

# Package ‘ORKM’

July 19, 2022

**Title** The Online Regularized K-Means Clustering Algorithm

**Date** 2022-7-19

**Version** 0.4.0.0

**Description** Algorithm of online regularized k-means to deal with online multi(single) view data.  
The philosophy of the package is described in Guo G. (2020)  
<[doi:10.1080/02331888.2020.1823979](https://doi.org/10.1080/02331888.2020.1823979)>.

**License** MIT + file LICENSE

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**RoxygenNote** 7.2.0

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**Imports** MASS, Matrix, stats,

**Config/testthat/edition** 3

**NeedsCompilation** no

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**Repository** CRAN

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## R topics documented:

citesview1 . . . . .	2
citesview2 . . . . .	3
citesview3 . . . . .	3
citesview4 . . . . .	4
DMC . . . . .	5
INDEX . . . . .	6
KMeans . . . . .	7

movie1	8
movie2	59
OGD	98
OMU	99
ORKMeans	100
PKMeans	101
QCM	102
RKMeans	104
seed	105
sobar	106
turelabel	107

## Index 108

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citesview1	<i>The first view of Cora dataset.</i>
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### Description

The first view of Cora dataset.

### Usage

```
data("citesview1")
```

### Format

The format is: Formal class 'dgTMatrix' [package "Matrix"] with 6 slots ..@ i : int [1:10556] 0 0 0 0 0 1 2 2 2 2 ... ..@ j : int [1:10556] 8 14 258 435 544 344 410 471 552 565 ... ..@ Dim : int [1:2] 2708 2708 ..@ Dimnames:List of 2 ..@\$ : NULL ..@\$ : NULL ..@ x : num [1:10556] 1 1 1 1 1 1 1 1 1 1 ... ..@ factors : list()

### Details

The first view of Cora dataset.

### Source

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

### References

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

### Examples

```
data(citesview1)
## maybe str(citesview1) ; plot(citesview1) ...
```

---

citesview2

*The second view of Cora dataset.*

---

### Description

The second view of Cora dataset.

### Usage

```
data("citesview2")
```

### Format

The format is: Formal class 'dgTMatrix' [package "Matrix"] with 6 slots ..@ i : int [1:49216] 0 0 0 0 0 0 0 0 0 ... ..@ j : int [1:49216] 118 125 176 252 351 456 507 521 619 648 ... ..@ Dim : int [1:2] 2708 1433 ..@ Dimnames:List of 2 ... ..\$: NULL ... ..\$: NULL ..@ x : num [1:49216] 1 1 1 1 1 1 1 1 1 ... ..@ factors : list()

### Details

The second view of Cora dataset.

### Source

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

### References

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

### Examples

```
data(citesview2)
## maybe str(citesview2) ; plot(citesview2) ...
```

---

citesview3

*The third view of Cora dataset.*

---

### Description

The third view of Cora dataset.

### Usage

```
data("citesview3")
```

**Format**

The format is: Formal class 'dgTMatrix' [package "Matrix"] with 6 slots ..@ i : int [1:5429] 163 163 163 163 163 163 163 163 163 ... ..@ j : int [1:5429] 402 659 1696 2295 1274 1286 1544 2600 2363 1905 ... ..@ Dim : int [1:2] 2708 2708 ..@ Dimnames:List of 2 .. ..\$ : NULL .. ..\$ : NULL ..@ x : num [1:5429] 1 1 1 1 1 1 1 1 1 ... ..@ factors : list()

**Details**

The third view of Cora dataset.

**Source**

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

**References**

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

**Examples**

```
data(citesview3)
## maybe str(citesview3) ; plot(citesview3) ...
```

---

citesview4

*The fourth view of Cora dataset.*

---

**Description**

The fourth view of Cora dataset.

**Usage**

```
data("citesview4")
```

**Format**

The format is: Formal class 'dgTMatrix' [package "Matrix"] with 6 slots ..@ i : int [1:5429] 402 659 1696 2295 1274 1286 1544 2600 2363 1905 ... ..@ j : int [1:5429] 163 163 163 163 163 163 163 163 163 ... ..@ Dim : int [1:2] 2708 2708 ..@ Dimnames:List of 2 .. ..\$ : NULL .. ..\$ : NULL ..@ x : num [1:5429] 1 1 1 1 1 1 1 1 1 ... ..@ factors : list()

**Details**

The fourth view of Cora dataset.

**Source**

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

**References**

<http://www.cs.umd.edu/projects/linqs/projects/lbc/>

**Examples**

```
data(citesview4)
## maybe str(citesview4) ; plot(citesview4) ...
```

---

DMC

*Calculate the estimator on the DMC method*

---

**Description**

Calculate the estimator on the DMC method

**Usage**

```
DMC(X, K, V, r, lamda, true, max.iter, method = 0)
```

**Arguments**

X	data matrix
K	number of cluster
V	number of view
r	first balance parameter
lamda	second balance parameter
true	true cluster result
max.iter	max iter
method	calculate the index of NMI

**Value**

NMI, Alpha, center, result

**Author(s)**

Miao Yu

**Examples**

```

library(MASS)
V=2;lamda=0.5;K=3;r=0.5;max.iter=10;n1=n2=n3=70
X1<-rnorm(n1,20,2);X2<-rnorm(n2,25,1.5);X3<-rnorm(n3,30,2)
Xv<-c(X1,X2,X3)
data<-matrix(Xv,n1+n2+n3,2)
data[1:70,2]<-1;data[71:140,2]<-2;data[141:210,2]<-3
truere=data[,2]
X<-matrix(data[,1],n1+n2+n3,1)
lamda1<-0.2;lamda2<-0.8
lamda0<-matrix(c(lamda1,lamda2),nrow=1,ncol=2)
sol.svd <- svd(lamda0)
U1<-sol.svd$u
D1<-sol.svd$d
V1<-sol.svd$v
C1<-t(U1)%*%t(X)
Y1<-C1/D1
view<-V1%*%Y1
view1<-matrix(view[1,])
view2<-matrix(view[2,])
X1<-matrix(view1,n1+n2+n3,1)
X2<-matrix(view2,n1+n2+n3,1)
DMC(X=X1,K=K,V=V,lamda=lamda,r=r,max.iter=max.iter,truere=truere,method=0)

```

---

INDEX

*Calculate the indication on the functions*


---

**Description**

Calculate the indication and the estimator on the functions,method=0 purity;method=1,precision;method=2,recall; method=3, F-score; method=4, RI.

**Usage**

```
INDEX(vec1, vec2, method = 0, mybeta = 0)
```

**Arguments**

vec1	algorithm cluster result
vec2	true cluster result
method	Calculate the selection of indicators.
mybeta	calculate the index

**Value**

accuracy

**Examples**

```
P1<-c(1,1,1,2,3,2,1);trueLabel<-c(1,1,1,2,2,2,3)
INDEX(P1,trueLabel,method=0);INDEX(P1,trueLabel,method=2)
```

KMeans

*Calculate the estimator on the KMeans method***Description**

Calculate the estimator on the KMeans method

**Usage**

```
KMeans(X, K, V, r, max.iter, trueLabel, method = 0)
```

**Arguments**

X	data matrix
K	number of cluster
V	number of view
r	balance parameter
trueLabel	true cluster result
max.iter	max iter
method	calculate the index of NMI

**Value**

NMI,weight,center,result

**Author(s)**

Miao Yu

**Examples**

```
library(MASS)
library(Matrix)
V=2;K=3;r=0.5;max.iter=10;n1=n2=n3=70
X1<-rnorm(n1,20,2);X2<-rnorm(n2,25,1.5);X3<-rnorm(n3,30,2)
Xv<-c(X1,X2,X3)
data<-matrix(Xv,n1+n2+n3,2)
data[1:70,2]<-1;data[71:140,2]<-2;data[141:210,2]<-3
trueLabel=data[,2]
X<-matrix(data[,1],n1+n2+n3,1)
lamda1<-0.2;lamda2<-0.8
lamda<-matrix(c(lamda1,lamda2),nrow=1,ncol=2)
sol.svd <- svd(lamda)
```

```
U1<-sol.svd$u
D1<-sol.svd$d
V1<-sol.svd$v
C1<-t(U1)
Y1<-C1/D1
view<-V1
view1<-matrix(view[1,])
view2<-matrix(view[2,])
X1<-matrix(view1,n1+n2+n3,1)
X2<-matrix(view2,n1+n2+n3,1)
KMeans(X=X1,K=K,V=V,r=r,max.iter=max.iter,truere=truere,method=0)
```

---

movie1

*The first view of Movie dataset.*

---

### **Description**

The first view of Movie dataset.

### **Usage**

```
data("movie1")
```

### **Format**

A data frame with 617 observations on the following 1878 variables.

V1 a numeric vector  
V2 a numeric vector  
V3 a numeric vector  
V4 a numeric vector  
V5 a numeric vector  
V6 a numeric vector  
V7 a numeric vector  
V8 a numeric vector  
V9 a numeric vector  
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V16 a numeric vector



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### Details

The first view of Movie dataset.

### Source

<https://lig-membres.imag.fr/grimal/data.html>.

### References

C. Grimal. the multi-view movie data set. 2010. URL <https://lig-membres.imag.fr/grimal/data.html>.

### Examples

```
data(movie1)
## maybe str(movie1) ; plot(movie1) ...
```

---

movie2

*The second view of Movie data set.*

---

### Description

The second view of Movie data set.

### Usage

```
data("movie2")
```

**Format**

A data frame with 617 observations on the following 1398 variables.

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**Details**

The second view of Movie data set.

**Source**

<https://lig-membres.imag.fr/grimal/data.html>.

## References

C. Grimal. the multi-view movie data set. 2010. URL <https://lig-membres.imag.fr/grimal/data.html>.

## Examples

```
data(movie2)
## maybe str(movie2) ; plot(movie2) ...
```

---

OGD

*Calculate the result and the estimator on the OGD*

---

## Description

Calculate the pardon matrix and the estimator on the OGD

## Usage

```
OGD(X, K, gamma, max.m, chushi, yita, epsilon, truer, method = 0)
```

## Arguments

X	data matrix
K	number of cluster
gamma	step size
yita	the regularized parameter
truer	true cluster result
max.m	max iter
epsilon	epsilon
chushi	the initial value
method	calculate the index of NMI

## Value

result,NMI,M

## Author(s)

Miao Yu

**Examples**

```

yita=0.5;V=2;K=3;chushi=100;epsilon=1;gamma=0.1;max.m=10;n1=n2=n3=70
X1<-rnorm(n1,20,2);X2<-rnorm(n2,25,1.5);X3<-rnorm(n3,30,2)
Xv<-c(X1,X2,X3)
data<-matrix(Xv,n1+n2+n3,2)
data[1:70,2]<-1;data[71:140,2]<-2;data[141:210,2]<-3
X<-matrix(data[,1],n1+n2+n3,1)
truere=data[,2]
lamda1<-0.2;lamda2<-0.8
lamda<-matrix(c(lamda1,lamda2),nrow=1,ncol=2)
sol.svd <- svd(lamda)
U1<-sol.svd$u
D1<-sol.svd$d
V1<-sol.svd$v
C1<-t(U1)
Y1<-C1/D1
view<-V1
view1<-matrix(view[1,])
view2<-matrix(view[2,])
X1<-matrix(view1,n1+n2+n3,1)
X2<-matrix(view2,n1+n2+n3,1)
OGD(X=X1,K=K,gamma=gamma,max.m=max.m,chushi=chushi,
yita=yita,epsilon=epsilon,truere=truere,method=0)

```

---

OMU

*Calculate the pardon matrix and the estimator on the OMU*


---

**Description**

Calculate the pardon matrix and the estimator on the OMU

**Usage**

```
OMU(X,K,V,chushi,yita,r,max.iter,epsilon,truere,method=0)
```

**Arguments**

X	data matrix
K	number of cluster
V	number of view
chushi	the initial value
yita	the regularized parameter
r	banlance parameter
max.iter	max iter
epsilon	epsilon
truere	true cluster result
method	calculate the index of NMI

**Value**

NMI,result,M

**Examples**

```

yita=0.5;V=2;chushi=100;K=3;r=0.5;max.iter=10;n1=n2=n3=70;epsilon=1
X1<-rnorm(n1,20,2);X2<-rnorm(n2,25,1.5);X3<-rnorm(n3,30,2)
Xv<-c(X1,X2,X3)
data<-matrix(Xv,n1+n2+n3,2)
data[1:70,2]<-1;data[71:140,2]<-2;data[141:210,2]<-3
truere=data[,2]
X<-matrix(data[,1],n1+n2+n3,1)
lamda1<-0.2;lamda2<-0.8
lamda<-matrix(c(lamda1,lamda2),nrow=1,ncol=2)
sol.svd <- svd(lamda)
U1<-sol.svd$u
D1<-sol.svd$d
V1<-sol.svd$v
C1<-t(U1)%*%t(X)
Y1<-C1/D1
view<-V1%*%Y1
view1<-matrix(view[1,])
view2<-matrix(view[2,])
X1<-matrix(view1,n1+n2+n3,1)
X2<-matrix(view2,n1+n2+n3,1)
OMU(X=X1,K=K,V=V,chushi=chushi,yita=yita,r=r,max.iter=max.iter,
epsilon=epsilon,truere=truere,method=0)

```

ORKMeans

*Calculate the estimator on the ORKMeans method***Description**

Calculate the estimator on the ORKMeans method

**Usage**

```
ORKMeans(X,K,V,chushi,r,yita,gamma,alpha,epsilon,truere,max.iter,method=0)
```

**Arguments**

X	is the data matrix
K	is the number of cluster
V	is the view of X
chushi	is the initial value for online
yita	is the regularized parameter
r	is the banlance parameter

gamma	is the step size
alpha	is the caculated the weight of view
epsilon	is the epsilon
truere	is the ture label in data set
max.iter	is the max iter
method	is the caluate the NMI

**Value**

NMI,weight,center,result

**Author(s)**

Miao Yu

**Examples**

```

library(MASS)
library(Matrix)
yita=0.5;V=2;chushi=100;K=3;r=0.5;max.iter=10;n1=n2=n3=70;gamma=0.1;alpha=0.98;epsilon=1
X1<-rnorm(n1,20,2);X2<-rnorm(n2,25,1.5);X3<-rnorm(n3,30,2)
Xv<-c(X1,X2,X3)
data<-matrix(Xv,n1+n2+n3,2)
data[1:70,2]<-1;data[71:140,2]<-2;data[141:210,2]<-3
truere=data[,2]
X<-matrix(data[,1],n1+n2+n3,1)
lamda1<-0.2;lamda2<-0.8
lamda<-matrix(c(lamda1,lamda2),nrow=1,ncol=2)
sol.svd <- svd(lamda)
U1<-sol.svd$u
D1<-sol.svd$d
V1<-sol.svd$v
C1<-t(U1)
Y1<-C1/D1
view<-V1
view1<-matrix(view[1,])
view2<-matrix(view[2,])
X1<-matrix(view1,n1+n2+n3,1)
X2<-matrix(view2,n1+n2+n3,1)
ORKMeans(X=X1,K=K,V=V,r=r,chushi=chushi,yita=yita,gamma=gamma,epsilon=epsilon,
max.iter=max.iter,truere=truere,method=0)

```

---

PKMeans

*Calculate the pardon matrix and the estimator on the PKMeans*

---

**Description**

Calculate the pardon matrix and the estimator on the PKMeans

**Usage**

```
PKMeans(X, K, yitapower, sm, max.m, truere, method = 0)
```

**Arguments**

X	is the data matrix
K	is the number of cluster
yitapower	is the regularized parameter
sm	is the banlance parameter
max.m	is the max iter
truere	is the ture label in data set
method	is the caluate the NMI

**Value**

center,NMI,result

**Author(s)**

Miao Yu

**Examples**

```
library(MASS)
yitapower=0.5;K=3;sm=0.5;max.m=100;n1=n2=n3=70
X1<-rnorm(n1,20,2);X2<-rnorm(n2,25,1.5);X3<-rnorm(n3,30,2)
Xv<-c(X1,X2,X3)
data<-matrix(Xv,n1+n2+n3,2)
data[1:70,2]<-1;data[71:140,2]<-2;data[141:210,2]<-3
truere=data[,2]
X11<-matrix(data[,1],n1+n2+n3,1)
PKMeans(X=X11,K=K,yitapower=yitapower,sm=sm,max.m=max.m,truere=truere,method=0)
```

---

QCM

*The QCM data set with K=5.*

---

**Description**

The QCM data set with K=5.

**Usage**

```
data("QCM")
```

**Format**

A data frame with 125 observations on the following 15 variables.

V1 a numeric vector  
V2 a numeric vector  
V3 a numeric vector  
V4 a numeric vector  
V5 a numeric vector  
V6 a numeric vector  
V7 a numeric vector  
V8 a numeric vector  
V9 a numeric vector  
V10 a numeric vector  
V11 a numeric vector  
V12 a numeric vector  
V13 a numeric vector  
V14 a numeric vector  
V15 a numeric vector

**Details**

The QCM data set with  $K=5$ .

**Source**

<https://www.sciencedirect.com/science/article/pii/S2215098619303337>.

**References**

M. F. Adak, P. Lieberzeit, P. Jarujamrus, and N. Yumusak. Classification of alcohols obtained by qcm sensors with different characteristics using abc based neural network. *Engineering Science and Technology, an International Journal*, 23(3):463–469, 2020. ISSN 2215-0986. doi: <https://doi.org/10.1016/j.jestch.2019.06.011>. URL <https://www.sciencedirect.com/science/article/pii/S2215098619303337>.

**Examples**

```
data(QCM)
## maybe str(QCM) ; plot(QCM) ...
```

---

 RKMeans

*Calculate the pardon matrix and the estimator on the RKMeans*


---

**Description**

Calculate the pardon matrix and the estimator on the RKMeans

**Usage**

```
RKMeans(X, K, V, yita, r, max.iter, truere, method = 0)
```

**Arguments**

X	is the data matrix
K	is the number of cluster
V	is the view of X
yita	is the regularized parameter
r	is the banlance parameter
max.iter	is the max iter
truere	is the ture label in data set
method	is the caluate the NMI

**Value**

NMI,weight,center,result

**Author(s)**

Miao Yu

**Examples**

```
library(MASS)
library(Matrix)
yita=0.5;V=2;K=3;r=0.5;max.iter=10;n1=n2=n3=70
X1<-rnorm(n1,20,2);X2<-rnorm(n2,25,1.5);X3<-rnorm(n3,30,2)
Xv<-c(X1,X2,X3)
data<-matrix(Xv,n1+n2+n3,2)
data[1:70,2]<-1;data[71:140,2]<-2;data[141:210,2]<-3
X<-matrix(data[,1],n1+n2+n3,1)
truere=data[,2]
lamda1<-0.2;lamda2<-0.8
lamda<-matrix(c(lamda1,lamda2),nrow=1,ncol=2)
sol.svd <- svd(lamda)
U1<-sol.svd$u
D1<-sol.svd$d
V1<-sol.svd$v
```



```
C1<-t(U1)
Y1<-C1/D1
view<-V1
view1<-matrix(view[1,])
view2<-matrix(view[2,])
X1<-matrix(view1,n1+n2+n3,1)
X2<-matrix(view2,n1+n2+n3,1)
RKMeans(X=X1,K=K,V=V,yita=yita,r=r,max.iter=max.iter,truere=truere,method=0)
```

---

seed

*A single-view data set named seed.*

---

### Description

A single-view data set named seed.

### Usage

```
data("seed")
```

### Format

A data frame with 210 observations on the following 8 variables.

V1 a numeric vector  
V2 a numeric vector  
V3 a numeric vector  
V4 a numeric vector  
V5 a numeric vector  
V6 a numeric vector  
V7 a numeric vector  
V8 a numeric vector

### Details

A single-view data set named seed.

### Source

<http://archive.ics.uci.edu/ml/datasets/seeds>

### References

<http://archive.ics.uci.edu/ml/datasets/seeds>

### Examples

```
data(seed)
## maybe str(seed) ; plot(seed) ...
```

---

sobar

*A single-view data set named sobar.*

---

**Description**

A single-view data set named sobar.

**Usage**

```
data("sobar")
```

**Format**

A data frame with 72 observations on the following 19 variables.

behavior\_sexualRisk a numeric vector  
behavior\_eating a numeric vector  
behavior\_personalHygine a numeric vector  
intention\_aggregation a numeric vector  
intention\_commitment a numeric vector  
attitude\_consistency a numeric vector  
attitude\_spontaneity a numeric vector  
norm\_significantPerson a numeric vector  
norm\_fulfillment a numeric vector  
perception\_vulnerability a numeric vector  
perception\_severity a numeric vector  
motivation\_strength a numeric vector  
motivation\_willingness a numeric vector  
socialSupport\_emotionality a numeric vector  
socialSupport\_appreciation a numeric vector  
socialSupport\_instrumental a numeric vector  
empowerment\_knowledge a numeric vector  
empowerment\_abilities a numeric vector  
empowerment\_desires a numeric vector

**Details**

A single-view data set named sobar.

**Source**

<http://archive.ics.uci.edu/ml/datasets/Cervical+Cancer+Behavior+Risk>

**References**

<http://archive.ics.uci.edu/ml/datasets/Cervical+Cancer+Behavior+Risk>

**Examples**

```
data(sobar)
## maybe str(sobar) ; plot(sobar) ...
```

---

turelabel	<i>Ture label of Movie data set.</i>
-----------	--------------------------------------

---

**Description**

Ture label of Movie data set.

**Usage**

```
data("turelabel")
```

**Format**

A data frame with 617 observations on the following variable.

V1 a numeric vector

**Details**

Ture label of Movie data set.

**Source**

<https://lig-membres.imag.fr/grimal/data.html>.

**References**

C. Grimal. the multi-view movie data set. 2010. URL <https://lig-membres.imag.fr/grimal/data.html>.

**Examples**

```
data(turelabel)
## maybe str(turelabel) ; plot(turelabel) ...
```

# Index

## \* datasets

- citesview1, 2
- citesview2, 3
- citesview3, 3
- citesview4, 4
- movie1, 8
- movie2, 59
- QCM, 102
- seed, 105
- sobar, 106
- turelabel, 107

- citesview1, 2
- citesview2, 3
- citesview3, 3
- citesview4, 4

DMC, 5

INDEX, 6

KMeans, 7

- movie1, 8
- movie2, 59

- OGD, 98
- OMU, 99
- ORKMeans, 100

PKMeans, 101

QCM, 102

RKMeans, 104

- seed, 105
- sobar, 106

turelabel, 107