Artificial Intelligence 4 Imaging – Radiomics, Deep Learning, Synthetic Data and Distributed Learning

A hands-on course
11 – 14 December 2019
Maastricht, The Netherlands

Endorsed by the European SocieTy for Radiotherapy and Oncology (ESTRO)

Vast numbers of medical images lie unused in the storage banks and picture archiving and communication systems (PACS) of most medical centres. While it is known that data is gold, and that images represent rich data fields, most medical staff lack the knowhow to take full advantage of their goldmine. After some careful sorting and labelling of their data, modern Artificial intelligence (AI) algorithms take over the majority of the hard work, by, for instance, pre-screening or ranking images based on the likelihood of the presence of cancer. Furthermore, AI enables the practice of precision medicine with more personalised and cost-effective treatment choices. The trend is towards large-scale analysis of medical images for clinical applications such as detection, workflow optimisation, segmentation and theragnostics. Radiomics and deep learning can reveal key components of tumour phenotypes for multiple lesions at multiple time points over the course of treatment. Engineered and deep quantitative features that have been extracted from three-dimensional medical images with standardised software have been used to better understand spatial and longitudinal tumour biology and for the prediction of diverse outcomes. In addition, synthetic-data generation might help to solve the problem of data-hungry AI, and new paradigms of distributed learning will enable the creation and evaluation of models without the difficulties and risks of sharing patient health information.

Unfortunately, the rapid growth in popularity of this immature scientific discipline has resulted in a large number of early publications that miss key information and/or utilise underpowered patient datasets. It is a complex field of research, and key principles should be followed to realise its full potential.

The four-day hands-on AI-4-Imaging course has the following learning objectives:

1. Understand the fundamentals of big data for imaging;
2. Critically evaluate the literature and review published articles;
3. Understand how to implement a simple AI system in a clinic;
4. Gain the tools to plan an imaging-based clinical trial;
5. Comply with regulation and privacy laws.

At this turning point of AI in medical imaging we desire to renew a focus on study design/reporting practices, standardisation, interpretability, data sharing and clinical trials. In this course, hands-on sessions will supplement conventional lectures from international experts with the sole purpose of preparing participants to perform high-impact research and to implement clinical tools that will prepare them for the future of precision medicine.

On behalf of the organising and scientific committees for the course, we are looking forward to seeing you and to growing the exciting scientific community of quantitative-imaging.
https://www.ai4imaging.org