Package 'BNMF'

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Type Package

Title Package of the Non Negative Matrix Factorization Model

Version 1.0

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Description This Package is used for the recommendation of items in Collaborative Filtering

License GPLv2

Suggests knitr

VignetteBuilder knitr

R topics documented:

`BNMF-package` *BNMF: Bayesian probabilistic model of non-negative factorization for collaborative filtering*

Description

Algorithm for predicting the tastes of users in recommender systems based on a Bayesian probabilistic model of non-negative factorization for collaborative filtering. BNMF is based on factorizing the rating matrix into two non negative matrices.

Usage

```
BNMF(iter,R,k,alpha,eta)
```

Arguments

The input of the algorithm is a matrix of ratings R, and some parameters as the following:

iter:	setting number of iterations
k:	number of latent factors (or number of gropus)
R:	matrix of ratings (user x items)
alpha:	control of group overlap
eta:	evidence that a group of users likes an item

Details

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This package use a matrix of ratings R and three parameters of setting, k, alpha, and eta.

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References

Hernando, A., Bobadilla, J., & Ortega, F. (2016). A non negative matrix factorization for collaborative filtering recommender systems based on a Bayesian probabilistic model. Knowledge-Based Systems, 97. http://doi.org/10.1016/j.knosys.2015.12.018

Examples

```
library(BNMF)
#loading dataset of training and testing
data(ratings)
dim(R)
#System setting parameters
k<-6  #Number of groups (latent factors)
alpha<-0.8 #Control of group overlap
eta<-5 #Evidence that a group of users likes an item
iter<-20  #setting number of iterations
output<-BNMF(iter,R,k,alpha,eta)
#Matrix associated to users
output$au.k
#Matrix associated to items
output$bk.i
#Predictions of the ratings
predictions<-output$pred
predictions
```

```
####Prediction Accuracy
mae(R.tst,predictions)
####Precision/Recall
vectPredictions <- c(5,10,20,40)
PrecisionRecall(predictions,vectPredictions)
```

---

computeLearningParameters *Functions of BNMF model.*

Description

Main functions used to the learning of parameters of the model

Usage

```
computeLearningParameters(m.pos, m.neg, gamma, sum.gam, e.pos, e.neg, N, M)
```

Arguments

m.pos	positive matrix
m.neg	negative matrix
gamma	gamma matrix
sum.gam	Summation of gammas
e.pos	positive epsilons matrix
e.neg	negative epsilons matrix
N	number of users
M	number of items

Value

matrix lambda

Examples

```
computeLearningParameters<-function(m.pos,m.neg,gamma,sum.gam,e.pos,e.neg,N,M)
```

computeMatrixPredictions *Predictions*

Description

Compute the prediction the tastes of users: pu,i

Usage

```
computeMatrixPredictions(k, au.k, bk.i, N, M)
```

Arguments

k	number of groups (latent factors)
au.k	matrix associated to users
bk.i	matrix associated to items
N	number of users
M	number of items

Value

matrix outP outR

Examples

```
computeMatrixPredictions<-function(k,au.k,bk.i,N,M)
```

computeOuput *Output Matrices*

Description

Compute the Output Matrices of the algorithm

Usage

```
computeOuput(k, gamma, e.positive, e.negative, N, M)
```

Arguments

k	number of groups (latent factors)
gamma	gamma matrix
e.positive	positive epsilons matrix
e.negative	negative epsilons matrix
N	number of users
M	number of items

Value

matrix a b

Examples

```
computeOuput<-function(k,gamma,e.positive, e.negative,N,M)
```

---

initializeModel *Initialization of parameters of the model.*

Description

Utilities of BNMF software required to initialize parameters of the model.

Usage

```
initializeModel(k, N, M)
```

Arguments

k	number of groups (latent factors)
N	number of users
M	number of items

Value

matrix e.pos e.neg m.pos m.neg l

Examples

```
initializeModel<-function (k,N,M)
```

---

loadData *Loading the dataset*

Description

The dataset containing ratings of users to movies

- UserID: numeric
- MovieID: numeric
- Rating: rating, numeric in a scale from 1-5
- Timestamp: date

Usage

```
data(ratings)
"R"
```

Source

https://grouplens.org/datasets/movielens/'

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