Package ‘goftest’

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for continuous univariate distributions, using
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goftest-package

Classical Goodness-of-Fit Tests

Description

Cramér-von Mises and Anderson-Darling tests of goodness-of-fit for continuous univariate distributions, using modern algorithms to compute the null distributions.

Details

The goftest package contains implementations of the classical Cramér-von Mises and Anderson-Darling tests of goodness-of-fit for continuous univariate distributions.

The Cramér-von Mises test is performed by `cvm.test`. The cumulative distribution function of the null distribution of the test statistic is computed by `pCvM` using the algorithm of Csörgő and Faraway (1996). The quantiles are computed by `qCvM` by root-finding.

The Anderson-Darling test is performed by `ad.test`. The cumulative distribution function of the null distribution of the test statistic is computed by `pAD` using the algorithm of Marsaglia and Marsaglia (2004). The quantiles are computed by `qAD` by root-finding.

Author(s)

Adrian Baddeley, Julian Faraway, John Marsaglia, George Marsaglia.

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References


See Also

`ks.test`

Examples

```r
x <- rnorm(10, mean=2, sd=1)
cvm.test(x, "pnorm", mean=2, sd=1)
ad.test(x, "pnorm", mean=2, sd=1)
```
Description

Performs the Anderson-Darling test of goodness-of-fit to a specified continuous univariate probability distribution.

Usage

ad.test(x, null = “punif”, ..., nullname)

Arguments

x numeric vector of data values.
null A function, or a character string giving the name of a function, to compute the cumulative distribution function for the null distribution.
... Additional arguments for the cumulative distribution function.
nullname Optional character string describing the null distribution. The default is "uniform distribution".

Details

This command performs the Anderson-Darling test of goodness-of-fit to the distribution specified by the argument null. It is assumed that the values in x are independent and identically distributed random values, with some cumulative distribution function \( F \). The null hypothesis is that \( F \) is the function specified by the argument null, while the alternative hypothesis is that \( F \) is some other function.

Value

An object of class "htest" representing the result of the hypothesis test.

Author(s)

Original C code by George Marsaglia and John Marsaglia. R interface by Adrian Baddeley.

References


See Also
   `pAD` for the null distribution of the test statistic.

Examples
   ```r
   x <- rnorm(10, mean=2, sd=1)
   ad.test(x, "pnorm", mean=2, sd=1)
   ```

---

cvm.test  \hspace{2em}  Cramér-Von Mises Test of Goodness-of-Fit

Description

Performs the Cramér-von Mises test of goodness-of-fit to a specified continuous univariate probability distribution.

Usage

   ```r
   cvm.test(x, null = "punif", ..., nullname)
   ```

Arguments

   - **x**: Numeric vector of data values.
   - **null**: A function, or a character string giving the name of a function, to compute the cumulative distribution function for the null distribution.
   - **...**: Additional arguments for the cumulative distribution function.
   - **nullname**: Optional character string describing the null distribution. The default is "uniform distribution".

Details

This command performs the Cramér-von Mises test of goodness-of-fit to the distribution specified by the argument `null`. It is assumed that the values in `x` are independent and identically distributed random values, with some cumulative distribution function \( F \). The null hypothesis is that \( F \) is the function specified by the argument `null`, while the alternative hypothesis is that \( F' \) is some other function.

Value

An object of class "htest" representing the result of the hypothesis test.

Author(s)

Adrian Baddeley.

References

pAD

See Also

pCvM for the null distribution of the test statistic.

Examples

```r
x <- rnorm(10, mean=2, sd=1)
cvm.test(x, "pnorm", mean=2, sd=1)
```

---

**pAD**  
**Null Distribution of Anderson-Darling Test Statistic**

Description

pAD computes the cumulative distribution function, and qAD computes the quantile function, of the null distribution of the Anderson-Darling test statistic.

Usage

```r
pAD(q, n = Inf, lower.tail = TRUE, fast=TRUE)  
qAD(p, n = Inf, lower.tail = TRUE, fast=TRUE)
```

Arguments

- **q**: Numeric vector of quantiles (values for which the cumulative probability is required).
- **p**: Numeric vector of probabilities.
- **n**: Integer. Sample size for the Anderson-Darling test.
- **lower.tail**: Logical. If TRUE (the default), probabilities are \( P(X \leq q) \), and otherwise they are \( P(X > q) \).
- **fast**: Logical value indicating whether to use a fast algorithm or a slower, more accurate algorithm, in the case n=Inf.

Details

pAD uses the algorithms and C code described in Marsaglia and Marsaglia (2004).

qAD uses `uniroot` to find the quantiles.

The argument fast applies only when n=Inf and determines whether the asymptotic distribution is approximated using the faster algorithm adinf (accurate to 4-5 places) or the slower algorithm Adinf (accurate to 11 places) described in Marsaglia and Marsaglia (2004).

Value

A numeric vector of the same length as p or q.
Author(s)


References


See Also

`ad.test`

Examples

```r
pad(1.1, n=5)
pad(1.1)
pad(1.1, fast=FALSE)

qad(0.5, n=5)
qad(0.5)
```

---

**pCvM**  
*Null Distribution of Cramér-von Mises Test Statistic*

Description

pCvM computes the cumulative distribution function, and qCvM computes the quantile function, of the null distribution of the Cramér-von Mises test statistic.

Usage

```r
pCvM(q, n = Inf, lower.tail = TRUE)
qCvM(p, n = Inf, lower.tail = TRUE)
```

Arguments

- `q`  
  Numeric vector of quantiles (values for which the cumulative probability is required).
- `p`  
  Numeric vector of probabilities.
- `n`  
  Integer. Sample size for the Cramér-von Mises test.
- `lower.tail`  
  Logical. If `TRUE` (the default), probabilities are $P(X \leq q)$, and otherwise they are $P(X > q)$. 
Details

For finite \( n \) the cumulative distribution function is approximated by the first order expansion \( V(x) + \frac{\psi_1(x)}{n} \), equation (1.8) of Csörgő and Faraway (1996).

qcvm uses \texttt{uniroot} to find the quantiles.

Value

A numeric vector of the same length as \( p \) or \( q \).

Author(s)

Original Matlab code by Julian Faraway, translated to \texttt{R} by Adrian Baddeley.

References


See Also

cvm.test

Examples

\begin{verbatim}
pcvm(1.1, n=5)
pcvm(1.1)
qcvm(0.5, n=5)
qcvm(0.5)
\end{verbatim}

<table>
<thead>
<tr>
<th>recogniseCdf</th>
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</tr>
</thead>
</table>

Description

Recognises many standard cumulative distribution functions and returns a string describing the distribution.

Usage

\texttt{recogniseCdf(s="punif")}

Arguments

\( s \) 

A single character string giving the \textit{name} of an \texttt{R} function that calculates cumulative probabilities.
recogniseCdf

Details

The list of recognised distribution functions includes all those available in the stats package and in goftest.

Value

Character string, or NULL if the name is not recognised.

Author(s)

Adrian Baddeley.

See Also

pAD

Examples

recogniseCdf("punif")
recogniseCdf("pt")
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