

## ► Will Machine Learning Replace Radiologists?

In recent months, medical journals, conference sessions, and social media posts have made inferences that machine learning could replace radiologists in the near future. The September 29 issue of the New England Journal of Medicine<sup>1</sup> even made the bold prediction that machine learning will “displace much of the work of radiologists and anatomical pathologists.”

Does the advent of this technology mean that radiologists need to be updating their resumes or begin looking for a new career? The short answer is no. It is highly unlikely that machine learning will ever totally replace the role of radiologists in the healthcare industry. However, the longer and more realistic answer is that machine learning can dramatically change the healthcare industry and the role of radiologists.

The goal for healthcare systems is to focus on using machine learning for tasks that the technology can complete better or faster than humans, while using radiologists to perform those tasks which machines are not capable of doing. Radiologists who understand machine learning and embrace integrating it into their processes to increase quality and efficiency – as well as capitalize on the additional time gained to provide more value to patients and providers – will become highly valuable and sought after.



## ► INTEGRATING MACHINE LEARNING INTO RADIOLOGY

The technical definition of machine learning, according to the Radiological Society of North America,<sup>2</sup> is when “algorithms create computational models based on example inputs in order to derive data-driven predictions or decisions.” The RSNA says that machine learning is mainly used in radiology for classification, such as when images and clinical information are used to determine the most likely diagnosis. Machine learning is especially useful in interpreting complex images or identifying rare abnormalities. Additionally, the technology can flag specific images that require a radiologist’s review, thus freeing up radiologists to focus their time on tasks that leverage their specialties.

Machine learning can best be used by radiology to:

- **Facilitate more accurate diagnoses.** Machines have a greater ability to understand complex data sets than humans do. In a recent study<sup>3</sup> by Katie Chockley and Ezekiel Emanuel, MD, PhD, of the Perelman School of Medicine at the University of Pennsylvania in Philadelphia, the authors explained this concept: “A human reading a chest radiograph may be inclined to simply interpret the image, determining if it represents someone healthy or sick and, if sick, whether infection, fluid, tumor or another issue is present. On the other hand, a machine will treat each tiny pixel on the scan as an individual variable and will seek to organize those pixels into shapes and patterns and, from there, make a diagnosis.”
- **Increase the speed of reading image studies.** The prognosis for some patients, such as stroke patients, depends on the speed of diagnosis from an image. The Health Data Management article “Artificial Intelligence, Machine Learning Find Role in Radiology”<sup>4</sup> points out that machine learning’s increased speed can be life-changing for the patients in such a case. Additionally, with the help of machine learning, radiologists are able to see more patients in the same amount of time. This can improve outcomes for patients who are able to see their provider earlier instead of waiting days or weeks for an appointment.
- **Improve prognosis predictions, especially with metastatic cancer.** Patients with a terminal disease want to know their prognosis in terms of life expectancy. Emergency physician Ziad Obermeyer, MD, M.Phil, of Harvard and Emanuel published a study in the September 2016 New England Journal of Medicine showing that machine learning can improve mortality rate prediction. To accomplish this improvement, algorithms use information such as multiple organ systems, infections, uncontrolled symptoms, and wheelchair use, reported Health Imaging Magazine.<sup>5</sup>

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<sup>5</sup> [commvau.lt/2jhLseg](http://commvau.lt/2jhLseg)

- **Assess image quality.** Low-quality images can often result in incorrect diagnoses. However, it can be challenging and time-consuming to manually identify the contents of these images. AuntMinnie<sup>6</sup> reported that German researcher Dr. Sergios Gatidis of the University Hospital Tübingen uses machine learning to automatically process such low-quality images before making a diagnosis.
- **Diagnose specific diseases earlier than humans can.** Machines are often able to detect the presence of a disease before it is noticeable to the human eye, which can dramatically improve patient outcomes. Health Imaging Magazine<sup>7</sup> reported on a recent study published in Radiology, which noted that doctors (with help from the computer program) were able to detect early Alzheimer's with between 82 and 90 percent accuracy, allowing patients to begin taking medications that can help slow the progression of the disease.


## ▶ WHY MACHINE LEARNING CANNOT REPLACE THE RADIOLOGIST

No matter how sophisticated or smart machine learning becomes, a machine will never be able to have a two-way dialogue with a patient or referring physician conversation like a human radiologist. Radiology Business Journal<sup>8</sup> reported that a study published in the American Journal of Roentgenology found that 84 percent of patients want to have a one-on-one conversation with their radiologist. Article author Michael Walter said that the reason for this high number was that patients want the sense of comfort that comes from talking to a real person. "Sometimes, the easiest way to provide value to a patient is to simply be there for them; and that's something that can't be provided by even the most advanced algorithm," wrote Walter.

Additionally, someone must identify the tasks appropriate for machine learning, program the algorithm, test the machine learning, and facilitate the process. To ensure that everything is compliant and working correctly, a human must set up and oversee the machine learning process. Even the smartest machines cannot program themselves. Machine learning will also never be able to perform tasks such as triaging patients, conducting studies, and coordinating with other departments in the same manner as radiologists.

## ▶ VALUE-BASED IMAGING: THE INTERSECTION OF RADIOLOGISTS AND MACHINE LEARNING

The future of radiologists will likely be found in "value-based imaging," as the radiology profession transitions, along with the rest of health care, to value-based payment models. AuntMinnie<sup>9</sup> reported that Dr. Giles Boland, chair of radiology at Brigham and Women's Hospital in Boston, defined this transition as "moving from a mindset of 'reading images' to an orientation of creating and organizing information for greater accuracy, faster speed, and lower cost in medical decision-making." By integrating machine learning into this transition, radiologists can ultimately provide a much higher level of value than their traditional role of reading images to both patients and providers.



Radiologists can prepare to meet this new challenge by focusing on developing the new skills needed for their evolving role. In the AuntMinnie article “3 Questions to Shape the Future of AI and Radiology,”<sup>9</sup> radiologists are encouraged to gain expertise in computer science, process engineering, and data science so they can help create the algorithms used by machines and effectively design the workflow. Radiologists can also increase their value in the new model by improving their communications with physicians, especially in terms of making sure that both professionals are speaking the same language, reported Health Imaging Magazine.<sup>10</sup>

Yes, machine learning can perform many tasks better than a radiologist can. However, this does not mean that radiologists are going to be replaced. Radiologists bring many skills to the table other than simply being able to read images, and machine learning allows radiologists to capitalize on the speed and accuracy of a mechanical diagnosis while spending more time on tasks that require a human touch, resulting in a higher level of care for patients. By being proficient in machine learning and transitioning to value-based imaging, the radiology profession will continue to serve patients for many decades to come.

<sup>10</sup> [commvau.lt/2j pzRfM](http://commvau.lt/2j pzRfM)



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