

SPRING DERMATOLOGY & SKIN CARE EXPO CONFERENCE

May 14-15, 2018 | Montreal, Canada

Skin cancer detection via deep analytics of harmonically generated microscopy (HGM) images

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Approximately 5.4 million new skin cancer cases are diagnosed in United States every year. It was reported that the survival rate increases from 14% to 97% with early treatment hence placing high importance in the early detection of this disease. We will, therefore, introduce a computer-aided-diagnosis (CAD) algorithm for differential diagnosis of pigmented lesions in HGM images by which the pathological structures described by the dermatologist in National Taiwan University's Hospital are used to quantify healthiness, age, distinguish gender, etc. of the subject in addition to assisting the enhancement of the efficiency and inter/intra consistencies during HGM image reading. These corresponding knowledges of human experts were also transferred to the Artificial Intelligence (AI) machine in characterizing the feature layers of the Deep Convolution Neural Network (CNN). With limited data of approximately

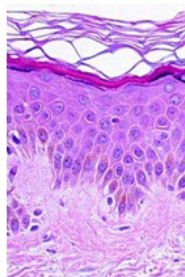
2000 HGM images based on transfer learning, detection of basal cell carcinoma (BCC) was achieved with a recognition rate of 97.3% accuracy, 98.7% sensitivity and 95.9% specificity.

Speaker Biography

Chris Gwo Giun Lee is an investigator in the field of data science including bioinformatics and multimedia. He has previously held leading and managerial positions in the industry such as System Architect in former Philips Semiconductor in Silicon Valley. He has joined NCKU in 2003 where he found and is currently directing the Bioinfotonics Research Center (BITS). He conducts highly multidisciplinary research having collaborations with IBM TJ Watson Research Center on cloud computing; Inform Genomics Inc., found by experts from MD Anderson Cancer Research Center, Harvard Medical School, and MIT, on analytics architecture for precision medicine; Banner Health Research on intelligent health cloud for Alzheimer disease; National Taiwan University on harmonically generated microscopy medical image processing, etc.

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Cross section of human skin



Stratum corneum (SC)
Stratum granulosum (SG)
Stratum spinosum (SS)
Stratum basale (SB)

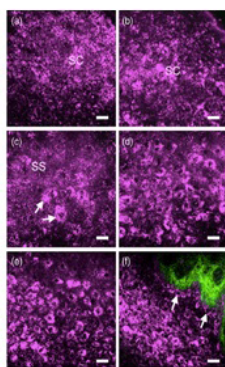
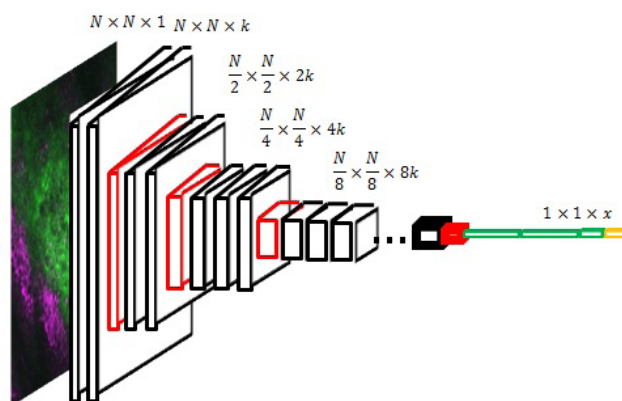



Image stack in epidermis



 Notes: