



CONFERENCES

Artificial Intelligence 4 Imaging

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Endorsed by the European Society for Radiotherapy and Oncology



The data era in medicine has left hospitals with vast amounts of unused medical imaging and privacy-sensitive patient-related data on the picture archiving and communications system (PACS) and electronic patient record systems. While these images represent rich data fields to be mined, it is key to have a clear understanding of which data are useful and when, as well as having insight into the models derived from the data. **While the far future almost certainly belongs to artificial intelligence (AI), the near future belongs to augmented intelligence, in which human-machine teams easily outperform those who refuse to adopt this exciting new technology.**

After ensuring data privacy and careful sorting and labelling of the data, modern algorithms take over the majority of the hard work, e.g. by pre-screening or ranking images based on the likelihood of the presence of a certain trait/ disease. Furthermore, AI enables the use 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 disease/ anomaly detection, workflow optimisation, segmentation and theragnostics. Radiomics and deep learning, unlike gold-standard pathology, can non-invasively reveal key components of disease phenotypes for multiple lesions at multiple time points over the monitoring period. Engineered quantitative features and those that are derived from deep convolutional neural networks that are extracted from medical images have been used to better understand spatial and longitudinal disease biology and for the prediction of diverse outcomes. In addition, synthetic data generation might help to solve the problem of data-hungry AI and will enable the creation and evaluation of models without the hurdles of sharing patient-sensitive health information. **Unfortunately, the rapid growth in popularity of this immature scientific discipline has resulted in a large number of early publications and trials 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.**

To improve your understanding of this fast-growing but complex and immature scientific field, we invite you to attend the four-day hands-on AI 4 Imaging course. During the course you will be provided with information on the latest developments within the field through morning lectures by international experts, with each day devoted to a relevant topic, and split into a clinical track (for doctors and interested researchers) and a technical track (for experienced researchers). This will be followed by hands-on afternoon sessions, in which you will be instructed in the practical application of radiomics, deep learning, synthetic data, and clinical trials, again tailored to your level of knowledge. You will also have the opportunity to test these methods on your own data! In addition to this core section of the course, you can sign up for additional activities such as the Hackathon or to design your own clinical trial.

After participating in the four-day hands-on AI 4 Imaging course you will have learned the following objectives:

1. Understand the fundamentals of big data analysis;
2. Understand the advantages and pitfalls of synthetic data generation;
3. Critically evaluate the literature and review published articles;
4. Understand how to implement a simple AI algorithm in order to answer a clinical question to augment a human decision;
5. Gain the tools to plan and evaluate an imaging-based clinical trial;

6. Gain basic understanding of regulation and privacy laws;
7. Gain basic understanding of increasing the interpretability of AI models.

Most importantly, you will be able to network with the leading names in the field! As the saying goes:

“If you have an apple and I have an apple and we exchange these apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas.”

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

<https://www.ai4imaging.org>

