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Image Processing Software
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Adobe's decision to charge a subscription fee for Photoshop has inspired some photographers to look for alternate solutions, in particular those available for free. Before you jump down this particular rabbit hole though, make a rational assessment of your needs. Photoshop is a highly refined program with a large user base and shelves of well-written books, and this one program does almost every photo processing task. If you are a professional or a serious photographer, its new subscription fee may not be a large item in your photo budget. By comparison, its free replacements are more limited, and you will probably need several different ones to cover all the tasks that Photoshop does. Each will have its own different, and possibly idiosyncratic, user interface, and probably the only documentation will be help files (or maybe not) and Internet papers of varying quality. If you enjoy exploring new territory without a GPS, and have some time to learn, this can be a fascinating adventure; if not, just pay the Photoshop fee or switch to another commercial application with acceptable pricing.

This is a three-part article: this month I'll discuss software to retouch images, part 2 will cover developing raw image files, and part 3 the more specialized areas of panoramas and high-dynamic-range photography. Before diving into the programs, let's look at the overall process. Your digital camera captures an image as an array of blue, green, and red dots called pixels, where typically each pixel is captured as a 12- or 14-bit word. We call this unprocessed form a raw image, and high-end cameras can store images in this form. If you were to look at most digital camera sensors under a microscope, you would see something like the figure below, although with many more colored squares (typically well over a million), one for each pixel. This array of filters is called a *Bayer filter array*, after the Kodak engineer who invented it. The array covers the sensor, with the result that about half the pixels are sensitive only to light in the green portion of the spectrum, a quarter are sensitive to red, and a quarter to blue.
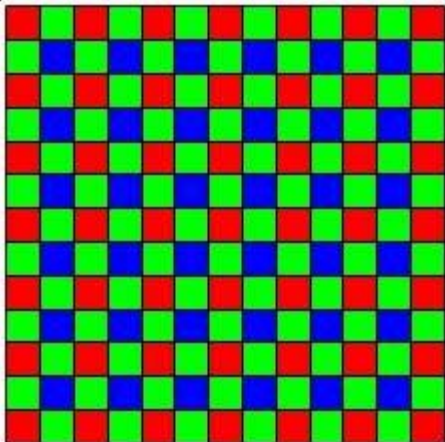
Usually, the camera converts the raw image into one where each pixel contains three colors, each stored as an 8-bit byte, and performs compression to reduce the number of stored bytes. The result is a Joint Photographic Expert Group (JPEG) file, and all cameras make this form available. Although convenient, JPEG images have lower quality than do raw ones. For snapshots, taken with good lighting and presented on a computer display or as a small print, the lower quality of JPEG is imperceptible to most people. For pictures taken in poor light, those needing a lot of retouching, those presented in large formats, or those viewed by critical audiences, you must be quite careful about how you transform a raw image to the final product. The process of converting a raw image to JPEG or its equivalent is called developing, as opposed to later work, such as removing red eye, which is called retouching. When most people use "Photoshop" as a verb they mean "retouch."

As your first step in looking for a Photoshop alternative, look at what you already have, in particular, the photo-processing software that most likely came on a DVD included in the box with your camera. If you are a casual photographer, it probably does more than you need, usually including color correction, cropping, special effects, and possibly panorama creation and raw development, and because it has been tuned to your particular camera, it will probably automatically correct for lens distortion and other defects. (However, if your camera has a removable lens, it may not correct the distortion of all lenses from other manufacturers.) Even if you've been using Photoshop, try this software and see if it doesn't meet all of your important needs. Windows and OS X also have photo software, and such programs as Picassa (Windows), PhotoScape (Windows, Mac), Paint.net (Windows) are also available. These are all worthwhile programs, with features beyond image processing, such as organizing your collection and publishing on-line albums, but the program bundled with and tuned to your camera probably can do a better job of image processing.

The screen-shot shows a raw image being processed by Olympus Viewer 3, which is bundled with their enthusiast cameras. Your software is most likely not the same, so I won't discuss the details, except to say that it is sufficiently capable to satisfy all but the most rabid amateur photographer. Because Olympus knows their cameras' limitations well, their software does an excellent job of correcting for lens distortion and vignetting. It also has features for images with high dynamic range and for creating panoramas.

The GNU Image Manipulation Program or GIMP (http://www.gimp.org/ for Linux, OS X, and Windows) is the closest free program to Photoshop, with a comparable range of features. Like Photoshop, GIMP is designed both for photographic image processing and also creating computer art. Also like Photoshop, it has a bewildering number of add-ons, ranging from invaluable to useless. GIMP's main use for photographers is retouching (replacing an overcast sky with one having scattered clouds, removing red-eyes, patching in heads from several group shots to get one where everybody has their eyes open, and the like). However, it does have a serious flaw; it uses 8-bit arithmetic for all its processing. (The developers promise to incorporate 16-bit arithmetic in the next version, but its release is not yet scheduled.) This means that you should do as much processing as possible before handing off an image to GIMP. For example, if you begin with a raw file, make your exposure adjustments, color corrections, dynamic range adjustments, distortion corrections, sharpening, and noise reduction in a raw processing program with at least 16-bit fixed, or preferably 32-bit floating point, arithmetic.

The screen-shot shows the default GIMP display with three separate windows, two containing tools and the center one the image. The menu in the image window resulted from a right mouse click; it provides access to all the tools, as only the most-used ones appear in the tool windows. If you prefer, you can configure GIMP to use a single window. Unlike most other free image-processing programs, there are several good GIMP books available, and using the program effectively requires that you study at least one of these.
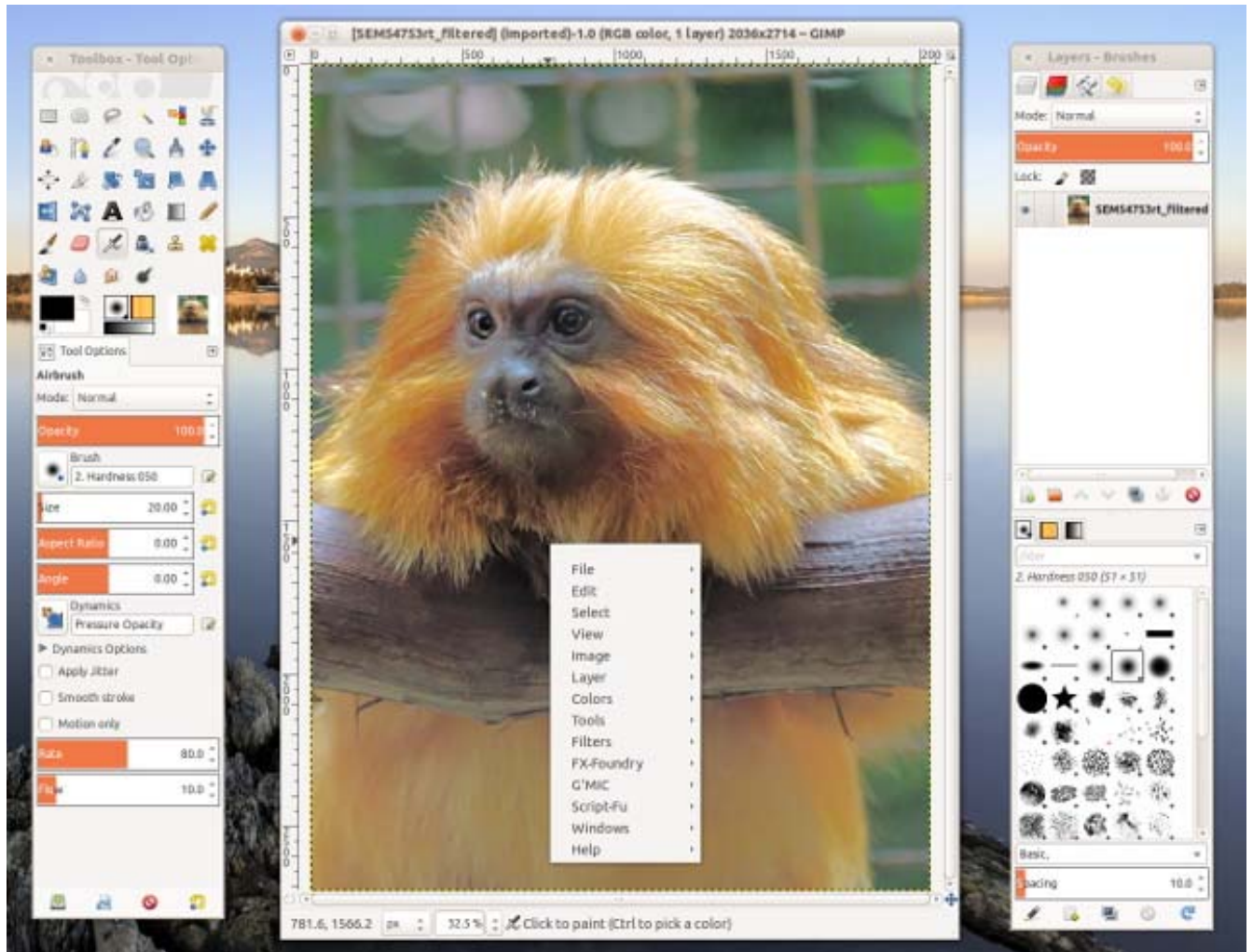
There are many other free digital photo applications besides GIMP, and an Internet search using "image processing software" will reveal dozens of alternatives, both free and commercial. Finally, while Photoshop can develop raw files, GIMP cannot, and next month we'll look at programs that handle this important step, in particular, RawTherapee and LightZone.

References

- Montabone: Beginning Digital Image processing Using Free Tools for Photographers – provides a good overview several photo tools, although the book is less helpful than it could be as all the example images are in black and white.
- http://www.cambridgeincolour.com/ – contains many very valuable tutorials on photography and image processing. If you check only one photo Web site, this should be the one.
- Lecarme and Delvare: The Book of GIMP – is a reference for the current version of GIMP.
- Goelker: GIMP 2.8 for Photographers – concentrates on using GIMP as an image processor.