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AI to Enable Digital Medicine and Detect COVID-19

Giorgio Quer, PhD, Dir. of AI,
Scripps Research Translational Institute, La Jolla, California, USA

DATE: Friday May 14, 2021

TIME: 11:00 a.m. – 12:00 p.m. ET

PLACE: Webinar via Zoom

<https://us02web.zoom.us/j/85676389854>

REGISTRATION: <https://events.vtools.ieee.org/m/271155>

ADMISSION: Free, but the registration in advance is strongly encourage

For any additional information please contact: [Wahab Almuhtadi](#) or [Eman Hammad](#)

Abstract

Digitalize human beings using biosensors to track our complex physiologic system, process the large amount of data generated with artificial intelligence (AI) and change clinical practice towards individualized medicine: these are the goals of digital medicine. In this talk, we discuss how to design AI solutions in the clinical space and what are the key aspects to make a difference. We focus on two critical clinical topics that need AI: 1) atrial fibrillation (AF), and 2) viral illnesses (COVID-19). AF is the most common sustained cardiac arrhythmia, associated with stroke, heart failure and coronary artery disease. AF detection from single-lead electrocardiography (ECG) recordings is still an open problem, as AF events may be episodic and the signal noisy. We conduct a thoughtful analysis of recent convolutional neural network architectures developed in the computer vision field, redesigned to be suitable for a one-dimensional signal, and we evaluate their performance in the detection of AF using 200 thousand seconds of ECG, highlighting the potential and pitfall of this technology. We also discuss how to explain (global and local post hoc explanations) this AI model for AF detection using features that are commonly used by a cardiologist.

To tackle the problem of COVID-19, we start with an overview of continuous, passively monitored vital signs from 200,000 individuals wearing a Fitbit wearable device for 2 years. This large study provides the baseline for DETECT, our app-based, nationwide clinical study enrolling individuals who routinely use a smartwatch or other wireless devices to determine if individualized tracking of changes in heart rate, activity and sleep can provide early diagnosis and self-monitoring for COVID-19. We analyze data from more than 36,000 individuals, showing how we can discriminate (on an individual level) between COVID-19 and other types of infections. We discuss how this can impact both the individual and public health, and how the use of AI can be a game changer in this fight against the virus.

Speaker's Bio

Giorgio Quer is the Director of Artificial Intelligence at the Scripps Research Translational Institute, where he is leading the Data Science and Analytics team within the All of Us Research Program's Participant Center (NIH).

His research focuses on artificial intelligence and probabilistic modeling applied to heterogeneous data signals, in order to extract key information and make predictions on future occurrences based on past data. He is involved in several digital medicine initiatives within the Scripps Research Digital Trials Center. For the DETECT study, he is developing algorithms to predict COVID-19 and other viral infections from wearable sensor data. He is responsible for collaborations with several industry partners, studying changes in heart rate and sleep data monitored by commercial wearable devices. He is also interested in the detection and modeling of atrial fibrillation from single-lead ECG signals. He is leading the collaboration with the Halicioglu Data Science Institute at UC San Diego towards the development of new AI models for health data.

He received his Ph.D. degree in Information Engineering from the University of Padova, Italy, and he continued his studies as a Postdoctoral researcher with the Qualcomm Institute at the University of California San Diego. He is a Senior Member of the IEEE and a Distinguished Lecturer for the IEEE Communications society.