Package 'vertexenum'

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Title Vertex Enumeration of Polytopes

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Depends R (>= 1.8.0)

Imports numbers

Description When given a description of a polyhedral set by a system of linear inequalities Ax <= b, produce the list of the vertices of the set.

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NeedsCompilation yes

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R topics documented:

`enumerate.vertices` *Enumerate the vertices of a polytope.*

Description

Returns a `d` by `n + 1` dimensional matrix representing the `d` vertices of the polytope represented by `Ax <= b`.

Usage

```
enumerate.vertices(A, b, warn_if_open=FALSE)
```

Arguments

A	An m by n matrix.
b	A m by 1 vector.
warn_if_open	Boolean.

Value

A d by n + 1 dimensional matrix. The rows of this matrix represent the d vertices of the polytope represented by the system Ax <= b. If the optional argument warn_if_open is set to TRUE, then a warning will be printed if the system of inequalities is not closed, i.e. if it contains an extreme ray.

Note

This is a port of the lrs library for vertex enumeration (http://cgm.cs.mcgill.ca/~avis/C/lrs.html). The source was written by David Avis.

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Examples

```
library(vertexenum)
## example vertex enumeration
## the system Ax <= b represents a unit square, with
## the lower left corner at the origin

A <- rbind(c(-1, 0), c(0, 1), c(1, 0), c(0, -1))
b <- c(0, 1, 1, 0)
## outputs a 4 x 2 matrix, each row corresponds to a vertex
enumerate.vertices(A, b)

## second example
## this is a unit square, with lower left corner at the origin, missing
## a facet on the right side
A <- rbind(c(-1, 0), c(0, 1), c(0, -1))
b <- c(0, 1, 0)

## outputs a 2 x 2 matrix, each row corresponds to a vertex
## will print a warning, since the input set described by Ax <= b
## is not closed
enumerate.vertices(A, b, warn_if_open=TRUE)
```

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