

Digital Photography 101

Useful definitions

- **Pixel (Picture Element):** a single “dot” in a digital image
- **Megapixel:** 1 million pixels (mega = million)
- **MB:** a megabyte of computer storage, a million bytes (approximately)
- **Pixel Size:** the number of horizontal and vertical pixels that make up a picture, e.g., 1600 x 1200 pixels
- **Image Resolution:** the number of pixels per inch (ppi) that make up an image on a monitor (72 to 90 pixels per inch) or the number of dots per inch (dpi) that make up an image on a printer (240 to 300 dots per inch)
- **Picture Size = Pixel Size / Image Resolution**
 - Example: 1600 x 1200 pixel picture displayed on a monitor is $1600 \times 1200 / 72 = 22.2'' \times 16.7''$
 - Example: 1600 x 1200 pixel picture displayed as a print is $1600 \times 1200 / 300 = 5.3'' \times 4.0''$
 - Note: Picture Size is often called Resolution, as in the number of pixels per picture
- **Compression:** a technique to reduce the picture file size but with some loss of image quality
 - Jpg: the typical compressed file format; pronounced j-peg
 - Fine (or High) Quality: larger file size and better image quality
 - Normal: smaller file size but lower image quality
 - 1600x1200 pixel example: 6 MB without compression, 1 MB at fine compression, ¼ MB at normal

What you need

- **Digital Camera:** 3 to 5 megapixels optical zoom lens
 - 3 megapixel is enough for displaying an image on the computer screen
 - For prints, 3 megapixel can easily make a 4x5 print; 5 megapixels can easily make an 8x10 print
 - Note: not all camera pixels are created equal; pro cameras have larger pixels, not always more
 - Suggestion: buy your first digital camera locally so that you can handle the camera and ask questions
- **Larger Memory Card:** 128MB or larger
 - Memory Card Picture Capacity = Memory Card Storage / Average Picture Size
 - Example: 128 MB Memory Card / 2 MB Average Picture Size = 64 pictures

What may be useful

- **Extra set of Rechargeable Batteries** – digital cameras drain batteries very quickly
- **Lens Cleaning Cloth** – to remove fingerprints or dust from a lens
- **Polarizing Filter** – use to darken blue skies or reduce reflections when the sun is 90° to your left or right
- **External Flash Unit** – more powerful than the built-in flash and less chance of red-eye
- **Camera Bag** – to carry your camera, extra memory card, and extra battery
- **Computer, Software, and Printer** – for picture file storage, editing, printing, and e-mail transfer
 - A laptop computer or a picture storage device may be useful for storing pictures on long trips

What can I do with my digital camera

- Send pictures while on a vacation to family back home via a computer and e-mail
- Photograph your home for insurance purposes, put picture data onto a CD, place in safe deposit box
- Take pictures at a party that your wife can not attend so that she can see the people; delete afterwards
- Photograph and restore your old photographs and slides to make a family history slide show
- Show off your digital prowess to your kids and grandkids

What you need to know

How to transfer picture files from your camera to your computer

- **USB Cable:** connect an USB cable between the camera and a computer
- **Memory Card Transfer:** remove the memory card from the camera and insert the memory card into a computer or printer memory card slot or adapter

How to send a picture by e-mail

You should reduce the number of pixels in your image BEFORE you e-mail it: the number of pixels in the longest dimension of the picture being e-mailed should not be more than 800 to 1000 pixels. For example, if your original picture size is 1600 by 1200 pixels, the file to be mailed should be half that size, or 800 by 600 pixels.

To accomplish this, software is needed. Most cameras come with software that offers the ability to change the picture size or you may have purchased a picture edit program. In some cases, your e-mail program may offer this ability to e-mail a picture file - this will usually reduce the picture size automatically (e.g., in Windows XP, open Explorer, select *name.jpg*, and select *E-mail this file* from the menu at left).

To change resolution in many programs, look under the pull-down EDIT for some entry involving resolution. Or, see if there is a pull-down labeled TRANSFORM for an entry labeled Resize. If all else fails, look in the index for the software's manual for a Resolution or Resize entry. The one concern here is to make sure the vertical and horizontal proportions remain the same. If the original 1600 by 1200 pixel picture's horizontal dimension of 1600 pixels is reduced by half to 800, set the vertical dimension to the same reduction, half of 1200 pixels is 600 pixels. Most software allows you to do this automatically.

1. Move your picture files from your camera to a computer folder
2. Open the picture file in an image editing program; crop, rotate and edit as needed; save in the file format of the image editing program (not jpg)
3. Convert the picture to the final image size (e.g., 600 pixels x 800 pixels) and resolution (e.g., 72 ppi), sharpen, and save as a new jpg file at medium quality (e.g., if the original file is IMG_200.jpg, you might name the new file, IMG_200 mail.jpg)
4. Send an e-mail with this file attached

How to view your pictures

If you don't want to make your own prints,

- Take your memory card to a store that prints digital images; e.g., Color Services, Armstrong Photolab, Goleta Camera, Costco, Ritz Camera, Longs Drug, Rite Aid Drug
- Send your image via the internet to a web site that prints digital images; see a list of websites at www.steves-digicams.com/digresources.html#photo

If you own a printer that accepts your camera's memory cards

1. Insert your camera's memory card into the memory card slot of photo printer; for reviews of printers, see www.steves-digicams.com/printers.html
2. Select an image and print

If you own a computer and printer

1. Move your picture files from your camera to a computer folder
2. Open the picture file in an image editing program to crop, rotate and edit as needed; save the picture in the file format of the image editing program (not jpg); e.g., Adobe Photoshop Elements, Adobe Photoshop, JASC Paint Shop Pro, see also www.steves-digicams.com/digsoftware_editors.html
3. Convert to the final image size (e.g., 8"x10") and resolution (e.g., 300 dpi), sharpen, and save the picture file as a separate file in the file format of the image editing program; print the picture on photo paper

If you own a computer and want to make a slide show

1. Move your picture files from your camera to a computer folder
2. Open the picture file in an image editing program; crop, rotate and edit as needed; save in the file format of the image editing program (not jpg)
3. Use slide show software to create a slide show; e.g., Adobe Photoshop Album, Cerious Software Thumbs Plus, see also www.steves-digicams.com/digsoftware_albums.html
4. Display the slide show on your computer or e-mail the slide show to another person

Important stuff

1. Back up your photos: as with any backup, keep two copies (e.g., one copy in the computer and the second copy on a CD or external hard disk, or two copies on separate CD's); keep each copy at a different location
2. Don't overwrite your original picture file from your camera. For a good picture, I might save the following:
 - *Name.jpg*: the original file from the camera (2 MB file for a 5 MP camera)
 - *Name.psd*: the file edited in Photoshop (14MB to 60+MB file depending upon complexity)
 - *Name 8x10.psd*: the file used for printing (21 MB file for an 8" by 10" print)
 - *Name net.jpg*: the file attached to an e-mail (0.1 MB, 20 seconds to transmit with a modem)
3. Don't use the camera's digital zoom feature – use software if you must enlarge an image
4. Don't set the camera's compression too small to save memory space – too much compression can ruin an image; use at least a middle setting; consider buying a larger memory card instead
5. Don't set the camera resolution too low to save memory space – the lost detail can not be replaced; use the highest resolution if at all possible; consider buying a larger memory card instead
6. Buy and learn some software beyond what came with the camera – external image editing software is better
7. Take time to learn your camera and software before an important photographic event occurs
 - Idea: setup a photographic assignment such as creating a set of pictures of your home town
8. Organize, organize, organize: don't lose track of your picture collection
 - Move your picture files from your camera to a computer folder that you can recognize; I name my folders after the date and the subject, e.g., *C:\ 2004 Pictures \ 03-18 Ellwood Butterfly Preserve*

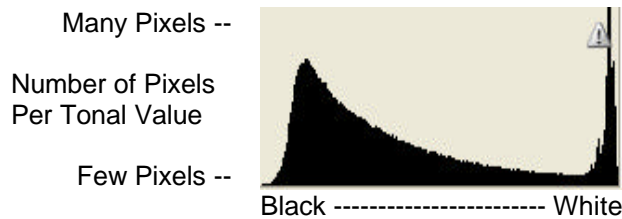
Facts of life

- The colors in your print may not match the colors in your image viewed on your monitor – this can be fixed but it's complex
- Batteries may lose their power if the camera is used a lot, especially with the LCD display and with flash – consider buying a spare battery
- Pictures of people taken by small cameras with their built-in flash will often have red-eye – if possible, have them turn their head slightly and not look directly into the camera, or fix later on with software
- Take lots of pictures – it's cheap; deleting bad pictures afterwards is a good thing to do
- It's easy to forget this stuff – write down the steps needed to perform common procedures
- Better camera and printers will appear each year for the next few years – but why wait, go for it!
- Computers and cameras will fail at some point in time – backup, backup, backup
- Take your time learning this new technology – remember, it's meant to be fun

More digital camera features to think about

- **Auto**: a camera setting for point and shoot operation; works well in bright sunlight
- **Zoom Lens**: a lens that can make the image larger or smaller
 - Zoom at wide angle position: smaller image but can capture a wide angle of view (landscapes)
 - Zoom at telephoto position: larger image but its easy to blur the image if handheld – use a faster shutter speed
 - Don't take close-up pictures of people with the zoom at full wide angle – not very attractive
- **ISO Speed or Film Speed**: control how much light is needed for a properly exposed picture
 - Slow film speed (50 or 100): needs more light but picture is very clear
 - Fast film speed (400): need less light but picture may contain colored spots (i.e., digital noise)
- **Aperture Priority Mode**: you pick the lens opening and the camera calculates the shutter speed
 - f/2 to blur the background; f/8 to make foreground and background in focus
- **Shutter Speed Priority Mode**: you pick the shutter speed and the camera calculates the lens opening
 - 1/30 to blur a waterfall; 1/500 to stop action
- **Light Metering**: the method used by the camera to measure light and then calculate the exposure
 - Matrix or Standard: camera measures light at many parts of the image and calculates an “intelligent” average – best for most situations

- Center-Weighted: camera measures light at many parts of the image but favors the lighting near the center of the image – best for back-lighting
- Spot: camera measures light at one small part of the image – best when the subject is very different in brightness from the background
- **White Balance:** the method by which a digital camera attempts to get the colors right
 - Auto: the camera makes a best guess at color correction – good in daylight and flash
 - Specific settings (Daylight, Cloudy, Flash, etc): the camera corrects the color for this specific lighting condition – does a better job than Auto but you must remember to set it correctly
- **Sharpening:** a process applied to an image in the camera or in software to make the image “appear” clearer
 - If you use software, perform sharpening in software, not the camera
- **Black & White Mode:** a process applied to an image in the camera or in software to make the monochrome
 - If you use software, convert the color image to monochrome in software, not the camera
- **Red-Eye Reduction:** the camera’s flash fires twice – first to reduce the size of the subject’s iris, and then to take the actual picture – this causes a delay in taking the picture and can be annoying
- **Exposure Bracketing:** the camera takes 3 pictures when you press the shutter – one at the calculated exposure, one slightly over-exposed, and one slightly under-exposed, in the hope that one of them is perfectly exposed; you can delete the 2 less-than-perfect pictures
- **Histogram:** a display showing the distribution of tonal values from dark to bright



This image had good shadows since no pixels were totally black but did have some highlights where the pixels were pure white and thus lost detail. Solution: slightly reduce exposure. In general, it’s better to lose some shadow detail than to lose highlight detail.

- **RAW:** an advanced method of obtaining the camera’s original data without modification allowing the user to perform exact white balance color correction and exposure control – don’t use RAW files when you are learning but plan to use this in the future if your camera offers this option.

I’m still confused – where else can I find help

- Adult Education: City College, UCSB, Clik and Go (www.clikandgo.com)
- A friend – find another person learning digital photography and take pictures together
- The Internet – there is an amazing amount of information; see www.shortcourses.com/using/index.htm, and luminous-landscape.com/ at *The Understanding Series* for more advanced topics
- Books: *Shooting Digital*, *Digital Photography for Dummies*, *The Hidden Power of Photoshop Elements 2*

Web Sites

- www.steves-digicams.com/
- www.imaging-resource.com/
- luminous-landscape.com/
- www.dpreview.com/
- www.creativepro.com/
- www.kodak.com/US/en/digital/dlc/index.jhtml
- www.microsoft.com/windowsxp/digitalphotography/

Newsgroups

Digital Photography

- rec.photo.digital

Photoshop

- alt.graphics.photoshop
- comp.graphics.apps.photoshop

Important Disclaimer: you should realize that we have not tried many of the products and services referenced in this presentation; they are listed for your convenience and future investigation – Dan Moore and Bob Rottenberg