

# Package ‘OPC’

May 15, 2023

**Title** The Online Principal Component Estimation Method

**Date** 2023-05-15

**Version** 0.0.2

**Description** The online principal component method can process the online data set. The philosophy of the package is described in Guo G. (2018) <[doi:10.1080/10485252.2018.1531130](https://doi.org/10.1080/10485252.2018.1531130)>.

**License** MIT + file LICENSE

**Encoding** UTF-8

**RoxygenNote** 7.2.3

**Imports** MASS, stats

**Suggests** testthat (>= 3.0.0)

**Config/testthat/edition** 3

**NeedsCompilation** no

**Author** Chunjie Wei [aut, cre],  
Guangbao Guo [aut]

**Maintainer** Chunjie Wei <[wcj1236@163.com](mailto:wcj1236@163.com)>

**Depends** R (>= 3.5.0)

**Repository** CRAN

**Date/Publication** 2023-05-15 14:10:02 UTC

## R topics documented:

Cloud . . . . .	2
HTRU . . . . .	3
IPC . . . . .	4
PPC . . . . .	4
SAPC . . . . .	5
Wine . . . . .	6
<b>Index</b>	<b>8</b>

---

Cloud

*Cloud*

---

**Description**

A data frame with 1024 observations on the following 10 variables.

**Usage**

```
data("Cloud")
```

**Format**

A data frame with 1024 observations on the following 10 variables.

x1 a numeric vector  
x2 a numeric vector  
x3 a numeric vector  
x4 a numeric vector  
x5 a numeric vector  
x6 a numeric vector  
x7 a numeric vector  
x8 a numeric vector  
x9 a numeric vector  
x10 a numeric vector

**Details**

The data sets we propose to analyse are constituted of 1024 vectors, each vector includes 10 parameters. You can think of it as a 1024\*10 matrix.

**Source**

The Cloud data set comes from the UCI database.

**References**

NA

**Examples**

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

---

HTRU

*HTRU*

---

**Description**

A data frame with 10000 observations on the following 9 variables.

**Usage**

```
data("HTRU")
```

**Format**

A data frame with 10000 observations on the following 9 variables.

A a numeric vector

B a numeric vector

C a numeric vector

D a numeric vector

E a numeric vector

F a numeric vector

G a numeric vector

H a numeric vector

I a numeric vector

**Details**

Pulsar candidates collected during the HTRU survey. Pulsars are a type of star, of considerable scientific interest. Candidates must be classified in to pulsar and non-pulsar classes to aid discovery.

**Source**

The HTRU data set comes from the UCI database.

**References**

NA

**Examples**

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

---

IPC *The incremental principal component method can handle online data sets.*

---

### Description

The incremental principal component method can handle online data sets.

### Usage

```
IPC(data, m, eta)
```

### Arguments

data is an online data set  
 m is the number of principal component  
 eta is the proportion of online data to total data

### Value

T2,T2k,V,Vhat,lambdahat,time

### Examples

```
library(MASS)
n=2000;p=20;m=9;
mu=t(matrix(rep(runif(p,0,1000),n),p,n))
mu0=as.matrix(runif(m,0))
sigma0=diag(runif(m,1))
F=matrix(mvrnorm(n,mu0,sigma0),nrow=n)
A=matrix(runif(p*m,-1,1),nrow=p)
D=as.matrix(diag(rep(runif(p,0,1))))
epsilon=matrix(mvrnorm(n,rep(0,p),D),nrow=n)
data=mu+F%*%t(A)+epsilon
IPC(data=data,m=m,eta=0.8)
```

---

PPC *The perturbation principal component method can handle online data sets.*

---

### Description

The perturbation principal component method can handle online data sets.

### Usage

```
PPC(data, m, eta)
```

**Arguments**

data is an online data set  
 m is the number of principal component  
 eta is the proportion of online data to total data

**Value**

T2,T2k,V,Vhat,lambdahat,time

**Examples**

```
library(MASS)
n=2000;p=20;m=9;
mu=t(matrix(rep(runif(p,0,1000),n),p,n))
mu0=as.matrix(runif(m,0))
sigma0=diag(runif(m,1))
F=matrix(mvrnorm(n,mu0,sigma0),nrow=n)
A=matrix(runif(p*m,-1,1),nrow=p)
D=as.matrix(diag(rep(runif(p,0,1))))
epsilon=matrix(mvrnorm(n,rep(0,p),D),nrow=n)
data=mu+F%*%t(A)+epsilon
PPC(data=data,m=m,eta=0.8)
```

---

SAPC

*The stochastic approximate component method can handle online data sets.*

---

**Description**

The stochastic approximate component method can handle online data sets.

**Usage**

SAPC(data, m, eta, alpha)

**Arguments**

data is a online data set  
 m is the number of principal component  
 eta is the proportion of online data to total data  
 alpha is the step size

**Value**

T2,T2k,V,Vhat,lambdahat,time

**Examples**

```

library(MASS)
n=2000;p=20;m=9;
mu=t(matrix(rep(runif(p,0,1000),n),p,n))
mu0=as.matrix(runif(m,0))
sigma0=diag(runif(m,1))
F=matrix(mvrnorm(n,mu0,sigma0),nrow=n)
A=matrix(runif(p*m,-1,1),nrow=p)
D=as.matrix(diag(rep(runif(p,0,1))))
epsilon=matrix(mvrnorm(n,rep(0,p),D),nrow=n)
data=mu+F%*%t(A)+epsilon
SAPC(data=data,m=m,eta=0.8,alpha=1)

```

---

Wine

*Wine*


---

**Description**

A data frame with 177 observations on the following 13 variables.

**Usage**

```
data("Wine")
```

**Format**

A data frame with 177 observations on the following 13 variables.

X14.23 a numeric vector  
X1.71 a numeric vector  
X2.43 a numeric vector  
X15.6 a numeric vector  
X127 a numeric vector  
X2.8 a numeric vector  
X3.06 a numeric vector  
X.28 a numeric vector  
X2.29 a numeric vector  
X5.64 a numeric vector  
X1.04 a numeric vector  
X3.92 a numeric vector  
X1065 a numeric vector

### **Details**

These data are the results of a chemical analysis of wines grown in the same region in Italy but derived from three different cultivars. The analysis determined the quantities of 13 constituents found in each of the three types of wines.

### **Source**

The Wine data set comes from the UCI database.

### **References**

NA

### **Examples**

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

# Index

## \* datasets

Cloud, [2](#)

HTRU, [3](#)

Wine, [6](#)

Cloud, [2](#)

HTRU, [3](#)

IPC, [4](#)

PPC, [4](#)

SAPC, [5](#)

Wine, [6](#)