Artificial Intelligence - Window for cancer research

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Artificial intelligence (AI) is everywhere: personal digital assistants answer our questions, robo-advisors trade stocks for us, and driverless cars will someday take us where we want to go. AI has penetrated our lives, and its use is exploding in biomedical research and health care—including across all dimensions of cancer research, where the potential applications for AI are vast. Artificial Intelligence (AI) is a computer performing tasks commonly associated with human intelligence. Humans are coding or programing a computer to act, reason, and learn. An algorithm or model is the code that tells the computer how to act, reason, and learn.

Machine Learning (ML) is a type of AI that is not explicitly programmed to perform a specific task but rather can learn iteratively to make predictions or decisions. The more data an ML model is exposed to, the better it performs over time. Deep Learning (DL) is a subset of ML that uses artificial neural networks modeled after how the human brain processes information to learn from huge amounts of data. A well-designed and well-trained DL model is able to perform classification tasks and make predictions with high accuracy, sometimes exceeding human expert–level performance. AI excels at recognizing patterns in large volumes of data, extracting relationships between complex features in the data, and identifying characteristics in data (including images) that cannot be perceived by the human brain. It has already produced results in radiology, where clinicians use computers to process images rapidly, thus allowing radiologists to focus their time on aspects for which their technical judgment is critical. For example, last year, the Food and Drug Administration approved the first AI-based software to process images rapidly and assist radiologists in detecting breast cancer in screening mammograms.

Integration of AI technology in cancer care could improve the accuracy and speed of diagnosis, aid clinical decision-making, and lead to better health outcomes. AI-guided clinical care has the potential to play an important role in reducing health disparities, particularly in low-resource settings. NCI will invest in supporting research, developing infrastructure, and training the workforce to help achieve these goals and more Emerging AI Applications in OncologyNCI-funded research has already led to several opportunities for the use of AI. Improving Cancer Screening and Diagnosis Scientists in NCI's intramural research program are leveraging the capabilities of AI to improve cancer screening in cervical and prostate cancer. NCI investigators developed a deep learning approach for the automated detection of precancerous cervical lesions from digital images. Read more about this in Mark's story.

Another group of NCI intramural investigators and their collaborators trained a computer algorithm to analyze MRI images of the prostate. Historically, standard biopsies of the prostate did not always produce the most accurate information. Starting 15 years ago, clinicians at NCI began performing biopsies guided by findings from MRI, enabling them to focus on regions of the prostate most likely to be cancerous. MRI-guided biopsy improved diagnosis and treatment when utilized by prostate cancer experts, but the method did not transfer well to clinics without prostate cancer expertise. The NCI clinicians used AI to capture their diagnostic expertise and made the algorithm accessible to clinics across the country as a tool to help with diagnosis and clinical decision-making. The full potential of the MRI-guided biopsy developed by NCI researchers is being realized in clinics without prostate cancer–specific expertise because of this AI tool. New AI algorithms under development now aim to surpass the capabilities of well-trained radiologists by enabling the prediction of patient outcomes from MRI.

Biography

Dr Bhavna Anand I am a Physiotherapy professional since last decade and having an extensive experience in the field of orthopaedic, oncology, neurology , paediatric care with almost 20 publications and conference papers in the emerging trends of Physiotherapy.