



Project Title

(Instructions: this proposal will appear on the PhD webpage <https://cqb.dieti.unina.it/> and will be forwarded to specialized sites. Please give a synthetic background and two to four research objectives. Include some information about the expected background of the candidate and relevant references. Please fill the part regarding the funding source/grants of the research activity needed for equipment, reagents, travels, conferences, traineeships etc.)

Machine learning approaches in radiogenomics to characterize complex diseases and support precision medicine

Project Description (max 500 words)

Recent and innovative computational approaches are increasingly influencing medical and biological research. The application of these new methodologies has been possible thanks to the significant increase in the availability of data that, in recent years, always have quality and volumes (high-throughput technologies, sequencing, parallelized analysis and imaging). This aspect, together with the rapid innovative methods on artificial intelligence and machine learning, is contributing to the possibility of highlighting new biological information often connected to the mechanisms underlying complex diseases to support precision medicine.

Radiogenomics is a research field that combines data extracted from different levels of omics belonging to both bio-omics and radiomics. The main purpose is to highlight connections and relationships between different types of features belonging to the omics listed above and starting from these bases for diagnosis and treatment of several complex diseases supporting clinical decisions. One of the main problems of radiogenomics consists in the management of a large amount of heterogeneous data. The goal of extracting information from this complex data therefore requires advanced integration and analysis workflows to manage the high dimensionality of the data. The main goal of this project is to overcome problems such as those through the use and development of advanced methods, based on machine learning algorithms, to collect, manage, integrate, and analyse radiogenomic data to support precision medicine. In particular, in direction of data integration for decision making in healthcare, robust and reproducible methodological workflow will be defined evaluating several machine learning methods for discovering potential diagnostic and prognostic radiogenomic markers and characterizing human phenotypes linked to different pathological conditions.

Candidates should have a Master Degree in Digital Health and Bioinformatic Engineering and excellent computational skills with experiences in programming (Python, R, Matlab or equivalent) and, preferably, in machine learning and advanced statistical techniques. Moreover, he/she should be author/co-author of at least one manuscript published on international peer-review journals.

Supervisor(s), Lab/Group details, other additional info.

This project will be carried out within the Bioinformatics and Statistics laboratory of IRCCS SYNLAB SDN, Naples, under the supervision of Dr. Monica Franzese, IRCCS SYNLAB SDN

Funding



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