

# Package: dtgiw (via r-universe)

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**Type** Package

**Title** Discrete Transmuted Generalized Inverse Weibull Distribution

**Version** 1.1.0

**Language** en-US

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**Description** The Discrete Transmuted Generalized Inverse Weibull (DTGIW) distribution is a new distribution for count data analysis. The DTGIW is a discrete distribution based on Atchanut and Sirinapa (2021). <DOI:10.14456/sjst-psu.2021.149>. In addition, a function for maximum likelihood estimation of the DTGIW distribution is provided.

**License** GPL-3

**Encoding** UTF-8

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**Suggests** testthat (>= 3.0.0)

**Config/testthat/edition** 3

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dDTGIW	<i>The probability mass function (PMF) for Discrete Transmuted Generalized Inverse Weibull (DTGIW) distribution.</i>
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### Description

This function calculated the PMF of the DTGIW distribution.

### Usage

```
dDTGIW(x, alpha, beta, lambda, theta, log = FALSE)
```

### Arguments

x	vector of quantiles.
alpha	shape parameter#1.
beta	scale parameter.
lambda	shape parameter#2.
theta	the transmuted parameter.
log	logical(TRUE or FALSE); if log=FALSE, then return the PMF; if log=TRUE, then return the natural logarithms of the PMF.

### Details

The PMF of the DTGIW distribution is shown in Theorem 1 based on the research paper in references.

### Value

the PMF of DTGIW distribution

### References

Atchanut Rattanalertnusorn and Sirinapa Aryuyuen (2021). The zero-truncated discrete transmuted generalized inverse Weibull distribution and its applications, Songklanakarin Journal of Science and Technology (SJST), Volume 43 No.4 (July - August 2021), pp. 1140 - 1151. DOI: 10.14456/sjst-psu.2021.149

### Examples

```
x <- c(0:10)
dDTGIW(x, 3.45, 0.7, 1.05, 0)
```

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loglikeDTGIW	<i>Negative Log-Likelihood value of DTGIW distribution.</i>
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**Description**

The function for calculating negative log-likelihood value of DTGIW distribution.

**Usage**

```
loglikeDTGIW(x, alpha, beta, lambda, theta)
```

**Arguments**

x	a vector of quantile
alpha	shape parameter#1
beta	scale parameter
lambda	shape parameter#2
theta	the transmuted parameter

**Value**

the negative log-likelihood value of DTGIW distribution

**References**

Atchanut Rattanalertnusorn and Sirinapa Aryuyuen (2021). The zero-truncated discrete transmuted generalized inverse Weibull distribution and its applications, Songklanakarin Journal of Science and Technology (SJST), Volume 43 No.4 (July - August 2021), pp. 1140 - 1151 <DOI: 10.14456/sjst-psu.2021.149>.

**Examples**

```
x <- rDTGIW(n=20, 3.45, 0.7, 1.05, 0)
loglikeDTGIW(x, 3.45, 0.7, 1.05, 0)
```

---

mleDTGIW

*Maximum likelihood estimation of the DTGIW distribution*


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### Description

The function is used to estimate parameters based on the maximum likelihood method

### Usage

```
mleDTGIW(x, par)
```

### Arguments

x	a data vector
par	a parameter vector of the DTGIW distribution; i.e. c(2.5, 1.5, 1.5, -0.5) means alpha=2.5, beta=1.5, lambda=1.5, theta=-0.5

### Value

a list of variables as follows: mle.est gives the estimated parameter vector, negloglik gives a value of the negative loglikelihood function, method gives the method of optimization, AIC gives the Akaike Information Criterion, and BIC gives the Bayesian Information Criterion.

### References

Rattanalertnusorn, A., & Aryuyuen, S. (2022). An R implementation for estimating the parameters of the discrete transmuted generalized inverse Weibull distribution, *International Journal of Mathematics and Computer Science*, Volume 17, Issue 3, pp. 1427 - 1438. <<https://www.scopus.com/pages/publications/85130592>>

### Examples

```
x <- rDTGIW(30,alpha = 2.5,beta = 1.5, lambda = 1.5, theta = -0.5)
initpar <- c(2.5,1.5,1.5,-0.5)
mleDTGIW(x=x,par=initpar)
```

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pDTGIW

*The cumulative distribution function (CDF) for Discrete Transmuted Generalized Inverse Weibull (DTGIW) distribution.*


---

### Description

This function calculated the CDF of the DTGIW distribution.

### Usage

```
pDTGIW(q, alpha, beta, lambda, theta, lower.tail = TRUE, log.p = FALSE)
```

**Arguments**

q	vector of quantiles.
alpha	shape parameter#1.
beta	scale parameter.
lambda	shape parameter#2.
theta	the transmuted parameter.
lower.tail	logical; if TRUE (default), probabilities are Prob of X less than or equal to x. Otherwise, Prob of X greater than x.
log.p	logical(TRUE or FALSE); if log.p=FALSE, then return the CDF; if log.p=TRUE, then return the natural logarithms of the CDF.

**Details**

The PMF of DTGIW distribution is shown in Theorem 1. based on the research paper in references. For discrete random variables, the CDF of DTGIW distribution can be calculated by summation of the PMF.

**Value**

the cdf of DTGIW distribution

**References**

Atchanut Rattanalertnusorn and Sirinapa Aryuyuen (2021). The zero-truncated discrete transmuted generalized inverse Weibull distribution and its applications, Songklanakarin Journal of Science and Technology (SJST), Volume 43 No.4 (July - August 2021), pp. 1140 - 1151. DOI: 10.14456/sjst-psu.2021.149

**Examples**

```
x <- c(0:10)
pDTGIW(x, 3.45, 0.7, 1.05, 0)
```

---

plotDTGIW

*Plot Discrete Transmuted Generalized Inverse Weibull(DTGIW) distribution.*

---

**Description**

This function for the plot of DTGIW distribution.

**Usage**

```
plotDTGIW(x, fx, alpha = 3.45, beta = 0.7, lambda = 1.05, theta = 0)
```

**Arguments**

x	a vector of quantile
fx	probability mass function
alpha	shape parameter#1.
beta	scale parameter.
lambda	shape parameter#2.
theta	the transmuted parameter.

**Value**

the figure of DTGIW distribution

**Examples**

```
x <- c(0:10)
fx<- dDTGIW(x,3.45,0.7,1.05,0)
plotDTGIW(x,fx,alpha=3.45,beta=0.7,lambda=1.05,theta=0)
fx2 <- dDTGIW(x,2.50,0.5,1.00,0)
plotDTGIW(x,fx2,alpha=2.50,beta=0.5,lambda=1.00,theta=0)
```

---

qDTGIW

*The quantile function for Discrete Transmuted Generalized Inverse Weibull (DTGIW) distribution.*

---

**Description**

This function calculated the quantile values of the DTGIW distribution.

**Usage**

```
qDTGIW(p, alpha, beta, lambda, theta, lower.tail = TRUE, log.p = FALSE)
```

**Arguments**

p	vector of probabilities
alpha	shape parameter#1.
beta	scale parameter.
lambda	shape parameter#2.
theta	the transmuted parameter.
lower.tail	logical; if TRUE (default), probabilities are Prob of X less than or equal to x. Otherwise, Prob of X greater than x.
log.p	logical(TRUE or FALSE); if log.p=FALSE, then return the cdf; if log.p=TRUE, then return the natural logarithms of the cdf.

**Details**

The R script calculated the quantile values of the DTGIW distribution is shown based on the research paper in references.

**Value**

the quantile values of DTGIW distribution

**References**

Atchanut Rattanalertnusorn and Sirinapa Aryuyuen (2021). The zero-truncated discrete transmuted generalized inverse Weibull distribution and its applications, Songklanakarin Journal of Science and Technology (SJST), Volume 43 No.4 (July - August 2021), pp. 1140 - 1151. DOI: 10.14456/sjst-psu.2021.149.

**Examples**

```
x <- c(0:10)
p<- pDTGIW(x, 3.45, 0.7, 1.05, 0)
qDTGIW(p, 3.45, 0.7, 1.05, 0)
```

---

rDTGIW

*The random generating function for Discrete Transmuted Generalized Inverse Weibull(DTGIW) distribution.*

---

**Description**

This function generates random numbers for the DTGIW distribution.

**Usage**

```
rDTGIW(n, alpha, beta, lambda, theta)
```

**Arguments**

n	number of observations. If length(n) > 1, the length is taken to be the number required.
alpha	shape parameter#1.
beta	scale parameter.
lambda	shape parameter#2.
theta	the transmuted parameter.

**Details**

The R script generates the n random values of the DTGIW distribution is shown based on the research paper in references.

**Value**

the  $n$  random number of DTGIW distribution.

**References**

Atchanut Rattanalertnusorn and Sirinapa Aryuyuen (2021). The zero-truncated discrete transmuted generalized inverse Weibull distribution and its applications, Songklanakarin Journal of Science and Technology (SJST), Volume 43 No.4 (July - August 2021), pp. 1140 - 1151. DOI: 10.14456/sjst-psu.2021.149.

**Examples**

$rDTGIW(n=100, 3.45, 0.7, 1.05, 0)$

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