Subject: Re: generalized eigenvectors
Posted by Ralf Flicker on Wed, 17 Apr 2002 23:57:06 GMT
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Randall Skelton wrote:
>
> On Mon, 15 Apr 2002, Ralf Flicker wrote:
>
>> In working on large sparse arrays it has become crucial to make the
>> SVD more efficient than O(n^3), but that seems to be easier said
>> than done. Do you know of an efficient implementation of the Laczos
>> bidiagonalization with selective reorthogonalization? I have not
>> been able to accomplish it - with complete, explicit
>> reorthogonalization it actually gets even worse than O(n^3).
>
> I have had this same problem in the past when attempting to solve large
> Jacobian matrices. I haven't tried to implement the algorithm you
> described, but I have definitely thought about trying it. I probably
> won't get back to working on my code that relies on SVD for another month
> or so but I seem to recall that the SVD was near the top of my "need to
> optimize" list. Sorry I can't be of more help but at the moment CPU
> cycles are cheaper than my time is... If you find anything in the mean
> time, please post it!

Just to follow up on this - I still haven't found anything that
could be of any help to me, but I tested the LANSVD.m Lanczos
bidiagonalization implementation from the PROPACK package for matlab
(http://soi.stanford.edu/~rmunk/PROPACK/).

For computing only a few singular values, the efficiency for my test
case (taken from an adaptive optics wavefront reconstruction
application) is improved by an order of magnitude. Computing the
full SVD, however, the LANSVD still scales as O(n^3), and with a
larger factor, so it's actually a lot slower. And you loose some
orthogonality besides. Not good.

I put a plot of it at http://www.astro.lu.se/~ralf/stuff/lansvd.pdf.
If it's a bit messy it's because I had to take a crash course in
matlab just to test this stuff.

ralf
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