We All Need a Little Magic

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Ipsa scientia potestas est [Knowledge itself is power].
Thomas Hobbes

As artificial intelligence (AI) systems have demonstrated the power to detect wrist fractures (1), recommend thyroid nodules for biopsy (2), and predict response to chemotherapy (3), radiologists have pondered how to harness AI technologies and what skills they'll need to do so.

Will the radiologists of the future have to program in Python? Will we all need degrees in computer science?

First and foremost, radiologists must be physicians. To relieve suffering, we seek to understand disease: from its molecular biology, to its manifestations in medical images, to its impact on the human experience. We serve others by using our knowledge of medical science to recognize patterns in the "shadows" of our patients and to communicate those results clearly to patients and fellow physicians.

But medicine is also about technology: we must understand the tools that help us serve our patients, whether those tools are medications, imaging devices, or AI systems. So, just as radiologists must learn pharmacology and medical physics, modern practice demands that we gain knowledge of AI and deep learning.

Will we need to be facile at computer programming? No. Will we need to know enough about AI to strip away the mystery? Yes, definitely!

Radiologists will need to understand what AI is, how it works, and what it can and cannot do. And the best way to learn is by doing.

In 2017 and 2018, the RSNA Deep Learning Classroom, presented by NVIDIA Deep Learning Institute, used the MNIST image dataset to show radiologists how to train a classifier to recognize handwritten digits.

This year, RSNA will again host a hands-on classroom at its Scientific Assembly and Annual Meeting where radiologists can learn to build and test deep learning models.

The RSNA Medical Imaging Deep Learning Classroom ("MIDL-C," pronounced "middle C"), developed and presented by RSNA member volunteers, will provide interactive learning in a variety of introductory and intermediate courses throughout the week.

This year, the Classroom will feature a medically oriented set of images, the MedNIST database. MedNIST comprises 1000 images each of chest radiographs, head CTs, chest CTs, abdomen CTs, breast MRIs, and brain MRIs. The goal is to build and train an AI model that accurately classifies images into those six categories.

To complement and enhance the in-person learning experience, Dr Bradley Erickson, Consultant to the Editor for this journal and RSNA volunteer leader for MIDL-C, has prepared a series of articles, entitled the Magician's Corner. These articles seek to demystify the tools, processes, and results of deep learning.

In this issue, the first article of that series helps us create our own magic with a set of simple, easy-to-follow steps that begin to show the power of deep learning (4).

I hope our readers will join me in exploring the Magician's Corner. By improving our collective knowledge of deep learning, we become better able to direct how AI can be used to improve the practice of radiology.

Thus, we turn knowledge into power. And that's the real magic.

References

1. Thian YL, Li Y, Jagmohan P, Sia D, Chan VEY, Tan RT. Convolutional neural networks for automated fracture detection and localization on wrist radiographs. Radiol Artif Intell 2019; 1(1):e180001.
2. Buda M, Wildman-Tobriner B, Hoang JK, et al. Management of thyroid nodules seen on US images: deep learning may match performance of radiologists. Radiology 2019 Jul 9 [Ahead of print].
3. Khorrami M, Khunger M, Zagouras A, et al. Combination of peri- and intratumoral radiomic features on baseline CT scans predicts response to chemotherapy in lung adenocarcinoma. Radiol Artif Intell 2019; 1(2):e180012.
4. Erickson BJ. Magician's corner: how to start learning about deep learning. Radiol Artif Intell 2019; 1(4):e190072.