Understanding Your Histogram

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November 8th, 2007
Understanding Your Histogram

- Understanding image histograms is probably the single most important concept to become familiar with when working with pictures from a digital camera.

- It's the greatest invention since the built-in light meter.

- The ability to interpret histograms is key to getting proper exposures with your digital camera.

- It will not only improve your skills on the computer, but as a photographer as well.

- An image histogram is a histogram of the values of the pixels in a digital image.

- The histogram plots the number of pixels in the image (vertical axis) with a
What is a Histogram?

Population of NY County
Source: US Census Bureau

Shadows | Mid-tones | Highlights

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<th>Highlights</th>
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What is an Image Histogram?

- Each pixel in an image has a color which has been produced by some combination of the primary colors red, green, and blue (RGB).
- Each of these colors can have a brightness value ranging from 0 to 255 for a digital image of 8-bits.
- A RGB histogram results when the computer scans through each of these RGB brightness values and counts how many are at each level from 0 through 255.
- Other types of histograms exist, although all will have the same basic layout as the histogram example shown below.
A histogram simply gives a summary of the image's tonal values.

It tells nothing about how the individual pixels are arranged.

So how the pixels were arranged does not affect the histograms.
The region where most of the brightness values are present is called the "tonal range."

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.

The above image is an example which contains a very broad tonal range, with markers to illustrate where regions in the scene map to brightness levels on the histogram.
High and Low Key Images

- Histograms can be quite different looking depending on the content of the image. There really isn't just one proper histogram for any given image.

- To take advantage of the information supplied by an image's histogram, you have to be able to visually interpret the image content, taking into consideration the location and approximate percentage of highlight, shadow, and mid-tone pixels in the image itself.
A low key image with lots of dark and shadow areas will produce a histogram graph that is mostly center and left of center.

Most cameras will produce mid-tone-centric histograms when in an automatic exposure mode.

Underexposure is usually more forgiving than overexposure. Detail can never be recovered when a region becomes so overexposed that it becomes solid white. When this occurs the highlights are said to be "clipped" or "blown."
High Key Image

- A histogram of a high key image with a majority of the content being very bright will produce a histogram that has most of the histogram graph located from the center to the right of center.
- A good rule of thumb is that you will need to manually adjust the exposure whenever you want the average brightness in your image to appear brighter or darker than the mid-tones.
In-Camera Examples

Camera’s Correct Exposure

Plus One F-stop in Camera

Minus One F-stop in Camera
Exposure Examples
Different Types of Image Histograms

- **Highlight**: 220R-220G-232B
- **Midtone**: 127R-122G-117B
- **Shadow**: 55R-51G-46B
Contrast

- A histogram can also describe the amount of contrast.
- Contrast is a measure of the difference in brightness between light and dark areas in a scene.
- Broad histograms reflect a scene with significant contrast, whereas narrow histograms reflect less contrast and may appear flat or dull.
Adjusting Tonal Range

• You can shift the tonal range (the histogram) around to lighten, darken or adjust the contrast in an image.
Tonal Range Example
Tonal Range Example
Resources

- http://www.cambridgeincolour.com/tutorials/histograms1.htm
- http://www.dpreview.com/learn/?/key=histogram