Artificial Intelligence and Cancer Diagnosis

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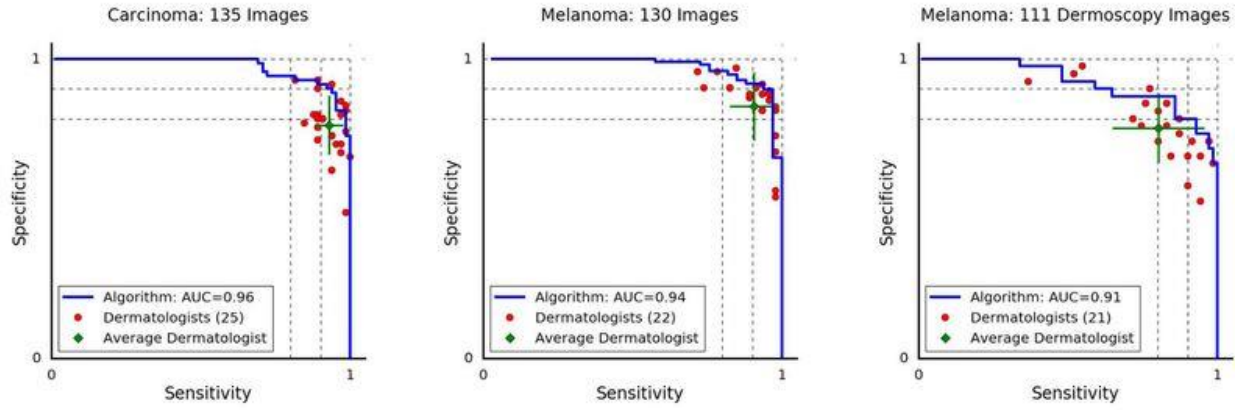
You might have experience with or know someone who has had a misdiagnosis of their cancer. Radiologists are often expected to analyze a large volume of scans in a short amount of time, and an error every now and then is unfortunately inevitable. The solution to this problem may present itself in an unexpected way: In recent years, scientists have been continuing to develop Artificial Intelligence (AI), and are finding revolutionary applications in oncology. AI is branch of computer science where the computer learns from its data inputs, enabling it to adapt and solve novel problems.

So what about cancer? Hosny (2018) suggests three major areas where the technology can help: Diagnosis, Characterization, and Monitoring of cancer. We all know how important early diagnosis is for cancer treatment: Imagine an AI that could identify and characterize small lesions or aggregations of cells, classify them as either malignant or benign, then help oncologists plan treatment or evaluate treatment results.

Traditionally, a trained radiologist analyzes images to detect and diagnose various medical conditions. They use qualitative and quantitative judgements in their diagnosis, but are also susceptible to tiredness, personal biases, and lapses in judgement. AI is able to detect trends and patterns at a level that a human could never achieve, while quantifying and analyzing a much greater volume of information.

You may think that technology like this is far in the future, but that might not be true. Recent advances in computing power and data availability has only made AI in radiology better. An AI is 'trained' by exposing it to data, like a student with a limitless mental capacity to remember and compare images. The technology will only get more precise as more data becomes available. In an experiment by Esteva (2017), an AI performed equally well to 21 board-certified dermatologists in classification of skin cancer. In the following graph from the paper, optimal performance is at the top-right corner – we can see that in all 3 cases, the AI (the blue line) outperformed most dermatologists (green dot).

a. Deep learning outperforms the average dermatologist at skin cancer classification using photographic and dermoscopic images.



There is a host of mixed expectations for AI, and still a long way for the technology to develop. If successfully incorporated and developed, it promises greater accuracy, greater access, and reduced

manpower than current methods. Over the next years, expect research and development to continue in this burgeoning field, and more possible breakthroughs.

References:

Esteva, Andre, et al. “Dermatologist-Level Classification of Skin Cancer with Deep Neural Networks.” Nature News, Nature Publishing Group, 25 Jan. 2017, www.nature.com/articles/nature21056.

Hosny, Ahmed, et al. “Artificial Intelligence in Radiology.” Nature News, Nature Publishing Group, 17 May 2018, www.nature.com/articles/s41568-018-0016-5#Sec3.