Consumer Needs for Digital Imaging

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Abstract

The most successful digital imaging products in the consumer segments being offered by traditional photo-finishers have been pictures on disk and images over the Internet. Consumer's image quality requirements for these products are in some way vastly different, but also very similar to Silver Halide Imaging. In today's world of digital imaging, computer monitor displays and desktop color, the consumer still has the same expectation for image quality being delivered by Silver Halide, but with the flexibility promised by purveyors of digital technology. This is a singularly difficult task due to the absence of control over the user's environment. Adoption of standards such as ColorSync 2.0 and development of better scene balance algoritms etc will help. However, it is becoming increasingly obvious that new tools and educational programs are needed to effectively meet the requirements of the digital consumer. We have developed and deployed some tools that have been very effective in educating and helping consumers enjoy their digital images.

Introduction

Eastman Kodak's well known Imaging Scientist, Ralph Evans is sometimes quoted as saying **"a good quality image is one that does not offend you."** While Evan's work spanned the decades of the 1930's, 40's, and 50's, his statement is equally true in today's world of digital imaging, computer monitor displays and desktop color printers. Usually "poor quality" images are not the result of "offensive" subject matter. Rather, they fall short of our expectations with respect to one or more critical image quality attributes. This has created a brand new set of challenges that need to be resolved for consumer digital imaging to achieve mass market status.

Products

Other than digital cameras, some products that have enjoyed a modicum of commercial success are Picture's on Disk and Internet Delivery of consumer images. The concept behind Internet Delivery is that a customer sends their roll in for processing and requests Internet Delivery of their images along with their prints. In the lab, the roll is scanned, unloaded to a server and made available to customers on the Internet. Notification of image availability is through e-mail or a postcard in the mail. First time users receive a user name and password that allows them access to the images . Once on the net, they will have the ability to download the low resolution images, send the images in a e-mail or order a variety of gifts such as mugs and t-shirts. Picture on Disk is a derivative product in which the low resolution images are stored on a disk and delivered to the customer through mail or picked up at the store.

Tools

The common thread for all these products are that the images have to be viewed on a monitor. To help customer's get the best image quality on their displays, the following step by step guide was very effective. In this guide we only concenterated on color resolution, room lighting, brightness and contract and color cast.

Color Resolution

Your first step should be to select the largest number of colors, or *color resolution*, that can be displayed by your monitor and video card.

Windows 95
- From the **Start** menu select **Settings … Control Panel**.
- Within **Control Panel**, double click **Display**.
- Select the **Settings** tab.
- Under the **Color Palette** menu, several choices should be available, depending on the capabilities of your graphics card. Typically the choices are **256 Color, High Color (16 bit),** and **True Color (32 bit)**. Choose the highest practical setting. Avoid **256 Color**.

Macintosh
- From the **Apple menu** select **control panels.**
- Within **control panels**, double click on **monitors.**
- Under the **Color Depth** menu, several choices should be available, depending on the capabilities of your graphics card. Typically, the choices are **16, 256, thousands,** or **millions.** Choose the highest practical setting. Avoid less than 256 colors.

Room Lighting

The color and lighting surrounding your monitor can have a significant effect on displayed pictures. An "ideal" viewing environment can be costly and time consuming to construct. Following are some steps you can take to make your viewing environment better. They are listed roughly in order of importance.

Avoid windows
Place your monitor in a room without windows. If a window is unavoidable, consider installing an opaque shade. If the window must remain unshaded, locate your monitor so that the window is not in your direct field of view, and window light does not shine directly on the monitor face.

Consider the surround
The other things you can see around your monitor from your normal seating position constitute the "surround." The area closest to the monitor, within about one screen width, is the most critical. Ideally, this area would be neutral gray in color and about as bright as a middle gray displayed on the monitor. One way to accomplish this is to place the monitor a few feet away from a gray wall, and illuminate the wall with a small fluorescent lamp placed behind the monitor.

Control reflections
Lights or brightly colored objects located *behind* your seating position can be reflected in the monitor screen, distorting the tones and colors of the displayed picture. A black painted wall or black curtain behind you is an ideal solution. Or you can turn your monitor OFF and check for visible reflections. Moving a few lights or light colored objects, or reorienting the monitor, can make a major improvement.

Brightness and Contrast Adjustment

The brightness and contrast controls on your monitor can effect the appearance of any pictures you display. The following procedure should get you very close to the "best" adjustment points. However, please understand that the procedure has had very limited testing so far, and results may vary depending on your monitor and room lighting conditions.

1. Set both the brightness and contrast controls on your monitor to a midrange position.
2. Display the image FOTOCAL.TIF. **(Figure 1)**
3. Adjust the brightness control first. The brightness control effects mainly the shadow tones in your pictures. Turn the brightness control UP until patches A, B, and C are all visible within the black area. Now turn the brightness control DOWN until patch A just "disappears" into the black background. Note: This is your maximum brightness setting.

Now turn the brightness control DOWN even further until patch B disappears into the black background, then back UP until patch B is just visible. This is your minimum bright-

ness setting. If the lower limit of brightness adjustment is reached before patch B disappears, use the lower limit as your minimum brightness setting. Set the brightness control about midway between the maximum and minimum settings.

Adjust the contrast control next. The contrast control mainly effects the highlight tones and overall contrast in your pictures. Turn the contrast control all the way UP, and note whether any of the following things happen:
   ·Patch E disappears into the white background.
   ·The text in FOTOCAL.TIF becomes blurry.
   ·The WHITE area becomes brighter than a white area in your hard copy picture.

If patch E disappears or the text becomes blurry, turn the contrast control DOWN just enough to eliminate these artifacts. Otherwise, you may set the contrast control any-
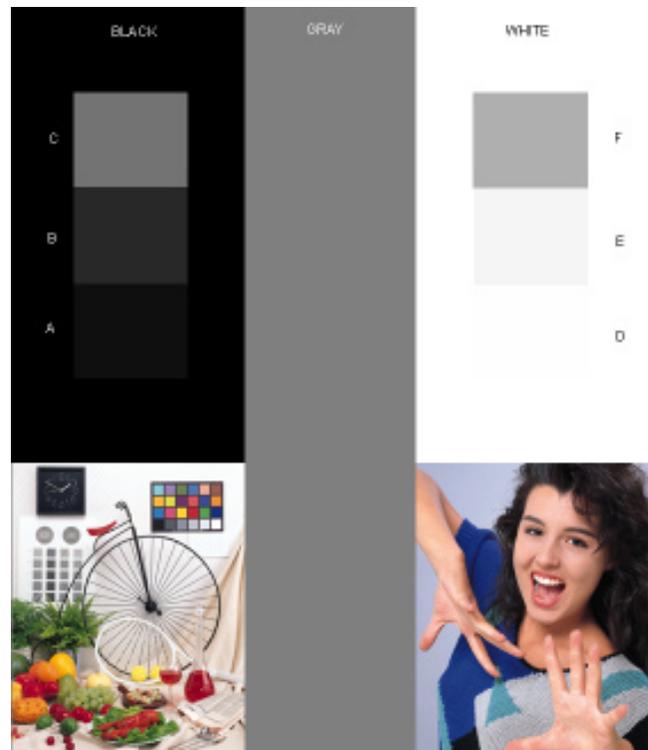

Figure 1(Fotocal.TIF)

where in the range between the maximum setting and a setting that matches the brightness of the WHITE area to a white area in your hard copy picture.

4. Repeat the brightness and contrast adjustments until no further change is necessary.

Patches C, F, and GRAY should now appear approximately the same in lightness and color balance.

Patch B should be just lighter than BLACK, and patch E should be just darker than WHITE.

Patch A should not be visible, and patch D may or may not be visible, depending on your monitor and room lighting conditions.

The pictures in FOTOCAL.TIF should look good, with good tone reproduction, color balance, clean highlights, black shadows, and no loss of detail in either the highlights or shadows. (It is normal for some of the very dark areas in the model's hair to appear solid black, with no detail.)

Color Balance

If patches C, F, and GRAY are not neutral gray in appearance, your monitor may be improperly color balanced. If that is true, there may be little that you as a user can do to correct the problem, short of having the monitor adjusted by a service technician. Your pictures will probably appear to have a color cast similar to that of FOTOCAL.TIF.

One way to make a color cast less noticeable is to view your images in a dark surround. Turn off the room lights, and display only your image on the screen, making the non-image screen area black. The eye tends to adapt to the image itself, and color balance may appear better.

If you have a full featured image editing program, such as Adobe Photoshop®, you may be able to use its capabilities to correct a color cast. Either of two approaches can be taken with Photoshop:

To correct the appearance of your pictures without modifying the digital images, use Photoshop's monitor calibration feature (FILE…PREFERENCES…MONITOR SETUP…CALIBRATE). This feature only changes the appearance of images when they are viewed using Photoshop.

To change the digital image itself, use one of Photoshop's image adjustment features:

- ✧ IMAGE…ADJUST…LEVELS
- ✧ IMAGE…ADJUST…CURVES
- ✧ IMAGE…ADJUST…COLOR BALANCE
- ✧ IMAGE…ADJUST…VARIATIONS

After the digital image has been modified, it can be viewed with Photoshop or with other image viewing software.

Conclusion

This is just one example of a tool that can be used to help consumers achieve better image quality. We expect to see an amazing number of tools to be appearing on the market that have the dual purpose of educating the consumer as well as helping them achieve better image quality.