Package ‘rjqpd’

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Type Package
Title The Johnson Quantile-Parameterised Distribution
Version 0.2.3
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Description Implementation of the Johnson Quantile-Parameterised Distribution in R.
The Johnson Quantile-Parameterised Distribution (J-QPD) is a flexible distribution
system that is parameterised by a symmetric percentile triplet of quantile values
(typically the 10th-50th-90th) along with known support bounds for the distribution.
The J-QPD system was developed by Hadlock and Bickel (2017) <doi:10.1287/deca.2016.0343>.
This package implements the density, quantile, CDF and random number generator functions.

Suggests devtools, knitr, rmarkdown, testthat
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BugReports https://github.com/bobbyingram/rjqpd/issues
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Density function of Johnson Quantile-Parameterised Distribution.

**Description**

Density function of Johnson Quantile-Parameterised Distribution.

**Usage**

\[ djqpd(x, \text{params}) \]

**Arguments**

- \( x \) vector of quantiles
- \( \text{params} \) jqpd object created using \( \text{jqpd()} \)

**Value**

A numeric vector of density values corresponding to the \( x \) quantile vector

**Examples**

\[
x <- c(0.32, 0.40, 0.60) \\
\text{params} <- \text{jqpd}(x, \text{lower} = 0, \text{upper} = 1, \text{alpha} = 0.1) \\
\text{iles} <- \text{seq}(0.01, 0.99, 0.01) \\
\text{density} <- djqpd(x = \text{iles}, \text{params})
\]

Calculates the parameters of the Johnson Quantile-Parameterised Distribution

**Description**

Calculates the parameters of the Johnson Quantile-Parameterised Distribution

**Usage**

\[ \text{jqpd}(x, \text{lower} = 0, \text{upper} = \text{Inf}, \text{alpha} = 0.1) \]
jqpd_kurtosis

Arguments

x  
a length 3 numeric vector containing the symmetric percentile triplet values used
to parameterise the distribution.

lower  
a real number specifying the lower bound of the distribution. (default: 0)

upper  
a real number specifying the upper bound of the distribution. A value of Inf
indicates a semi-bounded distribution. (default: Inf)

alpha  
a real number (between 0 and 0.5) used to describe the symmetric percentile
triplet for which the quantile values provided in 'x' correspond. For instance,
alpha = 0.1 (default value) indicates the percentiles used are [0.1, 0.5, 0.9].

Value

A jqpd object with elements

x  
a length 3 numeric vector containing the symmetric percentile triplet values used
to parameterise the distribution

alpha  
a real number (between 0 and 0.5) used to describe the symmetric percentile
triplet for which the quantile values provided in 'x' correspond

lower  
a real number specifying the lower bound of the distribution

upper  
a real number specifying the upper bound of the distribution

c  
distribution parameter

n  
distribution parameter

eta  
distribution parameter

delta  
distribution parameter

lambda  
distribution parameter

k  
distribution parameter

Examples

theta <- jqpd(c(0.32, 0.40, 0.6), 0, 1, alpha = 0.1)

jqpd_kurtosis  

Calculates the kurtosis of a Johnson Quantile-Parameterised Distribution.

Description

Calculates the kurtosis of a Johnson Quantile-Parameterised Distribution.

Usage

jqpd_kurtosis(params)
Arguments
params    jqpd object created using jqpd()

Value
The kurtosis of the distribution as a length one numeric vector.

\[
\text{jqpd\_mean}
\]
\text{Calculates the mean of a Johnson Quantile-Parameterised Distribution.}

Description
Calculates the mean of a Johnson Quantile-Parameterised Distribution.

Usage
jqpd\_mean(params)

Arguments
params    jqpd object created using jqpd()

Value
The mean of the distribution as a length one numeric vector.

\[
\text{jqpd\_sd}
\]
\text{Calculates the standard-deviation of a Johnson Quantile-Parameterised Distribution.}

Description
Calculates the standard-deviation of a Johnson Quantile-Parameterised Distribution.

Usage
jqpd\_sd(params)

Arguments
params    jqpd object created using jqpd()

Value
The standard deviation of the distribution as a length one numeric vector.
jqpd_skewness

Calculates the skewness of a Johnson Quantile-Parameterised Distribution.

Description
Calculates the skewness of a Johnson Quantile-Parameterised Distribution.

Usage
jqpd_skewness(params)

Arguments
params (jqpd object created using jqpd())

Value
The skewness of the distribution as a length one numeric vector.

jqpd_var

Calculates the variance of a Johnson Quantile-Parameterised Distribution.

Description
Calculates the variance of a Johnson Quantile-Parameterised Distribution.

Usage
jqpd_var(params)

Arguments
params (jqpd object created using jqpd())

Value
The variance of the distribution as a length one numeric vector.
**pjpd**  
*Cumulative distribution function of Johnson Quantile-Parameterised Distribution.*

---

**Description**
Cumulative distribution function of Johnson Quantile-Parameterised Distribution.

**Usage**
\[ \text{pjpd}(x, \text{params}) \]

**Arguments**
- **x**: vector of quantiles
- **params**: jqpd object created using `jqpd()`

**Value**
A numeric vector of probabilities corresponding to the x quantiles vector

**Examples**
```r
x <- c(0.32, 0.40, 0.60)
params <- jqpd(x, lower = 0, upper = 1, alpha = 0.1)
iles <- seq(0.01, 0.99, 0.01)
probs <- pjpd(x = iles, params)
```

---

**plot_jqpd**  
*Plots the density, cumulative distribution function, quantile function and a set of 1000 random samples for a Johnson Quantile-Parameterised Distribution.*

---

**Description**
Plots the density, cumulative distribution function, quantile function and a set of 1000 random samples for a Johnson Quantile-Parameterised Distribution.

**Usage**
\[ \text{plot_jqpd}(\text{params}) \]

**Arguments**
- **params**: jqpd object created using `jqpd()`
**qjqpd**

*Quantile function of Johnson Quantile-Parameterised Distribution.*

### Description
Quantile function of Johnson Quantile-Parameterised Distribution.

### Usage
```r
qjqpd(p, params)
```

### Arguments
- `p` vector of probabilities
- `params` `jqpd` object created using `jqpd()`

### Value
A numeric vector of quantiles corresponding to the `p` probability vector

### Examples
```r
x <- c(0.32, 0.40, 0.60)
params <- jqpd(x, lower = 0, upper = 1, alpha = 0.1)
probs <- seq(0.01, 0.99, 0.01)
quantiles <- qjqpd(p = probs, params)
```

**rjqpd**

*Generate random samples from a jqpd distribution object*

### Description
Generate random samples from a `jqpd` distribution object

### Usage
```r
rjqpd(n = 1, params)
```

### Arguments
- `n` number of observations (default is 1)
- `params` `jqpd` object created using `jqpd()`
Value

A numeric vector of n random samples from the input distribution

Examples

```r
x <- c(0.32, 0.40, 0.60)
params <- jqpd(x, lower = 0, upper = 1, alpha = 0.1)
samples <- rjqpd(n = 1000, params)
```
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