Color Loader

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PSYCH 221 Project

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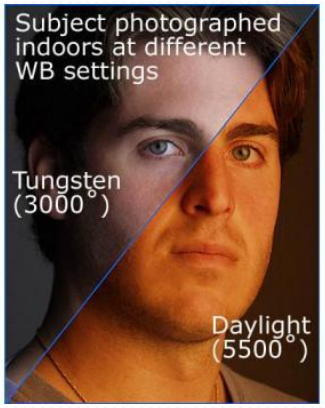
Motivation

- Color Balancing
  - Humans have color constancy – cameras do not!
  - Involved problem of restoring unknown surfaces and illuminants to “look right”.
  - Needs surfaces, lights, and cameras data to serve as test cases.



Motivation

- Online database for surface reflectances, illuminants, and camera sensors.
  - What's currently out there?
  - How can we improve upon what exists?

File Edit View History Bookmarks Yahoo! Tools Help

http://kobus.ca/research/data/colour_constancy_synthetic_test_data/index.html

Color Loader | Synthetic Data for Computatatio...

The Data

The camera sensors (gzipped).

Illuminants used for most of our experiments with real images. (gzipped) (info file).

Measured illuminants (normalized). (gzipped) (info file).

The derived set of training illuminants (gzipped).

The derived set of testing illuminants (gzipped).

The reflectance database (gzipped).

Several researchers have asked for specific subsets of the above reflectance dataset. Some were n
PR-630 spectraphotometer (380-780nm in 4nm steps).

- 1269 Munsell chips (gzipped).
- 355 Krinov reflectances (gzipped).
- 120 Dupont paint chips (gzipped).
- 170 natural objects (gzipped) (info file).
- 7 book covers measured by ourselves (gzipped) (info file).
- 21 samples of cardboard and construction paper (gzipped) (info file).
- 2 more samples of cardboard and construction paper (duplicates, likely not intended)
- 1 spectra of the wall of the SFU vision lab (gzipped) (info file).
- 7 cloth samples measured by ourselves (gzipped) (info file).
- 24 Macbeth color chart patches measured by oursevles (gzipped) (info file).
- 19 paint-chips measured by ourselves (gzipped) (info file).

Spectral Data

The spectra in the table below is data I used while at Cornell's Program of Computer Graphics. I do not know its origin or its accuracy, however it seems to have been gathered from a variety of sources. Other spectra are available at the following sites:

- Cornell Measurement Data
- Lappeenranta University of Technology
- MGF Material Libraries
- Columbia-Utrecht Reflectance and Texture Databa
- Principles of Digital Image Synthesis

ACOUSTICAL PLASTER	
LIGHT_BUFF	
ASPHALT FLOOR TILES	
DARK_BLUE_31	DARK_BLUE_FLEXACHR
TOLEDO_RED	
ASPHALT WALL TILES	
LIGHT_GREEN_184	PINK_190
BARE AREAS AND SOIL	
BLACK_EARTH	CLAY_LOAM
DRY_SOIL_B	DRY_SOIL_C
SAND	WET_SOIL_A
WET_SOIL_C	
BRICK	
DRYPRESS_BRICK_1	DRYPRESS_BRICK_2

FTP directory /pub/eos/pub/spectra/ at ftp.eos.ncsu.edu

To view this FTP site in Windows Explorer, click **Page**, and then click **Open FTP Site in Windows Explorer**.

```
**************************************************************
**                                                          **
**              North Carolina State University             **
**            Information Technology FTP server             **
**                                                          **
**************************************************************

Welcome anonymous user from rescomp-08-127157.Stanford.EDU!
Current anonymous users: 1         Maximum anonymous users: 25
```

Up to higher level directory

```
10/04/2006 12:00AM       Directory .
05/26/2005 12:00AM       Directory ..
03/10/1994 12:00AM           3,986 README
06/22/1993 12:00AM           2,116 basis.functions
11/04/2004 12:00AM          59,551 dupoint_spectra_10.asc
05/01/1994 12:00AM          26,160 dupont.spectra.10
05/01/1994 12:00AM         143,760 dupont.spectra.2
05/01/1994 12:00AM             703 munsell.description
05/01/1994 12:00AM          15,936 munsell.spectra.10
05/01/1994 12:00AM          76,672 munsell.spectra.2
11/04/2004 12:00AM          31,775 munsell_spectra.asc
11/04/2004 12:00AM          84,351 object_spectra.asc
05/01/1994 12:00AM           3,702 objects.description
05/01/1994 12:00AM          37,059 objects.spectra.10
05/01/1994 12:00AM         203,659 objects.spectra.2
03/07/1993 12:00AM           3,702 objects_descrip.asc
```

Objectives:

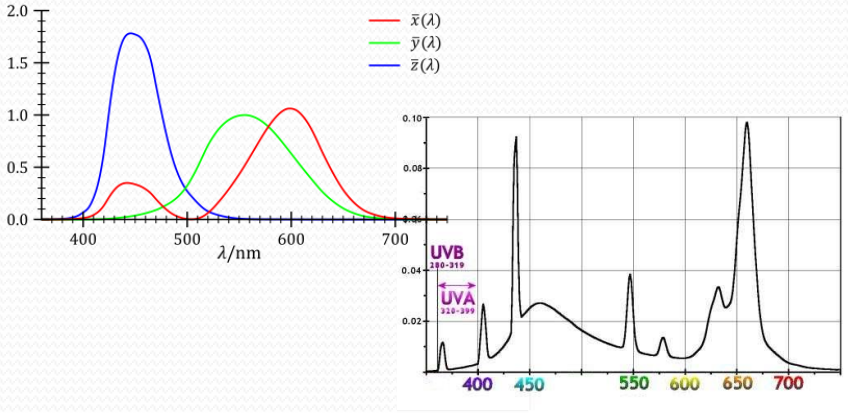
- Data transparency:
  - Users can access (or even make their own) datasets
  - Aids in color balancing algorithm testing
- Interaction with the data:
  - Choose the data you want.
  - Display RGB representation of scenes.
  - Provide resultant RGB data.

Data and Data Parsing

- Dataset format:

# starting comments	# this is a dataset for surfaces
dataset_type	SURFACES
#items, nm_step, nm_start, nm_end	10, 4, 380, 784
item_name	BananaPeel
item_description	A yellow peel of banana
reflectance_data	0.001
	0.021
	0.032
	…
	0.00
next_item_name	Apple
item_description	A Red Delicious apple
reflectance data	0.72

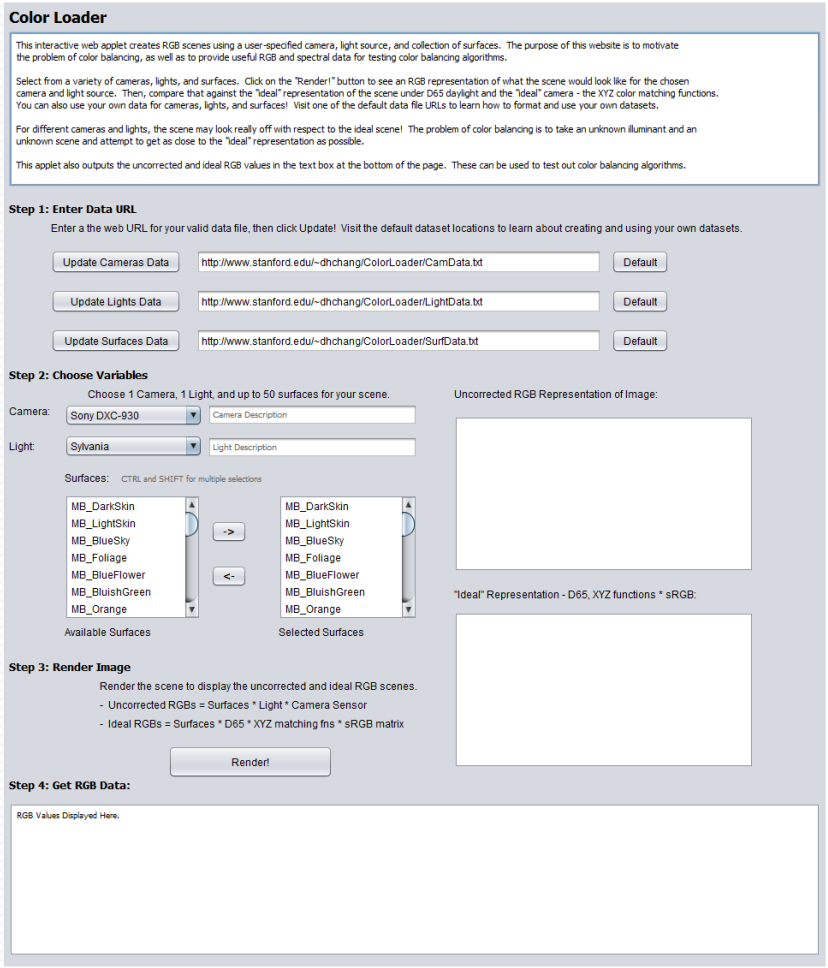
Methodology



- User creates dataset
- Parse data and build matrices
- User selects camera, light, and up to 50 surfaces
- ColorLoader calculates RGB data:
  - Uncorrected: [Surfaces] * [Light] * [Camera]
  - “Ideal”: [Surfaces] * [D65] * [XYZ matching] * [sRGB]
- Display scenes, output numerical RGB

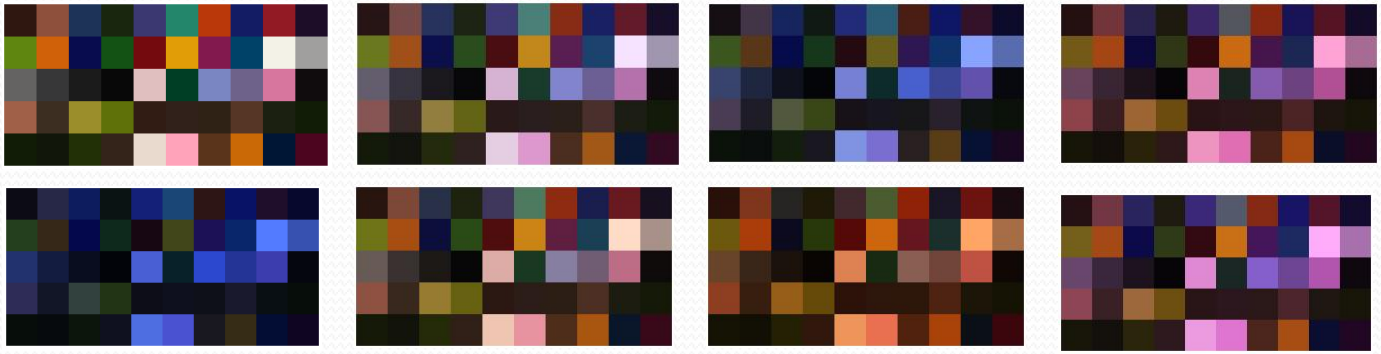
Methodology - Color Loader

- Java web applet
  - Cross platform
  - web-accessible
- A demo!

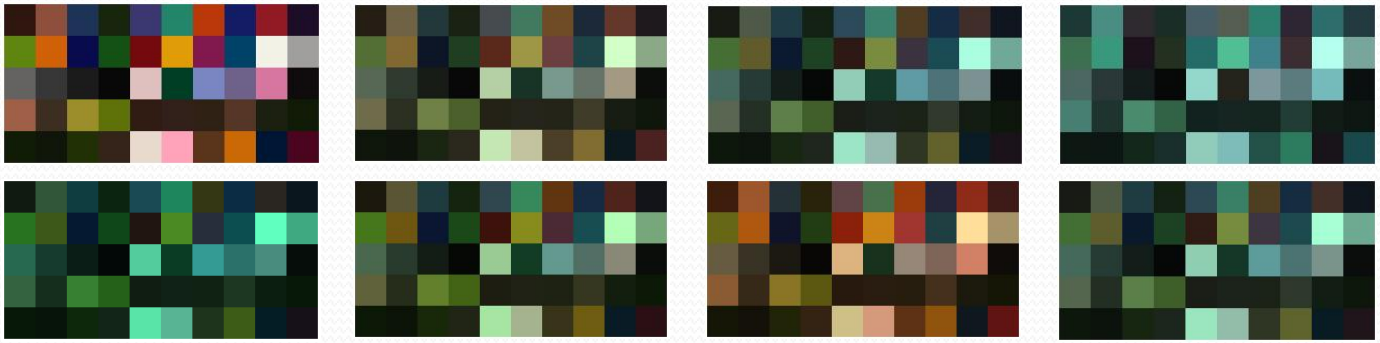


Practical Value

- Compare Lights



- Compare Cameras



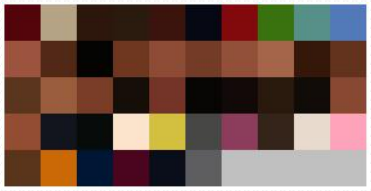
Practical Value

- Create Scenes
  - MacBeth

  - Paint

  - Forest Scene

  - People and clothes



Future Work

- Gamma correction.
- Automatic script generation of data .txt files.
- Expanded Databases.
- Plot the raw spectral data.
- Illuminant estimation?

Acknowledegments

- Data available from
  - http://kobus.ca/research/data/colour_constancy_synthetic_test_data/index.html
  - Imageval's ISET utility
- Special thanks to Dr. Joyce Farrell for her guidance throughout the project.
- Special thanks to Dr. Kobus Barnard for the data and clarifications.