More graphics from the command line

Tips and tricks for using ImageMagick on Linux

Level: Introductory

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There's nothing quite like command-line tools for handling large batches of tasks, and image manipulations are no exception. Web developers and administrators will appreciate the ability to handle large numbers of files easily, either at the command line or in scripts. Programmer Michael Still presents more examples of the ImageMagick suite, this time demonstrating how to put curved corners, logos, or frames and borders on your images, as well as how to convert to and from multipage file formats including Adobe's PDF format.

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Last year I wrote an article for *developerWorks* about image manipulations on the command line using ImageMagick. The article was quite well received, and since then I have fielded many e-mail questions on ImageMagick. This article expands on the techniques discussed in that previous article, as well as answering as many of those questions as I can. If this is the first ImageMagick article from IBM DeveloperWorks that you've found, you would do well to have a look at this first article as well -- you will find it linked in the Resources section.

This article takes the form of discussing specific problems as examples, but the concepts should be applicable to other problem spaces as well. This is the same approach as taken in the previous article. The techniques discussed here also work in combination with those we've discussed previously.

It should be noted that there are many ways to do the things discussed in this article. I will only discuss the methods I use, and know work for me. That doesn't mean the other tools out there are broken, it just means that I'm happy with what I am using now.

Curving corners

If you have a look at Mac OS/X, and many Web sites, the pictures have quite nice curved corners. How do you achieve this effect with ImageMagick? Well, we're going to have to show some ingenuity in producing this effect by using the `composite` command.

Before we get there though, let's talk about the strategy we're going to employ. If you think about it, an image with curved corners can be made by taking some standard pre-made corners, and superimposing them over the original image. There's no real need for the corners to be curved even -- we could have angled corners, or something much more fancy.

Remember to make the unwanted parts of the corner transparent. This transparency will allow the image we are adding the corners to to show through. This can be a little confusing, as some image viewers such as **xview** will show the transparency in black or some other color.

Figure 1. The curved corner displayed with xview

The GIMP
The GIMP, the GNU Image Manipulation Package, is a very useful raster graphics editor, much like Adobe Photoshop. It's great for tweaking images, or for creating your own new pictures. Check out the Resources section of this article for links to the Gimp and Gimp resources.

The actual corner image will become more clear when we superimpose it upon an image, so let's get on with that. I have a thumbnail which I made earlier of the view from the shore of one of Canberra's lakes. Without the rounded corners, the thumbnail looks like this:

Figure 2. Lake Burley Griffin

To superimpose one image onto another, you use the `composite` command. Let's just do one corner, to see what happens...

```
composite -gravity NorthEast rounded-ne.png lake.png lake-1.png
```

Here, the gravity argument defines where on the image to put the superimposed image -- in our case the rounded corner. This particular command gives us the following image:

Figure 3. Lake Burley Griffin with one rounded corner

So let's do the rest of the corners...

```
composite -gravity NorthEast rounded-ne.png lake.png lake-1.png
composite -gravity NorthWest rounded-nw.png lake-1.png lake-2.png
composite -gravity SouthEast rounded-se.png lake-2.png lake-3.png
composite -gravity SouthWest rounded-sw.png lake-3.png lake-4.png
```

Which gives us the finished image:

Figure 4. Lake Burley Griffin with rounded corners

Which looks kinda cool in my humble opinion. You should also take note that there is no reason for these corner images to be rounded. If you're interested in angled corners or such, then they're equally possible -- just change the corner images in a bitmap editor. In fact, you could even superimpose your logo onto the image instead of a corner.

If you want to use my rounded corners, a URL is listed in the resources section at the end of this article.

Finally, here's a small script which will allow you to round all the corners of all the png images in a given directory:

```
for img in *.png do composite -gravity NorthEast rounded-ne.png $img.png $img-1.png
composite -gravity NorthWest rounded-nw.png $img-1.png $img-2.png
composite -gravity SouthEast rounded-se.png $img-2.png $img-3.png
composite -gravity SouthWest rounded-sw.png $img-3.png $img-4.png
done
```

Putting frames around images

Another thing which several readers asked about was how to add frames to images. Again, this is relatively easy to do with ImageMagick.

A raised or lowered border

The first type of frame I will show you is a raised or lowered border. This effect works by tweaking the colors at the edge of an image to give the impression that it is either raised above the surrounding surface, or pushed below it. For the effect, you need to specify a size, with the horizontal size first, and then the vertical size. These sizes must obey the rule that twice the size specified must be less than or equal to the dimension of the image in that direction. For example, you can't specify a frame size vertically that is more than half the vertical size of the image -- which basically just means that you can't make a frame that's larger than the original picture.

To create a raised border, use the *-raise* command-line argument. For example, to create a 5 pixel by 5 pixel border, we execute:

```
convert -raise 5x5 tree.png tree-raised.png
```

Which gives us the finished image:

Figure 5. An image with a raised border

To create a lowered border, just use the *+raise* command-line argument instead. For example:

```
convert +raise 5x5 tree.png tree-lowered.png
```

Which gives a slightly different finished image:

Figure 6. An image with a lowered border

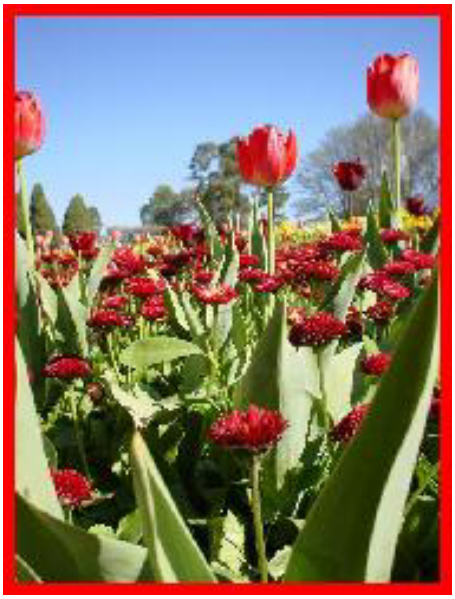
A simple colored border

If you're after something a little more simple, you might be interested in a border of just a solid color. ImageMagick can do this for you as well.

```
convert -bordercolor red -border 5x5 flower.png flower-border.png
```

Which creates:

Figure 7. An image with a red border



What border colors can we specify on the command line? Well, the list is simply too long to put into this article. To get a copy of the list, execute this command:

```
convert -list color
```

From bisque to burlywood and from cornsilk to seashell, there are 683 "basic" colors to choose from -- which is not to mention that you can also specify your own colors by using any of the following formats, where R represents the red value, G the green, B the blue, and A the alpha (transparency) value:

- #RGB - (R,G,B are hex numbers, 4 bits each)
- #RRGGBB - (8 bits each)
- #RRRGGGBBB - (12 bits each)
- #RRRRGGGGBBBB - (16 bits each)
- #RGBA - (4 bits each)
- #RRGGBBAA - (8 bits each)
- #RRRGGGBBBAAA - (12 bits each)
- #RRRRGGGGBBBBAAAA - (16 bits each)
- rgb(r,g,b) - (r,g,b are decimal numbers)
- rgba(r,g,b,a) - (r,g,b,a are decimal numbers)

Building a more complicated frame

Next let's build a slightly more complicated frame, using the *-frame* command-line argument. First we'll add a simple frame which is identical (except for the color) to the border we built in the previous example.

```
convert -mattecolor black -frame 5x5 beach.png beach-frame.png
```

The arguments are *-mattcolor* and *-frame* instead of *-bordercolor* and *-border*, but the rest is the same as with the border command.

Figure 8. A simple black border

Now we can add some extra complexity by adding some gray shading similar to what the *-raise* command gave us.

```
convert -mattecolor black -frame 5x5+2 beach.png beach-frame2.png
```

Which is getting there:

Figure 9. The same picture, but with some more decoration

Finally, we can add some more decoration, to get the final effect I want...

```
convert -mattecolor black -frame 5x5+2+2 beach.png beach-frame3.png
```

Which finally gives us:

Figure 10. A finished frame

If you're looking at ways to make nice frames for your images, then I recommend that you spend a few moments playing with the arguments to the *-frame* command. For example, here are some interesting frames for a picture of a rock at King's Canyon, in Australia.

For more information on the various frames available, check out the **convert** manpage.

```
convert -mattecolor gray -frame 25x25+0+25 rock.png rock-frame1.png
```

```
convert -mattecolor gray -frame 25x25+25+0 rock.png rock-frame2.png
```

Figure 11. A couple of frames

Processing many images at once

In my previous article, I showed you sample code to apply conversions to many images at once. As has been pointed out by several people, the code I showed was not the best way of doing this.

Here's the code I showed you:

Listing 1. Thumbnailing all the JPEGs in the current directory

```
for img in `ls *.jpg`
do
  convert -sample 25%x25% $img thumb-$img
done
```

Now it turns out that this is poor bash style, as it doesn't handle spaces in filenames very gracefully (each word will be treated

as a separate filename). Instead, a better way of doing this in bash is to do:

Listing 2. Thumbnailing all the JPEGs in the current directory, with better bash

```
for img in *.jpg
do
  convert -sample 25%x25% $img thumb-$img
done
```

Which which will handle spaces in filenames much more gracefully.

It turns out, however, that both of these solutions aren't needed with ImageMagick -- we can just use the `mogrify` command. `mogrify` is used to convert a sequence of images (although it will work for single images as well).

That code snippet above becomes:

```
mogrify -sample 25%x25% *.jpg
```

Note that this will overwrite the original images with new ones. This is one of the limitations of `mogrify`, in that it is harder to specify output filenames. The only way to specify an output filename is to change the format of the output image compared with the input image. This will result in a different extension for the new image. For example:

```
mogrify -format png -sample 25%x25% *.jpg
```

This will create a series of output files where the jpg at the end of the filename has been replaced with a png, with the associated image format change.

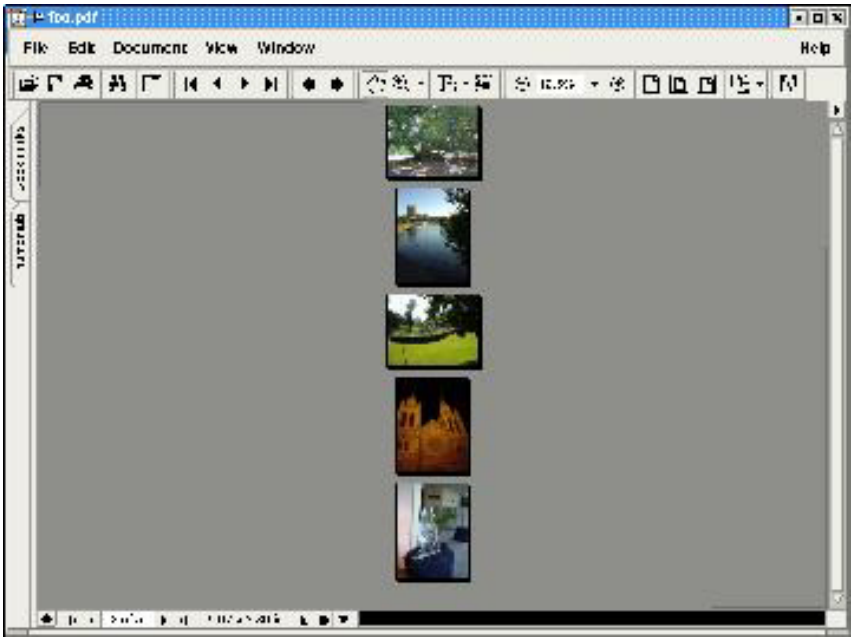
All of the conversions previously defined will also work with the `mogrify` command, so if you don't mind the original images being overwritten then it's a good choice. If you do mind that the originals are overwritten, you can either copy them to a temporary directory to mogrify them and change their names -- or you could stick with convert and bash.

PDF handling

So far all of the examples we've discussed, both in this article and the previous one, have discussed simple conversions where each image stands alone. ImageMagick can also do interesting conversions to more than one image at once which are worth mentioning.

The most common example is ImageMagick's PDF handling. Let's imagine a scenario where you are sent a PDF which is a series of images (one per page). ImageMagick will extract those images for you into separate files. For example, here's a screen shot of a PDF document containing some pictures of my recent trip to linux.conf.au (which rocked by the way):

Figure 12. A sample PDF with a bunch of images



Let's imagine that the above PDF had been sent to you by a friend. You want to extract the images for further processing.

The `convert` can of course extract these images from the PDF document:

```
convert foo.pdf pages.png
```

This will do what we want -- each page has been extracted to its own PNG file. However, there's an unexpected naming side effect.

Listing 3. Check out the filenames

```
mikal@deathstar:~/foo$ convert foo.pdf pages.png
mikal@deathstar:~/foo$ ls pages*
pages.png.0  pages.png.1  pages.png.2  pages.png.3  pages.png.4
mikal@deathstar:~/foo$
```

Because the command created more than one PNG file, a unique number has been appended to the filename. This won't work so well if you then try to use code or scripts which make assumptions about the file type based on the extension of the file.

Being a friendly utility, `convert` allows us to specify the filename a little better. The command above really should have looked like:

Listing 4. Extracting pages from a PDF document with better filenames

```
mikal@deathstar:~/foo$ convert foo.pdf pages-%03d.png
mikal@deathstar:~/foo$ ls pages*
pages-000.png  pages-001.png  pages-002.png  pages-003.png  pages-004.png
mikal@deathstar:~/foo$
```

The *%03d* is a **printf**-style format specifier. All you need to know for this use is that *%d* means a decimal number, and that you can also pack in a set of leading zeros by inserting a 0<number> into the sequence. The number specifies the total number of digits the displayed value should consume.

It should be noted that you can extract PDF pages which also contain text. What is actually happening under the hood is that ImageMagick is using Ghostscript to render the page, and then converting it to your chosen image format. There's no optical

character recognition though -- what you get is a bitmap.

You can also convert image files into PDFs with `convert`. In fact the PDF from the example above was built with this command:

```
convert dsc* foo.pdf
```

Just pass a list of image files to `convert`, and make sure that the last filename in the list is the name of the PDF document to put them all into.

Other formats which support more than one image per file

There are 45 other file formats which can store more than one image when used with ImageMagick, a pointer to the complete list is referenced in the Resources section of this article.

All of these are handled in the same way as the PDF example described. Some of these are also really interesting. It's very convenient to be able to extract the pages of a postscript file as images (think about having thumbnails of your published papers on your Web site for instance), or being able to get to all of the pages of that multiple-page fax you just received as a TIFF image.

You can even extract frames from your MPEG movies, although that deserves more discussion than I have space for in this article.

Conclusion

In this article we've expanded on some of the interesting techniques discussed in my previous article about ImageMagick, including how to round the corners of your images (especially the thumbnails we discussed last time), add a variety of nice frames to your images, and process many images at once. We finished up with how to extract images from multi-page formats, and how to build new multi-page documents.

If you're looking for more information, then I encourage you to check out the ImageMagick Web site in the Resources section of this article. Also, if you have any questions feel free to e-mail me.

Many thanks to all those people who asked the sensible questions which became this article. I also thank you for your patience with how long I took to answer them.

Resources

- ImageMagick is a collection of tools and libraries to read, write, and manipulate images in over 89 major formats. The ImageMagick Web site is an excellent resource, and offers downloads of the ImageMagick source code. The Command-line utilities page gives more information on convert, mogrify, composite and other tools like compare and conjure, as well as their options -- it also gives a complete list of the file formats that are recognized by ImageMagick.
- You can also invoke ImageMagick capabilities from your favorite programming language, from C and Java to Perl and PHP. Check the list of programming interfaces for more information.
- Learn even more at Anthony Thyssen's ImageMagick Examples page.
- The GIMP, or GNU Image Manipulation Program, is a freely distributed piece of software suitable for such tasks as photo retouching, image composition and image authoring. It is released under the GNU General Public License (GPL).
- Many of the pictures in this article were taken during my recent trip to linux.conf.au.
- "Graphics from the command line" (*developerWorks*, July 2003) is the first article in the series and discusses how to thumbnail, rotate, apply interesting graphical manipulations, and determine image information with ImageMagick.

- "Graphics programming with libtiff" (*developerWorks*, March 2002) discusses black and white imaging concepts, with a particular focus on TIFF images.
- "Graphics programming with libtiff, Part 2" (*developerWorks*, June 2002) discusses color TIFF images, but also discusses important topics such as which compression scheme is right for you.
- Scalable Vector Graphics (SVG) is an XML application language which describes 2D vector graphics including animation and scripting functionality. Get started with Interactive, dynamic Scalable Vector Graphics (*developerWorks*, February 2002).
- The IBM Toolkit for MPEG-4 is a set of Java classes and APIs with sample playback and MPEG-4 generation applications. It's also one of the top downloads at alphaWorks -- check it out for yourself to see why!
- Got pictures? Add voice to your Web site with VoiceXML. Get started with the article, Voice-Enabling Your Web Sites (*developerWorks*, November 2001).
- Got pictures *and* voice? Find out what impact it's having with IBM Tivoli Web Site Analyzer. IBM Tivoli Web Site Analyzer captures, analyzes, stores and reports on Web site usage, health, integrity and site content, and provides essential metrics on visitor site interactions and the site's overall performance
- Find more resources for Linux developers in the developerWorks Linux section.
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About the author

Michael has been working in the image processing field for several years, including a couple of years managing and developing large image databases for an Australian government department. He currently works for TOWER Software, which manufactures a world-leading EDMS and Records Management package named TRIM. Michael is also the developer of Panda, an open-source PDF generation API, as well as a bunch of other open source code.