CoCoALib - Feature #1277

Gaussian row reduction

30 Apr 2019 10:40 - John Abbott

Status:	Closed		Start date:	30 Apr 2019
Priority:	Normal		Due date:	
Assignee:	John Abbott		% Done:	100%
Category:	New Function		Estimated time:	1.99 hour
Target version:	CoCoALib-0.99700		Spent time:	2.00 hours

Description

Julian Danner (Passau) would like CoCoA to offer matrix row reduction via gaussian elimination.

Discuss, design, implement.

History

#1 - 30 Apr 2019 10:44 - John Abbott

The request seems reasonable to me.

Not yet sure what the best design might be, but I suggest the following as a start:

- assume input matrix is over a field (so we may divide by any non-zero)
- output could be a triple: row-permutation, column-permutation, and "echelon" matrix

The interpretation is that we apply the permutations to the rows and cols of the input matrix, then we do gaussian row reduction (from left to right, and always using the element in position (k,k) as pivot, unless this element is zero in which case the rest of the matrix is zero).

Perhaps I'll look to see what NTL offers...

#2 - 30 Apr 2019 10:54 - John Abbott

NTL's doc shows just one fn **gauss** which accepts 2 args: matrix M and an optional integer w (default is number of rows in M); it computes row reduction on the first w rows of M.

Mmm, maybe my design is too complicated? :-/

#3 - 09 Jan 2020 17:18 - John Abbott

- Status changed from New to In Progress

- Assignee set to John Abbott

- % Done changed from 0 to 30

I have a prototype which seems to work.
It is very simple: accepts a matrix, and returns a matrix. No smarts inside; works by columns from left to right.
A couple of quick tests worked.

No doc; no official tests (yet).

#4 - 12 Feb 2020 15:17 - John Abbott

- Status changed from In Progress to Feedback

- % Done changed from 30 to 90

Now documented. CoCoALib and CoCoA-5.
Do we really need a test?

#5 - 12 Feb 2020 15:26 - John Abbott

- Status changed from Feedback to Closed

- % Done changed from 90 to 100

- Estimated time set to 1.99 h

I have added a test to test-matrix2.C.