Notes on Sharpening Digital Images - Tim Almdal

Highpass sharpening

Retains edge details in the specified radius where sharp color transitions occur and suppresses the rest of the image. (A radius of 0.1 pixel keeps only edge pixels.) The filter removes low-frequency detail in an image and has an effect opposite to that of the Gaussian Blur filter. The reset of the image is set to 50% grey so when applied with the Overlay, Soft Light or Hard light blending modes only the edges are lightened or darkened.

1. Duplicate the existing layer.
2. Apply the Highpass filter. The radius you need to set will depend upon the size of the image and the type of detail. Finer details need a smaller radius to avoid becoming over sharpened. A good rule of thumb is to adjust it so the edge details are visible without being too well defined..
3. At this point, only the high pass layer is visible, to obtain the sharpening you need to change the blend options on this layer. I typically use Soft Light. Hard Light gives a much harsher effect, which is sometimes useful where there isn't much detail in the shot.
4. To check the effect the sharpening layer is having on the image, hide it and then make it visible again. You should see a very slight overall lightening of the image and fine detail will become more distinct.
5. If, when you make the layer visible, too much sharpening appears, turn down the opacity or select a different blend mode. Soft Light is the most subtle.

Another variation is to change the image to LAB mode and sharpen using the Highpass filter on the Luminosity channel.

Unsharp mask

The Unsharp Mask does not detect edges in an image. Instead, it locates pixels that differ in value from surrounding pixels by the threshold you specify and increases the pixels' contrast by the amount you specify.

So, for neighboring pixels specified by the threshold, the lighter pixels get even lighter and the darker pixels get even darker based on the specified amount.

There are three settings:

1. **Amount:** The amount of USM applied is a function of the threshold and the radius (see below). This is usually the last slider you set. In general, the amount should be between 50 - 150 per cent.
2. **Radius**: The radius is a sneaky thing. In general, the more pixels the picture has, the larger the radius. You'll want to get sharp images, but not overly so. On a 6 megapixel image, Set the radius between 3 and 6 - but it all depends on what you want and need. Experiment. Also, if the image is more blurry than normal, you'll want a higher radius. If your image is sharper than normal (i.e. has already been sharpened in your camera), you might want to use less. To find how to set the radius, set the amount to 100 %, the Threshold to 0, and experiment. Then, set the threshold, and see if you are still happy with the image. Then tweak the amount:
3. **Threshold:** Typically can leave at 0. However, if you have an image with large amounts of noise (esp. if you are working with digital files that have been made a lot brighter, or taken on a high digital ISO value), you might want to set this to somewhere between 1-5. This also prevents small details from being accentuated. On a portrait, for example, using a high threshold might make skin look smoother (than if you didn't set the threshold), but the hair of the model will not come out as sharp as if you didn't set a threshold. As I said; I usually leave this on 0, but if you ever need it; Now you know what it does.

Setting the blending mode to Luminosity on the layer with the USM will help reduce the halo effect. Another approach is to again convert the image to LAB colour, and apply the sharpness to the L (luminosity) channel only.

This gives a far crisper sharpness effect, as the a and b channels only control the colour. This means that the colours bleed a little, but the underlying black and white picture (the L(uminosity) channel) will be tack sharp.

Edge Mask Sharpening

There are several ways to create an edge mask.

Easy

The Photoshop CS help file describes a method using mostly the channels palette. Search on “selective sharpening”.

Ron Bigelow’s Detailed Approach (http://ronbigelow.com/articles/articles.htm)

The detailed edge mask approach starts off with the channels palette. Each of the three channels must be examined to determine which contain the most detail. What is desired is to create a black and white image, from the original image, that contains as much detail as possible. For the next steps, we move back to the Layers palette

First a new layer is created and the other layers effects are merged into the new layer. This layer is renamed the Mono layer (short for monochromatic). This layer is immediately duplicated. The duplicated layer is renamed the Sharpen layer. Lastly, the Sharpening layer is hidden by clicking the eye icon (you can still see the layer, but the layer will not affect the image until it is unhidden). The Mono layer is then reselected.

The tool of choice to turn the Mono layer into a black and white layer with the most detail possible is the Channel Mixer. The advantage of using the Channel Mixer is that it allows us to choose how much detail we pull out of each channel. This results in the Mono layer to contain the maximum amount of detail.

With the Mono layer selected, the Channel Mixer is launched by selecting Image/Adjustments/Channel Mixer. The monochrome option is checked. The Red, Green, and Blue sliders are adjusted to maximize the amount of detail. Moving a slider to the right increases the amount of detail taken from that channel. Conversely, moving the slider to the left decreases the amount of detail taken from that channel. The Constant slider is used to adjust the overall brightness of the image. Clicking OK converts the Mono layer to black and white

The Find Edges filter is used to isolate the edges (select Filter/Stylize/Find Edges). At this time, the edges are shown in black. The Levels tool is used to increase the contrast of the image.

The Gaussian blur tool is used to soften the mask so that the dark to light transitions are not so abrupt (select Filter/Blur/Gaussian Blur). If there is a lot of detail then a very small radius (0.2) should be used. If there is less detail a larger radius can be used (3-5).

The edges of the Mono layer are still defined in black. So, the image needs to be inverted by using Image/Adjustments/Invert.

The Mono layer is now turned into a selection. Open the Channels palette and select the RGB channel. The Load Channel as Selection icon at the bottom of the palette is clicked (first icon on the left).

Returning to the Layers palette, the Sharpen layer is selected and the eye icon is clicked to unhide the layer. The selection has been applied to the layer.

The selection is used to add a mask to the Sharpen layer by selecting Layer/Layer Mask/Reveal Selection. The Sharpen layer Opacity is set to 50% (so that adjustments to the sharpening can be made later) and the Blend mode is set to Luminosity (so that the sharpening will only affect the tonality to avoid color fringing). The Layers palette now has the Sharpen layer with a new edge mask.

At this point, the Mono layer no longer has any value, so it is deleted.

The final step is to apply sharpening via the preferred sharpening tool to the Sharpen layer and to fine tune the sharpening.

Higher Levels of Sharpening

Since edge masks sharpen only the edges, higher amounts of sharpening can be used without degrading other areas of the image. This is a particular advantage when producing larger prints. Larger prints require larger amounts of sharpening, but the higher sharpening amounts tend to degrade the finer detail in the image. The use of edge masks allows us to get around this problem. Thus, edge masks are one key to producing high quality, large prints.

Two Pass Sharpening

Edge masks also open up the opportunity to utilize a two pass sharpening approach. In the first pass, edge masks are used to sharpen the more significant edges in the image. Since only the edges are being sharpened, larger sharpening amounts can be used. This will make the major detail really come to life. A second sharpening can then be carried out on a separate layer. This sharpening does not use an edge mask. Rather it is aimed at sharpening the fine detail in the image. For this purpose, a fairly low level of sharpening is applied.

Example

The following example used USM with an edge mask followed by a Highpass filter on the entire image to achieve the sharpening. In addition, the original raw file was converted three times with different exposure settings. The three images were then merged using layer masks in order to balance the overall lighting.

Before

After