

Panoramas (photo-stitching) – Part 3

T.O.M.S.

We'll use this final part to look at and discuss in some detail the varied demo panoramas included on the CD.

Whitby – a.k.a. 'Ashfordley'

This is a roughly 180° horizontal panorama of 13,362×2,046 pixels, rendered from a blend of 11 source images, looking west across the River Esk at Whitby to the harbour area, the main town, the coast and Yorkshire Moors.

PanoramaPlus 2 produced perfect results, requiring no image pre-processing. This was probably helped by the high viewpoint, looking down-sun and with a mix of near and distant objects giving a good sense of scale.

Sutton Bank

The view is looking from the western edge of the Moors at Sutton Bank, across the Vale of York to the Yorkshire Dales in the far distance.

This is a roughly 200° horizontal panorama of 16,801×2,108 pixels, rendered from a blend of 13 source images.

This demo panorama is a good example of where the camera does *not* lie!

The evident darkening of the sky over the Dales was very apparent at the time, in life – and, with auto-exposure set, faithfully reproduced by *PanoramaPlus 2!* Indeed, this was one of four sets of source images we took, the darkening being even more apparent on the three others.

But here we can take advantage of the flexibility afforded by digital processing in that, if desired for aesthetic reasons, the darkening evident in life can be reduced – or even eliminated.

We can achieve this by taking the relevant source images in the central area, in turn, lightening them, re-introducing them into the image sequence and re-rendering the results.

Clearly a degree of trial-and-error would be required but *PanoramaPlus 2* does seem to be very responsive to such 'tweaks'.

The close objects to the left and right are intentionally included in the panorama to give a better sense of scale.

Arguably this wide panorama has *far* more visual impact than if restricted to, say, a single 4:3 or landscape camera exposure, e.g. Fig 1 which is a relatively 'dull' presentation of what, in life, is a stunning panoramic view towards 'Herriot' country.



Fig 1 Sutton Bank (a single 4:3 image)

Goathland – a.k.a. 'Aidensfield'

This is a near-360° horizontal panorama of 22,490×2173 pixels, rendered from a blend of 18 source images, including the *Heartbeat* opening titles scene.

When capturing the source images, the camera unavoidably needed to be panned through the sun's azimuth, resulting in very difficult light/shade conditions. As a result, a number of images needed considerable processing (lightening) before being reintroduced and prior to the final rendering.

Nevertheless, *PanoramaPlus 2* was very amenable to this treatment and, after some trial-and-error, gave near-perfect results; a big improvement on an earlier run without pre-processing.

Note the extreme ‘fish-eye’ curvature effect along the road at the right side of the panorama which, in life, is straight (Fig 2).

On this occasion, the camera *does* lie...



Fig 2 Apparent curvature due to fish-eye effect

Scarborough

This is a full, 360° horizontal panorama of 24,666×2,170 pixels (153MB TIFF; 16.2MB JPEG!), rendered from a blend of 24 source images.

Again, the camera was unavoidably panned through the sun’s azimuth, resulting in very difficult light/shade conditions and needing some pre-processing.

Here, distant views and closer objects are unavoidably mixed (noting that some cropping of relatively close objects such as buildings can be difficult to avoid).

We feel this is an interesting example of where, if we aren’t careful, technology can sometimes override aesthetics. From this vantage point, the ‘standard’ camera view of the South Bay and Castle at Scarborough (No. 21 in the slideshow) is very pleasing (Fig 3).



Fig 3 South Bay and Castle, Scarborough

And yet, looking at this area within the full 360° panorama, clearly it has lost much of its impact and, in effect, has become overwhelmed by the closer (and therefore seemingly larger) objects on the left- and right-hand sides.

So the lesson here is that, if you’re set on using technology to produce an effect which cannot be achieved by normal photographic means, then the choice of

viewpoint for the planned panorama can become crucial.

Specifically, in this example, we would have preferred to base the 360° panorama on the higher vantage point at the top of the nearby Oliver’s Mount (Fig 4; also No. 20 in the demo slideshow).



Fig 4 Viewpoint at Oliver’s Mount, Scarborough

But Sod’s Law prevailed: Oliver’s Mount was closed for a motorcycle race meeting. *Drat!*

Vertical Panoramas

We’ve included three, demo, vertical panoramas on the CD, all based in York (not quite Heartbeat country – but close...)

They are *Monk Bar* (one of the main barbicans/gates in the city walls), the *West Door* of York Minster and, on the south side, the Minster’s *Rose Window* (badly damaged by fire a few years ago and painstakingly rebuilt).

All the panoramas resulted from using *PanoramaPlus 2* to render and blend the source piccies, each taken as a single, vertical column of 5-7 images, overlapping by c. 65%.

Immediately, we can see that these literally long-standing mediaeval buildings have caught a *very* nasty case of distortion. Some might say this is being “creative”; others will pour scorn on the results. Take your pick.

But why do we need to use panorama ‘stitching’ software in the first place? Why not simply back off and use a standard or even telephoto lens, avoiding the distortion?

Here we return to the overriding factor of physical limitations. Backing away from *Monk Bar* is *not* recommended – you’ll be mown down at a very busy crossroads. But if you were to cross to the far side of the crossroads, then the forest of traffic lights will intrude.

And at both viewpoints outside the Minster, it’s quite literally a case of ‘backs to the wall’; you physically cannot back off.

If the stitching software didn’t exist, another way to capture these images would be to use a ‘fish-eye’ lens, in this case estimated at 18-20mm (relative to a standard 50mm lens), and probably costing £500 or more.

But then of course the evident degree of distortion in the image would be *exactly* the same – so we may as well let the computer and software produce the same results, at a fraction of the cost.

1. **Monk Bar.** Looking at the three vertical panoramas, the one of *Monk Bar* came out well, first time, with no image pre-processing required. So far so good.

2. **The West Door,** York Minster. This one was rather more tricky as it was heavily ‘backlit’ by the early morning sun from, er, the east. But *DPScan* did a good job of handling that, with **Colour–Non-linear–Gamma** set to quite a ‘fierce’ value (0.6).

But two further limitations now become apparent. Firstly, if the focal length is set to the standard 50mm (or 31mm for digital cameras with a CCD), the resulting field of view prevents our capturing anything like the full width of the building in a single image.

We cannot back off – and we must resist the temptation to reduce the focal length – but this is a prime example of where the physical limitation can be worked around by capturing a two-dimensional matrix of images.

Even so, we’re not out of the wood as the wider image, unavoidably, will then result in even more distortion. This will be demonstrated when we look at a matrix panorama.

Secondly, even though this image appears to be a perfectly symmetrical view of the *West Door*, we can see that there’s a fractional ‘skew’ between the base and upper horizontals of the inner section.

This is due to the camera viewpoint not being *perfectly* central, relative to the building. The error is quite marginal but, nevertheless, does cause a small upset.

And, in this case, *DPScan* cannot simply correct the distortion; it would take more effort in a relatively complex package to do it.

3. **The Rose Window,** York Minster.

Comparatively speaking, this was a failure! But we still include it for the purposes of discussion.

Firstly, as with the *West Door*, the camera view is not perfectly central, and the ‘skew’ induced here is more obvious. But secondly, the signpost arms clearly are badly ‘ghosted’, presumably because of their proximity to the camera. This isn’t a one-off hiccup as we’ve seen the identical phenomenon elsewhere.

We tried getting round this by dumping a source image to ensure that the signpost arms appeared on only one of those to be blended. It worked well with the other example but, for some unknown reason, not here.

We could of course get round this – quite literally – by moving in front of the signpost, but then that would reduce the distance from the camera to the main subject, the *Rose Window*, and thus the field of view.

But, again, taking a 2D matrix of source images will help, accepting that the ‘fish-eye’ distortion will increase. Which brings us to...

Matrix panoramas

As this sub-topic is so straightforward, we’ve included only one demo, 2D matrix panorama, this time using Serif’s example images provided; *Nottingham Cathedral*.

Serif had taken a total of 15 source images in a roughly 5×3 matrix, with approximately the same degrees of overlap we’ve deduced and discussed in Part 2, so that’s OK.

Rendering and blending using *PanoramaPlus 2* was entirely trouble-free and the result is perfect, with no need for any source image pre-processing.

However, a feature of matrix panoramas is that, because of the increased level of distortion due to the ‘fish-eye’ effect, the boundaries of the resultant image will be much more higgledy-piggledy than horizontal or vertical panoramas, and we’ve left this panorama uncropped on the CD to illustrate that (Fig 5).



Fig 5 Matrix panorama (uncropped)

Unsurprisingly, the composite, matrix image had finished up with a few degrees of ‘skew’, but that was easily removed by *DPScan*, using the ‘auto-rotate’ feature.

Cropping the final image (again using *DPScan*) was rather problematical in that, due to the extensive distortion of its boundaries, a decision had to be made whether to crop off the trees at the left- and/or right-hand sides, or lop off the very top of the spire and/or chop the bottom off the signpost legs!

The spire and signpost legs took priority so the tree surgeons were necessarily put to work. But the end result is still a quite elegant ‘close-up’ shot of the building, without recourse to using a wide-angle lens (Fig 6).



Fig 6 Matrix panorama (rotated and cropped)

The lesson here, when taking source images for a matrix panorama, is to allow *plenty* of spare coverage at the top/bottom and left/right sides, to allow for subsequent cropping.

In effect, this is exactly the same as adding ‘dummy’ images to horizontal panoramas, as we discussed in Part 2, p5.

The results are impressive – and fun to do – so enjoy!

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