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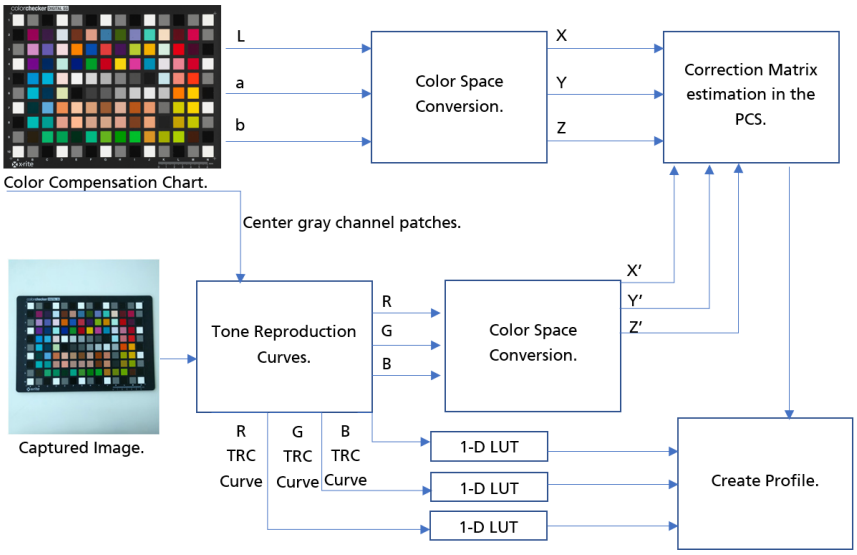

Fig1. Profile Creation Process.

MSKINCOLORCALIB

COMPUTER VISION BASED SYSTEM FOR COLOR CALIBRATION OF MOBILE ACQUIRED SKIN LESION IMAGES

Motivation

Skin cancers constitute nowadays one of the most common malignancies in the Caucasian population. Although malignant melanoma (MM) accounts for only a small percentage of skin cancers, it is the fastest growing form of cancer and, if not detected early the deadliest form. Thus, early diagnosis of MM is of the utmost importance. The inadequate distribution of dermatologists in Portugal conjugated with the fast spreading of mobile devices with remarkable improvements in terms of image acquisition led to the appearance of Mobile Teledermatology (MT) as a promising tool for personal dermatology data acquisition.

Problem

Optimal acquisition and display of color medical images are critical to the evaluation process as it impacts accuracy and consistency of MT systems.

As images captured with different mobile phones have different colors due to different camera specifications or illumination conditions, mSkinColorCalib was developed to calibrate the colors of skin lesion images acquired with mobile phone devices.

Solution

The system developed uses a color compensation chart for the color compensation task and adopts the

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Objectives

mSkinColorCalib aims to calibrate the colors of skin lesion images acquired with mobile phone devices, thus eliminating the influence of different camera specifications or illumination conditions.

Results

Images acquired in the scope of this project showed to have average color differences corresponding to different colors when no calibration was performed, whereas applying this algorithm as is, perceivable color differences were already achieved.

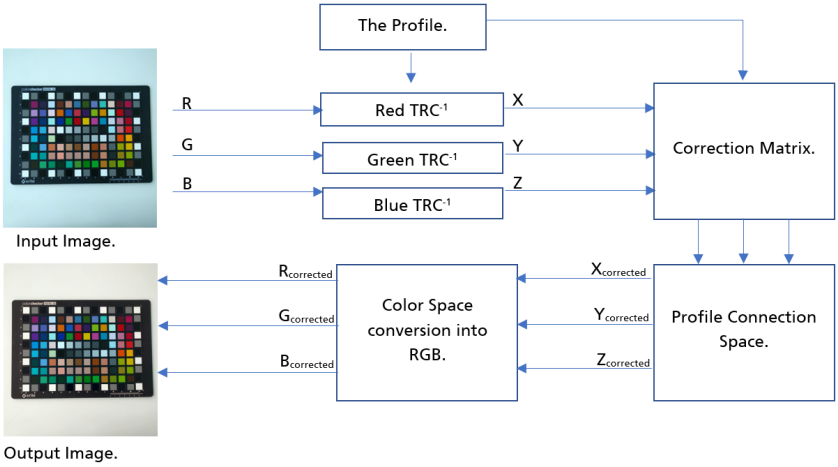

Fig2. Profile Application Process.

concept of Color Management System and Profile Connection Space.

The color chart used as target reference was the ColorChecker Digital SG constituted by 140 patches. Besides the patches representing natural, miscellaneous, primary, secondary and grayscale colors this chart has 14 patches specifically selected to simulate the appearance of various skin shades. The periphery is constituted by a pattern of neutral patches designed to evaluate the uniformity of the illuminance. The remaining patches were added to extend the color gamut to better match sensors of digital cameras.

Fig1. shows the block diagram of the proposed system. First, the image of the color compensation chart is captured and a relationship between the colors of the patches in the captured chart and the internal reference colors is estimated. After the estimation, a color profile is created that embeds the relationship. The created profile is used as the source profile to correct the colors of the other images captured under the same conditions.

Fig2. corresponds to the profile application process. The tone reproduction curve correction is applied to the color of the input image and the color is corrected by the matrix embedded on the created color profile.

Next Steps

This system will be coupled in an Android App to turn it into a mobile solution (Fig3). To create the profile an image of the color chart is acquired and detected based in AKAZE keypoint detector and descriptor extractor. After this implementation, the system will be tested with skin lesion images and its performance will be compared with those of two commercial applications: Gretag Profile Maker 5 and X Rite i1 Profiler.

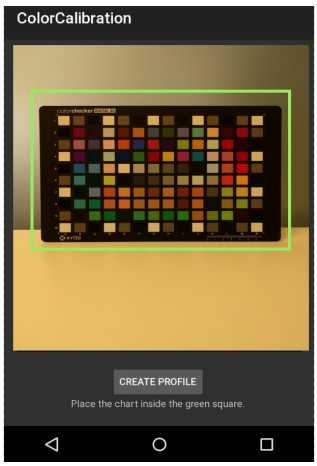

Fig3. Preview of the app that implements the system.