Image processing with Gimp: Part 3

PICTURE PERFECT

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Last month we covered using Gimp's basic painting tools, which should mean you're well equipped for this issue's topics: selection and photograph reprocessing.

Let's conduct an experiment: Try filling in a new image in black, create an ellipse and use the fill tool to colour it white. At first glance you'll see that a perfectly clear egg on a black border has been created. On closer inspection however, a couple of things don't look quite right. You'll notice that the border between the two images is not a hard edge where black and white meet. In fact it is a muddy concoction of shades of grey.

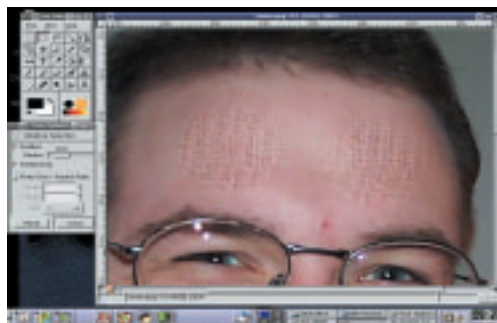**Figure 1: The fill tool has spilt some colour outside the border**

Figure 2: Soft edges allow gentle transitions

***Anti-aliasing** makes lines and edges look smoother. If an oblique edge were drawn in a 100% saturated colour, 'stairs' or Aliasing would be visible. However, if several gradated saturation values are used to blur the steps, the line appears smoother. In Gimp, the paintbrush tool uses anti-aliasing — the pencil tool does not.*

By taking a closer look with the magnifying glass tool, you'll see that the fill tool has filled beyond the selected area and that the inside of the egg is not consistently shaded (Figure 1, the marching ants are coloured for clarity's sake). But how has this happened?

Gimp pixel selection is not just a simple on or off proposition. It is possible to select the saturation level for each pixel — the higher the saturation, the brighter the colour. When using the selection tool to select a gradated area of colour, you'll discover that the whole of the area doesn't appear to be selected. The marching ants only surround an area of colour with a 50% or more saturation level, although the whole of the area is in fact selected. The ellipse tool employs saturation options when using **Anti-aliasing**, which means the edges of the finished image don't look so serrated.

The idea of only half selecting pixels seems a bit odd at first, but is very important when reprocessing photos. You will find an image of me on the coverdisc (*simon.png*), and we'll use this to take a look (you can of course use a picture of your own).

Skin problems

Open the image in Gimp. Create an ellipse, on the forehead for example, and select *<image>/Filters/Artistic/Apply Canvas*. Chasing away the marching ants with *<image>/Selection/None* reveals a sharp-edged screen effect. This type of edge often looks unnatural, which is why we're going to create a soft transition with the aid of half-selected pixels.

Click the tool settings on the ellipse selection by double-clicking on the appropriate symbol. Now use the slider to select the radius of the feather edge — 20 pixels is a good value. Select a new area in the image. At first glance, the ants seem to be marching
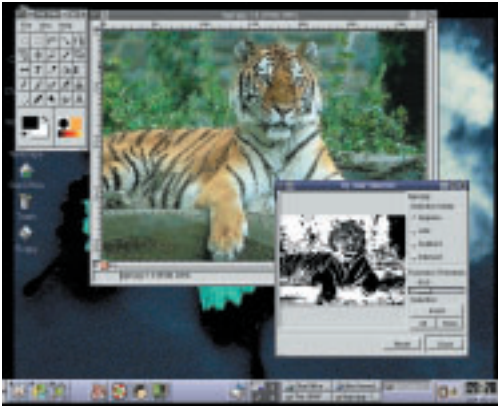
[left]
Figure 3: Select areas with similar colours

[right]
Figure 4: Quickmask mode allows you to correct selections using painting tools

Figure 5: The tiger with background blur

in the same area as before, but calling up the screen effect reveals that the edge has softened.

But, having created a soft edge without the guidance of the marching ants, how else can you tell if the edge is softened or not?

As mentioned earlier, it's possible to set the saturation level of a pixel in Gimp or, more precisely, a pixel can be selected in 256 levels. A selection is nothing but a grey shade image, or channel. The paler a pixel is, the stronger the selection. Clicking on the red square at bottom left in the image window enables you to edit this channel directly. The selection then turns into a mask and the channel lies — coloured red — over the original image.

The various graduations of a selection can be recognised here. The selected areas show the original image. The second ellipse clearly displays a soft edge, which you can work on using the painting tools. The smudge tool is really handy for pinpointing any sharp edges you'd like to blur.

Let's try out a practical example. You'll find an image of a tiger (*tiger.jpg*) on the coverdisc, which you can load into Gimp. Let's make the background a bit less sharp, so that the tiger stands out from it more clearly. To do this, we have to select the background.

First, make a rough selection using *Select/By Color*. To do this, select 50 as the *Fuzziness Threshold* value and click on the grey area in the top left of the image. The black and white image of the selection channel now appears in the dialog (Figure 3). As you can see, unfortunately it is not only the background that's been selected. Hold down the [Shift] key to remedy this. This adds two selections (as you may remember from part 1 of this series). Now click in the black area at top right.

To sharpen up the tiger you have to change mask mode, do this by closing the *Colour Selection* dialog and clicking in the image on the red quadrangle at bottom left in the image window. Select the paintbrush tool and set black as the foreground colour and white as the background colour. Using a coarse paintbrush from the paintbrush selection, paint inside the tiger so that it is protected from the mask. It doesn't matter if you paint slightly over the outline. Then swap the

foreground and the background colour using the *x* key and delete the red marks in the background. Select a smaller paintbrush with a somewhat softer edge and correct the outline of the tiger where necessary.

If you can't see the outline for edges, simply invert the mask via *Image/Colours/Invert*. The tiger should now be much more clearly defined, and the background covered in red. If you are satisfied with the result, click on the hatched square at the bottom left in the image window to toggle back into normal mode. The tiger should now be encircled with marching ants.

Before we finish off, double-check that the background is selected (the marching ants should be surrounding the tiger, and the edge of the image). If the background isn't selected, invert the selection using Select/Invert or [Ctrl+i]. Then you can blur the background using Filters/Blur/Gaussian Blur (IIR) with a radius of 15. The result looks something like Figure 5.

Retouching

One of the most common, and perhaps most useful, applications of image processing programs is that of retouching photographs. Removal of the **red-eye effect** is a popular way of improving images and the basic steps for removing red-eye are explained in Figure 6. The image used can be found on the coverdisc as *red-eye.png*.

You can't remove this effect automatically in Gimp, but nevertheless, it's very easy to do. Zoom into the image so that you can work accurately

Red-eye effect: This often happens when portraits are taken using a flash in dim light. The pupils of the subject's eyes are dilated and the sudden burst of light from the flash is reflected back by the retina in similar way to cats' eyes. To prevent this, most cameras offer a pre-flash, which causes the pupils to close and can reduce the effect.

[top left]
Figure 6: Removing the red-eye effect

[top right]
Figure 7: It is easier to remove blemishes in a photo than from actual skin...

Now we've removed the demonic eye effect, let's turn our attention to corrective surgery. I have a small blemish between the eyes and it would be nice if this could be eradicated from the photo. The fastest way of doing this is to use the smudge tool. Select a medium-sized paintbrush with a soft edge and wipe it from the outside onto the spot (Figure 7). After a short time, the spot should have disappeared. Only small faults can be cleared up like this, since the smudge tool eventually obliterates all detail.

If you want to correct larger areas, you will have to fall back on the cloning tool, which copies parts of the image. The smudge tool would be no use in getting rid of the shadows behind my head, since the photographic grain would be completely obliterated. We have to paint over the shadows with illuminated parts of the wallpaper.

To do this, click on the Clone Tool symbol and use a double-click to open the tool settings, convert the tool to *Aligned* (see Figure 8). Then select a large paintbrush with a soft fade-out and find the area in the image you'd like to copy. Press the [Ctrl] key, click on your chosen starting point and then release [Ctrl]. Click in the shadows, the relationship between source and target point will be defined, as you can tell by the small cross-hairs.

You can now eliminate the shadows gradually. From time to time, you should redefine the start point with the [Ctrl] key, so that the various bright parts of the wallpaper fade smoothly into each other. By copying in pieces, the structure of the wallpaper is retained.

Just a couple more words on the various settings for the clone tool: *Aligned* means that the relationship between target and source is defined

inside the eyes. Paint the red pupils black with the paintbrush tool, using black as the foreground colour and a small, gently fading out paintbrush. Make sure the light reflection remains visible and don't paint over the iris. Skilled artists can also work with the airbrush tool or a lower covering power (found in the tool settings).

The light reflection quality of the eyes may have suffered somewhat as a result of our corrections, making the eyes appear a bit listless. To correct this, select white as the foreground colour and enhance the reflection of light slightly. When doing so, it's important to try to keep the shape and position of the reflection the same — otherwise the eyes could begin to look a little strange.

[bottom left]
Figure 8: Use the clone tool to copy areas of an image.

[bottom right]
Figure 9: Change colours using the levels tool. The area in the circle has been intensified.
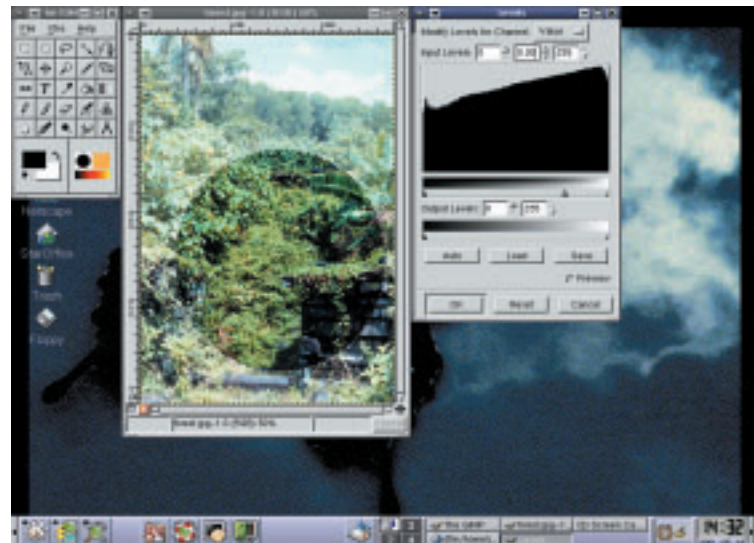
when you click in the image (first with, and then without, the [Ctrl] key). *Non-aligned* defines the source with a [Ctrl] click. A fresh start is made at this source with each subsequent mouse click. This is useful when you want to copy large areas. The last point, *Registered*, always fixes source and target at the same co-ordinates. This is unnecessary within one image, but makes it easy to copy between different images.

So green...

Now let's look at changing colours. On the coverdisc you will find *forest.jpg*, this is an image of a rain forest. As you will surely notice, the image is markedly overexposed. Such errors can be corrected with the commands from the *Image/Colors/...* menu. First select *Levels* — the dialog in Figure 9 will appear.

You can correct the basic brightness of the image here. In the dialog's upper button you can set whether you want to edit all or just individual colour channels (red, green or blue). In the area below you will see a histogram, showing how the colours are distributed in the image. Using the triangles below the two grey colour scales you can control precisely how the colours should be adjusted. The black and the white triangle in the input levels are displayed on the corresponding triangle at the output levels; the grey triangle can be used to shift the average value a bit.

In this case it is enough to drag the grey triangle slightly to the right, to darken the bright medium colour tones. If you'd like to create a misty atmosphere, you can drag the two triangles at the output levels roughly to the centre. The contrast is considerably reduced as the result of this — it's rather like the smoky haze after a battle.

While the *Level* tool essentially retains the colours, the *Curves* tool allows more flexibility. Start it via *Image/Colors/Curves*. In this dialog, you can define almost any curves and easily create solarisation effects (Figure 10). The results are

sometimes reminiscent of images that are coloured badly — looking like satellite photos. Edit the individual channels separately to correct this. The rain forest scene still doesn't look exactly verdant, so you could reduce the blue a bit.

Use the top button to select the blue colour channel and click in the curve area slightly below the centre. An additional restart point will be added to the curve, and the curve is slightly dented. The blue channel is slightly darkened where the image is of medium brightness, which makes for more saturated greens. Play around with the curves, until you have grasped the idea behind them. This is a very powerful tool for correcting colours.

Perspectives

The last tool we'll look at is the transformation tool, which allows you to distort images. Gimp provides four different types of distortion via the tool settings: *Rotation*, *Scaling*, *Shearing* and *Perspective*. Rotation and perspective distortion are especially useful.

To turn our primeval forest into a "slantwise photographed wallpaper", select *Perspective* from the "Tool Option" settings (double-click on the Transform Tool icon) and click in the image. A grid appears over the image with an additional dialog. Distort the grid in the image window by clicking close to the vertices and dragging them to the target position. After a click on *Transformation* the image is distorted accordingly.

These transformations are also useful for correcting mistakes: If you have scanned an image in askew for instance, select corrective rotation and adapt the grid to the edges, which should really be straight. After clicking on *Rotate*, the image is pulled straight. It can now be put into the appropriate format using the *Crop* tool, and saved.

We will deal with the grey quadrangles that might have cropped up during the distortion in our next installment. Tricks such transparency and levels will also be on the agenda. ■

The Author

*Simon Budig suffered badly from Murphy's Law when producing this piece.
He would like to express many thanks to Michael Engel for rescuing this article from his hard disk.*

[bottom left]
Figure 10: The curves tool produces vivid colour effects

[bottom right]
Figure 11: Perspective distortions are defined by means of a grid.