# Package 'NMFN'

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**Type** Package

**Title** Non-negative Matrix Factorization

**Version** 2.0

**Date** 2011-01-02

**Author** Suhai (Timothy) Liu

**Maintainer** Suhai (Timothy) Liu <tim.liu@alumni.duke.edu>

**Description** Non-negative Matrix Factorization

**License** GPL

**LazyLoad** yes

**Repository** CRAN

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**NeedsCompilation** no

## R topics documented:

NMFN-package *Non-negative Matrix Factorization - Overview*

## Description

Non-negative Matrix Factorization

## Details

| | |
|---|---|
| Package: | NMFN |
| Type: | Package |
| Version: | 2.0 |
| Date: | 2010-01-02 |
| License: | GPL |
| LazyLoad: | yes |

## Author(s)

Suhai (Timothy) Liu <tim.liu@alumni.duke.edu> based on multiplicative updates (Lee and Seung 2001), alternating least squares and multinomial algorithms; Lars Kai Hansen's nnmf_als Matlab implementation; Torsten Hothorn's Moore-Penrose inverse function

## References

Lee and Seung - Algorithms for non-negative matrix factorization. In Advances in Neural Information Processing Systems 13, 2001.

## Examples

```
X <- matrix(1:12,3,4)
z.mm   <- nnmf(X,3)             # 3 factors via multiplicative update
z.als  <- nnmf(X,3,'nnmf_als')  # 3 factors via alternating least square
z.prob <- nnmf(X,3,'nnmf_prob') # 3 factors via multinomial
```

---

# distance2 *Euclidean Distance between two matrices*

---

## Description

Euclidean Distance between two matrices

## Usage

```
distance2(x1, x2)
```

## Arguments

| | |
|---|---|
| x1 | Matrix 1 |
| x2 | Matrix 2 |

### Author(s)

Suhai (Timothy) Liu

### Examples

```
X<-matrix(1:12,3,4)
Y<-matrix(5:16,3,4)
distance2(X,Y)
```

---

## mpinv *Moore-Penrose Inverse*

---

### Description

Moore-Penrose Inverse

### Usage

```
mpinv(X)
```

### Arguments

| | |
|---|---|
| X | original matrix |

### Author(s)

Torsten Hothorn

### Examples

```
X<-matrix(1:12,3,4)
m.inv = mpinv(X)
```

---

## nnmf *Non-negative Matrix Factorization*

---

### Description

Non-negative Matrix Factorization

### Usage

```
nnmf(x, k, method = "nnmf_mm", maxiter = 1000, eps = 2.2204e-16)
```

### Arguments

| | |
|---|---|
| x | original input matrix |
| k | number of factors / components |
| method | which method to use for matrix factorization (default - multiplicative update) |
| maxiter | max number of iterations |
| eps | small threshold value |

### Author(s)

Suhai (TImothy) Liu

### Examples

```
X <- matrix(1:12,3,4)
z.mm   <- nnmf(X,3)             # 3 factors via multiplicative update
z.als  <- nnmf(X,3,'nnmf_als')  # 3 factors via alternating least square
z.prob <- nnmf(X,3,'nnmf_prob') # 3 factors via multinomial
```

---

## nnmf_als *Non-negative Matrix Factorization via alternating least squares*

---

### Description

Non-negative Matrix Factorization - alternating least squares method

### Usage

```
nnmf_als(x, k, maxiter, eps)
```

### Arguments

| | |
|---|---|
| x | original input matrix |
| k | number of factors / components |
| maxiter | max number of iterations |
| eps | small threshold value |

### Value

W, H - returned decomposed matrices

### Author(s)

Suhai (Timothy) Liu

## Examples

```
X <- matrix(1:12, 3, 4)
results <- nnmf(X, 2, 'nnmf_als')
```

---

nnmf_mm *Non-negative Matrix Factorization via multiplicative update*

---

## Description

Non-negative Matrix Factorization - multiplicative update method

## Usage

```
nnmf_mm(x, k, maxiter, eps)
```

## Arguments

| | |
|---|---|
| x | original input matrix |
| k | number of factors / components |
| maxiter | max number of iterations |
| eps | small threshold value |

## Value

W, H - returned decomposed matrices

## Author(s)

Suhai (Timothy) Liu

## References

Lee and Sung 2001

## Examples

```
X <- matrix(1:12, 3, 4)

results <- nnmf(X, 2)
#which is equivalent to
results <- nnmf(X, 2, 'nnmf_mm')
```

nnmf_prob *Non-negative Matrix Factorization via multinomial*

## Description

Non-negative Matrix Factorization - multinomial method

## Usage

```
nnmf_prob(x, k, maxiter, eps)
```

## Arguments

| | |
|---|---|
| x | original input matrix |
| k | number of factors / components |
| maxiter | max number of iterations |
| eps | small threshold value |

## Value

W, H - returned decomposed matrices

## Author(s)

Suhai (Timothy) Liu

## Examples

```
X <- matrix(1:12, 3, 4)
results <- nnmf(X, 5, 'nnmf_prob')
```

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