

IMAGING WEB GRAPHICS IN PHOTOSHOP

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A Need for a Simple Imaging Tutorial

In the last 15 years, uses for the World Wide Web have expanded, and facets of the internet have become an integral part of the teacher's toolbox. The convenience of email and home pages have allowed for information and important announcements to be passed on to students at a moments notice. Downloadable course information such as syllabi, schedules and assignments has become useful in class delivery. The web has become a wealth of information for students in their study and research. In addition, E-learning has become a new and exciting way of reaching students in physically distant areas while at the same time increasing enrollment.

In the future, uses for the internet will most certainly expand. Technologies will change. Venues will commonly include more complex and varied content such as video, sound and animation. In addition, as technology allows bandwidth to expand, the quality and quantity of photo-based content will surely increase in importance. Advanced technologies will also continue to be integrated into the lifestyles of the general public.

For many people not versed in image editing software, it can be a challenge to create images that look good on the internet. Bandwidth requirements dictate that images be made small in both resolution and physical size. Images taken with digital cameras have their own set of problems to solve. Lighting, exposure, composition, resolution, color gamut, and imaging issues add to a stew of potential problems.

Unfortunately, for most people, especially busy teachers, these issues do not warrant the time allocation for getting up to speed on the color correction and the imaging of their digital photographs. What is needed is a condensed and easy to understand primer for those who simply want their digital images to look good on the web.

Here then, is a tutorial on digital photography and the imaging of photographs headed for use on the web. We'll start with a basic look at digital photography and then finish with a basic imaging tutorial in Photoshop.

Digital Camera Terms and Definitions

Pixels - Pixels, short for "picture element", are the small square colored dots that make up a digital photo. If a photograph is 1400 x 1600 pixels, it means that in size, the photograph is 1400 pixels wide by 1600 pixels tall. This photo would contain 1400 x 1600 pixels, for a total of 2,240,000 pixels.

Mega-pixels - One million pixels equals one mega-pixel. Our photograph in the previous paragraph would therefore be approximately 2.2 mega-pixels. Cameras are rated on how many mega-pixels they can capture at their highest settings. This is called the "pixel count". An example would be a 3-megapixel camera which would capture an image around 2048 x 1536 pixels in size, or 3,145,728 pixels.

Resolution - The more pixels in a photo, the more resolution it can have at any fixed size.

For instance, a 1"x1" photograph at 72 pixels per inch (ppi) contains 72 x 72 pixels, or 5184 pixels. This photo's resolution is 72 then ppi. This file takes up 44 kilobytes (k) of memory space on a computer's hard drive. On the other hand, a 1"x1" photograph at 300 ppi contains 300 x 300 pixels, or 90,000 pixels. This photo's resolution is 300 ppi and it takes up 56k on the hard drive.

Aspect Ratio - The aspect ratio of a camera is the ratio of the width to the height of the image. A traditional 35mm film frame is approximately 36mm wide and 24mm high. Therefore, it has an aspect ratio of 36 to 24, or about 3:2. Most digital SLR (single lens reflex) cameras also have a 3:2 aspect ratio. However, most consumer level digital cameras use a 4:3 aspect ratio. Some digital cameras also have a "panoramic" setting that allows for a much larger ratio of width to height.

Factors Affecting Screen Size of Web Images - When you display a digital image is displayed on a monitor, the only thing that determines the size of the image is the pixel count and aspect ratio. It doesn't matter if the ppi is set to 1 or 1000. The way to control how large an image appears on a monitor screen is by changing the pixel count. One should make sure that the image size is changed in a software package such as Photoshop and not in a web design program. The safest way to approach this is to make web-bound photos 72 ppi and the exact physical size that they will be on the page. One should not fall into the trap of increasing resolution in order to make a better-looking photo. This only make a larger photo that ultimately slows down the load time of the visitor's page, creating impatience and frustration in the user.

Maximum Printing Size - Since all images for the web are viewed on a computer screen, they are always used at the resolution of computer screens, which is 72 pixels per inch (ppi). Because it is so common a practice, I also want to mention the issue of printing to an ink jet printer. Many cameras suggest an approximate print size that the camera will create for most ink jet printers. For this example, we will use the 3-megapixel camera that was mentioned before. It captures an image that is around 2048 wide by 1536 pixels tall in size, or 3,145,728 pixels. The common lowest resolution that gives us a decent-looking photograph is about 150 ppi. Dividing the width of 2048 by the resolution of 150 pixels per inch, creates a physical width of about 13 inches. Dividing the height of 1536 by 150, creates a height of about 10 inches. Shooting a photo with a 3MP camera on its highest setting, and printing it at 13"x10" at 150 ppi will create decent results most of the time. Printing the photo larger than 13"x10" at 150 ppi, or printing it at 13"x10" and at a considerably lower resolution than 150 ppi will start to degrade the quality of the print. The stair-step effect of the square pixels of the print will start to show. This effect is called pixelization, and is commonly known as the "jaggies". (see below) Of course, printing it at a higher resolution creates a better-looking photograph, but after about 300 dpi the improvement is negligible. Again, this discussion relates to photos printing on an ink jet printer. If the images are only going to be used on a website or on a computer screen, we will only need to use 72 ppi resolution for our images.

ISO Setting for Sensitivity - The sensitivity of the camera to light can be set so that the photographer can set the camera to operate more effectively under various lighting conditions. The common settings are 50, 100, 200, 400, and 800. The higher the number,

the more sensitive the camera will be to light. Therefore, one should set the ISO on the camera to 50 or 100 on a bright day, 200 on a cloudy day or in a brightly lit room, to 400 indoors and to 800 after dark.

Basics Digital Camera Parts

Exposure Controls - Many digital cameras now come with manual controls for the shutter and aperture. If one knows how to use manual controls, it allows for much more creative control over depth of field and motion effects in photographic images. However, all digital cameras have a program setting that will suffice under the most common conditions. However, shooting on program reduces the choices the photographer may want to control concerning the rendering of depth of field and motion effects. Many digital cameras also offer preset shooting modes to be used under certain condition such as landscape, sports, portrait, etc. Some also offer a limited amount of video to be shot. However, because of the low quality of the video capture, one should not allow this feature to drive your purchasing decisions.

Light Metering System - All digital cameras have a light-measuring device that aids in getting proper exposures, either on program or manual mode. Some cameras allow for other types of metering, such as spot metering, where only a small portion of the scene is measured. This allows the photographer to expose for the most important part of the photo, especially under tough lighting conditions.

LCD (liquid crystal display) - The LCD is a small screen on the back of many digital cameras. It allows the user to view and adjust the photo's composition before the shot is made. LCDs often use a large amount of battery power.

Flash - Most good digital cameras have a flash, which allow the user limited ability to shoot indoors and in other tough lighting conditions, such as lightening a backlit object.

Digital and Optical Zooms - An optical zoom is a created by the lens and creates much better images than a digital zoom, which is virtually useless. Digital zooms enlarge photos the same as a software program does. In other words, it is the same as zooming in on a photo in Photoshop. It creates a lack of detail and pixelization.

Lens - Just as with conventional cameras, every brand of digital camera comes with lenses of varying quality. The mega-pixel capability is important, but so is the quality of the lens.

Macro Mode - Macro allows the camera to shoot extreme close up shots. The icon for the button usually looks like a drawing of a tulip flower.

Memory Cards - Most digital cameras come with a removable memory card, which is similar to a roll of digital film. There are a lot of versions on the market, such as Smart Media, Compact Flash, Memory Stick, Secure Digital or SD, and XD cards. They come in various sizes such as 64 megabyte, 128 megabyte, 256 megabyte, 512 megabyte and 1

gigabyte (1000 megabyte). It is useful to have larger sizes because they hold more photos, but the larger sizes cost more too. Memory cards can be used with a card reader. Card readers hold the card from the camera and are then plugged into the USB port on the PC. There are common software packages that aid in downloading the photos off the card and onto the computer. The other option to memory card readers is a simple USB wire that connects to your camera and is usually sold with the camera. The user can simply download the photos directly to the computer.

Problems to Overcome with Digital Images

Jaggies - "Jaggies" is the common word for pixelization. The problem is caused by relatively low resolution and are seen as jagged lines in some digital photos. They show up in areas that have slanted or diagonal lines. Very slight jaggies are expected under certain conditions, but they should never be extreme or pronounced unless used as an artistic effect. The best way to defeat the problem is to re-shoot it at a higher resolution of camera capture, if it is possible. See the photo below for an example of a low-resolution photo with the "jaggies".



Chromatic Aberrations - Chromatic Aberration (CA) is an effect where there is a purplish haze along the edge of two areas of high contrast. It is usually caused by low quality digital cameras.

Noise - Noise is an effect very similar to film grain. It looks like small multi-colored specks in parts the image that should be solid color. Noise shows up more often when the camera is set to a more sensitive ISO setting. More expensive digital SLR cameras often create less noise.

Compression - A camera must "compress" an image file in order to store it on a memory card. When it compresses an image, it takes data out of the image, in order to make the file size smaller. This is called "lossy" compression. The file format that is created is called a JPEG. The more compression, the smaller the file size, and the more photos that

can be stored on a card or disk; however, the more an image is compressed, the worse it will look (See the two examples below. The example on the left is saved at a setting of 100 and takes up 48k of space and the sample on the right is saved at a lower compression setting of 5 and takes up 4k of space). As you see (especially around the heads of the birds), there is a trade-off of size and quality. For the web, photos should be compressed as little as possible while still looking good. If one wants to shoot photos at their finest resolution and size for printing, then a solution would be to shoot with the uncompressed TIFF format and buy a very large memory card. Also, on most cameras there is an option for shooting in RAW mode, which compresses images without a loss of quality.



Camera Shake - This is not really a problem that is solely reserved for digital cameras, or any cameras for that matter. It is also not a problem that is caused by faulty or cheap equipment. Camera shake is caused by hand holding and shooting any camera under lighting conditions which forces the shutter to stay open for too long, thereby recording the natural shaking caused the photographer's hand. The obvious solution is to use a tripod when shooting in low light conditions. As a rule of thumb, one should use a tripod when the shutter speed dips below 1/60 of a second. Also, remember that the further one zooms out, the stronger the shaking effect. Interestingly, there are a few newer cameras that offer "image stabilization", a technology that helps stabilize the lens, thus reducing the risk of shooting a blurry photo.

White Balance Setting - Shooting under certain lights will cause a cast to photos. There is a light balancing setting on most digital cameras that allows the user to match the camera to the "temperature" or cast of light being shot under, such as daylight, tungsten, and fluorescent. Later in the paper, I will show a way to fix those problems in photos that have already been shot under wrong lighting conditions.

Proper Settings for Photos Used on the Web

Formats - Although there are some advantages to capturing images in TIFF and especially RAW format, JPEG is the most common file format for most uses and most users. It is also the format used on the internet. Occasionally, there is a need to convert photos to GIF format, such as when constructing a GIF animation.

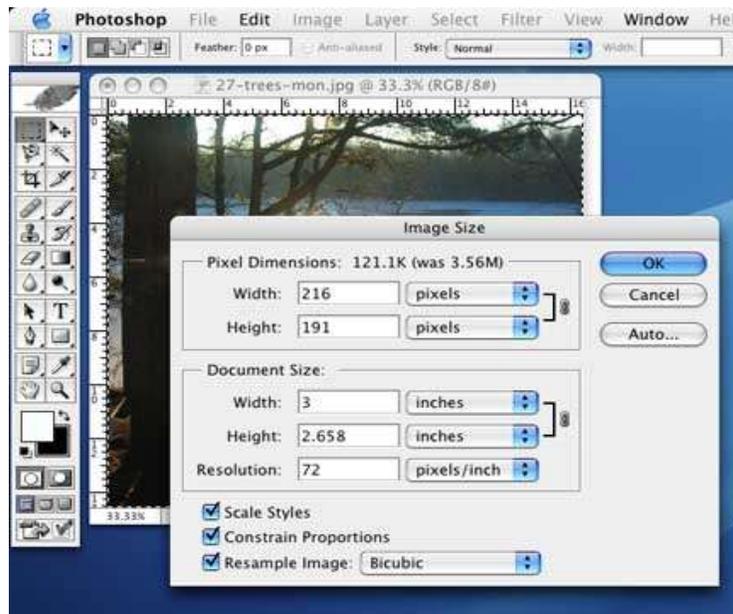
Modes - There are two main modes that are used. For color images, use RGB. For black and white images, use Grayscale (saves file size and loading time).

Resolution - 72 ppi is the only resolution to use on the web. The reason is because web pages are shown on computer screens and computer screens display images at 72 ppi.

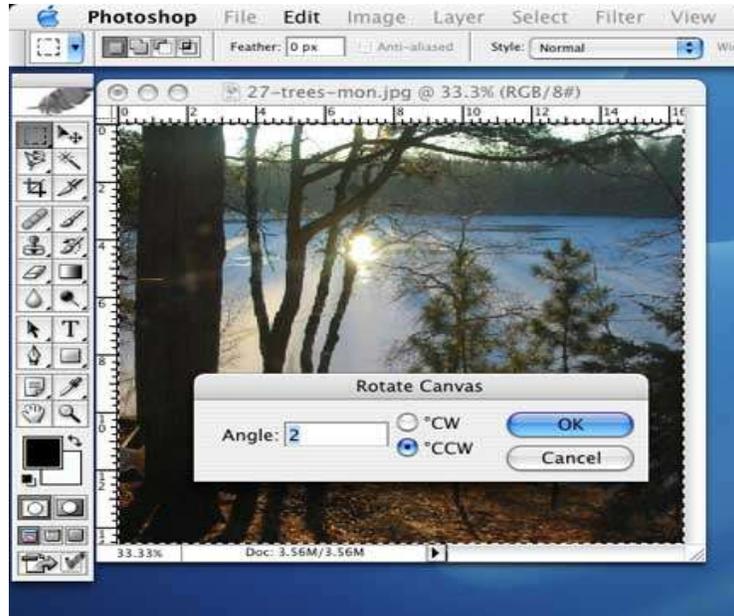
Naming Conventions - when naming an image, use all lower case letters and no spaces, followed by a dot and a three-letter file extension. For photographic image, use ".jpg". An example would be myphoto.jpg. For GIF files, the name would be myphoto.gif.

Imaging Tutorial

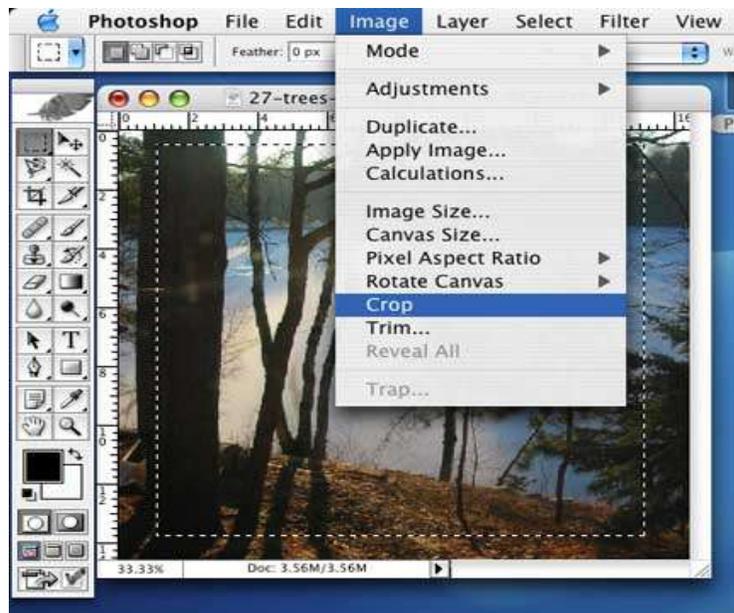
1. Check image size and resolution - There is no use going through all of the following imaging steps if your image is not the proper physical size and resolution so you should check it first. After you have saved, scanned or transferred your image onto the computer, open it up in Photoshop (recommended) or another image editing program. In Photoshop CS2, go to Image - Adjust - Image Size (see below). Check that the image resolution is 72 ppi and that it is a little larger than the physical size that you want to use it at. If it is much smaller than the size you need for your use, you must re-shoot the photo at a higher camera capture resolution in order to retain image quality by avoiding pixelization.



2. Rotating - If the image needs rotating, go to Image - Rotate Canvas - Arbitrary. A dialog box comes up that allows you to enter in a degree of rotation. Check either the CW (clockwise) or CCW (counter clockwise) button and enter OK. You might have to guess the amount of rotation and enter several times to get the photo straightened out. (see illustration below)

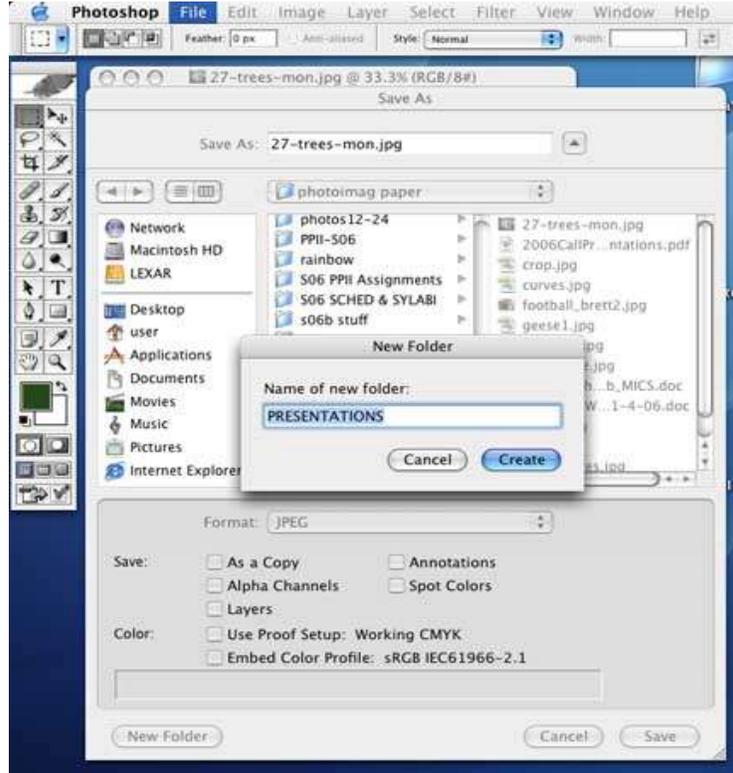


3. Cropping - If the image needs cropping, select the Rectangular Marquee Tool from the Toolbar (top left tool) and then click hold and drag a selection on your photo. Note that as long as the Rectangular Marquee Tool is selected, you can move the selection around your canvas by clicking, holding and dragging the mouse. Now go to the top menu and click Image - Crop. (see illustration below)



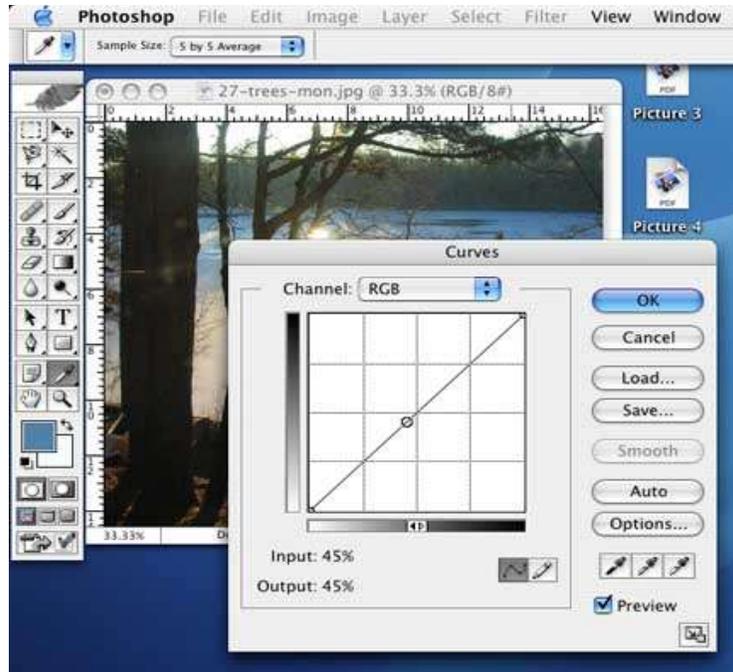
4. Saving - At this point in the imaging process, it is probably wise to save your image. After opening up your image, checking the resolution and size, rotating, and cropping the image, it makes sense to save the image so that one has a proper base file to work from. Although there are some advantages to capturing images in TIFF and RAW format, JPEG is the proper file format to save your images in for most images headed for the internet.

To save your image, go to File - Save for the Web.

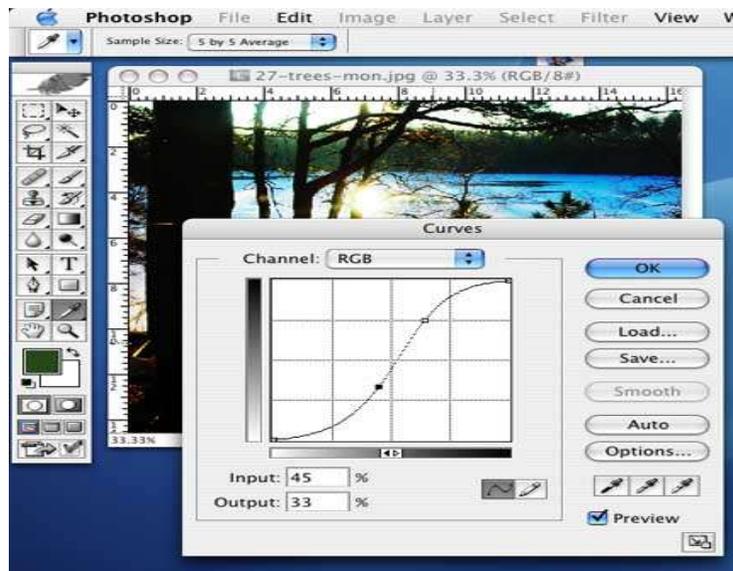


5. Evaluating - Seeing and understanding what is wrong with an image takes a little time and experience. Evaluating images involves learning how to recognize a lack of contrast, color casts, soft images, images that are underexposed (too dark) or overexposed (too light), imperfections, visual clutter, and other problems.

6. Increasing Contrast - One of the first things we might want to do to an image is to increase the contrast. Contrast is the difference between the dark and light tones in an image. First of all, not all images need more contrast and we must first decide that the image needs more contrast. If the photo needs more contrast, go to Image - Adjust - Curves (see illustration below). Notice the diagonal line. The line represents the tones present in the image currently. The grid, under the diagonal line, is divided in quarters by vertical and horizontal lines. The vertical lines represents the percentage of tones that exist in the image (Input) and the horizontal lines represent the tones that we might change those tones to by moving the curve up or down with a handle (Output). One can find out what percentages of tone any area of the photo lie in by clicking, holding and moving the cursor on areas of the photo. A circle will appear on the curve line (see photo below) that visually shows where the tone lies. There will also be a read-out in the Output/Input boxes at the bottom of the Curves dialog box. This information helps us to determine where in the photo we would like to create contrast.



Handles are attached to the diagonal curve line with one click. By attaching two curves handles to the curve, we can make steeper any tonal range of the curve line. The steeper the curve is in any tonal area, the more contrast will exist in that corresponding area of the photograph. It is important to note that by making steeper one part of the curve, other parts of the curve (and photo) suffer from a loss of steepness (and contrast). Therefore, before adding contrast, the photographer should first decide which tonal areas of the image are most important to add contrast to and which areas are of less importance.



As you can see in the image above, the tonal areas in the mid-tones (30% to 75%) are steepened and thus have more contrast, and the highlights and shadow tone areas of the image are flatter and have lost contrast. Note the differences in this image and the

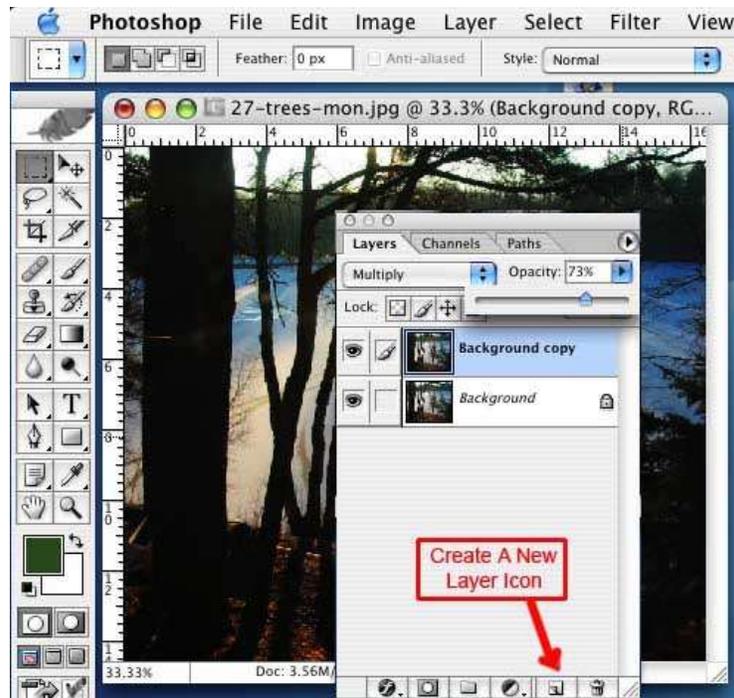
previous image.

An advanced technique involves increasing contrast between colors in the image. The operator first navigates to Image - Mode - LAB Color and converts the image to LAB color mode. Then, in Curves, the pop-up menu is changed to the A channel. The handle on the upper right is pulled over 15 levels to the left. The lower left handle is pulled 15 levels to the right. Next, the pop-up menu is changed to the B channel and the same operations are performed on the curve handles there. The image is then converted back to RGB. This technique causes the image to increase in saturation without the color problems associated with increasing saturation within the Saturation dialog box found under Image - Adjust - Saturation.

7. Adjusting Overexposed and Underexposed Images - This allows for quick adjustments on overexposed and underexposed photos. The trick also works for photos that are over-flashed or under-flashed. Here is how it is done:

For an overexposed photo (too light) go to the Layers palette and select the "Background" layer. Drag it into the "Create a New Layer" icon on the bottom right of the Layers Palette, which is just to the right of the Trash Can icon. (see example below) Next, select the "Layer Mode" pop-up menu on the top of the Layer palette. The menu reads "Normal". Scroll down and select "Multiply". You will notice that your photo gets darker. On the one hand, if the photo is too dark now, go to the top of the Layers palette and click on the triangle in the small blue box next to "Opacity" and the field that reads "100%". Once it is clicked a slider will pop out. Select the slider and back off the opacity on the duplicated layer to the left until you like how your photo looks. On the other hand, if the photo is still too light after duplicating the Background layer, simply duplicate the duplicate however many times you need. If the second duplicate makes the photo a little too dark, go to the Opacity slider and adjust as previously instructed.

For an underexposed photo (too dark) follow the instructions above except use "Screen" as your Layer Mode. Remember that in very blown out photographs you will only be able to increase tone in areas where there was some tone to begin with. Areas that have a zero tonal value will remain zero unless tone is carefully and expertly "painted" in.



8. Finding Shadow and Highlight Targets - We need to next adjust the darkest and lightest parts of the photo, but we need to find those areas on our photo first. There are two methods.

The first method is to open Curves and move the dialog box to the side so you can see your photo. We will set the highlights first. Grab the upper left handle of the Curve line and drag it to the left until nearly all of the tone is gone except the lightest area. Remember this spot as it is where we will want to set our highlights. Select "Cancel" on the Curves Palette. To mark the spot for later, go to the Tool Palette and click and hold on the Eyedropper Icon until a pop-up menu comes up. You will see the Color Sampler Tool. Click on it and then go to the photo and click once on the area of tone where you wanted to set the highlight. You will see a circle and crosshair appear with a number one next to it. Grab the handle and put it back to the top right position.

Now, to set the shadow area simply grab the bottom left Curve handle and drag it to the right until all of the tone is missing except for the darkest. Once you find the darkest spot, cancel the Curves dialog box and click on that spot with the Color Sampler Tool. You will see another circle and crosshair appear with a number two next to it.

The second method to finding the darkest and lightest parts of the photo is to first create an "Adjustment Layer". To do so, go to Layer - New Adjustment Layer - Threshold. When the "New Layer" dialog box appears, select "OK". The Threshold dialog box automatically comes up, so now slide the slider over to the left until nearly all of the light tone disappears. Click Ok. Use your Color Sampler Tool to mark the spot. Go to the Layers Palette and double click on the left side of the Threshold layer. The Threshold dialog box comes up again. Drag to the right until nearly all of the light tones disappear.

Click "OK". Use your Color Sampler Tool to mark the lightest spot. Finally, drag the Adjustment Layer in the Trash Can Icon on the bottom of the Layers Palette as you don't need it anymore. You now have your two areas selected and marked.

Either method works fine but it should be mentioned that using Threshold shows the image in black and white and there is no way to see the cast of shadow and highlight areas when deciding what to select. Therefore, the first method is superior as it allows the operator to view color and avoid selecting a highlight or shadow with hue, thus avoiding the mistake of throwing an opposite color cast into the photo upon correction.

9. Setting Shadow and Highlights - Now that we have our highlight and shadow points identified and marked, it is a simple matter to set them. Go to Image-Adjust-Curves. Double-click the light colored eyedropper, the one of the three that is furthest to the right. A color dialog box will come up. In each of the fields for R, G and B, enter 240, 240 and 240. Now click the middle eyedropper and in the RGB fields, enter 127 in each. Now double-click the shadow eyedropper on the far left and in the color picker RGB fields, enter 20 in each. After setting each, Click "OK". A dialog box will come up asking "Save the New Color Targets as Defaults?" Click "Yes". Now, open up Curves again. Select the Highlight Eyedropper Tool once and then click on your marker for the highlight. Now select the Shadow Eyedropper Tool once and then click on your marker for the shadow. You will see slight changes in your image in both cases.

10. Remove Colorcasts in the Mid-tones - Colorcasts can be introduced to photographs in a variety of ways. Florescent, incandescent and quartz lights all create different color casts. Some digital cameras can even introduce a cast into a photo. Traditional film cameras create a whole different set of color cast problems starting with outdated film, spoiled film developing chemicals, wrong color settings in the print-making process, faded prints, and the introduction of casts by scanners in the digitalization process of originals. Whatever the cause, there is a powerful rule that helps us to defeat casts.

The theoretical rule that we can use to our advantage is that in the additive theory of color, equal amounts of the primary colors of red, blue, and green (RGB) equals a neutral color. Therefore, if we can find anything in our photograph that *should* be neutral gray, then we can force that thing to be neutral (using the global tool Curves) and the rest of the photograph will lose its cast as well. We are in fact *betting the quality* of the image that the item that is supposed to be neutral is really neutral. If it is not, we will see another cast introduced. That colorcast will be based on its opposite primary color in the subtractive color theory (CYMK). For instance, the opposite of Red in the additive color theory is Cyan in the subtractive color theory. The opposite of Green in the additive color theory is Magenta in the subtractive color theory, and the opposite of Blue in the additive color theory is Yellow in the subtractive color theory.

Lets put the theory to practice. Remember that we have set our Mid-tone Eyedropper Tool to 127 for Red, Green and Blue in the Curves Dialog Box. That is a neutral color. It is as if we sucked up a neutral color into the eyedropper. Click once on the neutral area that we marked before and you will see the colorcast disappear from all areas of your photo. According to our theory, if the photo gains a cyan cast, then we know that the neutral gray

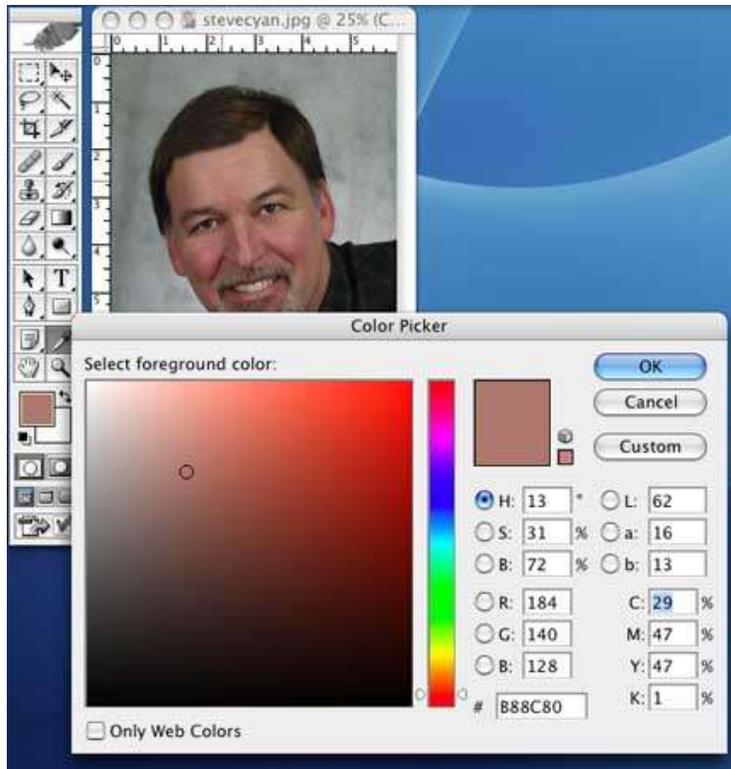
area was slightly red. If the photo gains a magenta cast, then we know that the neutral gray area was slightly green. If the photo gains a yellow cast, then we know that the neutral gray area was slightly blue. Our next move would be to either try another possible neutral gray area of the photo, or cancel the Curves dialog box, then go back into the Curves dialog box, where we would double-click the eyedropper again, select another target color that has a slight cast to it that is opposite of what we witnessed, and then experiment with that color in the target area of the photo.

11. Skin Tones - First of all, any object in a photograph whose color is easily recognized and known by is called a "memory color". Common examples include citrus oranges, the blue of the sky, the red of the American flag, consumer packaging such as Coke cans, Tide detergent, etc. and the color of skin. The prerequisite for assigning the label "memory color" to an object is that the correctness of the color of the object should be important. Skin tones are a great example in that everyone notices when they are off.

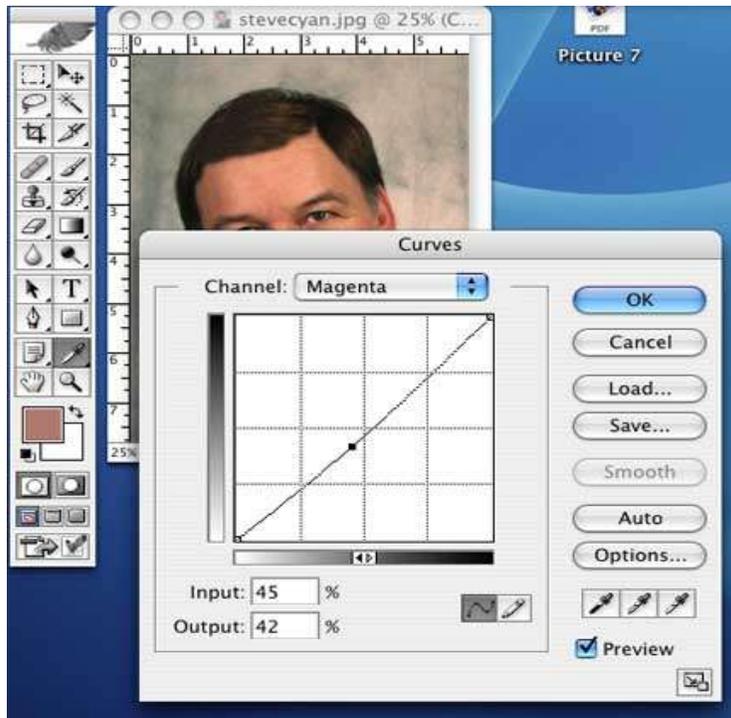
Fortunately, there is a way to correct skin tones using a formula. That formula is that for Caucasian skin tones, yellow should be slightly higher than magenta and cyan should be one-fifth of the yellow. Black is at zero. For other races and peoples the ratio is slightly different.

If we sample a skin tone with the eyedropper and load it into the color palette, we can then open up the color palette and read what the totals are under the C, Y, M, and K entry boxes. Then, after writing them down, we can open Curves and make adjustments that conform to the proper ratios.

On the image below, the numbers for the skin tone sampled on the man's forehead are 29% cyan, 47% magenta, 47% yellow and 29% cyan. To start, go to the pop-up menu in Curves and select Cyan. Make a Curve handle anywhere on the curve and enter 29% for the Input and then 9% for the Output. Since the curve drops some in the mid-tones, we need to compensate by increasing Cyan in the mid-tones. Attach another handle at about 35% or so and lift up the curve line a little.



Next, go back to the pop-up menu and select Magenta. Put a handle at about 47% and then pull it down so that the Output box shows about 43% or so. (See below) Click OK and you are done!



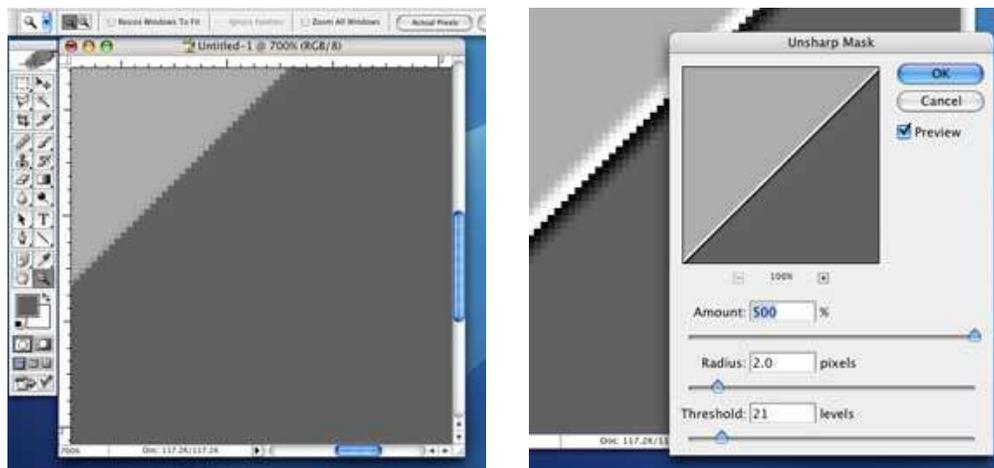
Check out the difference in the photos below that these simple moves make in the skin tones. You'll also notice that the backdrop was not neutral after all, as was guessed, and that it has a warm tone to it. Therefore, it was an astute decision to bet the image on the skin tone rather than the background.



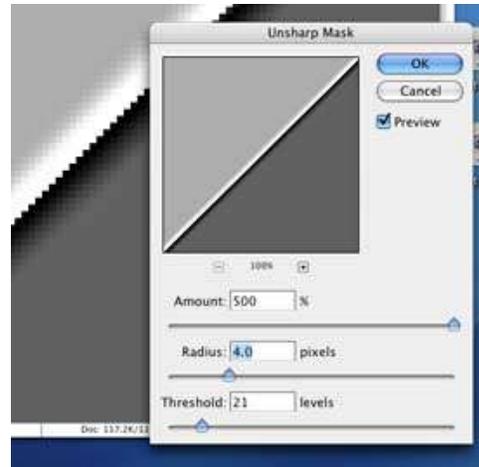
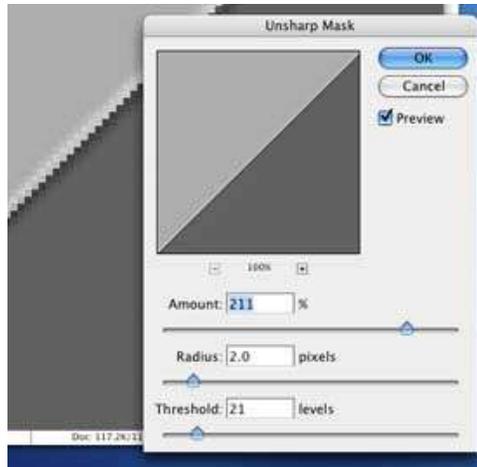
12. Fixing Imperfections - There are many areas of imaging combined under this heading, and there are too many tools and techniques involved in this section to properly address in a paper of this size. To summarize, Photoshop operators use the Clone Stamp tool to erase imperfections such as dust, scratches, unwanted items, etc. The Healing Brush and Patch Tool are also useful in repairing damaged areas. The Dodge and Burn Tools, used with brushes of different sizes, softness and opacity, are useful in darkening

or lightening certain areas of the photo and include the ability to darken or lighten only the highlights, mid-tones or shadow tones in areas of the image. The Sponge Tool is used to de-saturate selected areas without affecting the tonal range. The Sharpen Tools is used to sharpen and objects and the Smudge and Blur tools are used to blend and soften. Finally, the Magic Wand Tool and various marquee and lasso tools are used to select and isolate certain areas of the photograph for any intended imaging technique.

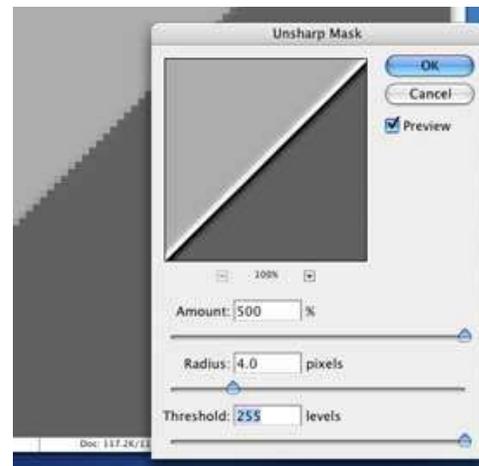
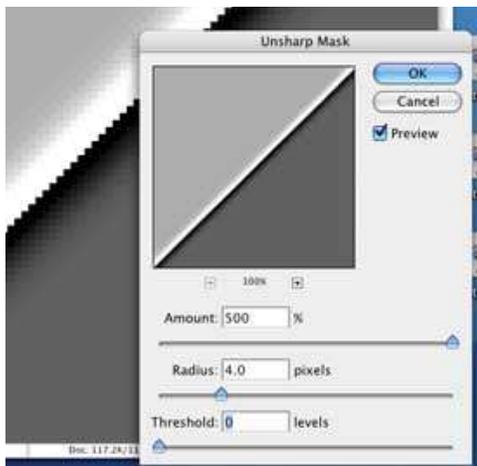
13. Sharpening Images - The last area of work on the image is sharpening. Final sharpening should only be undertaken when the operator knows for sure that the image is sized to the final physical size for its intended use. To sharpen an image, use only the Unsharp Mask command. The reason for not using the other three commands (Sharpen, Sharpen Edges, and Sharpen More) is that each is a one-click command. Unlike Unsharp Mask, they have no controls to vary the effect of the filter. Unsharp Mask can be found by selecting the Filter Menu and is then found under Sharpen. The three controls in the Unsharp Mask dialog box are Amount, Radius and Threshold. When the Unsharp Mask filter is applied, Photoshop finds areas of tonal transition between individual pixels. Below, in the example on the left, where I have painted two areas of tone separated from each other diagonally. When Unsharp Mask is applied, Photoshop creates a double "halo", as seen in the example on the right. In the darker area of tone, where it meets the lighter area of tone, the edge is darkened. In the lighter area of tone, where it meets the darker area of tone, the edge is lightened. How much these two halos are darkened and lightened is controlled by the "Amount", which is now set to the maximum of 500, which makes the halos black and white. The width of each halo is controlled by the "Radius" control slider, In this case, each of the halos is 2 pixels wide.



In the picture on the lower left, we can see what happens to the halos when the Amount is turned down to 211. The white halo gets a little darker and the dark halo gets a little lighter, which makes more of a subtle Unsharp Mask effect. In the photo on the lower right, we have again turned up the Amount, which causes the halos to get darker and lighter. We have also turned up the Radius to 4, which causes thicker halos.



Notice now in the example to the lower left that the Threshold is turned to 0 and that the Threshold on the example on the right has been turned to 255. The Threshold slider controls to what range of pixels the effect is applied to. First of all, in any image, there are 256 levels of grayscale tone. The Threshold slider goes from 0 to 255, which makes 256 possible levels. If the Threshold slider is set on any one particular number say 21, the operator is instructing Photoshop to apply the Unsharp Mask filter to any adjacent pixels in the image whose difference in tonal range is more that 21 levels. So in an image on the lower left, where the Threshold is set to 0, all pixels in the image will be sharpened. On the other hand, if the Threshold is set to the maximum of 500, none of the pixels in the image will be sharpened, as we see in the example to the lower right.



The problem with setting the Threshold to 0 is that when all the pixels in an image are sharpened it creates artifacts and a grainy and unnatural look to the photo (see example of the football player below on the left). The image on the right has a proper amount of Threshold applied, where the graininess disappears and yet some of the harder edges of the photo are still sharpened.



Although all images are different and warrant different settings, the ranges of setting for average photos are as follows:

Amount - usually between 75-200

Radius - usually between 1-3 pixels

Threshold - usually between 10-20

In conclusion, a safe average would be to set the Amount to 125, the Radius to 1 and the Threshold to 12.



14. Save the Image - Saving the image is the final step in this tutorial. To save the image for the web, go to File - Save for the Web. An enormous dialog box will appear with several options. As mentioned before, photos are almost always saved as JPEGs. Small file size is important in creating fast-loading graphics. JPEGs are made small by compression. File quality degrades the more a JPEG is compressed so the operator needs to make a decision on the trade-off between file size and image quality. File quality in

this example is set at 31, which is a medium compression setting. Finally, remember the file-naming conventions, mentioned earlier, that need to be followed for naming web graphics. Following these suggestions will go a long way toward creating photos that look great on the web.