

Dear Beta Tester

Enclosed is a new copy of Image, an image processing program for the Mac II (with \geq 2M RAM and 8 bit video) produced by Wayne Rasband at the National Institutes of Health.

As part of my Master's thesis at Thayer, I am making extensions to Image that allow one to compute the two dimensional discrete fourier transform of an image. Since this is so computation intensive, it is usually left to systems much more powerful than the Mac II. By writing most of the code in assembly language, however, the performance has been improved to the point of being bearable (10s for a 256x256 FFT).

Since my initial release of Image 1.20b1 several weeks ago, many modifications have been made to the image program, both by myself and Wayne Rasband. His work has led to Image 1.25 which has eliminated some bugs and added several new features described in 'CHANGES' (enclosed) and the new Image documentation, 'About Image' (also enclosed). My own modifications to the FFT code has led to version 1.25b2 of the Image program (enclosed). The changes since version 1.20b1 are described briefly below, while more general documentation can be found in the file 'FFT Dox' (enclosed).

Changes Since v1.20b1:

- Frequency domain editing and inverse transformation are now supported. This new capability allows one to transform an image, edit it's transform and then inverse transform the image. An example of this may be found in the file 'Image Example' (enclosed).
- Power spectra can be re-computed (e.g. with an new scaling) without recalculating the FFT: A new menu item, Update PS, enables this. The PS Scaling menu item now appears in the FFT Settings Dialog box.
- All operations can now be canceled with Command-.
- When a frequency domain window is front-most, the Results window displays the mouse coordinates in polar form. The angle is expressed in degrees, while the radius is expressed in spatial frequency. The units of this spatial frequency are pixels/cycle unless a spatial calibration has been done (with the ruler tool and the Set Scale... menu item), in which case the spatial frequency is displayed in the calibration units.
- All operations that are not Undo-able (Filter, Pass, Threshold Zero) as well as Masking can be done 'Automatically' during the transform process. Masking is a space domain operation that vignettes an image to eliminate the high frequencies associated with the edge discontinuities of the image's periodic extension. While Masking is undo-able, it is more convenient to use Auto-Masking, which masks only the copy of the image being transformed (displayed while the transform is being computed in the Frequency domain window), leaving the original unchanged. Likewise, Filter, Pass and Threshold Zero, which are frequency domain operations (described in 'FFT Dox'), can be done automatically on the copy of the power spectrum

displayed during inverse-transformation in the destination window, leaving the original power spectrum unchanged.

- A number of bugs have been exterminated.

I'm very grateful for any bug reports and suggestions you might have. Since I'm due to graduate at the end of the term, time is short and not many more modifications will be made to the program, so if there's a (reasonable) feature you really want to see, let me know soon.

As always, I'm reachable at arthur.arlo.reeves@mac.dartmouth.edu. If you prefer the phone, don't hesitate to call me at 603-643-9076.

Thanks for playing with the program and reporting bugs and suggestions to me.

Have fun.

Arlo Reeves

Remember:

For those in need of fast DFT code, the assembly language routine library I've written is also available. It uses a one dimensional radix 2 decimation-in-time Fast Hartley Transform that will run on any 680x0 processor. Execution times for the FHT alone on a Mac II are:

Sequence Length	Execution Time [ms]
64	2.47
128	5.66
256	13.02
512	29.49
1024	66.14