Application of artificial intelligence to radiology

Radiology has undergone two major technological transformations since its inception. First, Ultrasound, MRI and CT radically improved on X-ray for pathology detection. Next, Picture Archive and Computer Systems (PACS) dramatically improved radiologist efficiency and diagnostic accuracy. Radiology is now, again, on the precipice of another radical technological transformation—artificial intelligence (AI).

The desire to imbue artificial beings with intelligence dates to antiquity. Greek myths told of the autonomous golden robots of Hephaestus and craftsmen such as Yan Shi attempted to build automatons. However, it is not until recently that large amounts of digitized data, faster computers and neural networks have truly resulted in AI systems that can rival or better their human counterparts in completing certain tasks. In particular, neural networks have been successfully used for image recognition in tasks such as facial recognition, autonomous driving and photo categorization.

Radiology may be able to uniquely leverage AI due to the large amounts of digital data that have been generated and stored since the advent of PACS and due to its construction on visual data.

AI has the potential to radically alter the practice of Radiology. AI not only has the potential to improve the efficiency and accuracy of interpreting radiologic studies relative to human radiologists but to also glean additional information from radiologic studies not evident to radiologists (Radiomics).

Application of AI is, however, still in its infancy with many problems yet to be solved. Many AI algorithms can show exceptional diagnostic accuracy on one data set but show markedly worse performance on an unrelated one. Image recognition can sometimes be fooled by unexpected information in an image. Finally, though radiology, as a discipline, contains a massive amount of data most is poorly labeled and unavailable for building AI.

In this focused issue of the *Annals of Translational Medicine* "*Application of Artificial Intelligence to Radiology*", we explore the use of AI in to specific clinical and operational problems in Radiology.

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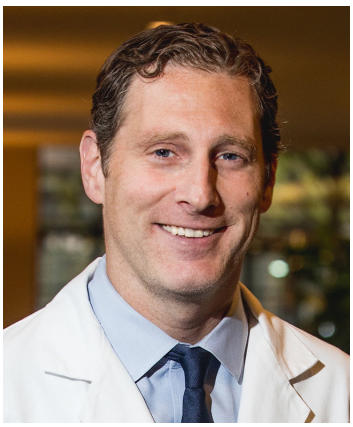

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