

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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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 quadratic 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 $n \times n$.
b	b is a vector of order $n \times 1$.
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 $n \times 1$

Note

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

Author(s)

B N Mandal and Jun Ma

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)
```

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