Package 'rootWishart'

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Title Distribution of Largest Root for Single and Double Wishart Settings

Version 0.4.1

Description Functions for hypothesis testing in single and double Wishart settings, based on Roy's largest root. This test statistic is especially useful in multivariate analysis. The computations are based on results by Chiani (2014) <DOI:10.1016/j.jmva.2014.04.002> and Chiani (2016) <DOI:10.1016/j.jmva.2015.10.007>. They use the fact that the CDF is related to the Pfaffian of a matrix that can be computed in a finite number of iterations. This package takes advantage of the Boost and Eigen C++ libraries to perform multi-precision linear algebra.

Depends R (>= 3.1.0)

License GPL (>= 2)

Encoding UTF-8

LazyData true

NeedsCompilation yes

RoxygenNote 6.0.1

LinkingTo Rcpp, RcppEigen, BH

Imports Rcpp

URL http://github.com/turgeonmaxime/rootWishart

BugReports http://github.com/turgeonmaxime/rootWishart/issues

Suggests testthat

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Repository CRAN

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R topics documented:

`singleWishart` *Distribution of the largest root*

Description

Computes the cumulative distribution function of the largest root in the single and double Wishart setting.

Usage

```
singleWishart(x, p, n, type = c("double", "multiple"))

doubleWishart(x, p, n, m, type = c("double", "multiple"))
```

Arguments

`x`	Vector of numeric values at which to compute the CDF.
`p, n, m`	Parameters of the single and double Wishart settings. See details.
`type`	Character string. Select `type = "multi"` for multiprecision; select `type = "double"` for double precision. Defaults to adaptive selection of the precision type based on the input parameters.

Details

If S follows a Wishart(p, n) distribution, e.g. if we can write

$$S = X^T X,$$

where X is an nxp matrix with i.i.d rows coming from a p-variate standard normal, then `singleWishart` gives the distribution of the largest root of S.

As its name indicates, the double Wishart setting involves two Wishart variables: let A and B be Wishart(p, m) and Wishart(p, n), respectively. If $A + B$ is invertible, then `doubleWishart` gives the distribution of the largest root of

$$(A + B)^{-}1B.$$

Alternatively, it gives the distribution of the largest root of the determinental equation

$$det(B - \theta(A + B)).$$

Value

Returns the value of the CDF at `x`.

Examples

```
x1 <- seq(0, 30, length.out = 50)
y1 <- singleWishart(x1, p = 5, n = 10)
plot(x1, y1, type='l')

x2 <- seq(0, 1, length.out = 50)
y2 <- doubleWishart(x2, p = 10, n = 10, m = 200)
plot(x2, y2, type='l')
```

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