Project Title

AI-based methods to support clinical decision in the medical imaging domain

Project Description (*max 500 words*)

Medical imaging produces a huge variety of complex data for scientific and medical research activities. Being collected during routine clinical practice, large datasets should be potentially readily available for medical research. However, the huge amount of these data presupposes the use of big data techniques and artificial intelligence to support clinical decision.
Obtaining all the meaningful and reliable information from these data and making the algorithms that process them understandable and explainable is both challenging and promising in the context of diagnostic support and its clinical translation.
Using the Big Data in an integrated way has enabled the development of radiomics as a quantitative analysis of the heterogeneity of radiological findings, together with radiogenomics, that combines radiomics data with individual genomic phenotypes. Taken together, and with the support of advanced analysis and computational techniques, these data have the potential to improve the diagnosis, prognosis and treatment of many diseases, especially neoplastic diseases, and enable response to therapy to be forecast.
The main objectives of this PhD project include the development and application of advanced analysis techniques applied to radiological data which give both functional and morphological information using artificial intelligence (AI) techniques, such as Deep Learning.
In particular, the use of deep learning techniques gives the possibility to carry out both the clinical outcome prediction and voxels' classification task. The application of these algorithms to biomedical images and the possibility of integrating them with data of a different nature represent a way in order to simplify decision-making and provide powerful tool for precision medicine.
The development of computational methods and the extraction of quantitative features from medical images will encourage their integration with other quantitative data (pathomics, genomics, clinical) to identify diagnostic and prognostic biomarkers for the management of the diagnostic pathways.

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

This project will be carried out within the Image processing laboratory of IRCCS SYNLAB SDN, under the supervision of Dr. Marco Aiello, PhD.

Funding

References