CoCoALib - Slug #874

factor: too slow on largish multivariate poly

03 May 2016 10:37 - John Abbott

Status:	In Progress	**Start date:**	03 May 2016
Priority:	Normal	**Due date:**	
Assignee:	John Abbott	**% Done:**	20%
Category:	Improving	**Estimated time:**	0.00 hour
Target version:	CoCoALib-1.0	**Spent time:**	2.85 hours

Description

Mario generates lots of multivariate polys (over QQ); most of them are irreducible. He reports that factorization of these polys is sometimes very slow.

Investigate, and improve the impl.

Related issues:

Related to CoCoA-5 - Slug #875: Interpreter is too slow reading a big polynomial	**In Progress**	**03 May 2016**
Related to CoCoALib - Feature #885: IsIrred3: fast 3-way irred test (returnin...	**In Progress**	**24 May 2016**

History

#1 - 03 May 2016 10:42 - John Abbott

Mario has given me an example poly. The poly ring has 84 indets; the poly itself uses 69 indets, and has about 6800 terms. Degree is relatively low: 7. 43 of the indets appear just linearly; and 17 appear quadratically.

Currently factorization takes about 85s (on my MacBook).

#2 - 03 May 2016 10:50 - John Abbott

- Status changed from New to In Progress

- Assignee set to John Abbott

- % Done changed from 0 to 10

Computing all contents takes about 44s; and computing contents wrt all indets which appear just linearly takes about 33s.

ContentWRT took varying amounts of time: fastest was about 0.19s, slowest was about 0.89s.

It should be enough to compute content for some "linear" indet, see that the content is 1, and then deduce that the poly is irred. This should be possible within 1s; much better than 85s!

#3 - 03 May 2016 13:14 - John Abbott

- Subject changed from factor" too slow on largish multivariate poly to factor: too slow on largish multivariate poly

Mario has just sent me an even bigger polynomial to try: 100 indets, about 127000 terms, total degree 9.

He also mentioned that some of his polynomials are reducible, but almost always the factors are a power product and some big irreducible poly.

#4 - 03 May 2016 14:00 - John Abbott

- Related to Slug #875: Interpreter is too slow reading a big polynomial added

#5 - 09 May 2016 20:51 - John Abbott

- % Done changed from 10 to 20

I have implemented a prototype "heuristic" irred test which returns a bool3.

First it checks for a non-triv common factor among the PPs in the support; if found, we know the poly is reducible.

Then it looks for indets which appear linearly; if there are none, it gives up and returns uncertain3.

Otherwise it picks the indet which appears in fewest terms in the poly, and computes content wrt to that indet. If content is not 1 then poly is reducible; otherwise it is irred.

On Mario's 2 polys this seems sufficient, and it faster than the previous code for IsIrred.

#6 - 24 May 2016 17:28 - John Abbott

- Related to Feature #885: IsIrred3: fast 3-way irred test (returning bool3) added

#7 - 06 Nov 2017 13:47 - John Abbott

- Target version changed from CoCoALib-0.99560 to CoCoALib-0.99600

#8 - 25 Jun 2018 12:05 - John Abbott

- Target version changed from CoCoALib-0.99600 to CoCoALib-0.99650 November 2019

#9 - 26 Feb 2019 16:29 - John Abbott

- Target version changed from CoCoALib-0.99650 November 2019 to CoCoALib-1.0