterion.

Distributions

The following modified Weibull-type distributions are included in the package, along with their respective probability density functions (PDFs) and references:

- **Rangoli2023:**

$$f(x) = (abx^{b-1} + \frac{g}{x^2}) \exp(ax^b - \frac{g}{x}) \exp(-\exp(ax^b - \frac{g}{x}))$$

Reference: Rangoli, A. M. (2024). doi:10.22271/maths.2024.v9.i4b.1771

- **Peng2014:**

$$f(x) = \alpha \exp(-\lambda/x)(\beta x^{\beta-1} + \lambda x^{\beta-2}) \exp(-\alpha x^{\beta} \exp(-\lambda/x))$$

Reference: Peng, X. (2014). doi:10.1016/j.ress.2013.07.007

- **Lai2003:**

$$f(x) = a(b + lx)x^{b-1} \exp(lx) \exp(-ax^b \exp(lx))$$

Reference: Lai, C. D. (2003). doi:10.1109/TR.2002.805788

- **Xie1996:**

$$f(x) = (abx^{b-1} + glx^{l-1}) \exp(-(ax^b + gx^l))$$

Reference: Xie, M. (1996). doi:10.1016/09518320(95)001492

- **Sarhan2009:**

$$f(x) = (abx^{b-1} + g) \exp(-(ax^b + gx))$$

Reference: Sarhan, A. M. (2009). https://www.researchgate.net/publication/228695122_Modified_Weibull_distribution

- **Rangoli2025:**

$$f(x) = (glx^{l-1} + abx^{b-1} \exp(x^b)/b^a) \exp(-((a/b^a)(\exp(x^b) - 1) + gx^l))$$

Reference: Rangoli, A. M. (2025). doi:10.7759/cureus.77347

- **Mustafa2012:**

$$f(x) = (\alpha\beta x^{\beta-1} + \lambda \exp(-\lambda x)) \exp(-(\alpha x^\beta + \lambda x))$$

Reference: Mustafa, A. (2012). doi:10.1016/j.ress.2013.07.007

- **Alwasel2009:**

$$f(x) = (a + bgx^{g-1}) \exp(-(ax + bx^g))$$

Reference: Alwasel, I. (2009). https://www.researchgate.net/publication/228817485_Statistical_Inference_of_a_Competing_Risks_Model_with_Modified_Weibull_Distributions

Examples

```
# Load your package
library(WeibullModiAMR)

# Example: Fit Rangoli2023 distribution
x <- rexp(50, rate = 1)
res <- WeibullModiAMR(x, dist = "Rangoli2023")
print(res)
```

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