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# Artificial intelligence and healthcare: how to make sustainable the future of the patients

**Project Description:**

Artificial Intelligence (AI) is an area of technological knowledge that in recent years is becoming increasingly popular in many areas of application: one of these is the health sector, where AI can be used not only to make the processes of diagnosis and patient care more effective, but also to increase the organizational and economic efficiency of operations (operational management), with a significant benefit in terms of management for hospitals (Ronquillo et al., 2021).

The combination of machine learning, health informatics and predictive analytics offers opportunities to improve healthcare processes, transform clinical decision support tools and help improve patient outcomes. The promise of machine learning's changing healthcare lies in its ability to leverage health informatics to predict health outcomes through predictive analytics, leading to more accurate diagnosis and treatment and improving physician insights for personalized and cohort treatments (Adkins et al., 2017).

The use of AI in healthcare fits within the criteria described in the recent National Recovery and Resilience Plan, where digitalization takes on a fundamental role in healthcare. Particular focus is placed on the management of patients at a territorial level, through the establishment of "Local Operating Centers". These particular structures will have the important task of remotely monitoring patients in home care (also through telemedicine tools) and will have to manage the taking charge of the person using a technological support platform, as well as implement new treatment and care paths through new diagnostic tools and wearable devices (PNRR, 2021).

The Local Operating Centers will therefore be equipped with the technological means to ensure the remote control of telemedicine devices provided to patients and will support the exchange of information between health professionals involved in the care.

The objective of the PNRR is to decrease the number of accesses to hospital facilities, transferring the care setting to the home, without reducing the quality of the service; to accomplish this task, the potential of Artificial Intelligence and machine learning tools will be exploited in the future (PNRR, 2021).

As far as the technical aspect is concerned, the candidate will have to study, apply and develop new techniques of machine learning and artificial intelligence in a "One Health" perspective related to a new institutional set-up in order to achieve better local,

national and global results in health, environment and climate, with the awareness that the three dimensions are strictly interconnected.

In the hospital context, the candidate will be able to use artificial intelligence techniques to automatically analyze the textual and/or image content of patients' medical records, enhancing aspects related to the characteristics of the living environment, as well as working conditions. Once the structure of the analysis algorithms has been completed, the candidate will be able to define innovative solutions in order to apply the results obtained within an operational context (e.g. pharmacy and internal pathways logistics) and healthcare planning (operating block sessions and outpatient agendas).

In the territorial context, the candidate will have to analyze a specific geographical area, collecting and processing the information flows of the services available in the ATS/ASL, based also on existing organizational models and on the settings for taking care of chronic patients in the territory. The correlations between clinical (comorbidity) and social (income, cultural and family context) problems will be investigated according to a multidimensional approach.

**Methods:**

A mix of theoretical and practical methodologies will be used to achieve the objectives of the PhD project. Specifically, the research design will be divided into three phases: technical business training and acquisition of machine learning/IoT tools applied to the healthcare context; literature review and data collection related to the topic of analysis, development of the machine learning algorithm and study of the operational fallout in the analyzed context.

**Expected Outcome:**

The expected output is a doctoral thesis that, starting from an extensive and critical review of the literature, reports in a quantitative and qualitative way the results obtained and proposes guidelines for the adoption of artificial intelligence techniques as a tool to support the management of hospital facilities and can help the development of systems to detect the need for care and assistance at the level of intermediate residential facilities or home (Integrated Home Care).

Finally, the last expected output is the publication of a scientific article on the issues addressed and the results obtained during the research project.

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## Supervision:

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