B. I. P. C.

Bainbridge Island Photo Club
Serving Bainbridge and North Kitsap

September 2009

Wednesday September 9 Club Meeting
Competition Night at the Commons

In September, we return to our usual schedule on the second Wednesday of each month. This is a competition meeting, and the Special Subject is "Silhouettes and/or Shadows". E-mail digital entries by September 4, and check in prints by 6:45 PM at the meeting.

DISG

The Digital Study Group will meet Thursday, September 17 at 10:00 AM at the Madison Avenue Fire Station.

Jeff Hummel Photo Exhibits

Jeffery Hummel, who was our guest speaker in February and our guest critic in May, has an exhibit of monochrome architectural images on display at Andante Coffee (on Bjune Drive on Bainbridge) through the end of September. He also has a show going up the first of September at the Zeitgeist coffee shop in Pioneer Square in Seattle.

NWCCC Conference

The Northwest Council has its Fall Conference on November 14 at the Museum of Flight, featuring speakers, displays, awards, and lunch, as well as all the great stuff at the Museum. For details, go to **http://www.nwcameraclubs.org/** and click on "2009 Conference".

Abbotsford Photo Seminar

The Abbotsford Seminar is coming up October 17 – 18, and the deadline for entering images is September 4. For information, see **http://www.apac.bc.ca/seminar.html**

JPEG: How'd They Do That??

We all use JPEG files, for storing images on memory cards, for sending them as e-mail attachments, and for putting them on web sites. They are useful because they reduce the file size by typically 10:1 or more, while producing images that are usually indistinguishable to the eye from the original. Aren't you at least a little curious how that trick is accomplished? I'll try to take you behind the curtain and explain how the magic works. I promise the math won't be too painful.

JPEG (which derives from "Joint Photographic Experts Group") relies on two things. First, in real photos, most pixels are actually quite similar to neighboring pixels. And second, the human eye and brain are very good at seeing certain aspects of pictures, but very poor at seeing others. So if you mess up only those things that people can't see, no one will ever know!

The original image has 3 numbers for each pixel: R, G, and B, representing the amount of red, green, and blue at that point. The first step in making a JPEG is the convert those to 3 different numbers called Y, C_b, and C_r. Y is the brightness, an average of R, G, and B. The numbers C_b and C_r are the relative amounts of B and R respectively. We still have 3 numbers for each pixel, so there is no advantage yet.

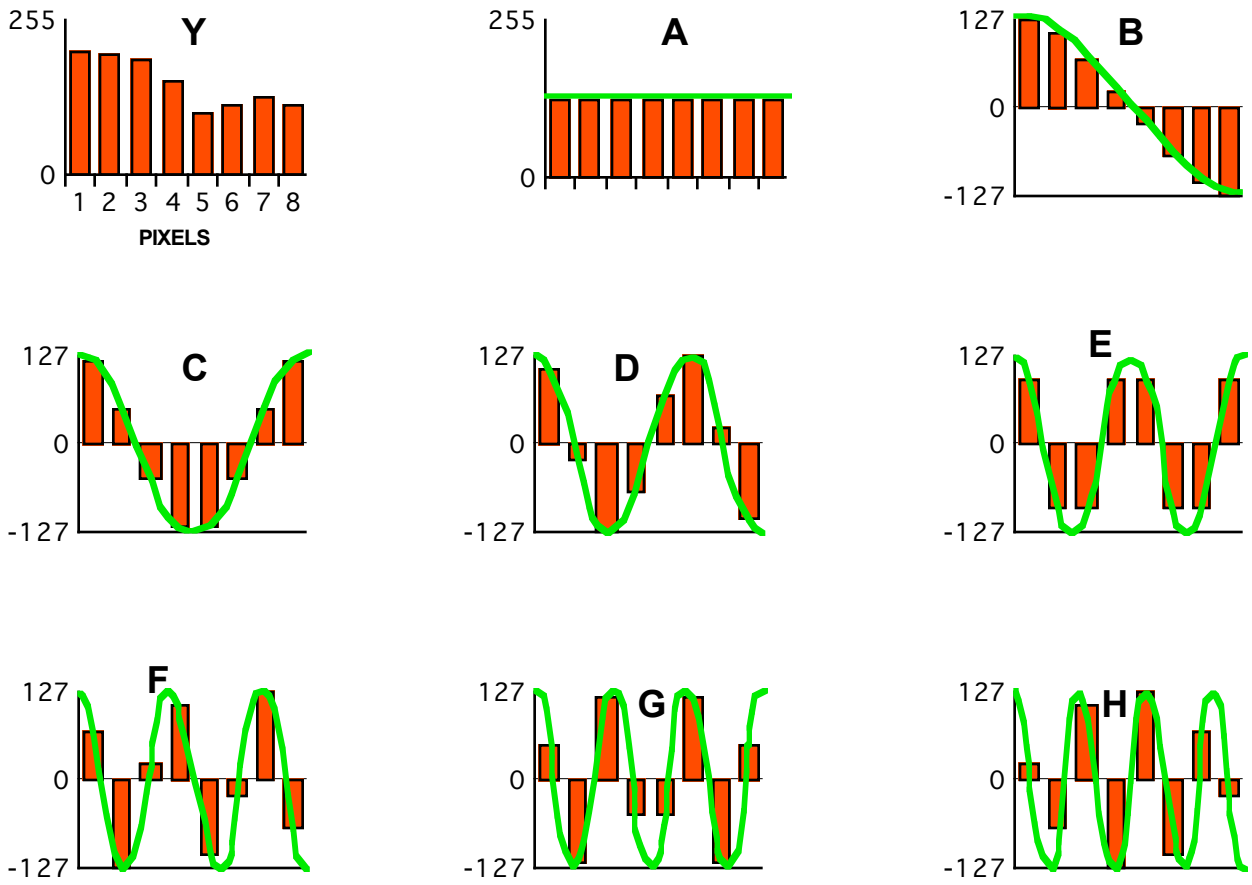
We save all the brightness numbers, but throw away three-quarters of the color numbers, keeping them only for every fourth pixel. The full resolution in brightness keeps the picture looking sharp. The color information is slightly blurry, but it fools the eye, and cuts the file size in half.

Now we process the brightness numbers. (We will also do exactly the same thing for the color numbers.) We divide the picture into "blocks" of 8x8 pixels (64 pixels in a block), and process one block at a time.

For each block of brightness numbers, we do a mathematical operation that goes by the somewhat intimidating name of "Discrete Cosine Transform". (It's roughly the same thing as a Fourier Transform, in case any of you dimly recall sleeping through a class in that sometime in the previous millennium.) The idea is that any arbitrary set of brightness numbers can be exactly recreated by adding up a series of sinusoidal curves. So instead of retaining all the brightness numbers, we can just retain the recipe for recreating them, specifying how much of each curve to use.

Say that Figure Y (on the next page) represents the brightness of eight consecutive pixels in our image. Mathematically, we could recreate this brightness pattern by adding up appropriate proportions of the sinusoidal curves A, B, C, D, E, F, G, and H. We would need eight numbers in our recipe, specifying the amounts of curves A through H to use.

Our real photo is two-dimensional, and we have blocks of 8x8 pixels. To recreate the brightness numbers for all 64 pixels in the block, we need 64 different curves, fluctuating in both horizontal and vertical directions across the block. So the recipe for recreating the block will have 64 numbers, specifying the amounts of each curve to use. We still need 64 numbers for the block, so there is no advantage yet from all this work.



But it turns out that the curves are not all equally important. For the image to look good to the human eye, we need to accurately specify the amounts of the slowly changing curves like A, B, and C. For the intermediate curves, like D and E, we can be a bit sloppier. As for the rapidly changing curves like F, G and H, it's sometimes important to have them in the recipe, but the exact amounts are not very critical.

So for curves like A, B, and C, we need to specify the amounts precisely, say to one of 256 possible amounts. For D and E, we might round off to one of 64 possible amounts (using fewer bits). For F, G, and H, we might round off more crudely to one of 8 amounts. Which amounts get rounded off how much is the major variable in choosing different JPEG quality levels for different degrees of compression.

In real photos, most pixels resemble their neighbors. So they mostly need curves like A and B, and only a little bit of G and H. So in most blocks the amount of curves like G and H is just rounded off to zero.

The two-dimensional blocks have 64 pixels and thus 64 potential curves in the recipe. If the block is in a patch of clear blue sky, it might only need one flat curve, like A, in the recipe. A block with significant detail or edges might need four to eight curves accurately specified, plus another 16 to 32 with the amounts rounded off. Rarely if ever would a block require the full set of 64 curves.

By specifying the amounts of only those curves really needed in the recipe, and only with as much precision as needed, JPEG achieves great compression of file size. If you are motivated to look into this further, one place to start is **http://en.wikipedia.org/wiki/JPEG**

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Sign Up To Exhibit Photos

We have a great opportunity to display our work for two months in a well used, uncluttered venue and possibly sell some images. The Marge Williams conference room, where we will be, is used by small groups of people who, while conducting other business, will not be distracted by other people walking around or engaging in personal conversations. They will mostly be around a conference table. Each person will face some of our displays, while others will be easily accessed, directly behind them.

We expect that selected participants (club members only) will each be able to display 4 to 5 images, depending upon size. Individual displays will be expected to be along a single theme chosen by each participant. At least one image should be 16 x 20, but others can go to 11 x 14 or 8 x 10. All must be mounted, in a black frame, and behind glass or Plexiglas. All images can be marked for sale. The Marge Williams Center does not expect a commission, but will appreciate a donation (tax deductible) of 5 to 10%. Very generous on their part!

Please contact me at **normwooldridge@comcast.net** to let me know of your interest in participating.

Norm Wooldridge