
Subject: Re: a plea for more reliable mathematical routines
Posted by [George White](#) on Fri, 24 Sep 1999 07:00:00 GMT
[View Forum Message](#) <> [Reply to Message](#)

On Tue, 14 Sep 1999, Theo Brauers wrote:

> Liam Gumley wrote:

>>

>> Richard G. French <rfrench@wellesley.edu> wrote in message

>> news:37D82EA9.BA62A369@wellesley.edu...

>>> I have the same uneasiness about the implementation of mathematics

>>> routines in IDL, having [previous bad experiences ...]

>>

>> I believe there is a market for either an add-on Mathematical Toolbox, or

>> preferably built-in access to a selection of routines from a well-respected

>> mathematical library like BLAS, LAPACK, CMLIB, NAG etc. For example, NAG

>> developed an add-on library for Matlab:

>>

>> <http://www.nag.co.uk/nagware/NN.html>

>>

>> I think many people would be more than willing to either upgrade their IDL

>> version, or buy an add-on toolbox, if it gave them access to a set of

>> high-quality numerical routines. A user survey would no doubt tell RSI very

>> quickly which routines people would like to see (Bessel functions and random

>> numbers have been mentioned).

>>

>> Cheers,

>> Liam.

>> <http://cimss.ssec.wisc.edu/~gumley/>

Add-ons are one thing, but first the basic math functions should be implemented properly. It is interesting to read Cleve Moler's comments on <http://math.nist.gov/javanumerics/>

See Appendix 3 of the June 7th, 1999 "Recent Progress of the Java Grande Numerics Working Group". Moler notes that although the Java specification calls for numeric functions that agree with Sun's "freely distributable math library" (FDLIBM), in fact both Sun and Microsoft use the Microsoft Visual C++ numerical library in their Java implementations for Win32. A quote:

"The exponential, sine, and cosine functions from Microsoft's math library are so innaccurate for large arguments that the library is unsuitable for general-purpose use."

Matlab uses FDLIBM to help insure the same results on all platforms. What does IDL use?

> In our group we do rely on a number of the built-in math routines of
> IDL and I would really appreciate if this group could assemble a
> warning list of bugs in the math routines of IDL. IMO most of the IDL
> user/programmers do simple checks for the correctness of their code
> but they might never check the math routines in detail.
>
> I would also prefer to have access to a full set of IMSL or NAG or ...
>
> Best,
> Theo

If performance is not an issue, numerical routines can be implemented in IDL. Thus I assume that the interest in libraries is largely driven by problems where performance is a major issue.

I don't know the current state of IMSL or NAG. A few years ago, the Slatec libraries (available on Netlib, and provided by some vendors, e.g., SGI at no cost). The Slatec libraries weren't written for current hardware (where CPU speed has outrun memory speed and the IEEE f.p. std. is supported in the hardware), so it makes some sense that SGI now provides their own library, but many functions we use are missing from the SGI library. It appears that a) hardware becomes obsolete in the time it would take to implement a high quality numerical library and b) the "market" doesn't support a big effort to develop scientific libraries on the part of vendors.

Users of packages like IDL need to adopt a skeptical view of the numerical routines and be aware of the situations where widely used libraries (such as MS Visual C++) don't work properly. Numerical analysts have a great tradition of making high quality code freely available, but they don't advertise!

--

George White <gnw3@acm.org> tel: 902.426.8509
Bedford Inst. of Oceanography, Nova Scotia, Canada.
