Cary Photographic Artists

Using the histogram to improve your photography

A “Mastering the Art of Photography” Topic

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Picasa 3.9 software is used in this presentation.
What is a histogram, and how can it help me?

• An image histogram is a graph of the brightness values of each of the pixels in a digital image.
• The ability to interpret histograms is one key to getting proper exposures in your images.
• In this presentation we’ll explore histograms and see some examples of how you can use them while taking and editing photos.

Let’s start with the graph part of this concept.....
What is a histogram? Continued.....

Here’s a typical graph of values.

Y axis: inches of rain

X axis: month of the year category

http://www.weather.com/weather/wxclimatology/monthly/graph/27587
Now the histogram

- The x axis shows the category of brightness values.
- The Y axis shows the number of pixels at a given brightness value.

The dark value categories are to the left and the light value categories are to the right on the x axis. Midtones are in the middle.
The image histogram

- Each pixel in a digital image is given a **brightness** or **luminance value** ranging from 0 to 255.
- An image histogram results when the computer scans through each pixel of the image and counts how many are at each brightness level from 0 through 255.
Are there good and bad histograms?

No!......

• The region where most of the brightness values are present is called the "tonal range" of the image.

• There is no one "ideal histogram" which all images should try to mimic; histograms should merely be representative of the tonal range in the scene and what the photographer wishes to convey.

However.....
Blocked shadows and blown out highlights

• If the pixels on your histogram are piled up on either the left or right side, it is an indication that your image will end up with pure black or pure white areas which lack detail.

• To avoid this loss of potential information, many photographers adjust their camera settings to avoid under or overexposure.

• More on this later.....
Color histograms

- Color histograms are three separate histograms, one each for the Red, Green and Blue channels.
- Some digital cameras show a single histogram that indicates exposure of only one of the color channels, i.e. green--beware! We’ll see an example on the next slide.
- The same may be true for blinking highlights if your camera shows them to indicate underexposed or overexposed pixels. You can determine what your camera is doing by comparing the in-camera histogram of your image with a three color histogram in your software.

http://www.kenrockwell.com/tech/yrgb.htm
Tone mapping

- This example shows how tones and colors from an image are mapped into various histograms.
- In the example, brightness or luminosity is drawn solely from the green channel.
- Where colors overlap on the color histogram, intermediate colors are shown (i.e. purple where red and blue overlap, yellow where green and red overlap, gray where all colors overlap).
An example of a color histogram in Picasa
This color image is predominantly red. When it is converted to black and white, we can see most of the pixels are midtones.
This is a high key image. The histogram is shifted to the right.
This is a low key image. The pixel values are shifted to the left.
Now for some examples of what you can do with histograms

While you are photographing:

• If your camera displays a histogram, you can refer to it to make changes as you shoot, to balance the brightness of your image. Especially try to avoid blown out highlights.

• Take a photo, check the histogram, then adjust your camera settings and reshoot if necessary

While adjusting your image later with software, such as Picasa:

• Use sliders to adjust brightness and shadows.

• Adjust the white balance of your image.
In camera

• A histogram display in your camera LCD can show whether the photo was properly exposed.
• If the histogram is piled up on the left, increase the exposure with exposure compensation, longer shutter speed, or larger aperture.
• If the histogram is piled up on the right, decrease exposure with exposure compensation, shorter shutter speed, or smaller aperture.
Underexposure, histogram to the left.

The shadows are clipped in this image, but may be recoverable in photo editing.

The fix: increase exposure compensation, shutter speed, or aperture.
Overexposure, histogram to the right

The image highlights are “clipped” or washed or blown out. Highlights are generally not recoverable in editing.

The fix: decrease exposure compensation, shutter speed or aperture.
Normal exposure

- Focal Length: 20mm
- Exposure Time: 0.008s (1/125)
- F Number: f/5
- ISO: 200
Using the histogram in photo editing

• Now let’s explore a couple of ways you can adjust your images in editing software.

• Most applications give you the ability to brighten or darken your image.

• In our examples using Picasa, you can use sliders to add fill light, darken shadows, or increase highlights.

• You can adjust the color balance of your photo as well.
The tonal range is narrow in this photo shot through a screen. Low contrast—narrow histogram. This is OK if it is the look you like.
Here, the tonal contrast has been greatly increased by adjusting the sliders to lighten the highlights and darken the shadows.
Check your white balance with a color histogram

- A color histogram can help you set your white balance.
- If one color, e.g. blue, is unintentionally way to the right on your histogram compared to the other colors, then your white balance may be skewed to blue.
This photo, taken of an aquarium, is skewed to blue.
After adjusting the color, the histogram has shifted.

To adjust the color, click on the neutral color picker, and then on a neutral area of the photo.

1  

The color is now more balanced.

2
OK, so how do I get started?

• If your camera has exposure compensation or manual aperture or shutter settings, pick a subject and experiment with shooting the same subject with different settings. Or use different “scene” settings available in your camera. Check the histogram if your camera has one. Camera apps on your phone can also be fun for experimentation. Be aware of how the exposure affects your image.

• Experiment with Picasa or another photo editing application which shows image histograms. Choose an image and play around with the sliders to make adjustments.

• Remember, obvious over or underexposure is detrimental to your image. But let your vision determine the “right” settings for each image.
Challenge yourself

- Experiment by taking photos that are properly exposed high key and low key images, and also with low contrast images.
- Draw some random histograms, then try to take photos that reproduce the histograms.
- When you look at photos, try to imagine what their histograms would look like.
Resources

1- The help screens of Picasa or other photo editing software.


3- More detailed information on histograms:
   http://www.luminous-landscape.com/tutorials/understanding-series/understanding-histograms.shtml

4- CPA presentations (http://caryphotographicartists.org/education.html):
   • Computer Editing
   • Understanding Your Histogram
   • Photography Fundamentals

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