Test and Research of The Soft Proof Based on The WCS

Jincheng Li,[1,2] , Jian Luo,[3]

(1 . Printing&Publish School, Hangzhou DianZi University Hangzhou 310037, China)

(2. College of Chemical Engineering,Nanjing Forestry University,Nanjing,210037,China)

(3. Zhejiang Industry&Trade Polytechnic, Wenzhou 325003, China)

Abstract

The WCS System based on Vista Operation System is a new means of promoting Color Management. With the development of renewed PC hardware and the increasing demand of better imaging in China, researching the practical effect of Color Management System based on WCS, according to recent software and equipment, is meaningful to the application of the WCS. Based on the Vista Operation System and WCS, implementing soft proofing and compare color difference and color gamut with the traditional ICC Color Management, then introduce the default custom operation setting. Research the cross-medium reproduction of color under this condition. The conclusion is that, WCS System is better than ICC Color Management, smaller color difference, wider color gamut and fine appearance of cross-medium reproduction.

Introduction

The quest for consistent color is always a problem in high-end printing and publishing industries. In 1993, the International Color Consortium (ICC) provide the ICC profile specification and made valuable contributions to advancing the color cause. Although the ICC standard has continued to evolve over the last several decades, whose latest version is V4.0 ,its solutions and standards have not been successful satisfying the needs of the vast majority of color users during years of practical implementations, for its flaws and inconsistency. Even worse, customers have grown weary of promises to "fix color management once and for all." [1].

Researchs in color science have continued to advance, mostly independent of modern computer operating systems and networks. Now the Microsoft Windows Vista operating system provides a new development platform for advanced color applications and devices called the Microsoft Windows Color System (WCS). The Microsoft Windows Color System provides the following benefits to customers: completely revamped color infrastructure and translation engine (CITE); Seamless interoperability with ICC-based workflows; easy-to-use; Important enhancements to Microsoft imaging codes as well as key improvements to the core color management and print infrastructure to support very specific target scenarios and so on. [1]

In 2006, at WinHEC ,we had a demo that showed the use of ICC and WCS by various applications and system components on Windows Vista. This allowed us to show how applications written to use ICM2 got WCS support "for free" via the WCS-in-ICC mechanism. Research and application have being continuing.

Experimental section

1. Instrumentation

Displayed value	L=38.8	a=15.2	b=16.4	Measured value	L=39.3	a=16.2	b=17.3	dE=1.49
	L=67.6	a=17.2	b=19.3		L=68.0	a=17.8	b=20.3	dE=1.20
	L=49.6	a=-3.1	b=-22.4		L=50.0	a=-2.9	b=-21.6	dE=0.92
	L=44.3	a=-13.3	b=22.0		L=44.8	a=-12.9	b=23.3	dE=1.45
	L=56.6	a=9.5	b=-24.4		L=56.9	a=10.3	b=-23.5	dE=1.25
	L=70.6	a=-32.6	b=0.7		L=71.1	a=-32.6	b=1.7	dE=1.08
	L=64.2	a=35.0	b=59.6		L=64.4	a=35.7	b=61.2	dE=1.80
	L=41.4	a=9.1	b=-43.8		L=41.2	a=9.5	b=-44.0	dE=0.48
	L=53.2	a=49.1	b=18.6		L=53.4	a=50.8	b=19.0	dE=1.81
	L=30.4	a=24.5	b=-22.8		L=30.2	a=26.0	b=-23.0	dE=1.49
	L=74.1	a=-23.7	b=57.6		L=74.8	a=-22.8	b=59.8	dE=2.56
	L=73.4	a=20.4	b=69.0		L=73.7	a=21.2	b=71.3	dE=2.47
	L=29.0	a=21.0	b=-55.3		L=28.7	a=20.8	b=-55.7	dE=0.59
	L=55.6	a=-38.2	b=30.9		L=56.1	a=-38.6	b=32.0	dE=1.20
	L=43.5	a=59.0	b=30.5		L=43.5	a=63.0	b=30.9	dE=4.03
	L=84.5	a=3.8	b=80.9		L=84.8	a=6.0	b=81.6	dE=2.32
	L=52.5	a=51.8	b=-12.8		L=52.5	a=53.6	b=-12.5	dE=1.85
	L=50.4	a=-27.4	b=-29.6		L=51.3	a=-27.7	b=-27.8	dE=2.04
	L=97.1	a=-0.1	b=2.4		L=97.2	a=1.8	b=2.8	dE=1.99
	L=82.0	a=-0.4	b=0.7		L=81.4	a=1.3	b=0.9	dE=1.81
	L=67.8	a=0.3	b=0.9		L=67.6	a=1.4	b=1.7	dE=1.30
	L=53.0	a=-0.5	b=0.4		L=52.7	a=0.6	b=1.1	dE=1.39
	L=37.1	a=-0.6	b=-0.2		L=36.9	a=0.8	b=-0.2	dE=1.32
	L=21.3	a=0.2	b=0.2		L=21.1	a=1.4	b=0.6	dE=1.29

Table1. Data of Windows XP-based Profile

Facilities and conditions:

(ⅰ)MonacoPROFILER4.8.3(now with 32-bit VISTA support);

(ⅱ)Microsoft Windows XP(ⅲ)ATI Radeon HD 2400XT(ⅳ);

Monitor:BENQ HDMI Senseye;(ⅴ) X-rite DTP94;(vi) screen illumination is moderate;(vii) The profile version is ICC.1:2004-10 (Version 4.2.0.0)

Displayed value	L=38.8	a=15.2	b=16.4	Measured value	L=38.3	a=15.4	b=15.5	dE=1.03
	L=67.6	a=17.2	b=19.3		L=66.3	a=16.7	b=19.2	dE=1.38
	L=49.6	a=-3.1	b=-22.4		L=47.9	a=-2.7	b=-22.4	dE=1.78
	L=44.3	a=-13.3	b=22.0		L=43.1	a=-13.5	b=20.3	dE=2.06
	L=56.6	a=9.5	b=-24.4		L=55.7	a=10.4	b=-23.9	dE=1.33
	L=70.6	a=-32.6	b=0.7		L=69.7	a=-32.7	b=-0.2	dE=1.29
	L=64.2	a=35.0	b=59.6		L=63.8	a=34.1	b=57.4	dE=2.33
	L=41.4	a=9.1	b=-43.8		L=39.9	a=11.0	b=-43.7	dE=2.40
	L=53.2	a=49.1	b=18.6		L=52.7	a=49.1	b=19.0	dE=0.62
	L=30.4	a=24.5	b=-22.8		L=29.4	a=26.8	b=-22.7	dE=2.45
	L=74.1	a=-23.7	b=57.6		L=73.5	a=-25.0	b=54.0	dE=3.85
	L=73.4	a=20.4	b=69.0		L=73.1	a=18.7	b=66.0	dE=3.44
	L=29.0	a=21.0	b=-55.3		L=26.9	a=25.5	b=-55.6	dE=4.98
	L=55.6	a=-38.2	b=30.9		L=54.6	a=-39.4	b=28.4	dE=3.01
	L=43.5	a=59.0	b=30.5		L=43.2	a=58.8	b=31.1	dE=0.64
	L=84.5	a=3.8	b=80.9		L=84.0	a=2.4	b=77.4	dE=3.75
	L=52.5	a=51.8	b=-12.8		L=51.6	a=52.9	b=-12.1	dE=1.61
	L=50.4	a=-27.4	b=-29.6		L=48.6	a=-25.8	b=-30.5	dE=2.55
	L=97.1	a=-0.1	b=2.4		L=96.5	a=0.5	b=2.6	dE=0.89
	L=82.0	a=-0.4	b=0.7		L=81.2	a=-1.0	b=0.2	dE=1.12
	L=67.8	a=0.3	b=0.9		L=67.0	a=-0.1	b=0.7	dE=0.98
	L=53.0	a=-0.5	b=0.4		L=52.3	a=-1.3	b=0.2	dE=1.09
	L=37.1	a=-0.6	b=-0.2		L=36.5	a=-0.6	b=-1.2	dE=1.20
	L=21.3	a=0.2	b=0.2		L=20.3	a=1.0	b=-1.0	dE=1.69

Table2. Data of Windows Vista™ -based Profile

Facilities and conditions:

(ⅰ)MonacoPROFILER4.8.3(now with 32-bit VISTA support);

(ⅱ)Microsoft Windows VistaTM Business 2007;(ⅲ)ATI Radeon HD 2400XT;(ⅳ) Monitor:BENQ HDMI Senseye LCD;(ⅴ) X-rite DTP94;(vi) screen illumination is moderate;(vii) The profile version is ICC.1:2004-10 (Version 4.2.0.0)

We make two types of monitor profiles. All data （table1,table2） are created by X-rite DTP94, the first profile(profileA) is based on Windows XP operation system, the other(profileB) is Microsoft Windows Vista™ Business 2007.These measurement are carried out with different operation system, but with the same software MonacoPROFILER4.8.3(this is the first release of MonacoPROFILER that supports Windows new VISTA operating system, which includes both enhanced features and maintenance improvements),and all of those are measurement-based profile according to ICC-Profile color management workflow. All facilities in these measurement are adjusted before experiment and have normal and stable performance. Then, describing the two profiles with 2D grapher (Yxy), 3D grapher(LAB) ,and comparison of each other as well(Figure1).

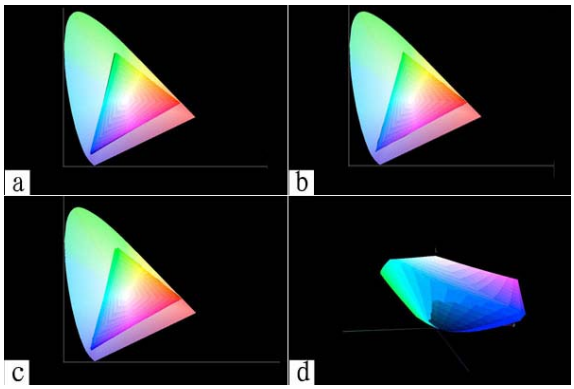

***Figure1**.gamut comparison of two profiles (a)* gamut of *profileA (2D grapher,Yxy). (b) gamut of profileB (2D grapher,Yxy). (c) gamut comparison of two profiles (2D grapher,Yxy). (d) gamut comparison of two profiles (3D grapher,Lab)*

The Next step is to install WCS on Microsoft Windows Vista™ Business 2007[2]. Default color-Profiles, baseline-device-models, and baseline-gamut-map-models are installed in color-resource-collection[3]. Then using the profiles(based on Microsoft Windows Vista™ system), the color infrastructure and translation engine (CITE), and plug-in extensions to create a color transform. CITE applies the color transform to input image content to create output content appropriate for the output device [4]. Finally, the new XML-based color profile(profileC) is created which contains color measurement data and associated color appearance model parameters that describe the circumstances under which the measurements are taken.

2. Synthesis

In the work described above, we have two profiles, one based on ICC Profile, another based on XML profile. Then，select one jpeg picture and embed these two profiles respectively with Photoshop CS1 , finally viewing theirs appearance under same viewing environment(Fig.2).The soft proof of CMYK color space is U.S.Web Coated(SWOP)V2.

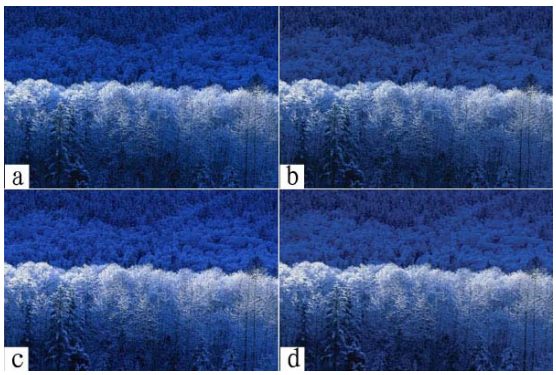

***Figure2.** soft proof of different profiles. (a) appearance of jpeg embedded XML profileC (b) corresponding appearance of soft proof (c) appearance of jpeg embedded ICC profileA (d) corresponding appearance of soft proof*

Each color space works best for the conditions used to define the space. Many of us need a uniform color space for real world viewing conditions. In 1978 the CIE adopted a standard called L*a*b*. It uses X,Y,Z as inputs. These values are linear transforms of the sensitivities of human cones. The X,Y,Z space has the valuable property that it can identify whether two adjacent patches on the retina will match. However if one wants to represent colors as they appear in everyday life, X,Y,Z space is a very poor space[5]. Now, In WCS we uses CIECAM02, a modern color appearance model designed to support a color management system, rather than CIELAB, a 30-year-old color difference equation. Kyuanos provides WCS with a color management system based on the CIECAM02 color appearance model.

From Figure2，we can easily find that the color gamut of image embedded XML profile(figure2(a)) is wider than that of ICC-based profile(figure2(c)), in addition, it has wider blue area(figure1(d)).

What's more, the WCS has explicitly supported for LCD monitors as well as traditional support for CRTs, scanners, and RGB and CMYK printers.

Conclusion

In summary, two type of profiles are created, one is based on ICC profile workflow and another is on WCS profile ,what's more, we compare color gamut and color difference with two profiles ,the fact is that WCS System is better than ICC Color Management, more precise color difference, widercolor gamut and appearance of cross-medium reproduction.

The new Windows Color System in Microsoft Windows Vista is the basis for a staged implementation of the next-generation color that just works solution. The core infrastructure and developer platform are based on state-of-the-art color science, built on the principles of transparency, modularity, and controllability, and provides a baseline for vendor innovation. profile can contain a greater dynamic range and improve accurate assessment of white and black.

References

[1] Windows Color System: The Next Generation Color Management System White Paper (2005). pg. 1-5

[2] WCS Use Case: Install WCS WinHEC 2005 Version (2005)

[3] WCS Use Case: Configure Color WinHEC 2005 Version - April23, 2005.pg.45-50

[4] Michael Stokes. Color Management Concepts. Microsoft Corporation Draft v. 0.7, March 5, 2001,pg.45-50

[5] Bruce Fraser, Chris Murphy Fred Bunting. Real World Color Management II Publish house of electronics industry, pg.111

Author Biography

Jincheng Li received the MS degree from Wuhan University,Wuhan, People's Republic of China in 2003. He is currently pursuing her PHD degree at Nanjing Forestry University. He interests include color management and color reproduction.