DERMOSCOPY AND SKIN IMAGING

COMPUTATIONAL MODEL OF THE SKIN FOR VIRTUAL CLINICAL TRIALS OF DERMATOLOGICAL IMAGING

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Introduction: We present a computational skin model designed for Virtual Clinical Trials (VCTs) for dermatological imaging. Skin cancer is the most common cancer in the US. As early diagnosis offers more favorable treatment options; currently available diagnostics, however, shows large reader-dependence. A simulation approach offers advantages in terms of the known ground truth and flexibility to model clinically observed lesion variability.

Objective: A detailed skin model that would help in designing of the simulation pipeline for Virtual Clinical Trials of Dermatology Images.

Material and Methods: The simulation of skin anatomy uses open source software Blender v2.79. We simulated skin as composed of primarily 6 layers: stratum corneum, living epidermis, papillary dermis, upper blood net dermis, dermis, and the deep blood net dermis. Lesions were modeled as Cones with an irregular base. Each lesion was inserted, with its base just touching the epidermis-dermis border. The physical and optical characteristics of the skin and lesions were selected based upon reports in literature. We have also modeled the upper and lower dermal blood networks, as well as the uneven boundary between the epidermis and the dermis. The light absorption settings were selected to approximate the chromophore content of the skin, and achieve a clinically plausible appearance.
Dermoscopy images were simulated using the generic linear camera model available in Blender renderer LuxCore. We have assumed ambient white lighting, with 6mm distance to the camera.

Results: We generated synthetic images of the skin model in various configurations, and assessed the contrast of simulated lesions vs. their depth.

Conclusions: A computational skin model was designed, containing clinically plausible tissue structures. Preliminary assessment indicated clinically plausible appearance of synthetic images. Future work includes comprehensive evaluation of the model, prior to its

integration into the VCT pipeline for dermatological imaging.