
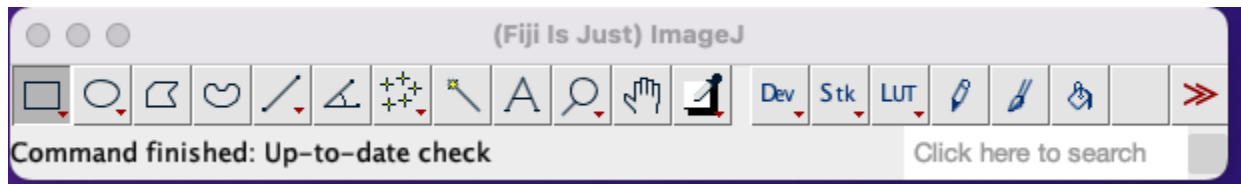


Image transformation may need to happen for many reasons, to make files more accessible to the scientific community, to avoid the necessity of using licensed software, or to fit community standards. Let's dive deeper into what happens each time you transform an image. What changes about the details of the data? What is lost? What is gained?

1. Download ImageJ (Fiji)  - <https://imagej.net/software/fiji/>
 - Fiji is an image processing package—a “batteries-included” distribution of ImageJ2, bundling a lot of plugins that facilitate scientific image analysis.
 - When opened, Fiji should look something like this:



2. File -> Open
 - Select the file to open, we will use the image TXM.tif from the dataset <https://doi.org/10.7302/day1-6d63>
3. This image is a TIFF z-stack, and you can view images by using the scroll bar at the bottom. The image within the stack you are currently viewing is in the top left corner. (ex. 84/1020)
4. In the metadata, it states “It is recommended that the raw images initially be normalized to narrow the range of grayscale intensities before any segmentation. This will help reduce the high brightness on first opening.”. So let's adjust the brightness and contrast of the image
 - Select the image
 - In the top tool bar select Image -> Adjust -> Brightness/Contrast...
 - Click Auto to automatically adjust the brightness and contrast
 - Close the B&C window
5. To convert the file from a TIFF to a JPEG, select File -> Save As -> Jpeg...
6. Let's take a look at what changes with this conversion. Open the Jpeg file with File -> Open...
 - First, we can see this is no longer an image stack, only the image from the stack we were looking at when the file was exported was saved
7. Let's export the stack of interest to compare. Select the original tiff file: Image > Stacks > Tools > Make substack...
 - Enter the number of the image of interest

8. For each of our images, select/highlight the image of interest and then open the metadata for each image by selecting Image -> Show Info...
9. We can see that one major change is that the pixel size has changed between the jpeg and tiff file. What other changes happened when the image was transformed?
10. At a glance, the images may appear to be the same, but when we zoom in far enough, there are features that can be lost. Zoom in by selecting the magnifying on the tool bar and selecting the area on the image to zoom in.



Additional Resources:

See Cornell's list of preservation format recommendations:

<http://guides.library.cornell.edu/ecommons/formats>

Library of Congress - Sustainability of Digital Formats:

<https://www.loc.gov/preservation/digital/formats/content/still.shtml>