
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 it 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:

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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

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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
double 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

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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
