1995-08-29

PROGRAM cdd README FILE

The program cdd is a C implementation of the Double Description Method of Motzkin et al. for generating all vertices (i.e. extreme points) and extreme rays of a general convex polyhedron in R^d given by a system of linear inequalities:

```
   P = { x :  A  x  <=  b }
```

where A is an m x d real matrix and b is a real m dimensional vector. The program can be used for the reverse operation (i.e. convex hull computation) if one run cdd with "hull" option. This means that one can move back and forth between an inequality representation and a generator (i.e. vertex and ray) representation of a polyhedron with cdd.

The cdd package is in "tar"ed and "gzip"ed format with name cdd-***.tar.gz, where *** is the version number. The standard anonymous ftp site for the package is

```
     ftp site : ifor13.ethz.ch (129.132.154.13)
     directory: pub/fukuda/cdd
     file name: cdd+-***.tar.gz
```

The old ftp site: ftp.efpl.ch (128.178.139.3) directory: incoming/dma is no more valid and please do not use this site although some of the old items are still there.

In order to unpack the package in a standard unix environment, type

```
     % gunzip cdd-***.tar.gz
     % tar xvf cdd-***.tar
```

where *** must be replaced by the appropriate version number, and % is a unix prompt.

The package cdd consists of the following files which will be placed in a newly created sub-directory cdd-*** :

```
     cdd.readme     This file itself

     cdd.c          C main source file
     cddarith.c     C subsource file
     cddio.c        C subsource file
     cdd.h          The header file for cdd.c
     cdddef.h       cdd definition file (whose two lines are to be edited by user)
     setoper.c      C library for set operation
     setoper.h      The header file for setoper.c

     cddman.tex     Latex source file of cdd User Manual
     cddHISTORY     brief description of changes made at each updates
     ine            A subdirectory containing sample input files
     ext            A subdirectory containing sample output files
     COPYING        GNU GENERAL PUBLIC LICENSE
```

Before using the software, please read COPYING and and read the manual cddman.tex.

To compile the manual cddman.tex (in latex format) in a standard unix environment, run the following command twice:

```
% latex cddmax.tex
```

to get the dvi file, cddman.dvi. On the printing or viewing commands for cddman.dvi file, please ask a local system administrator.

For compilation of cdd, simply use the following:

```
% gcc -o cdd cdd.c cddarith.c cddio.c setoper.c
```

to get an executable file "cdd", where o is the lower letter "oh". For a faster code, compile them with an optimization option as

```
% gcc -o cdd -O cdd.c cddarith.c cddio.c setoper.c
```

In above, gnu C compiler gcc can be replaced by the native C-compiler cc of your system if cc supports the modern ANSI C. We have found that some cc compilers (such as some C-compiler on SUN workstations) do not support it.

There is a supplementary C program, called domcheck, written by Francois Margot of EPFL, which can be used with cdd to compute the orthogonal projection of a polyhedron onto the subspace of any subset of variables. The program domcheck can be obtained from the same ftp site above. Note that one needs the additional commercial program CPLEX to run domcheck.

The program cdd is free software, but if cdd turns out to be useful, please kindly send to me (at the address below) a note or a paper mentioning for what purpose and how cdd has been used. The most powerful support for free software development is user's appreciation.

For more information, contact

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