Medical Photography task force
Teleconference
31 January 2014 • 11:00 (EST)

The meeting was called to order by Christye Sisson, leading the Color Eye Model activity in MIWG, with the following attendees:

Craig Revie
Dennis Thayer
Kevin Langton
Matt Carnavale
Rich Amador
Sunny Virmani
Susan Farnand
Tim Bennett
Mark Fairchild

Ms Sisson outlined the aim of the meeting as reviewing the goal of the project and the plan of action. She noted that the Color Eye Model project is part of the ICC Medical Imaging Working Group http://www.color.org/groups/medical/medical_imaging_wg.xalter, and summarised the goals and activities of ICC MIWG.

She presented the goals and action plan of the Color Eye Model [see attached]. The fundamental problem, as described in the problem statement, was to address color differences in the appearance of the retina in fundus imaging owing to a lack of a suitable calibration method or standard. To achieve this the group intends to develop a suitable calibration phantom and calibration method, devise the best working/vendor practices , generate a repeatable, reliable method of 'profiling' individual fundus camera/ophthalmic digital imaging system combinations, and work with the main manufacturers of these systems to adopt a set of color standards.

She envisioned a phantom comprising set of common colours that the fundus cameras can reproduce. Susan Farnand emphasised that the set of colours must be those most useful to those who have to interpret them. The Munsell ColorChecker was originally based on the needs of photographers, and so included flesh tone, sky and foliage colours. Her group was now considering the pigments used in fine art for a different calibration target. For the Color Eye Model activity it would be useful to do a survey amongst clinicians to establish the set of most useful colors.

Dennis Thayer reported that he saw a lot of variation in user set-up as well as between different camera models. However, good color balance should be universal and not manufacturer-specific, and should represent the image seen through the eyepiece or indirect ophthalmoscope.

The meeting agreed that it may be difficult to get agreement on the set of colours to use, but that this was worth doing. It was confirmed that the goal was to produce a color target or phantom. Sisson's work showed a proof of concept, and that fundus cameras could in principle be characterized. It seemed possible to match colors more closely, even by doing color correction after conversion to rendered jpeg images. The next step was a standard phantom that manufacturers could use to generate a profile for their camera, which could then be associated with an image in a DICOM workflow.

Tim Bennett suggested that having such consistency would benefit a wider range of users, in particular where consistency across multiple cameras is needed.

The meeting discussed the role of display calibration in the workflow. It was agreed that this was important, but was being addressed in the Displays activity within ICC MIWG.

Ms Sisson moved on to discussion of the plan of action. The main steps were development of the phantom, testing, development of a profiling method, and integration into an imaging system. She invited the participants to comment on the plan. It was suggested the workflow might be to make a RAW capture of the phantom, and then assign the resulting profile to the subsequent subject photos.

The meeting discussed the schedule for the proposed report and future meetings.

A full recording of the meeting is available at https://connect.rit.edu/p3n5k6tjp91/

Action items from the meeting:

MIWG-14-05	Identify colors to use in phantom (Farnand, Fairchild, Sisson)
MIWG-14-06	Model eye component of phantom (Sisson, fundus camera manufacturers)
MIWG-14-07	Devise capture protocol (TBD)
MIWG-14-08	Identify workflow (TBD)

Color Eye Model Project

Project Coordinator: Christye Sisson

Rochester Institute of Technology

ICC Medical Imaging Working Group

http://www.color.org/groups/medical/medical_imaging_wg.xalter

Agenda

- Meeting introductions
- Review of MIWG
- Review of White Paper Proposals
- Comments/Discussion
- Action Items
- Next Meeting

Introductions

- Christye Sisson, Rochester Institute of Technology, Project Coordinator
- Craig Revie
- Phil Green
- Mark Fairchild
- Susan Farnand
- Tim Bennett
- Jim Strong
- Bill Fischer
- Dennis Thayer
- Rich Amador
- Kevin Langton
- Matt Carnavale

Overview of Activities for Medical Imaging Working Group

- Craig Revie, MIWG Chair

White Paper

- Problem Statement:
  - One reason for the color differences in the appearance of the retina in fundus imaging in ophthalmology is the lack of a suitable calibration method or standard. This causes significant retinal color disparity from camera to camera, even within the same manufacturer for the same patient.

Objectives

- To generate a repeatable, reliable method of “profiling” individual fundus camera/ophthalmic digital imaging system combinations, and using that profile to attempt to bring the various systems to a reasonable color standard.
- To work with the main companies that produce these systems to work toward this set of color standards in the interest of longitudinal research and accuracy of imaging in the field at large.

Discussion

- Is the objective reasonable?
- Will there be buy-in?
- Alternatives?

Plan

- Development:
  - Develop a test target (patch of colors) to be inserted/integrated into model eye.
  - Test integration of unique test target into color management software.
  - Test statistically significant sample of various fundus camera systems in terms of color.
  - Measure each color fundus camera output in ophthalmic photography lab in terms of final image color.
  - Determine final output of profile, as well as integration into the existing digital imaging system.

Discussion

- Steps to development
  - Identification of colors
  - Capture Protocol
    - Access to RAW data
    - Execution
  - Final Product?
    - Software Integration (ICC profile?)
    - Company integration
  - Identify implementation

Implementation

- Working directly with companies agreeing to the project, develop an “output” of profile data that can easily be integrated into that company’s software system

OR

- Work directly with manufacturers to implement the calibration system at the manufacturing level
- Test the integration of the color profile system against the alternative control (no color system) and measure the comparable output in terms of RGB value against known test target values
- Test the system on all available camera systems and compare to control to determine efficacy and accuracy

Next Steps

- Action Items
  - Tasks
    - Identification of colors
    - Model Eye Component
    - Devising Capture Protocol
      - Who/How
    - Identifying Workflow

Next Meeting

- Presentation/Report: March 3-5
- Next online meeting: Mid-March?
- In-person meeting:
  - ICOP May 1-3 ?
  - DC June 19-20?