

Re: Scientifically Based Presharpening for Enlargement

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 - *Date:* Thu, 18 May 2006 06:54:36 +0000 (UTC)
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"aruzinsky" <aruzinsky@xxxxxxxxxxxxxxxxxxxxxxxx> writes:

1. If the main point of the page is implementing a method from a paper, include a one-paragraph summary of that method in your web page. I'll use that summary to decide whether I want to read the full paper, and it will also serve as a substitute if the site with the full paper is temporarily down."

I said "loosely based." In fact, the paper has an error that I corrected and my derivation is very different.

So if you did something different from the paper, it's even more important to tell the reader what you did!

2. As someone else pointed out, your examples are horrible. The discussion talks about how images from a sensor are not point sampled, they are effectively convolved with a small box (the area of a sensel) before being measured. So show us an example of an image that is either *direct from a sensor, with no processing applied*, or at least a simulation of such an image. (For example, you could take a much higher resolution image and convolve/downsample it to get your example).

Why do you assume it is not such a simulation? In fact it is.

Then where do the halos around (for example) the light poles come from? A raw image from a sensor would not have that. The effect of sensels that are not points is to attenuate some of the high frequency content of the image – it would not boost any frequencies. Yet the "before" images show sharpening artifacts.

What you have on the page at the moment shows really horrendous sharpening

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artifacts (halos) as well as compression artifacts that completely overwhelm the small difference between the two cases that you are trying to show. Your starting images should be uncompressed and unsharpened.

There are no compression artifacts in the input images because PNG uses lossless compression. The differences are obvious to my eyes. If you don't see the differences you don't need presharpening.

I do see differences between the two images, but those differences are minor compared to the really obvious problems in the images. I'd be much more interested to see how your method works on high-quality images without the artifacts.

Also, if the "data dependent Lanczos" filter is what's responsible for the weird wave-like textures in the road surface at the bottom of the image, don't use this filter! Adding artifacts that weren't there in the original is generally a bad idea, and especially bad in something that's supposed to be an example. Why not use bicubic polynomial interpolation, which (a) is familiar to many people, and (b) doesn't create such artifacts. Yes, it doesn't preserve high frequencies as well as Lanczos, but you should still be able to see the difference between the images with and without presharpening applied, and that's the point of the example.

a. I provided the input images so people could test them with their favorite enlargement method.

To be blunt, the input images look bad. If they were mine, I wouldn't show them to anyone. They will look bad after enlargement as well. That makes it hard to judge the value of the presharpening.

b. That "weird wave-like texture" is less offensive to the eyes than the jagged edges you will get with bicubic and the halos will be similar with both. Providing an exotic example without jagged edges illustrates the versatility of the method.

Bicubic interpolation does not give me "jagged edges". You *can* get somewhat "braided" looking effects on high-contrast diagonal edges if you are using an interpolation method that also boosts high frequencies, but not all bicubic polynomial interpolation methods do that – it depends on the coefficient of the cubic term. (If I remember correctly, a coefficient of -0.5 does not boost high frequencies, one of -0.75 does).

And that waviness in the road texture looks completely unrealistic. I'd

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rather have a uniform blur than that.

Although convolution is linear and commutative, linear operations are not generally commutative. And, my Data Dependent Lanczos enlargement method is not linear.

OK. So you should describe it too. The regular Lanczos interpolation method *is* linear.

Dave

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