



Department of
Biomedical Engineering

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Machine Learning of Colors for Digital Health

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Professor
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Time: 4:45 pm - 5:10 pm

Venue: Room 2510, 2/F

Li Dak Sum Yip Yio Chin Academic Building

Abstract

My primary research focus is on computational photography using machine learning informed by domain knowledge (also known as hybrid machine learning). My expertise lies in light-tissue interactions, tissue optics, and optical spectroscopy. While recent advances in machine learning for computer vision in biomedical imaging have primarily focused on 'spatial' analyses, they overlook the valuable information conveyed by intrinsic colors. My research seeks to address this gap by focusing on the machine learning of colors in biomedical imaging. My application areas include mobile health (mHealth), which addresses large-scale societal and healthcare challenges while also supporting advancements in personalized medicine. Another ongoing project is an mHealth surveillance initiative in the US, conducted in collaboration with the Centers for Disease Control and Prevention. The motivation behind my research stems from the need for novel machine learning frameworks that incorporate color analysis in biomedical imaging. Recent advances in machine learning for biomedical imaging have primarily focused on spatial analyses and feature extraction, often overlooking the valuable diagnostic information intrinsic colors can provide. A recent article in NIH Global Health Matters highlights my mHealth research on color-based diagnostics powered by machine learning for global health. My hybridized machine learning approach overcomes the limitations of conventional, purely data-driven machine learning and AI models employed by tech giants like Google.

Biography

Young Kim is Professor of Weldon School of Biomedical Engineering at Purdue University. He is a scientist at Centers for Disease Control and Prevention. He has affiliations with Purdue Quantum Science and Engineering Institute, Regenstrief Center for Healthcare Engineering, and Purdue Institute for Cancer Research. He has successfully managed an atypically broad spectrum of work ranging from cancer research, machine learning, optical imaging, spectroscopy, biomaterials, metamaterials, to cryptographic primitives. In particular, he is currently working on reciprocal innovation such that mHealth technologies developed in resource-limited settings can be brought back to developed country settings, which was recognized as the First Prize of the NIH Technology Accelerator Challenge 2020. He has also pioneered cyberphysical biomedical security technology development for medicines and pharmaceutical products, supported by the AFOSR Cybersecurity Program. Young Kim received his PhD and MSCI (Master of Science in Clinical Investigation) from Northwestern University and postdoctoral training supported by the National Cancer Institute Cancer Research Careers program.