Package 'pcg'

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Type Package

Title Preconditioned Conjugate Gradient Algorithm for solving Ax=b

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Description The package solves linear system of equations Ax=b by using Preconditioned Conjugate Gradient Algorithm where A is real symmetric positive definite matrix. A suitable preconditioner matrix may be provided by user. This can also be used to minimize quadratic function (x'Ax)/2-bx for unknown x.

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NeedsCompilation no

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Contents

pcg 1

Index 3

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pcg *Preconditioned Conjugate Gradient algorithm for solving Ax=b*

Description

The function solves linear system of equations Ax=b by Preconditioned Conjugate Gradient algorithm. Here matrix A must be real symmetric and positive definite. This can also be used to minimize the quadractic function (x'Ax)/2-bx.

Usage

```
pcg(A, b, M, maxiter = 1e+05, tol = 1e-06)
```

Arguments

A	A is real symmetric positive definite matrix of order n x n.
b	b is a vector of order n x 1.
M	Optionally a suitable preconditioner matrix specified by user
maxiter	Maximum number of iterations
tol	Tolerance for convergence of the solution

Value

A vector of order n x 1

Note

The algorithm does not check for symmetricity and positive definiteness of matrix A. Please ensure these conditions yourself.

Author(s)

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References

Barrett, R., M. Berry, T. F. Chan, et al., (1994). Templates for the Solution of Linear Systems: Building Blocks for Iterative Methods, SIAM, Philadelphia.

Examples

```
A=matrix(rnorm(100*100,mean=10,sd=2),100,100)
A=t(A)%*%A
b=rnorm(100)
pcg(A,b)
```

Index

∗ **linear system of equations**
pcg, 1
∗ **preconditioned conjugate gradient**
pcg, 1
∗ **quadratic function**
pcg, 1

pcg, 1