Re: Scientifically Based Presharpening for Enlargement

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- *From*: "aruzinsky" <aruzinsky@xxxxxxxxxxxxxxxxxxxx>
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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."

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

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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).

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

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

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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.

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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.

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

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.

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3. You might address why the sharpening should be a preprocessing step. If the sharpening is a linear filter, and interpolation is a linear filter (and most popular interpolation methods are linear) then it should not matter what order you perform them in − as long as you deal with the change in magnification for the sharpening step. You might even find a way to merge the sharpening into the interpolation.
On the other hand, if the interpolation filter is actually nonlinear, then that's a reason why the sharpening needs to be a preprocess.
Dave

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Although convolution is linear and commutative, linear operations are not generally commutative. And, my Data Dependent Lanczos enlargement method is not linear. An advantage of presharpening too obvious to mention is that a smaller image can be sharpened more quickly than after enlargement.

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