IEEE JOURNAL OF

BIOMEDICAL AND HEALTH INFORMATICS

J-BHI Special Issue on "Skin Image Analysis in the Age of Deep Learning"

Skin is the largest organ of the human body, and is the first area of a patient assessed by clinical staff. The skin delivers numerous insights into a patient's underlying health: for example, pale or blue skin suggests respiratory issues, unusually yellowish skin can signal hepatic issues, or certain rashes can be indicative of autoimmune issues.

Dermatological complaints are the most prevalent reason that patients seek primary care, and images of the skin are the most easily captured form of medical image in healthcare. However, certain serious skin diseases are not reliably diagnosed by primary care. For example, while unaided visual inspection by expert dermatologists yields about 60% accuracy for detecting melanoma, the most dangerous type of skin cancer, primary care clinicians achieve only 23–46% accuracy. Therefore, there is a clear a need to scale expertise for robust skin disease classification.

Out of all medical imaging datasets, skin images are the most similar to other standard computer vision datasets. However, significant and unique challenges still exist in this domain. For example, there is remarkable visual similarity across disease conditions, and compared to other medical imaging modalities, varying genetics, disease states, imaging equipment, and imaging conditions can significantly change the appearance of skin, making localization and classification in this domain unsolved tasks.

In recent years, several datasets have become publicly available to support research and development in automated skin image analysis across various imaging modalities, including dermoscopy and clinical photographs. These developments have spiked an interest in research around skin image analysis. According to Google Scholar, at the time of this writing, there are over 1,600 research works that use or cite the ISIC Skin Cancer publications, resources, and benchmark challenges.

With the release of large public datasets, development of novel learning algorithms and network architectures with open-source implementations, and the availability of powerful and inexpensive graphics processing units, deep learning has become the technique of choice in a wide variety of medical image analysis problems over the past decade. Skin image analysis is no exception, as demonstrated by the large number of deep learning-based contributions/entries submitted to our past five ISIC Workshops/Challenges. The goals of this special issue are to facilitate advancements and knowledge dissemination in deep learning-based skin image analysis, raising awareness and interest for these socially valuable tasks. The intended audience includes researchers and practicing clinicians, who are increasingly using digital analytic tools.

Only high-quality and original research contributions will be considered. The special issue will highlight, but not be limited to, the following topics:

- Computer Vision in Dermatology and Primary Care
- Few-Shot Learning for Dermatological Conditions
- Skin Analysis from Dermoscopic Images
- Skin Analysis from Clinical Photographs
- Skin Analysis from Total-Body Photography and 3D Skin Reconstructions
- Skin Analysis from Confocal Microscopy
- Skin Analysis from Optical Coherence Tomography (OCT)
- Skin Analysis from Histopathological Images
- Skin Analysis from Multi-Modal Data Sources

- Explainable Artificial Intelligence (XAI) Related to Skin Image Analysis
- Algorithms to Mitigate Class Imbalance
- Uncertainty Estimation Related to Skin Image Analysis
- Application Workflows for Skin Image Analysis
- Robustness to Bias from Clinical and User-Originating Photography

Note that while the issue focuses on deep learning-based approaches, outstanding contributions from other subfields of machine learning will also be considered.

Guest Editors

- M. Emre Celebi, University of Central Arkansas, Conway, AR, USA, ecelebi@uca.edu
- Catarina Barata, Instituto Superior Técnico, Lisbon, Portugal, ana.c.fidalgo.barata@ist.utl.pt
- Allan Halpern, Memorial Sloan Kettering Cancer Center, New York City, NY, USA, halperna@mskcc.org
- Philipp Tschandl, Medical University of Vienna, Vienna, Austria, philipp.tschandl@meduniwien.ac.at
- Marc Combalia, Hospital Clínic de Barcelona, Barcelona, Spain, mcombalia@clinic.cat
- Yuan Liu, Google Health, Palo Alto, CA, USA, yuanliu@google.com

Key Dates

- Submission deadline: **November 1, 2021**
- First reviews due: **December 15, 2021**
- Revised manuscripts due: **February 1, 2022**
- Final decisions: **March 15, 2022**