More graphics from the command line

This article discusses commonly used image manipulations using command line tools, mainly from the ImageMagick suite. It expands on the examples from the "Command line imaging tools" article.

Last year I wrote an article for IBM DeveloperWorks about image manipulations on the command line using ImageMagick. The article was quite well received, and since then I have fielded many email 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.

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.

1. Curving corners

If you have a look at MacOS X, and many websites, the pictures have quite nice curved corners. How do you achieve this effect with ImageMagick? Well, we're going to have to show some enginuity in producing this effect by using the **composite** command.

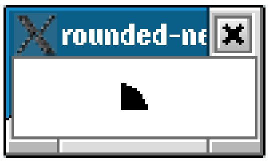
Before we get there though, let's talk about the strategy we're going to emply. If you think about it, an image with curved corners can be made by taking some standard pre-made corners, and superimposing them over the original image. There's no real need for the corners to be curved even -- we could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

So, the first step is to make some corners. Below is a corner I whipped up in the GIMP. I wont show you all four, as the others are just this one rotated by differing multiples of 90 degrees.

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. Checkout www.gimp.org for more details.

You should note that the curve on this image is actually in white, and the rest of the image is 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.



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:

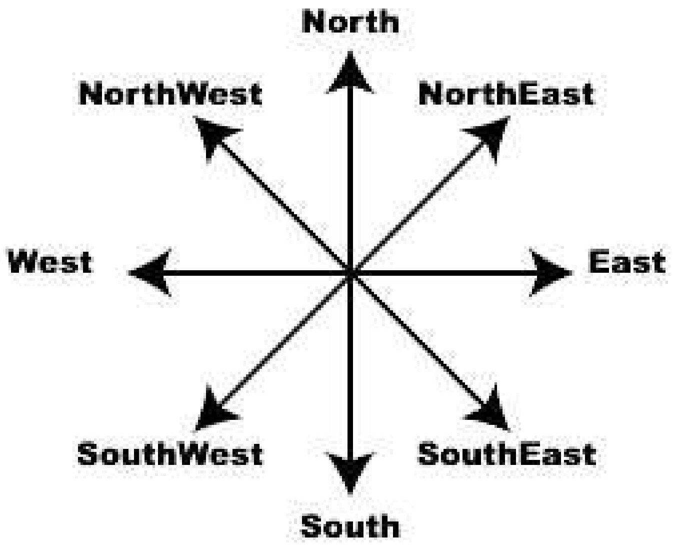
To superimpose an image onto another, you use the **composite** command. Let’s just do one corner, to see what happens...

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

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

Gravity

The gravity arguement specifies where on the background image the superimposed image is placed. The possible gravities, and their effects are:

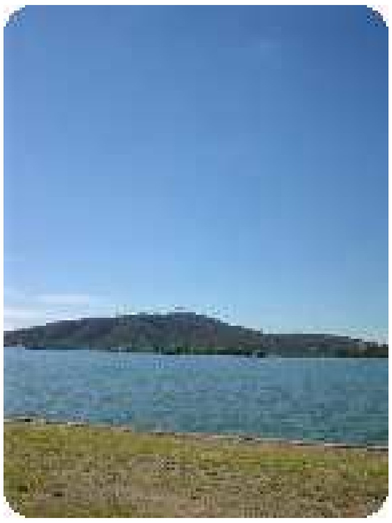


For example, SouthWest will force the superimposed image to the bottom left hand corner of the background image.

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:



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.

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

2. 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.

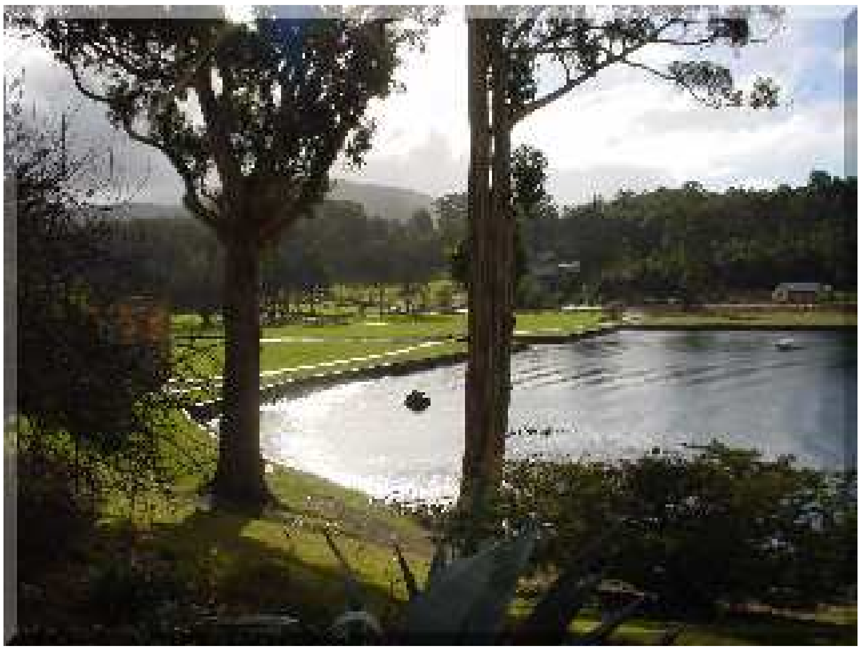
2.1. A raised or lowered border

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 dimention of the image in that direction. For example, you can’t specify a frame size verically that is more than half the vertical size of the image.

To create a raised border, use the *-raise* command line arguement. 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:



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

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

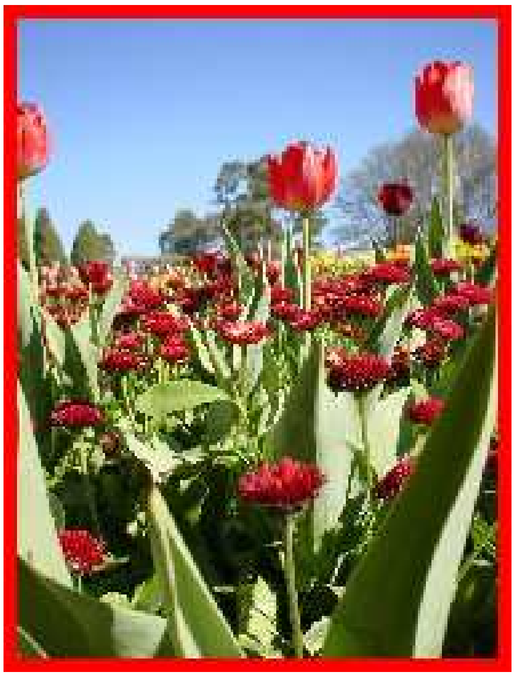
Which gives a slightly different finished image:

2.2. 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:



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
```

Here’s a list of some of the more commonly used colors of the 683 available: aquamarine, azure, beige, bisque, black, blue, brown, burlywood, chartreuse, chocolate, coral, cornsilk, cyan, firebrick, gainsboro, gold, goldenrod, green, honeydew, ivory, khaki, lavender, linen, magenta, maroon, moccasin, navy, orange, orchid, peru, pink, plum, purple, red, salmon, seashell, sienna, snow, tan, thistle, tomato, turquoise, violet, wheat and yellow.

You can also of course 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)

2.3. Building a more complicated frame

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

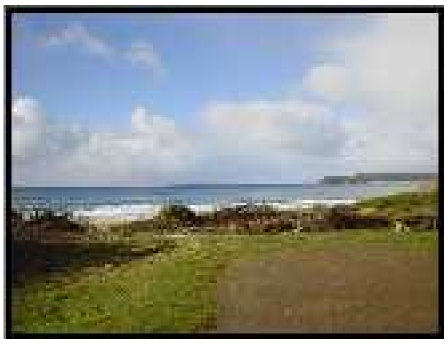
```
convert -mattecolor black -frame 5x5 beach.png beach-frame.png
```

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

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
```

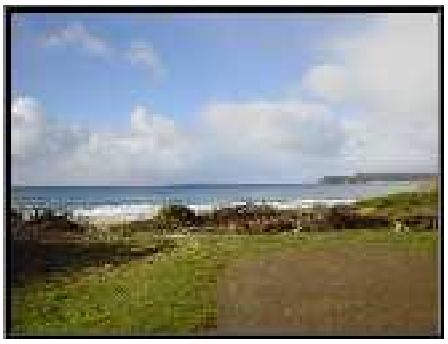
Which is getting there:



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

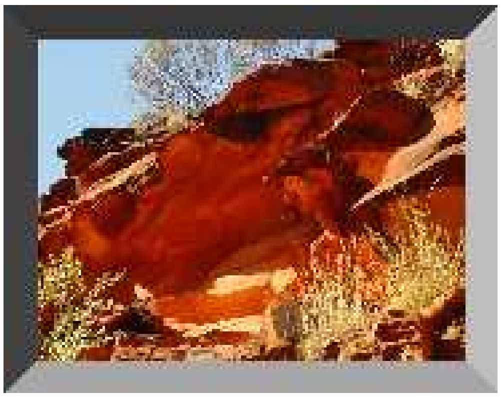
```
convert -mattecolor black -frame 5x5+2+2 beach.png beach-frame3.png
```

Which finally gives us:

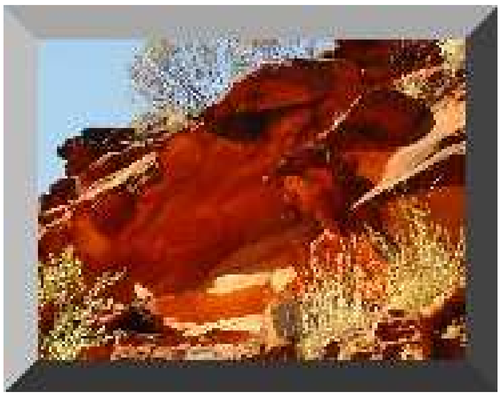


If you’re looking at ways to make nice frames for your images, then I recommend that you spend a few moments playing with the arguements to the *-frame* command. For example, here’s some interesting frames for a picture of a rock at King’s Canyon, in Australia.

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



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



3. 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:

```
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:

```
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 with the jpg at the end of the filename has been replaced with a png, with the associated image format change.

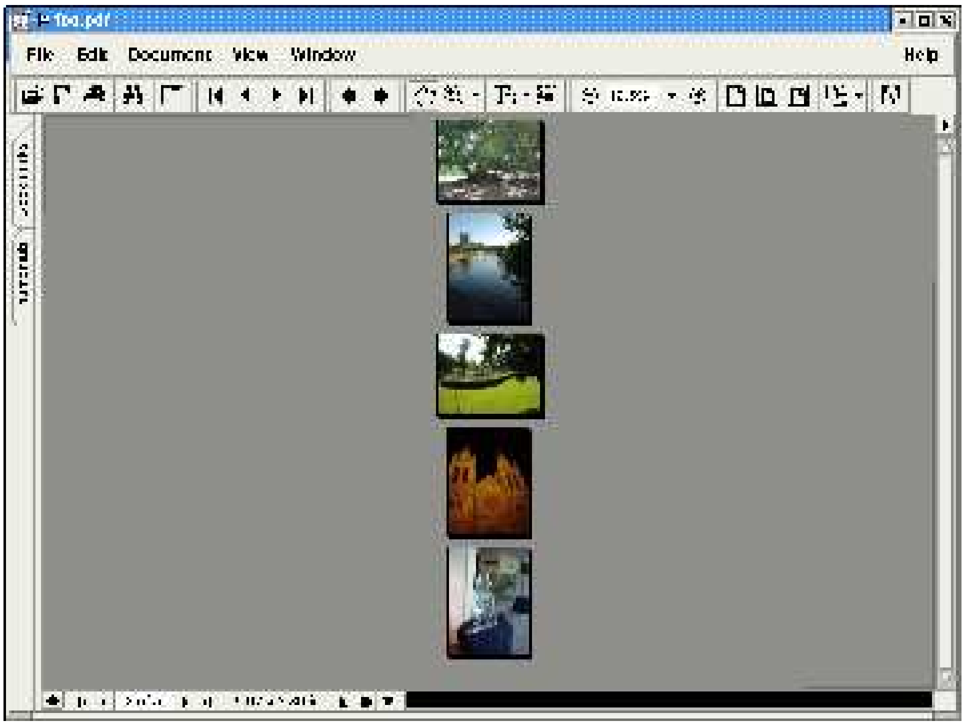
All of the conversions previously defined will also work with the **mogrify** command, so if you don't mind the original images being overwritten then it's a good choice.

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

4. PDF handling

So far all of the examples we've discussed, both in this artile 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 screenshot of a PDF document containing some pictures of my recent trip to linux.conf.au, which rocked by the way:



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 it’s own PNG file. However, there’s an unexpected naming side effect.

```
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$
```

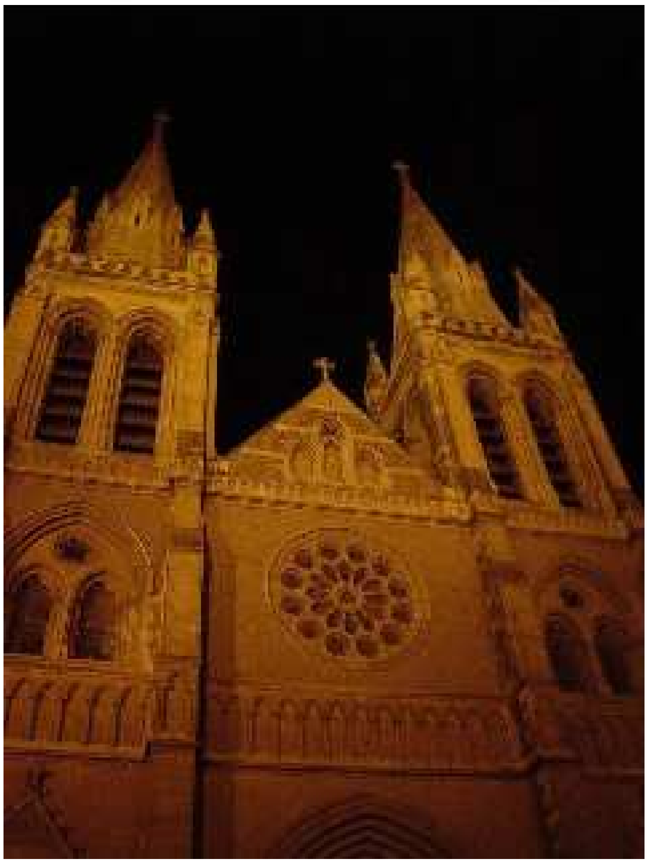
Because the command created more than one PNG file, a unique number has been appended to the filename to make them unique. This wont work so well if you then try to use code or scripts which make assumptions about the filetype based on the extension of the file.

convert of course allows us to specify the filename a little better. The command above really should have looked like:

```
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.

Because I've shown you really small versions of the images in the PDF, I figure I owe showing you larger versions. Adelaide is a really nice place by the way -- nearly as good as Canberra!



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** as well. In fact the PDF from the example above was build 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.

5. 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, the others are: AVS, BMP, CAPTION, DCX, DIB, FAX, GIF, GRAY, HDF, ICB, JBG, JBIG, M2V, MAT, MATTE, MIFF, MNG, MPEG, MPG, MTV, P7, PBM, PDF, PGM, PNM, PPM, PS, PS2, PS3, RAS, RGB, RGBA, SGI, SUN, SVG, TEXT, TGA, TIF, TIFF, TXT, VDA, VID, VIFF, VST, and XV.

All of these are handled in the same way that 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 website for instance), or being able to get to all of the pages of that multiple page fax you just received as a TIFF image.