CoCoALib - Slug #1739

IsHomog for ideals

05 May 2023 09:31 - Anna Maria Bigatti

Status:	Closed	**Start date:**	05 May 2023
Priority:	Normal	**Due date:**	
Assignee:	Anna Maria Bigatti	**% Done:**	100%
Category:	Improving	**Estimated time:**	2.01 hours
Target version:	CoCoALib-0.99850	**Spent time:**	1.75 hour

Description

the function IsHomog for ideals might take a long time computing a GBasis, but if
the check IsHomog(gens(I)) gives true, it should immediately return true without further computations.

Related issues:

Related to CoCoALib - Feature #1784: Add flag IhaveHomogGensValue for ide...	**New**	**01 Mar 2024**
Related to CoCoALib - Feature #1785: Add function IsHomog3(I)?	**New**	**01 Mar 2024**

History

#1 - 13 Jan 2024 22:16 - John Abbott

- Target version changed from CoCoALib-0.99800 to CoCoALib-0.99850

This should be easy to implement, right?
I was wondering how often one would want to know whether an ideal is homog without shortly afterwards wanting a GBasis?
I presume that if the ideal is not homog then one must compute the GBasis, right?

#2 - 31 Jan 2024 22:14 - John Abbott

- Status changed from New to In Progress

I say impl the suggestion in the main description: it should be very little code, and may make some computations faster.

Are there any other short-cuts?
If IsZeroDim(I) then it is not homog. I can think of other possible short-cuts, but would they ever be applicable? For instance, if there is a non-homog generator using indets x[1],...,x[n] and all other gens use only other indets... How often does this happen?

reply IsZeroDim(I) requires a GBasis, so it's not a real shortcut.

#3 - 01 Feb 2024 09:47 - John Abbott

Source is in SparsePolyOps-ideal.C:908 more or less

#4 - 01 Feb 2024 09:50 - John Abbott

Could it be useful to have also **IsHomog3** which returns a bool3?

#5 - 05 Feb 2024 12:21 - Anna Maria Bigatti

Fixed. Now checking if gens are monomial, then if gens are homogeneous.

```
/**/ use R ::= QQ[a,b,c,d,e,f];
/**/ L := monomials(sum(indets(R))^25);  len(L);
142506
```

```
/**/ IL := ideal(L);  t0 := CpuTime(); IsHomog(IL); TimeFrom(t0); -- monomial gens
true
0.003
/**/ L[len(L)] := a+b;
/**/ IL := ideal(L);  t0 := CpuTime(); IsHomog(IL); TimeFrom(t0); -- last gen non monomial
true
0.028
/**/ IL := ideal(L);  t0 := CpuTime(); GB := GBasis(IL); TimeFrom(t0);
--> very long time
```

#6 - 16 Feb 2024 17:51 - Anna Maria Bigatti

- Status changed from In Progress to Resolved

- % Done changed from 10 to 80

check if there is a "homog" flag to be set

#7 - 01 Mar 2024 14:36 - Anna Maria Bigatti

- Related to Feature #1784: Add flag IhaveHomogGensValue for ideals in SparsePolyRing? added

#8 - 01 Mar 2024 14:37 - Anna Maria Bigatti

Anna Maria Bigatti wrote:

> check if there is a "homog" flag to be set

The answer is "no" (#1784).

#9 - 01 Mar 2024 14:48 - Anna Maria Bigatti

John Abbott wrote:

> Could it be useful to have also **IsHomog3(I)** which returns a bool3?

it could be handy to have a function: it is not entirely trivial to write a quick check on the generators, if one needs it.
On the other hand, it is useful anywhere?

Usual philosophical question: it is good to add functions whose utility is uncertain?
I'm inclined to postpone this into a new issue.

#10 - 01 Mar 2024 14:51 - Anna Maria Bigatti

- Related to Feature #1785: Add function IsHomog3(I)? added

#11 - 01 Mar 2024 14:57 - Anna Maria Bigatti

- Status changed from Resolved to Closed

- % Done changed from 80 to 100

- Estimated time changed from 1.00 h to 2.01 h