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INTRODUCTION

Introduction to the Special Issue on the Wearable Technologies for Smart Health, Part 2

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Introduction to the Special Issue on the Wearable Technologies for Smart Health, Part 2

Wearable health-tracking consumer products are gaining popularity, including smart watches, fitness trackers, smart clothing, and head-mounted devices. These wearable devices promise new opportunities for the study of health-related behavior, for tracking of chronic conditions, and for innovative interventions in support of health and wellness. Next-generation wearable technologies have the potential to transform today's hospital-centered healthcare practices into proactive, individualized care. Although it seems new technologies enter the marketplace every week, there is still a great need for research on the development of sensors, sensor-data analytics, wearable interaction modalities, and more.

In this special issue, we sought to assemble a set of articles addressing novel computational research related to any aspect of the design or use of wearables in medicine and health, including wearable hardware design, AI and data analytics algorithms, human-device interaction, security/privacy, and novel applications. Here, in Part 2 of a two-part collection of articles on this topic, we are pleased to share four articles about the use of wearables for skill assessment, activity recognition, mood recognition, and deep learning.

In the first article, *Generalized and Efficient Skill Assessment from IMU Data with Applications in Gymnastics and Medical Training*, Khan et al. propose a new framework for skill assessment that generalizes across application domains and can be deployed for different near-real-time applications. The effectiveness and efficiency of the proposed approach is validated in gymnastics and surgical skill training of medical students.

In the next article, *Privacy-preserving IoT Framework for Activity Recognition in Personal Healthcare Monitoring*, Jourdan et al. propose a framework that uses machine learning to recognize the user activity, in the context of personal healthcare monitoring, while limiting the risk of users' re-identification from biometric patterns that characterize an individual. Their solution trades off privacy and utility with a slight decrease of utility (9% drop in accuracy) against a large increase of privacy.

Next, the article *Perception Clusters: Automated Mood Recognition using a Novel Cluster-driven Modelling System* proposes a mood-recognition system that groups individuals in "perception clusters" based on their physiological signals. This method can provide inference results that are more accurate than generalized models, without the need for the extensive training data necessary to build personalized models. In this regard, the approach is a compromise between generalized and personalized models for automated mood recognition (AMR).

Finally, in an article about the *Ensemble Deep Learning on Wearables Using Small Datasets,* Ngu et al. describe an in-depth experimental study of Ensemble Deep Learning techniques on small time-series datasets generated by wearable devices, which is motivated by the fact that there are no publicly available, large, annotated datasets that can be used for training for some healthcare applications, such as the real-time fall detection. The offline experimental results show that an ensemble of Recurrent Neural Network (RNN) models outperforms a single RNN model and achieves a significantly higher precision without reducing much of the recall after re-training with real-world user feedback.

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It has been a pleasure to oversee the selection of articles for this two-part special issue. Looking back, we received more than 40 submissions. Following the peer review process, we have selected 11 for inclusion in this two-part series of articles. We are incredibly grateful to the many colleagues who helped review these articles—and in most cases, second or third revisions of these articles. The result, we hope you agree, is a set of interesting and impactful set of articles.

Be sure to also read the seven articles in Part 1 of this special issue, which appeared in ACM HEALTH volume 1, number 4.

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Guest Editors