Super-size it

HOW TO SUCCESSFULLY INTERPOLATE YOUR IMAGES

READER OFFER
Bargain software

We are able to offer money-off discounts against two of the dedicated interpolation programes featured in this article. If you decide you want to invest in either BenVista and Fixerlabs, now is your chance to grab a bargain. BenVista is offering EOS magazine readers a 20% discount off PhotoZoom Pro software, which normally retails at €129, while Fixerlabs is offering a 25% discount off SizeFixer software, which normally retails at US$249. See box right for further details. Offers end 28 February 2006.

IN THE SEPTEMBER 2005 issue we told you about the on-line picture library, Alamy (Stock in trade, page 12), the emergence of which has helped revolutionise the stock photo industry. Like most digital picture libraries, Alamy requires contributing photographers to submit images at a file size of 48MB. 48MB? But that can't be right, can it? Only one digital camera in the EOS range – the EOS 1Ds Mark II – can produce a 48MB file and yet Alamy, and other picture libraries like them, has thousands of photographers submitting images on a daily basis. So how are they doing it?

The answer is image interpolation. Put crudely, the computer stretches the information already contained in the image to the new image size, and then creates extra information to fill in the gaps.

A digital image is a collection of pixels, each with a brightness and colour value as recorded by your digital camera. The trick is to make these original pixels fill a greater area. If your original image is 800 x 600 pixels (480,000 pixels), but you need an image which is 3600 x 2400 pixels (8,640,000 pixels), then you need to increase the size by 400%. So where does this extra information come from?

Interpolation software simply invents this information by looking at the pixels surrounding the areas that need filling in, and by some clever maths the software estimates the value of the gaps. So, following on from the example above, your 480,000 pixels have now become a whopping 8,640,000 pixels. You have, in effect, created 8.16 megapixels.

Not everybody has a desire to submit images to a photo library, but it's highly probable that at some point you might want a poster-size print of one of your images. To do this successfully, you ideally need a 50MB file. To produce a landscape format, A3 print at 300dpi you require an image of 4961 pixels wide by 3508 pixels high. This is

DAVID NEWTON

equivalent to a 17.4 megapixel image, or about a 49.8MB file – clearly much bigger than the file from an EOS 350D, which produces a 23.5MB file with dimensions of 3472 pixels by 2312 pixels. To print at A3 size, you need to enlarge the EOS 350D image by around 140%.

When enlarging an image, the fact that you are creating information based on existing data can lead to degradation of the final image quality. To combat this, software makers are constantly devising newer and better techniques of interpolating images without losing final image quality or destroying the image detail and sharpness. As a result, there is a bewildering array of algorithms and software to help you.

The simplest form of interpolation is nearest neighbour, where for each unknown value, the nearest known value is placed. In effect, it simply enlarges the size of each pixel by copying it. It's a quick and dirty method that doesn't usually yield good results, particularly if there is fine detail in the image. You could improve on this by using bilinear interpolation, which looks at the four known pixels surrounding a gap and creates an average value to fill the space. It is better than nearest neighbour interpolation, but it is still not good enough for picture library submission.

These are both non-adaptive algorithms, that is, they treat each pixel in the same manner regardless of what area of the subject they represent – whether or not they are part of some texture or an edge. This is not usually the best method for interpolating pictures, though it can work well in some cases.

As with everything, there is a trade-off. The more complex the algorithm you use, the more pixels it examines in making its guesses and the longer it takes to process an image. However, if you really want to produce the best results from your images, or you are considering submitting your images to a picture library, you will have to look at these more complex methods of interpolation and accept the time penalty.

Over the next few pages, we look at three of the most popular software solutions to your interpolation woes and show you some samples of extreme enlargements which we made using them, so you can decide which one gives the best results.

We have also looked at Bicubic Interpolation, which is the interpolation algorithm included in several popular image editing programmes.

All the programs are available as free trial downloads for PC or Mac. As with all photography equipment, you need to make your own choice about which best suits your needs.

Interpolation software

Bicubic Interpolation

Bicubic is one of the most widely used interpolation algorithms, since it is included in several popular image editing programes – we used Photoshop for this article. It is an improvement on nearest neighbour and bilinear enlargement as it includes more of the original data pixels in each calculation, extending to a 4x4 grid around each unknown pixel to fill the gaps. The averaged calculation is then weighted, so nearer pixels are given more weight than those further away.

Although bicubic can produce good results, being a non-adaptive algorithm – that is, it treats all pixels equally when analysing them – it can produce unwanted effects (called artefacts), such as 'staired' edges (aliasing), mosaic tiling, blurring or edge 'halos'.

onOnesoftware Genuine Fractals 4.0

www.ononesoftware.com US$199.95

Genuine Fractals used to be the standard by which all other interpolation algorithms were judged. It is similar to bicubic interpolation, but uses a larger sample set and therefore has a greater number of pixels from which to guess the colour and brightness of the generated ones.

It can produce very good results – good enough for Alamy to recommend it on their website as a preferred method of interpolation for submitted images. However, like bicubic, fractals can suffer from being non-adaptive.

Supplied as a Photoshop plug-in rather than as a stand-alone application, it may not suit all users. That said, the interface is quite straightforward, and the time to process an image is reasonable.

BenVista PhotoZoom Pro

www.benvista.com €129.00

PhotoZoom Pro has been around for a while, available as either an Adobe Photoshop plug-in or as a stand-alone application. It uses an algorithm called S-Spline.

Unlike bicubic and fractal interpolation, S-Spline is an adaptive algorithm. That is, it judges whether the pixels it is sampling are edges, continuous tone or part of a texture, and then treats each of them differently. Although it has to analyse every pixel in the image, it is surprisingly quick at doing this.

PhotoZoom Pro provides a very intuitive interface to work with, showing you the input size and giving you a drop down menu for output sizes up to A0.

Unusually, it doesn't just include the one algorithm, but a whole host of them, which you can choose between in order to obtain the best results. This is useful since each algorithm will give different results with different images. It allows you to experiment with each algorithm to find the one that best suits the image you are dealing with. That said, you will largely find the best results come from using the S-Spline method.

To save 20% on the purchase price of PhotoZoom Pro, use the following link: http://www.benvista.com/promotions/eos1205/

SizeFixer SLR

www.fixerlabs.com US$249

SizeFixer is the most expensive program on test and works differently to the other programmes, using what Fixerlabs calls 'super-resolution deconvolution' – technology that was previously only available to the military and NASA.

In contrast to the other programs on test, SizeFixer uses the EXIF information data contained in the file to perform the interpolation. The EXIF information provides details of the camera and lens used to take the image which SizeFixer uses to create an optical model for the image. By doing this it aims to eliminate any softness caused by upsizing. The claim is that this 'LensFIT technology', enlarges the image in the same way the camera would.

For the best results, SizeFixer doesn't do the calculation for each pixel just once – instead it makes an initial calculation and then refines it, going through the process up to 100 times.

This does mean that it can take a long time to process an image, since it may need to perform billions of calculations per image. In our test, an 8 megapixel, 16bit image from an EOS 20D took over 30 minutes to upsize to A3 on a reasonably new, well-specified Windows PC.

To save 25% on the purchase price of SizeFixer SLR, type CANONEOS in the coupon code box when using the checkout.

What did we do, what should you **do?**

Best practices

To get the best out of your interpolating software, you need to put the best in. This means that resizing your image should be your first task if you're shooting JPEG (ideally you should have no in-camera sharpening on), or immediately after performing your RAW conversion (with no RAW software sharpening applied) if you shoot RAW.

If you are using SizeFixer SLR, then you should also make sure that your RAW software is set to export the EXIF information with the files to help the algorithm get the best from the image.

Although picture libraries ask for 8bit images, to obtain the best results it is better to work with 16bit files and then reduce them to 8bit if your system will allow you to. Beware though, if you are resizing 16bit images to A3, you will end up with large files that will take a while to manipulate.

If you are planning on submitting to a library, turn off any interpolation sharpening as well.

Testing methods

We shot an image on an EOS 20D in RAW, converted it to a 16bit TIFF with no sharpening and then used each of the four software programmes to perform the interpolations.

We started off with a standard upsize to A3 (42cm x 29.7cm). We then performed a 300% enlargement, the equivalent of an A1 print (84.1cm x 59.4cm). This would be useful if you wanted to crop an image heavily but still submit it as an A3 image to a picture library. Or if you just like making really big prints!

After the interpolation, we re-sampled the images back to 8bit files, which produced 48MB A3 files and 199MB A1 files.

A3 interpolation using PhotoShop Bicubic

A3 interpolation using BenVista PhotoZoom Pro

A3 interpolation using onOneSoftware Genuine Fractals 4.0

A3 interpolation using FixerLabs SizeFixer SLR

How do they **compare?**

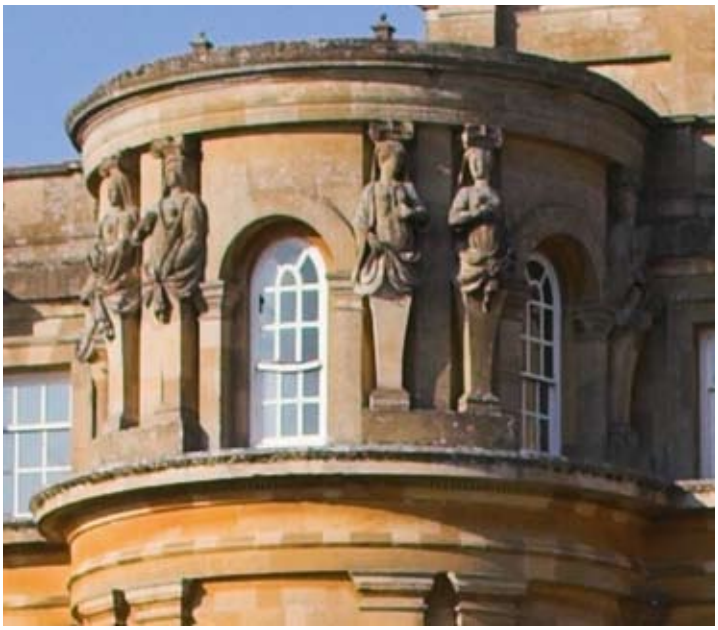
The results are in

Below we have printed 100% sections of the image that appears on page 48 after an A3 interpolation (left page) and an A1 interpolation (this page). Due to the limitations of the printing process, not all the differences will be apparent here, so you'll just have to believe what we tell you we can see on screen. Alternatively, if you want to see for yourself, we have placed these crops on our website at: www.eos-magazine.com for you to view (follow the link from the home page). They are large files and may take a while to download.

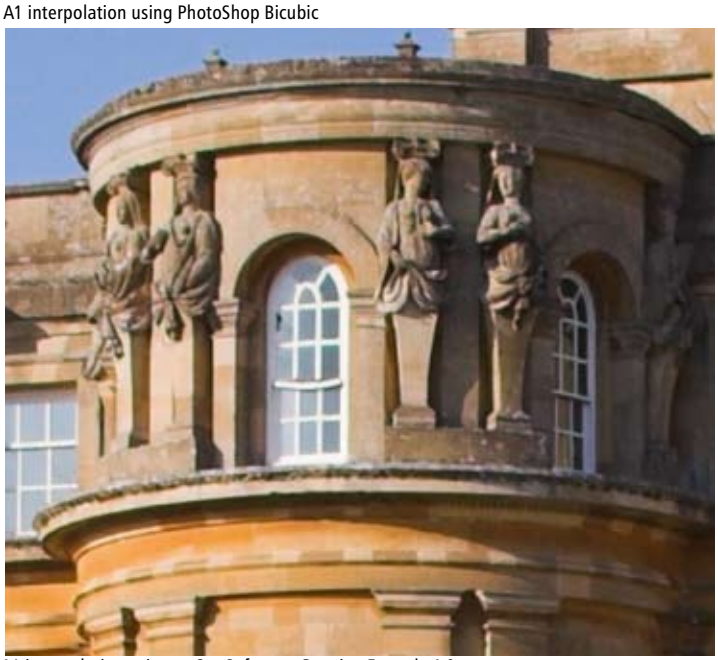
So what do the results show? Looking at the A3 images, Bicubic and Genuine Fractals have returned the least impressive results. Although they have produced a nice smooth toned sky, there is a loss of detail in the stonework and sculptures that the other two programes have retained. That leaves SizeFixer SLR and Photozoom Pro. These two have both introduced some level of noise to what was a clear toned sky – perhaps being over enthusiastic in their creation of information – but the detail in the stone is sharper and more defined, and the contrast is better. However, SizeFixer has created a green fringe in the window frames, which PhotoZoom has not produced, so it comes out top if you're printing at A3.

At A1, the story is very similar but the differences between the best two and worst two are more marked. Again, Fractals has produced the worst result, failing to retain any clear detail in the sculptures. Bicubic has done better, producing a good, albeit soft, result. Again SizeFixer SLR and PhotoZoom Pro have produced the best results, with top honours being split, depending on which part of the image you examine and your criteria.

A1 interpolation using PhotoShop Bicubic



A1 interpolation using BenVista PhotoZoom Pro



A1 interpolation using onOneSoftware Genuine Fractals 4.0

A1 interpolation using FixerLabs SizeFixer SLR