Data Capture and Artificial Intelligence in OneHealth Context from Concept to Educational Program

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Abstract

One Health is an approach calling for "the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals and our environment", as defined by the One Health Initiative Task Force (OHITF) (1). The implementation of OneHealth concept needs interdisciplinary approaches for prevention, education, investment, and policy development. The concept of OneHealth assumes that the patient health is no longer reduced to its purely medical dimension. It considers the elements of the patients in its ecological environment, as well as animal health. It promotes a multidisciplinary and integrative approach to health including Artificial Intelligence methods. It aims to raise the challenges of the increasing incidence of chronic diseases, infectious pathologies with pandemic risk. The impact of environment on health is huge. For examples, PM 2.5 Ultrafine particles induce 50% increase in asthma diagnoses. Residing near a highway is responsible for 9 to 25% increase of new asthma cases in children and between 10% and 35% increase of COPD and coronary heart disease in adults.

To prevent individual injuries, quantification of physiological and pathological parameters, as well as exposition to various chemical and physical stressors, is more and more necessary to increase the prevention and individual behavior modifications. But there are serious limits: What is important to measure? What is the quality of the devices, from true medical devices to health gadgets? Devices can cause also themselves the stress they are supposed to measure!

To collect all these data, The Internet of Things (IOT), the third wave in the development of the connected devices with a development benefits linked to the development of internet are important to monitor the parameters responsible of the diseases and to follow and predict patient trajectories. One goal is to be able to measure events before the clinical diagnosis.

The development of technics to grab more and more data from the patients results in a data deluge, particularly in the field of omics. We have to face also the multiplicity of data sources in Health. Artificial intelligence appears now as a key for implementing medicine of precision in the OneHealth concept. But how to move from the concept to the practice? We have to implement methods as a first challenge to succeed capturing the diversity.

To meet these challenges, in the context of the Multidisciplinary Institute of Artificial Intelligence (MIAI) of Université Grenoble Alpes (2), we designed an international master program called AI4OneHealth (2), entirely taught in English and 100% online. The purpose of the AI4OneHealth

programme is to address the issue of Artificial Intelligence in Health in the context of swift changes in healthcare systems and the merging of novel approaches. It provides a broad multidisciplinary training in the emerging field of AI for Health applied to the analysis and exploitation of data created during the treatment of the patients, but also by the patients themselves or from large national databases. Methods of AI dedicated to analysis of health data, including text mining, neural network modelling, visualization and modelling, deep learning for precision medicine, give rise to major health, ethical and societal challenges. The program offers the opportunity to gain the skills that will make experts in this new field, capable of understanding both the complexity of AI methods for analysis of health data and their practical application for the treatment of patients and for the expansion and the improvement of its strategies, based on the One Health concept.

(1) https://www.onehealthcommission.org/
(2) https://miai.univ-grenoble-alpes.fr/
(3) https://www.masterai4onehealth.eu/