Introduction to ImageJ

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Abstract

ImageJ is a public domain, Java-based image analysis program that can be easily extended via recordable plugins (written in Java), macros or JavaScript. I will briefly describe the history of ImageJ, including the two programs it evolved from, "Image" and NIH Image. I will also demonstrate some newer and lesser-known ImageJ features, including sub-pixel resolution, interpolated selections, custom cursors, "Live" histograms and profile plots, 3D gaussian blurring, the Control Panel, toolbar menus and custom tools. In addition, I will demonstrate the new Image>Transform>Bin command, which exemplifies how to write a plugin that handles all supported ImageJ data types (8-bit, 16-bit, float and RGB) and dimensions (up to 5D).

The first imaging program I developed, starting in the late 70s, was called simply "Image". It was written in Pascal, ran on PDP-11 minicomputers and ran in only 64KB of memory! I started work on the second, NIH Image, in 1987 when the Mac II became available. I was a Mac enthusiast, and the Mac II had card slots just like the PDP-11. I started work on ImageJ in 1997, when Java was becoming popular. I was intrigued by the idea of creating a version of NIH Image that would "run anywhere", including as an applet in Web browsers.

Biography

I was a software developer at the National Institutes of Health (NIH) for 40 years. I retired in 2010 but continue to work on ImageJ as an NIH volunteer. I fix bugs, answer questions and add features based on user feedback. I also manage the ImageJ Website and mailing list.

I developed three image analysis programs while at the NIH.

The first, from the late 70s, was called "Image". It ran on PDP-11 minicomputers, was written in Pascal, and was used to analyze autoradiographs and 2D electrophoresis gels. It had many of the capabilities we now take for granted in ImageJ, such as regions of interest, contrast stretching, thresholding and color lookup tables. "Image" did all this on computers with only 64KB of memory (images were stored in a 512x512 frame buffer/display).

I started work on NIH Image in 1987 when the Mac II was introduced, with the goal of creating a smaller, less expensive and more approachable imaging system. Unlike "Image", NIH Image was widely used outside of the NIH and it benefited greatly from suggestions, bug fixes, code and documentation contributed by dozens of users.

ImageJ came to life in 1997 when I started experimenting to see if I could recreate NIH Image in Java. Java was attractive because, in theory, I could develop a program on my Mac that would "run anywhere". ImageJ has continuously improved over the last 15 years based on user feedback and the contributions of hundreds of users.