

Appearance analysis of different digital cameras

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Introduction

This is a study to determine if there is a difference in color appearance between consumer and pro-level digital cameras in a color managed workflow.

Resources

1. Digital cameras:
 - Kodak DC260 (consumer \$900 MSRP)
 - Nikon Coolpix 5000 (mid-level \$1500 MSRP)
 - Nikon D1X (pro-level \$7000 MSRP)
2. Profiling software:
 - Kodak Colorflow - digital camera profile
 - GretagMacBeth 4.1 - printer profile
3. Scene: Macbeth ColorChecker & assorted fruits

Procedures

1. Image capturing
 - Assemble pictorial image of fruits. Take pictures with each camera. Use automatic settings.
2. Digital camera profiling
 - Using the MacBeth ColorChecker and Kodak ColorFlow, create 3 different ICC profiles, 1 for each camera.
3. Color management
 - Open up the pictures in Adobe Photoshop with the default camera profile, sRGB. Convert the pictures to CMYK using the provided Heidelberg M-1000B profile (created by GretagMacBeth 4.1) and perceptual rendering intent. This is what was done for Figures 1, 3, and 5. In addition, for Figure 2, 4, and 6, the sRGB input profile was replaced with the custom camera input profile created by Kodak Color Flow.

Discussion

The image from the Nikon D1X camera (Figure 6) looks slightly warmer than the other two. As long as image size is 100% or less,

the 3 images (Figures 2, 4, and 6) look very similar. If the images are enlarged to 300% (See Figures 7, 8, and 9) then it becomes apparent that there are major differences in sharpness and detail.



300% enlarged image. The graininess in the banana and apple is visible.

Figure 7. DC260Enlarge.tif



300% enlarged image. Image details look good but not sharp as D1X.

Figure 8. CP5000Enlarge.tif



300% enlarged image. This image looks sharp. Graininess is the least.

Figure 9. D1XEnlarge.tif

Conclusion

There are many different types of digital cameras ranging from the consumer level to the professional level. Besides a large difference in price, professional cameras offer higher capturing resolutions, more memory, and extended features.

Color management enables color rendering abilities in all cameras. for consumer level or pro-level camera. However color management systems cannot compensate for lack of spatial resolution.



Figure 1. KodakDC260_neel_raw.tif
sRGB profile to Heidelberg profile

File size: 4.56 M, Bit depth: 8, Exposure time: 1/14 sec., F stop: 3.0, Focal length: 13.6 mm



Figure 2. KodakDC260_neel_CMS.tif
ColorFlow profile to Heidelberg profile



Figure 3. CP5000_neel_raw.tif
sRGB profile to Heidelberg profile

File size: 14.1 M, Bit depth: 8, Exposure time: 1/5 sec., F stop: 3.8, Focal length: 14.9 mm



Figure 4. CP5000_neel_CMS.tif
ColorFlow profile to Heidelberg profile



Figure 5. D1X_neel_raw.tif
sRGB profile to Heidelberg profile

File size: 16.9 M, Bit depth: 8, Exposure time: 1/45 sec., F stop: 3.3, Focal length: 42 mm



Figure 6. D1X_neel_CMS.tif
ColorFlow profile to Heidelberg profile