

# Package ‘gaussDiff’

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**Title** Difference measures for multivariate Gaussian probability density functions

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**Depends** R (>= 1.8.0)

**Description** A collection difference measures for multivariate Gaussian probability density functions, such as the Euclidean mean, the Mahalanobis distance, the Kullback-Leibler divergence, the J-Coefficient, the Minkowski L2-distance, the Chi-square divergence and the Hellinger Coefficient.

**License** GPL (>= 2)

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## R topics documented:

normdiff . . . . . 1

**Index** 4

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normdiff                      *Difference measures for multivariate Gaussian pdfs*

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## Description

Various difference measures for Gaussian pdfs are implemented: Euclidean distance of the means, Mahalanobis distance, Kullback-Leibler divergence, J-Coefficient, Minkowski L2-distance, Chi-square divergence and the Hellinger coefficient which is a similarity measure.

**Usage**

```
normdiff(mu1, sigma1=NULL, mu2, sigma2=sigma1, inv=FALSE, s=0.5,
method=c("Mahalanobis", "KL", "J", "Chisq",
"Hellinger", "L2", "Euclidean"))
```

**Arguments**

mu1	mean value of pdf 1, a vector
sigma1	covariance matrix of pdf 1
mu2	mean value of pdf 2, a vector
sigma2	covariance matrix of pdf 2
method	difference measure to be used, see below
inv	if TRUE, 1-Hellinger is reported, default: inv=FALSE
s	exponent for Hellinger coefficient, default: s=0.5

**Details**

Equations can be found in H.-H. Bock, *Analysis of Symbolic Data*, Chapter *Dissimilarity Measures for Probability Distributions*

**Value**

A scalar object of class `normdiff` reporting the distance.

**Author(s)**

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**References**

H.-H. Bock, *Analysis of Symbolic Data*, Chapter *Dissimilarity measures for Probabilistic Distributions*

**Examples**

```
library(gaussDiff)
mu1 <- c(0,0,0)
sig1 <- diag(c(1,1,1))
mu2 <- c(1,1,1)
sig2 <- diag(c(0.5,0.5,0.5))

## Euclidean distance
normdiff(mu1=mu1, mu2=mu2, method="Euclidean")

## Mahalanobis distance
normdiff(mu1=mu1, sigma1=sig1, mu2=mu2, method="Mahalanobis")

## Kullback-Leibler divergence
normdiff(mu1=mu1, sigma1=sig1, mu2=mu2, sigma2=sig2, method="KL")
```

```
## J-Coefficient
normdiff(mu1=mu1,sigma1=sig1,mu2=mu2,sigma2=sig2,method="J")

## Chi-sqr divergence
normdiff(mu1=mu1,sigma1=sig1,mu2=mu2,sigma2=sig2,method="Chisq")

## Minkowski L2 distance
normdiff(mu1=mu1,sigma1=sig1,mu2=mu2,sigma2=sig2,method="L2")

## Hellinger coefficient
normdiff(mu1=mu1,sigma1=sig1,mu2=mu2,sigma2=sig2,method="Hellinger")
```

# Index

\* **cluster**

normdiff, 1

\* **distribution**

normdiff, 1

\* **multivariate**

normdiff, 1

maha (normdiff), 1

normdiff, 1

print.normdiff (normdiff), 1

tt (normdiff), 1