Package 'svmf'

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Type Package

Title The Scaled von Mises-Fisher Distribution

Version 1.0

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Depends R (>= 4.0)

Imports Rfast, stats

Description Functions to perform maximum likelihood estimation of and random value simulation from the scaled von Mises-Fisher distribution. The distribution is elliptical symmetric and can be applied to spherical and hyper-spherical data. The reference paper is Scealy J.L. and Wood A.T.A. (2019), <doi:10.1080/01621459.2019.1585249>.

License GPL (>= 2)

NeedsCompilation no

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Contents

svmf-package *The Scaled von Mises–Fisher Distribution*

Description

Functions to perform maximum likelihood estimation of and random value simulation from the scaled von Mises–Fisher distribution. For more information see Scealy and Wood (2019).

Details

Package:	svmf
Type:	Package
Version:	1.0
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Maintainers

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Author(s)

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References

Scealy J.L. and Wood A.T.A. (2019). Scaled von Mises-Fisher distributions and regression models for paleomagnetic directional data. Journal of the American Statistical Association, 114(528): 1547–1560.

rsvmf *Random value simulation from the scaled von Mises–Fisher distribution*

Description

Random value simulation from the scaled von Mises–Fisher distribution.

Usage

```
rsvmf(n, mu, a, kappa, Gamma = NULL)
```

Arguments

n	The sample size.
mu	The mean direction.
a	The vector of alphas.
kappa	The concentration parameter.
Gamma	The matrix with the γ vectors.

Value

A matrix with the simulated data.

Author(s)

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Scealy J.L. and Wood A.T.A. (2019). Scaled von Mises-Fisher distributions and regression models for paleomagnetic directional data. Journal of the American Statistical Association, 114(528): 1547–1560.

See Also

svmf.mle

Examples

```
mu <- rnorm(3)
mu <- mu / sqrt( sum(mu^2) )
a <- c(1, 3, 1/3)
y <- rsvmf(1000, mu, a, 20)
svmf.mle(y)
```

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svmf.mle — *Maximum likelihood estimation of the scaled von Mises–Fisher distribution*

Description

Maximum likelihood estimation of the scaled von Mises–Fisher distribution.

Usage

```
svmf.mle(y, a1 = 1, maxit_outer = 100, maxit_V = 500, tol = 1e-6)
```

Arguments

y	A numerical matrix with the (hyper-)spherical observations.
a1	The value of the α_1 parameter is set to 1 , as suggested by Scealy and Wood (2019).
maxit_outer	The maximum number of iterations to perform.
maxit_V	The maximum number of iterations to perform to estimate the V matrix.
tol	The tolerance value until convergence of the log-likelihood.

Value

A list including:

mu	The estimated mean direction.
kappa	The estimated concentration parameter.
a	The estimated vector of alphas, the first value is 1, by default.
loglik	the log-likelihood value.
Gamma	The estimated matrix with the γ vectors. The first column of this matrix is the mean direction.

Author(s)

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Scealy J.L. and Wood A.T.A. (2019). Scaled von Mises-Fisher distributions and regression models for paleomagnetic directional data. Journal of the American Statistical Association, 114(528): 1547–1560.

See Also

rsvmf

Examples

```
mu <- rnorm(3)
mu <- mu / sqrt( sum(mu^2) )
a <- c(1, 3, 1/3)
y <- rsvmf(1000, mu, a, 20)
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