Subject: Re: FFT and ROTATE
Posted by Vince Hradil on Thu, 04 Sep 2008 13:37:56 GMT
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On Sep 3, 5:20 pm, whe...@gmail.com wrote:
> Hello,
>
> I have been wrestling with the FFT and ROTATE functions recently. One
> of the properties of the Fourier transform is that the transform of a
> rotated object is equal to the rotation of the transform of the
> unrotated object. To test this in IDL, I took the FFT of an nxn array
> (called image) and the FFT of that array rotated 90 degrees, image90 =
> ROTATE(image,1). Then, I sorted the real and imaginary parts of the
> coefficients of the results of the FFTs and compared the sorted
> values. I expected that the sorted list of real parts from the FFT of
> the original and rotated arrays would be identical, and that the same
> would be true for the imaginary parts. This is not the case. The sets
> of the magnitudes of the coefficients are equal, as expected.
>
> I understand that edge effects can play a role, but when I rotate a
> square array by 90 degrees, I expect that the sets of real and
> imaginary values that define the coefficients to be equal.
>
> Is this a consequence of how the FFT is calculated -- rows first then
> columns or vice versa? Or is there something else going on? Any help
> or suggestions will be greatly appreciated.
>
> Here is some code I am using to try to wrap my head around this.
>
> Thanks,
> Will
>
> pro rotFFTtest
> ;;load an image
> fn = filepath('md1107g8a.jpg',SUBDIRECTORY='examples/data')
> image= read_image(fn)
> image90 = rotate(image,1)
>
> ;display the images
> tvscl,image,0
> tvscl,image90,1
>
> n = n_elements(image)
>
> ;;take fft of image, then get the real and imaginary parts
> f = fft(image)
> fr = real_part(f)
> fi = imaginary(f)

```
>
>    ;;take the fft of image90 then get the real and imaginary parts.
>    f90 = fft(image90)
>    fr90 = real_part(f90)
>    fi90 = imaginary(f90)
>
>    ;;sort and print the real and imaginary parts
>    frs = sort(fr)
>    fr90s = sort(fr90)
>    fis = sort(fi)
>    fi90s = sort(fi90)
>
>    ;;print some of the sorted coefficients
>    print,'fr[frs[[1:4]]',fr[frs[1:4]]
>    print,'fr90[fr90s[[1:4]]',fr90[fr90s[1:4]]
>
>  ;print all of the sorted coefficients
>  ;print,'Real','Real rotated','Imag.','Imag. rotated',FORMAT='(4A17)'
>  ;for i = 0L,n-1L do
>   print,fr[frs[i]],fr90[fr90s[i]],fi[fis[i]],fi90[fi90s[i]],FO RMAT='(4G17.13)'
>
>  end
```

This might help, too: http://cimss.ssec.wisc.edu/~paulv/fft/fft_comparison.html

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