

# Package ‘FACTMLE’

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**Type** Package

**Title** Maximum Likelihood Factor Analysis

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**Author**

Koulik Khamaru <koulik123@gmail.com>, Rahul Mazumder <rahul.mazumder@gmail.com >

**Maintainer** Koulik Khamaru <koulik123@gmail.com>

**Description** Perform Maximum Likelihood Factor analysis on a covariance matrix or data matrix.

**License** GPL-3

**Imports** rARPACK, stats

**Suggests** MASS

**RoxygenNote** 5.0.0

**NeedsCompilation** no

**Repository** CRAN

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Factmle	<i>Calculates the Maximum likelihood Factor analysis with a dataset.</i>
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## Description

Calculates the Maximum likelihood Factor analysis with a dataset.

**Usage**

```
Factmle(data, rnk, Psi_init = c(), lb = 0.01, index = c(), lb2 = 0.01,
        tol = 10^-7, Max_iter = 1000)
```

**Arguments**

data	The dataset. It is a $n \times p$ numeric matrix, where $n$ is the number of observations and $p$ is the number of variables.
rnk	Rank constraint for the Factor analysis problem. It must a positive integer less than the number of variables $p$
Psi_init	The initial value of Psi. It is a $p \times 1$ numeric vector, where $p$ is the number of variables. Default value is a vector of uniform random numbers.
lb	The lower bound on the Psi values. The default value is set to 0.05
index	This option is for modified version of factmle. The default value is a null vector. If assigned a zero vector, it will perform MLFA keeping some of the Psi values specified by the index at a specified level $lb2$
lb2	This option of modified version of factmle algorithm. The default value is 0.001. The Psi values specified by the $index$ is kept constant at $lb2$ while doing MLFA.
tol	Precision parameter. Default is $10^{-7}$
Max_iter	Maximum number of iterations. Default is 1000.

**Value**

A list with the following components

Psi	A vector containing the unique variances.
Lambda	A $p \times rnk$ matrix containing the factor loadings in the columns.
Nll	A vector containing the negative Log-likelihood values at every iteration.
Nllopt	The value of the negative log-likelihood upon convergence.

**See Also**

svds

**Examples**

```
library(MASS)
library(stats)
Psi=runif(15,min=0.2,max=1.3)
Lambda=mvrnorm(n=15,mu=rep(0,3),Sigma = diag(rep(1,3)))
data=mvrnorm(n=5000,mu=rep(0,15),Sigma = diag(Psi)+Lambda%*%t(Lambda))
x=Factmle(data,3)
```

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Factmle_cov	<i>Calculates the Maximum likelihood Factor analysis with a covariance Matrix.</i>
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### Description

Calculates the Maximum likelihood Factor analysis with a covariance Matrix.

### Usage

```
Factmle_cov(S, rnk, Psi_init = c(), lb = 0.01, index = c(), lb2 = 0.01,
  tol = 10^-7, Max_iter = 1000)
```

### Arguments

S	The Covariance Matrix. It is a p*p numeric matrix, where p is the number of variables.
rnk	Rank constraint for the Factor analysis problem. It must a positive integer less than the number of variables p
Psi_init	The initial value of Psi. It is a p*1 numeric vector, where p is the number of variables. Default value is a vector of uniform random numbers.
lb	The lower bound on the Psi values. The default value is set to 0.05
index	This option is for modified version of factmle. The default value is a null vector. If assigned a zero vector, it will perform MLFA keeping some of the Psi values specified by the index at a specified level *lb2*
lb2	This option of modified version of factmle algorithm. The default value is 0.001. The Psi values specified by the *index* is kept constant at *lb2* while doing MLFA.
tol	Precision parameter. Default is 10^-7
Max_iter	Maximum number of iterations. Default is 1000.

### Value

A list with the following components

**Psi** A vector containing the unique variances.

**Lambda** A p\*rnk matrix containing the factor loadings in the columns.

**Nll** A vector containing the negative Log-likelihood values at every iteration.

**Nllopt** The value of the negative log-likelihood upon convergence.

### See Also

eigs\_sym

**Examples**

```
library(MASS)
library(stats)
Psi=runif(15,min=0.2,max=1.3)
Lambda=mvnrnorm(n=15,mu=rep(0,3),Sigma = diag(rep(1,3)))
data=mvnrnorm(n=5000,mu=rep(0,15),Sigma = diag(Psi)+Lambda%*%t(Lambda))
S=cov(data)
x=Factmle_cov(S,3)
```

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