Subject: dissapointing fftw
Posted by R.G. Stockwell on Fri, 06 Feb 2004 18:51:58 GMT
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Hi all,
there has been discussions about using fftw in idl through
external calls recently. Our wonderful SA set it up here,
and unfortunately the results are a bit dissapointing.

The results:
1) there is a step where the fftw algorithm creates a "wisdom" file
to determine which algorithm is ideal for the given situations
(depending on length, dimension, variable type, processor, etc.).
This _can_ be very time consuming, and since it depends on the length
of the data, it is not very general at all. (perhaps minutes to determine
wisdom when using the exhaustive search).
This only needs to be done once (but has to be redone if the length
of the data changes). There is also a small delay in loading the dlm and
reading the file, but this is only done once when you start idl.

2) fftw is slightly slower than IDL fft for _some_complex 1D time series, slightly
faster for _some_ complex data. I initially found fftw to be slower, but later tests
showed if faster, see below.
3) fftw is slightly faster than IDL fft for real 1D time series (fftw
only calculates the positive 1/2 of the spectrum)
4) fftw is much (~8) times faster for 2D ffts of real data
(again fftw calcs only 1/2 the spectrum).

So, imho, use fftw when ffting 2D real-valued images (especially if
they are the same size). I.E. it is ideal for ffting data from a CCD for instance.

For general fft-ing of general time series (various length), might as
well stick with IDL fft.

This is dissapointing that the fftw is so slow in idl (my guess because of
the overhead of the external call). When I compare IDL fft to matlab fft
(which internally uses fftw), matlab smokes idl, almost an order of magnitude
faster.

More detailed results follow.

Cheers,
bob

float:

Elapsed time for /exhaustive =   4832.5616
SPEW   COMPLEX   = Array[524289]
SPEIDL   COMPLEX   = Array[1048576]
FFTW: 0.36619304
IDL fft: 0.53575690
float,nthreads=2:
Elapsed time for /exhaustive =   22502.406
SPEW   COMPLEX   = Array[524289]
SPEIDL   COMPLEX   = Array[1048576]
FFTW: 0.48127429
IDL fft: 0.68620352
/destroy:
Elapsed time for /exhaustive =   5364.2469
SPEW   COMPLEX   = Array[524289]
SPEIDL   COMPLEX   = Array[1048576]
FFTW: 0.36528679
IDL fft: 0.54512086
float 2d:
Elapsed time for /exhaustive =   195.64079
SPEW   COMPLEX   = Array[513, 1024]
SPEIDL   COMPLEX   = Array[1024, 1024]
FFTW: 0.060319290
IDL fft: 0.50715707
float 2d,nthreads=2:
Elapsed time for /exhaustive =   616.68032
SPEW   COMPLEX   = Array[513, 1024]
SPEIDL   COMPLEX   = Array[1024, 1024]
FFTW: 0.069700079
IDL fft: 0.50730018
float 2d,/destroy:
Elapsed time for /exhaustive =   196.30516
SPEW   COMPLEX   = Array[513, 1024]
SPEIDL   COMPLEX   = Array[1024, 1024]
FFTW: 0.073251941
IDL fft: 0.50794953
double:
Elapsed time for /exhaustive =   7275.4535
SPEW   DCOMPLEX = Array[524289]
SPEIDL   DCOMPLEX = Array[1048576]
FFTW: 0.28960719
IDL fft: 0.73290416

 /estimate:
float:
% Compiled module: COMPARE_FFT.
% Loaded DLM: FFTW.
% FFTW: Imported wisdom from file.
Elapsed time for wisdom =   0.48689103

SPEW COMPLEX = Array[524289]
SPEIDL COMPLEX = Array[1048576]
FFTW: 0.48639197
IDL fft: 0.53754315
/destroy:
Elapsed time for wisdom = 0.49383688
SPEW COMPLEX = Array[524289]
SPEIDL COMPLEX = Array[1048576]
FFTW: 0.48593453
IDL fft: 0.53892898
% Compiled module: DIST.
float 2d:
Elapsed time for wisdom = 1.1336241
SPEW COMPLEX = Array[513, 1024]
SPEIDL COMPLEX = Array[1024, 1024]
FFTW: 0.10067668
IDL fft: 0.49136082
float 2d,/destroy:
Elapsed time for wisdom = 1.0966880
SPEW COMPLEX = Array[513, 1024]
SPEIDL COMPLEX = Array[1024, 1024]
FFTW: 0.086122580
IDL fft: 0.49067524
double:
% FFTW: Can't read wisdom file.
Elapsed time for wisdom = 162.97562
SPEW DCOMPLEX = Array[524289]
SPEIDL DCOMPLEX = Array[1048576]
FFTW: 0.57721099
IDL fft: 0.66078199
/destroy:
Elapsed time for wisdom = 163.17508
SPEW DCOMPLEX = Array[524289]
SPEIDL DCOMPLEX = Array[1048576]
FFTW: 0.57687245
IDL fft: 0.66050471
double 2d:
Elapsed time for wisdom = 1.3941269
SPEW DCOMPLEX = Array[513, 1024]
SPEIDL DCOMPLEX = Array[1024, 1024]
FFTW: 0.12435352
IDL fft: 0.61359194
doubble 2d,/destroy:
Elapsed time for wisdom = 1.3879058
SPEW DCOMPLEX = Array[513, 1024]
SPEIDL DCOMPLEX = Array[1024, 1024]
FFTW: 0.11186049
IDL fft: 0.61340666

complex:
Elapsed time for wisdom =   164.32227
SPEW   DCOMPLEX = Array[1048576]
SPEIDL   COMPLEX   = Array[1048576]
FFTW: 0.70433186
IDL fft: 1.0169743
/destroy:
Elapsed time for wisdom =   163.18478
SPEW   DCOMPLEX = Array[1048576]
SPEIDL   COMPLEX   = Array[1048576]
FFTW: 0.70836432
IDL fft: 1.0172801
complex 2d:
Elapsed time for wisdom =   1.9998610
SPEW   DCOMPLEX = Array[1024, 1024]
SPEIDL   COMPLEX   = Array[1024, 1024]
FFTW: 0.22408933
IDL fft: 0.94814202
complex 2d,/destroy:
Elapsed time for wisdom =   1.9922080
SPEW   DCOMPLEX = Array[1024, 1024]
SPEIDL   COMPLEX   = Array[1024, 1024]
FFTW: 0.21766154
IDL fft: 0.94665491
dcomplex:
Elapsed time for wisdom =   278.01961
SPEW   DCOMPLEX = Array[1048576]
SPEIDL   DCOMPLEX = Array[1048576]
FFTW: 0.86303161
IDL fft: 1.2512911
/destroy:
Elapsed time for wisdom =   278.62218
SPEW   DCOMPLEX = Array[1048576]
SPEIDL   DCOMPLEX = Array[1048576]
FFTW: 0.85589477
IDL fft: 1.2513304
dcomplex 2d:
Elapsed time for wisdom =   2.5013170
SPEW   DCOMPLEX = Array[1024, 1024]
SPEIDL   DCOMPLEX = Array[1024, 1024]
FFTW: 0.29264280
IDL fft: 1.2062091
dcomplex 2d,/destroy:
Elapsed time for wisdom =   2.5212729
SPEW   DCOMPLEX = Array[1024, 1024]
SPEIDL   DCOMPLEX = Array[1024, 1024]
FFTW: 0.29645642
IDL fft: 1.2053123