VolEsti Documentation

July 19, 2018

`CheBall` *Compute the Chebychev ball of a H-polytope, P:= Ax<=b*

Description

Compute the Chebychev ball of a H-polytope, P:= Ax<=b

Usage

```
CheBall(A, b)
```

Arguments

`A`	the matrix of the H-polytope
`b`	the vector with the constants of the hyperplanes

Value

The Chebychev center of the Polytope discribed by the matrix `A` and the vector `b`

Examples

```
CheBall(A,b)
```

`ineToMatrix` *function to get a ine file and return matrix A in ine format for VolEsti()*

Description

function to get a ine file and return matrix A in ine format for VolEsti()

Usage

```
ineToMatrix(P)
```

Arguments

`P`	It is in format, read.cs('path/to/file.ine'). The ine file desrcibies the H-polytope

Value

The numerical matrix in ine format of `read.cs('path/to/file.ine')`

Examples

```
ineToMatrix(read.cs('path/to/data/cube40.ine'))
```

`modifyMat` *takes a numerical matrix in ine format and return numerical matrix A and vector b: Ax<=b*

Description

takes a numerical matrix in ine format and return numerical matrix A and vector b: Ax<=b

Usage

```
modifyMat(A)
```

Arguments

`A`	the numerical matrix in ine format of the H-polytope

Value

numerical matrix A and vector b: Ax<=b

Examples

```
modifyMat(A)
```

testRvolEsti *Run some experiments*

Description

Run some experiments

Usage

```
testRvolEsti()
```

Value

Print the computed volumes and the total time

Examples

```
testRvolEsti()
```

VolEsti *The main R function for volume approximation of a convex H-Polytope*

Description

The main R function for volume approximation of a convex H-Polytope

Usage

```
VolEsti(Inputs)
```

Arguments

list("path", "matrix", "vector", "Chebychev", "verbose", "coordinate", "rounding", "Walk_length", "	A list that includes alla the parameters of the algorithm
path	The path to the ine file that describes the H-polytope. If path is given then "matrix" and "vector" inputs are not needed
matrix	The matrix A of the polytope. If it is in ine format then the input "vector" is not needed
vector	The vector b that containes the constants of the hyperplanes
Chebychev	Optional. A d+1 vector that containes the chebychev center in the first d coordinates and the radius of the chebychev ball in the last coordinate
verbose	Optional. A boolean parameter for printing. Default is False
coordinate	Optional. A boolean parameter for the hit-and-run. True for Coordinate Directions HnR, false for Random Directions HnR. Default is True

rounding	Optional. A boolean parameter to activate the rounding option. Default is False
Walk_length	Optional. Declare the number of the steps for the random walk, default is 10+d/10
error	Optional. Declare the goal for the approximation error. Default is 1
test	Optional. A boolean parameter. Declare if the current excecution is a test or not. Default is False

Value

The approximation of the volume of an H-polytope

Examples

```
VolEsti(list("path"=/path/to/ine/file, "verbose"=TRUE))
```

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vol_R *The Cpp main function compiled by Rcpp and used by the main R function VolEsti for volume approximation*

Description

The Cpp main function compiled by Rcpp and used by the main R function VolEsti for volume approximation

Usage

```
vol_R(A, W, e, Chebychev, coord, rounding, V)
```

Arguments

A	the matrix of the H-polytope in ine format
W	The number of steps of the random walk
e	The goal for the error of the approximation
Chebychev	A d+1 numerical vector desribing the Chebychev ball. If it is of length d+2 then it is considered as null and lpSolve library is used for the computation of the Chebychev ball
coord	A boolean parameter. True for Coordinate Directions HnR, false for Random Directions HnR
rounding	A boolean parameter. True to activate rounding option, false to deactivate
V	A boolean parameter. True to activate printing, false to deactivate

Value

An approximation of the Polytope described by matrix A in ine format

Examples

```
Vol_R(A,10,0.5,c(0,0,0,0,0),TRUE,FALSE,FALSE)
```

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