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EDITORIAL

Artificial intelligence: a challenge for third millennium radiologist

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Diagnostic imaging techniques, i.e. conventional Radiography, Angiography, Ultrasound, Magnetic Resonance and Computed Tomography, are now all digital native. They produce a large number of images, on which the radiologist writes, after a subjective and personal evaluation, essentially qualitative, the diagnosis, the so-called report.

These diagnostic technologies acquire an enormous amount of numerical data in DICOM format, of which only a part is visually evaluated in greyscale. Conventional or human-engineered computational image features such as shape, edge sharpness, histogram features, spatial variation and gray values may be numerous. Hundreds to thousands can be derived from a statistical mathematical analysis of raw data [1].

For some years now, throughout the world, there has been an attempt not to disperse this great mass of information in the raw data. The ambitious objective is to identify, thanks to complex mathematical and statistical algorithms, which information, inaccessible to simple visual analysis, can predict the evolution of the disease and the effectiveness of the therapy, but in a quantitative and objective way.

Artificial intelligence, machine learning, big data, radiomics are just some of the many terms that are used by researchers in the field, especially computer scientists, clinical engineers, physicists, to define their activities. This perspective, if on the one hand it provokes great expectations on the other hand evokes great anxieties in radiologists.

However, the only collection of data collected by our equipment is not sufficient to make any leap and, so far, there has been no concrete clinical relapse of such research.

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What is missing then and what will be the keystone to achieve these goals? The answer may seem trivial, but it is not: the radiologist's collaboration.

In fact, it will never be sufficient to collect only the data, raw or in DICOM format, also re-elaborated to constitute the so-called big data, but it will be necessary to correlate them with the radiological reports, so that the computer can process them and find the correlation between them and the "phenotype" in question.

But, to do this, the computer must have a "standardized" report, which, in part, is also referred to as a "structured report". It is therefore essential to elaborate and share a "format" of our reports, unique and common to all of us, and specific to each individual pathology. It is a huge effort, both for their drafting and for the uniform use in daily practice. A large scientific society is the only entity able today to achieve this goal. It, thanks to the large number of members, knows the peculiarities and skills of every radiologist to ask for the drafting of the structured report. It, thanks to the recognized authoritativeness, has the possibility to convey its use in a large number of structures.

Oncology is the first area in which to apply. Combining the huge amount of data "tagged" with the radiological reports will be like inserting the plug into the socket: our radiological world will glow with a new light. Our report will contain over time not only a subjective and qualitative interpretation of the images, our diagnosis, but also a series of numerical values, objective and quantitative features, our contribution to the prognosis, because some of them will have proved useful to predict the efficacy of the therapeutic response. And so the radiologist will formulate not only a diagnosis, but will also directly influence the therapeutic choice [2].

Radiomics will be born.

A further evolution, not so distant, will be possible when the patient will no longer be identified with his tax code, like today, but through biometric data such as his genome. When the genetic mapping becomes more economical and widespread, it will be finally possible to correlate the big data and the structured report, i.e. the phenotype, with the genotype.

Diagnostic imaging will be used to quantify heterogeneity, predict outcome and longitudinally monitor responses [3, 4].

It will be the dawn of radiogenomics.

Compliance with ethical standards

Conflict of interest Authors declare that they have no conflict of interest.

Ethical standards This article does not contain any studies with human participants or animals performed by any of the authors.

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