BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

Ammin/DET - IS4MSPM: Intelligent Systems for MultiScale Personalized Medicine

Funded By	Politecnico di TORINO [P.iva/CF:00518460019] Dipartimento DET
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Context of the research activity	This research will focus on the development of systems based on AI methods to support personalized medicine. The systems will address problems at different scale from cellular level to patient level. Different data sources will be processed and/or aggregate by means of AI methods with a special attention to explainability. The final goal is to join several systems to construct digital twins to support both hospitalization and homecare.
Objectives	Evidence based medicine (EBM) is an approach to medical practice intended to optimize decision-making by emphasizing the use of evidence not just expertise. EBM leads to the development of clinical pathways that are defined as “are standardized, evidence-based multidisciplinary management plans, which identify an appropriate sequence of clinical interventions, timeframes, milestones and expected outcomes for a homogenous patient group. The limit of clinical pathways is that they are averagely good for the group but not the best for each patient. The evolution of clinical pathways is personalized medicine that aims to adapt them to the individual characteristics, needs, preferences and clinical history. Personalized medicine is an evolving field strictly related to personalized care and precision medicine. The final goal of systems developed to support personalized medicine is to optimize the care process both from a medical point of view and from the patient point of view. They can be used to personalize clinical pathways both during hospitalization and home care. They need interoperability with the clinical record medical device software and among them. Digital twins are the arti¿cial intelligent virtual replicas of physical systems and they evolve during time using the data acquired by the physical systems. They can be used in healthcare at different scale levels to model the patients and his clinical status, or specific physiological organs, or the cellular

	mechanisms. They are a possible way to aggregate intelligent systems for personalized medicine.

Skills and competencies for the development of the activity	The candidate must hold a Laurea magistrale in Ingegneria biomedica or equivalent. Competences on artificial intelligence (machine learning) are mandatory. Competences on personalized care, data science, and biomedical image processing are welcomed