

NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

PH.D DEFENCE - PUBLIC SEMINAR

Title: Color Mapping for Camera-Based Color Calibration and Color Transfer

Speaker: Mr Nguyen Ho Man Rang

Date/Time: 12 August 2016, Friday, 10:00 AM to 11:30 AM

Venue: Executive Classroom, COM2-04-02

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Abstract:

This thesis examines color mapping methods that aim to reduce color difference between images in three contexts. The first context is at the camera sensor level, where differences in spectral sensitivity functions of the sensors result in different RGB responses to the incoming light. This work attempts to produce an accurate color mapping between camera sensor-specific color spaces such that the imaged scenes appear the same. The second context targets the camera processing pipeline where in-camera photo-finishing operations have heavily processed the original RAW image to produce the final sRGB output. This work aims to find a mapping to undo the in-camera processing to obtain the original sensor-specific colors. The third context targets color mapping between images from unknown sources (e.g. from the internet, photo-sharing sites, etc). For these type of images, our work focuses on color transfer methods that attempts to manipulate a source image such that it shares a more similar "look and feel" of a specified target image.

This thesis begins by motivating the need for color calibration and color transfer between images. This is followed by a brief introduction on how color is represented and related work in the literature focused on both color calibration and color transfer. Afterwards, we describe three contributions made as part of this thesis work. In particular, we present a novel approach to estimate a mapping to an image of an arbitrary scene and illumination from one camera's raw color space to another camera color space. This is achieved using an illumination-independent mapping approach that uses white-balancing to assist in reducing the number of required transformations. Our second contribution is a new method to encode the necessary metadata with a photo-finished sRGB image for reconstructing its corresponding unprocessed RAW image. Our third contribution is a new approach for color transfer between two given images that is unique in its consideration of the scene illumination and the target image's color gamut. The thesis is concluded with summary of the existing contribution and potential future works.