COMP39/9900 Computer Science/IT Capstone Project
School of Computer Science and Engineering, UNSW

Project Number: P42

Project Title: Further Development of "Colour Combo Rush", aka the UNSW colour vision suite

Project Clients: E/Prof Stephen Dain and A/Prof Mei Boon (University of Canberra)

Project Specializations: Software development; System/game development; Human Computer Interaction (HCI).

Number of groups: 2

Background:

One of the problems that limits the possibilities in using computers to examine human colour vision this the huge variety of screens and computers is that the colours produced by any combination of computer and screen may vary considerably. As a consequence, commercially available examination methods use specific computers and screens and have calibration procedures. This means that the systems can be expensive.

A/Prof Mei Boon, I and others established that the colours within a specific model of iPad mini were sufficiently alike that individual calibration was not necessary. https://doi.org/10.3758/s13428-016-0725-1. We designed a colour vision test app, originally intended for examining diabetic children up to the age of about 12 years. This was in 3 forms, a purely clinical test and versions with two levels of added gaming effects. We validated and compared these versions https://doi.org/10.1089/g4h.2016.0100 and https://doi.org/10.3758/s13428-017-0893-7. We then. published the work on the diabetic children https://doi.org/10.1080/08164622.2023.2288176. There is a further paper in preparation on age changes in colour vision.

We have not assessed them, but we assume that there are variations between models as there are between smart phones. https://doi.org/10.1364/JOSAA.33.00A300.

We would now like to extend and improve the app in a number of respects.

1. The current version is designed for acquired colour vision and we would like to add an option to examine congenital deficiencies as well. The colour part of it is straight forward, requiring a second colour look up table but the program needs to allow selection and processing of the two procedures.

2. The current version is written for the iPad mini 3. We would like to app to identify the model and select the appropriate colour look up table (we have all the equipment to make the colour measurements and provide the RGB values) and sizing according to screen size.

3. The current version sends the raw data to a personal UNSW email address (as required by UNSW) but that person has left UNSW and we need to look at other methods of sending and storing the data in a more accessible form

4. The current version sends out the raw data, we would like to look at the possibilities of processing and storing the data in the app and, as well as transmitting it, having the option to display it on the screen.

5 There are probably some bugs still to be ironed out..

Requirements and Scope:

Programming in order to;

1. Extend the scope to congenital colour vision deficiencies

2. Run the app on other Apple tablets

3. Improve the data processing, communication and storage options.

To work with the colour vision researchers to achieve the aims. Colour vision knowledge is not necessary but some idea of the design and use of colour vision tests may be found in https://doi.org/10.1111/j.1444-0938.2004.tb05057.x

Required Knowledge and skills:

iOS programming essential

Gamification knowledge a useful, but not essential, skill.

Expected outcomes/deliverables:

'An improved app that can be used as a research tool for the examination and tracking of chuman colour vision.

Supervision:

Stephen Dain

Additional resources:

See papers listed in the background.

The Optics & Radiometry Laboratory in the School of Optomtery and Vision Science has all the necessary colorimetric and photometric capabilities for the project.