BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

MUR DM 117/Società e Salute - Development of intelligent clinical decision support systems utilizing patient data through artificial intelligence

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] SOCIETA' E SALUTE S.P.A. [P.iva/CF:05128650966] Politecnico di TORINO [P.iva/CF:00518460019]

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Context of the research activity	The research focuses on developing intelligent clinical decision support systems using artificial intelligence. It aims to improve patient care by analyzing clinical data. ML, DL and RL techniques are employed to create predictive models and decision support systems. These systems analyze patient data, including demographics, medical history, and diagnostics, providing evidence-based information and personalized recommendations to support complex clinical decisions. Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23001930004

Objectives	The research project aims to enhance clinical practice in the field of cardiovascular risk by developing intelligent clinical decision support systems using advanced techniques in artificial intelligence. The primary objective is to provide healthcare professionals with robust tools to support complex decision-making processes using patient data. By leveraging machine learning, deep learning, and reinforcement learning approaches, the project seeks to create predictive models and decision support systems that can effectively analyze and interpret diverse patient data, including demographics, medical history, laboratory tests, and medical images. The intelligent systems developed within this research endeavor will possess the capability to learn from vast amounts of clinical data, enabling them to identify subtle patterns and correlations that might elude human observation. By leveraging this machine learning capability, healthcare professionals will have access to more precise and evidence-based information to aid in their decision-making process.

Objectives	Moreover, the project will explore the application of deep learning techniques, such as deep neural networks, to tackle the challenges of complex data analysis and feature extraction for accurate diagnosis and treatment. The objective is to develop deep learning models capable of learning informative representations of patient data and generating highly accurate predictions. Additionally, the research may utilize reinforcement learning approaches to create systems that can dynamically learn from interactions with patients and healthcare professionals. This adaptive learning capability will facilitate the development of decision support models that can tailor recommendations to the specific needs of individual patients. In summary, the doctoral research project represents a significant endeavor aimed at enhancing clinical practice. By harnessing the power of artificial intelligence, the project endeavors to provide healthcare professionals with robust tools to improve patient care and decision-making processes in the domain of cardiovascular risk.
Skills and competencies for the development of the activity	The PhD candidate should possess a strong background in bioengineering, complemented by proficiency in computer science and data science. Key competences include biomedical signal processing, medical imaging, data analysis, and modeling. Proficiency in relevant programming languages (e.g., MATLAB, Python) and effective communication skills are essential for collaborating with clinicians and developing intelligent clinical decision support systems. Bridging bioengineering and AI expertise is crucial for successful research.