

Local Contrast Enhancement

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Local contrast enhancement (LCE) is a technique for bringing out detail and texture in an image. It is very similar to sharpening which accentuates only fine detail, but it operates at a larger scale. LCE sometimes goes by other names such as clarity or micro-contrast. The following images illustrate how local contrast enhancement and sharpening affect an image. Somewhat larger than normal amounts of LCE and sharpening have been used to make the effect more visible.



Original



Local Contrast Enhancement

Notice how LCE brings out texture, especially in the clouds and the mountain. Parts of the image whose contrast is already high such as the buildings, signs and umbrellas are more or less unchanged.



Sharpening Only



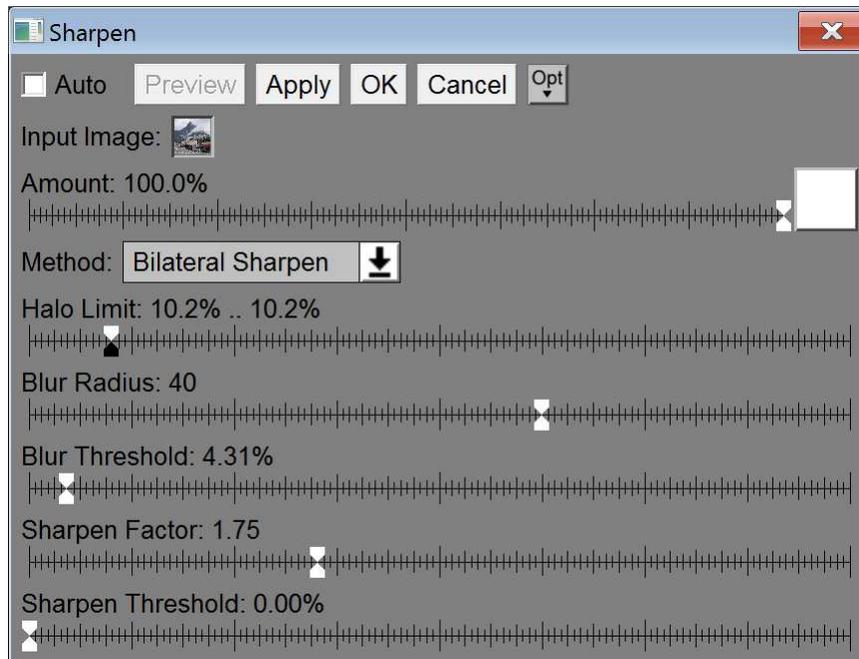
Local Contrast Enhancement + Sharpening

Here you can see that simply sharpening the image does not bring out much texture in the clouds and mountain, but the combination of LCE and sharpening brings those areas into sharper focus.

How LCE Works

LCE is just sharpening with a large radius. The simplest way is to use the Sharpen transformation and perform Unsharp Masking with a large radius setting. The problem with this method is that, depending on the image, it can create broad halos around light subjects against a dark background or dark subjects against a light background. To understand why this happens, you need to know how sharpening works. It starts by creating a blurred version of the original image and then, pixel by pixel, increases the difference between the original and the blurred image. When you have a subject against a strongly contrasting background, near the edges of the subject the blurred image consists of a mixture of subject and background and this gives rise to the halo. The solution to the halo problem is to use Bilinear Sharpening instead of Unsharp Masking since it avoids blurring across edges.

Using the Sharpen Transformation to perform LCE



Before proceeding, it is a good idea to uncheck the Auto preview checkbox until you have all the parameters set as this makes things go much faster. Next set the Method to Bilinear Sharpening.

Radius Slider

You select the scale of detail you want to enhance with the Radius slider. While you would use a relatively small value such as 5 for sharpening, for LCE you use a larger value.



Radius = 20



Radius = 40



Radius = 80

The effect is fairly subtle, but as you increase the radius, if you look carefully you will see more cloud detail, but less detail on the mountainside foliage. This happens because the cloud texture is much coarser than the foliage detail.

Sharpen Factor

The overall strength of the effect is mostly controlled by the Sharpen Factor – I find that values much higher than 1.8 can often make the image look unnatural.



Sharpen Factor = 2.0



Sharpen Factor = 4.0

To see the blurred image that forms the basis of Bilinear Sharpening, set the Sharpen Factor to 0.0. This is a good way to set the Blur Threshold as it lets you see what detail is blurred and what detail is retained.



Blur Threshold

If the Blur Threshold is too low, there will be no sharpening; if the Blur Threshold is too high, you get halos. The ideal value depends somewhat on the image and the Blur Radius. The idea is to set the threshold as low as possible while still getting the effect you want. Typical values might be between 5% and 25% -- I usually start around 10%.

Sharpen Threshold

Mostly, I leave the Sharpen Threshold at 0% for LCE. Higher values may help reduce noise in smooth areas like blue skies.

Halo Limits

The Halo Limit sliders do not have much effect for LCE. I usually leave them set at around 10% all the time.