Subject: Re: FFT's and images: or My 4th day on what I thought would take me only 6hrs
Posted by Richard French on Fri, 17 Aug 2001 05:05:52 GMT
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tbowers0@yahoo.com wrote:
>
A couple of suggestions:

1) grab the routine CONVOLVE_PSF.PRO from the astronomy IDL library - I can send you a copy that I commented a bit, if you are interested.... It assumes that you HAVE the MTF (PSF) and the image, and it does the blurring operation you want. It takes advantage of the fact that the PSF is usually a lot smaller an array than the image itself.

2) Calculating a 2-D gaussian is not that bad- you can make a 2-d array that contains the x values, a 2-d array of the same size that contains the y values, and then you can construct the 2-D gaussian just using regular IDL operations:
 Gaussian=exp(-((x/sigma_x)^2 + (y/sigma_y)^2)))
As for normalization, you can do
 PSF=PSF/total(PSF)
but you may also need an additional scaling by NX*NY depending on the version of the FFT routine you are using. It's pretty easy to figure out by trial and error if you are off by that factor.

3) When you use the convolution theorem to reconstruct an image, you need to be careful of how the quadrants map back into the image - if you are not careful, you'll find the original center wrapped into the four corners of the image. I have a special-purpose deconvolution routine that illustrates the technique - you would have to generalize it for arbitrary x and y sizes.

4) You will not run into trouble by truncating the gaussian at some radial range - the zeroes will not kill you. However, you may want to embed your image in a larger 'canvas' of zeroes to avoid wrap-around effects if you have a broad PSF.

5) If you are doing a LOT of processing of large images that are not 2^n in size, the IDL FFT routine may slow you down. There exists a nice implementation of the FFTW routine using an external callable library as a DLM. It takes a little work to set it up, but once it is working, it can save you an enormous amount of time if you are doing really heavy number crunching.

If these abbreviated suggestions don't get you any closer to the answer, then write to me at rfrench@wellesley.edu with some specifics of what you are trying to do - if you can send an image as a tiff

or jpeg or FITS file, and a description of the PSF, I could probably
cook up a quick program to do the convolution/deconvolution for you.
I had to do this very same thing to clean up some Hubble Space Telescope
images of Saturn. My code was not written for general use, though, so
I'd have to extract the pieces you need.

Good luck!
Dick French
rfrench@wellesley.edu
********** PLEASE USE THE ABOVE EMAIL ADDRESS *********

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Subject: Re: FFT's and images: or My 4th day on what I thought would take me only 6hrs
Posted by Aaron Birenboim on Sun, 19 Aug 2001 13:31:40 GMT
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Isn't the FFT of a gaussian another gaussian?
If you look it up in a book, you could compute
the PSF in the frequency domain. Could save some time.
It will be tricky because of the symetry about the origin.

As hinted at earlier, this could easily be overcome by defining
some x and y axis arrays.

So the PSF in FFT domain might look something like
psf = exp(c*((x*x+y*y)))

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Aaron Birenboim | Black holes are where G-d divided
Albuquerque, NM | by zero.
aaron@boim.com |
boim.com/~aaron | -Steven Wright

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