

Artificial Intelligence in radiography: reviewing current applications and providing e-learnings for (future) radiographers

Harmen Bijwaard^{1,2}, Sissy Georgakopoulou², Colinda Vroonland², and the KIM consortium

(1) National Institute for Public Health and the Environment (RIVM), Bilthoven, Netherlands, harmen.bijwaard@rivm.nl (2) Inholland University of Applied Sciences, Haarlem, Netherlands

Purpose: Artificial Intelligence (AI) has changed radiology substantially in the last years, where the focus of attention has mainly been on the radiologist. However, the radiographer's role has been largely ignored even though AI is also affecting for example patient positioning, treatment planning and image reconstruction: tasks that are typically carried out by radiographers (and RTTs). Radiographers are currently not prepared for the changes in their profession that will come with the introduction of AI into everyday work.

Materials and Method: Firstly, a survey was conducted among Dutch radiographers to investigate what role AI currently plays in their everyday work and what needs with respect to education and training currently exist. Secondly, a project was developed and funded consisting of three main steps, leading to online AI education (e-learnings) tailored to the needs of radiographers. The steps in this project consist of a systematic review of AI applications in radiography, focus groups with AI experts, and setting up e-learnings to train current and future radiographers in AI.

Results: From the survey we learned that 90% of the radiographers is familiar with the concept of AI, and 70% already encounters some form of AI in their day-to-day work. In most cases this concerns image reconstruction (40%), image recognition (35%) and image fusion (33%), but also quite often postprocessing and automatic delineation (both 29%) and dose optimization (28%).

For the systematic review a total of 70 articles were found, ranging from review, prospective study, retrospective study, to survey articles in search engines like PubMed, Scopus and Google Scholar. Results show a wide variety of applications of AI that (will) influence the work of radiographers, ranging from changes in everyday workflow, like patient checks, planning of examinations, acquisition of images and post-processing activities, to changes in work flexibility, like cross-modality employability or performing radiologist tasks, and training, implementing and quality control of AI systems. Knowledge of AI, the basics as well as pitfalls, challenges, ethical and legal complications appears prerequisite for radiographers.

The review was used in focus group sessions with AI experts to provide views on the future role of AI in radiography. Together, the members of the research consortium translated these views and the results from previous steps into e-learnings for (future) radiographers to provide basic and more advanced knowledge on AI. A pilot was conducted among radiographers who followed the e-learnings and their feedback was incorporated into a finalized version that will become freely available online for radiographers and students of radiography.

Conclusions: A survey among Dutch radiographers shows that they often encounter AI applications in their everyday work. They indicate a need for (preferably online) education to increase their

knowledge about AI. A project has been funded to fulfil this wish. The results of this project, namely a systematic review of AI applications in radiography and e-learning for (future) radiographers, will be presented. The e-learning will become freely available online for (future) radiographers.

Keywords: Artificial intelligence, radiography, education, e-learning