Package 'DynamicDistribution'

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Title Dynamically visualized probability distributions and their moments

Description The package is aimed at dynamically visualizing probability distributions and their moments and all the commonly used distributions are included.

Version 1.1

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DynamicDistribution-package *Dynamic graphs for discrete and continuous distributions*

Description

This package intends to perform how the probability density functions(probability mass functions for discrete distributions) and numeral characteristics change as the parameters change using a dynamic method.

Details

The most important function is DynCon and DynDis. These two functions are used to perform the result. The valid distributions in this package are Inverse_Gaussian, Exponential, Normal, Negative_Binomial, Lognormal, Logistic, Con_Uniform, Bernoull, Chi_square, Cauchy, Binomial, Beta_dis, Rayleigh, Dis_Uniform, Logarithmic_Series, Laplace, Geometric, Gamma_dis, F_dis, Hypergeometric, Pareto, Poisson, Student_t. And the valid numeral characteristics are cdf, Mean, Variance, Mode, Skewness, Kurtosis.

You will meet two different symbols, "o" and "x" on the graphs of numeral characteristics. The former means the numeral characteristic exists, but the latter means not, so we set it to 0.

Author(s)

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References

K. Krishnamoorthy(2006) Handbook of Statistical Distributions with Applications University of Louisiana at Lafayette

DynamicDistribution *Dynamic graphs for discrete and continuous distributions*

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References

K. Krishnamoorthy(2006) Handbook of Statistical Distributions with Applications University of Louisiana at Lafayette.

`DynCon` *Dynamically Visualized Continuous Probability Distributions and Their Moments*

Description

This function is aimed at dynamically visualizing continuous probability distributions and their moments when the parameters changed.

Usage

```
DynCon(name, par_matrix, total = c(100, 100), choice = "cdf",
interval = 0.05, const_par = c(NULL, NULL))
```

Arguments

`name`	A discrete probability distribution that you want to plot.
`par_matrix`	A matrix shows the ranges of the parameters. The column number of the matrix indicates the number of parameters in the distribution and the row number of the matrix is 2 for all the distributions. The first column shows the range for the first parameter, the second column accordingly show the ranges for the second parameter in distributions. All the elements in the first row indicate the minimum for the parameters and those in the second row show the maximum ones.
`total`	A vector and its elements indicate the step length for parameters by order, with the default value c(100,100).

choice	A vector and its elements indicate the plot you want to show, with a default value "cdf".
interval	A value to show the speed of changing plots.
const_par	A vector and its elements indicate the value of the parameters that do not change.

Details

For name, you can choose among Continuous Uniform('Con_Uniform'), Normal('Normal'), Chi-Square('Chi_Square'), F('F_dis'), Student's t('Student_t'), Exponential('Exponential'), Gamma('Gamma_dis'), Beta('Beta_dis'), Laplace('Laplace'), Logistic('Logistic'), Lognormal('Lognormal'), Pareto('Pareto'), Cauchy('Cauchy'), Inverse Gaussian('Inverse_Gaussian'), Rayleigh('Rayleigh'). For choice, you can choose among Cumulative Probability Function('cdf'), Mean('Mean'), Variance('Variance'), Mode('Mode'), Skewness('Skewness') and Kurtosis('Kurtosis').

More details about distributions and parameters are as follows:

Beta: Beta distribution. Shape parameters a, b, a>0, b>0.

Cauchy: Cauchy distribution. Location parameter a. Scale parameter b, b>0.The order of parameters is a, b. See Note Below.

Con_Uniform: Continuous Uniform distribution. Location parameter a, the lower bound of the range. Parameter b, the upper bound of the range. The order of parameters is a, b. See Note Below.

Chi_Square: Chi-squared Distribution. Shape parameter n, degrees of freedom.

Exponential: Exponential Distribution. The scale parameter b, b>0.

F_Dis: F(central) Distribution. Shape parameters m, n, positive integers.

Gamma: Gamma distribution. Shape parameter a, a>0.Scale parameter b, b>0.The order of parameters is a, b. See Note below.

Inverse_Gaussian: Inverse Gaussian (Wald) distribution. Scale parameter lamda, lamda>0. Location parameter mu, mu>0. The order of parameters is lamda,mu. See Note below.

Laplace: Laplace distribution. Location parameter a. Scale parameter b, b>0.The order of parameters is a, b. See Note below.

Logistic: Logistic distribution. Location parameter a, scale parameter b, b>0.The order of parameters is a, b. See Note below.

Lognormal: Lognormal distribution. Scale parameter mu, mu>0.Shape parameter sigma, sigma>0.The order of parameters is mu, sigma. See Note below.

Normal: Normal distribution. Location parameter mu. Scale parameter sigma, sigma>0. The order of parameters is mu, sigma. See Note below.

Pareto: Pareto distribution. Location parameter a, a>0.shape parameter b, b>0.The order of parameters is a, b. See Note below.

Rayleigh: Rayleigh distribution. Scale parameter b>0.

Student_t:Student's t distribution. Shape parameter n, degrees of freedom, n is a positive integer.

Value

A dynamic graph which includes probability density function graph and 'choice' graph.

Note

When you assign the parameter matrix to the argument par_matrix , you must follow the input sequence of parameters.

Author(s)

Lei ZHANG, Hao JIANG and Chen XUE (Equally contributed, the order is decided by the time the author joined the project.)

References

K. Krishnamoorthy(2006) Handbook of Statistical Distributions with Applications University of Louisiana at Lafayette.

Examples

```
DynCon(name=Lognormal,par_matrix=matrix(c(0,2,1,2),2,2),
choice='cdf',const_par=c(0,1))

DynCon(name=Inverse_Gaussian,par_matrix=matrix(c(1,12,10,20),2,2)
,choice='Kurtosis',const_par=c(2,3))

DynCon(name=Exponential,par_matrix=matrix(c(1,20),2,1),choice=
'Skewness')

DynCon(name=Normal,par_matrix=matrix(c(1,20,10,20),2,2),choice=
'Variance',const_par=c(0,1))

DynCon(name=Logistic,par_matrix=matrix(c(1,12,10,20),2,2),choice
='Kurtosis',const_par=c(2,3))
```

`DynDis` *Dynamically Visualized Discrete Probability Distributions and Their Moments*

Description

This function is aimed at dynamically visualizing discrete probability distributions and their moments when the parameters changed.

Usage

```
DynDis(name, par_matrix, total = c(100, 100, 100), choice = "cdf",
interval = 0.05, const_par = c(NULL, NULL, NULL))
```

Arguments

name	A discrete probability distribution that you want to plot.
par_matrix	A matrix shows the range of the parameters. The column number of the matrix indicates the number of parameters in the distribution and the row number of the matrix is 2 for all the distributions. The first column shows the range for the first parameter, the second and the third column accordingly show the ranges for the second and third parameter in distributions. All the elements in the first row indicate the minimum for the parameters and those in the second row show the maximum ones.
total	A vector and its elements indicate the step length for parameters by order, with the default value c(100,100,100).
choice	A vector and its elements indicate the plot you want to show, with a default value "cdf".
interval	A value to show the speed of changing plots.
const_par	A vector and its elements indicate the value of the parameters that do not change.

Details

For name, you can choose among Discrete Uniform('Dis_Uniform'), Bernoulli('Bernoulli'), Binomial('Binomial'), Hypergeometric('Hypergeometric'), Poisson('Poisson'), Geometric('Geometric'), Negative Binomial('Negative_Binomial'), Logarithmic Series('Logarithmic_Series'). For choice, you can choose among Cumulative Probability Function('cdf'), Mean('Mean'), Variance('Variance'), Mode('Mode'), Skewness('Skewness') and Kurtosis('Kurtosis').

More details about distributions and parameters are as follows:

Bernoulli: Bernoulli distribution. The Bernoulli probability parameter is p, 0<p<1.

Binomial: Binomial distribution. The Bernoulli trial parameter is n, and the probability parameter is p, 0<p<1.The order of parameters is: n, p. See Note below.

Dis_Uniform: Discrete Uniform distribution. The parameter is n.

Geometric: Geometric distribution. The Geometric trial parameter is n, and the probability parameter is p, 0<p<1. The order of parameters is: n, p. See Note below.

Hypergeometric: Hypergeometric distribution. Parameter N: the number of elements in the population. Parameter M: the number of successes in the population. Parameter n: sample size. The order of parameters is N, M, n. See Note below.

Logarithmic_Series: Logarithmic Series Distribution. Shape parameter theta, 0<theta <1.The probability function is (k*c^x)/x. For simplicity, let k =-1/log(1-c).

Negative_Binomial: Negative Binomial distribution. The distribution of the random variable that represents the number of failures until the rth success is called geometric distribution. Parameter r: rth success.Parameter p: the Bernoulli probability parameter, 0<p<1.the order of parameters is r, p. See Note Below.

Poisson: Poisson distribution. The parameter is lamda.

Value

A dynamic graph which includes probability mass function graph and the 'choice' graph.

Note

When you assign the parameter matrix to the argument par_matrix , you must follow the input sequence of parameters.

Author(s)

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References

K. Krishnamoorthy(2006) Handbook of Statistical Distributions with Applications University of Louisiana at Lafayette.

Examples

```
DynDis(name=Negative_Binomial,par_matrix=matrix(c(1,12,0.1,0.9),2,2)
,choice='Kurtosis',const_par=c(4,0.7))

DynDis(name=Bernoulli,par_matrix=matrix(c(0.1,0.9),2,1),choice='cdf')

DynDis(name=Binomial,par_matrix=matrix(c(1,12,0.1,0.9),2,2),choice='Mean'
,const_par=c(4,0.7))

DynDis(name=Logarithmic_Series,par_matrix=matrix(c(0.1,0.9),2,1),
choice='Variance')

DynDis(name=Geometric,par_matrix=matrix(c(0.1,0.9),2,1),choice='Skewness')

DynDis(name=Hypergeometric,par_matrix=matrix(c(1,3,2,8,10,20),2,3),
choice='Kurtosis',const_par=c(4,5,6))

DynDis(name=Dis_Uniform,par_matrix=matrix(c(2,5),2,1),choice='Skewness')

DynDis(name=Poisson,par_matrix=matrix(c(2,20),2,1),choice='Kurtosis')
```

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