GOAL:
Promote targeted investment via the Pan-Canadian artificial intelligence strategy to develop and implement tools that harness data science, deep learning, and big data for use in medical imaging

RECOMMENDATION
Invest $10.5 million over three years to establish frameworks to facilitate the implementation of AI tools in medical imaging

Canada is an innovative nation which has emerged as a world leader in artificial intelligence (AI) and deep learning (DL). Mobilizing fundamental AI and DL research for applications in medicine and the health system will define the way that the next generation of Canadians access and experience care.

Research is underway to make computers better at identifying patterns and making accurate predictions based on those patterns. This research has direct and immediate implications for medical imaging. The CAR wants to work with the Government of Canada to guide and facilitate the appropriate development and implementation of AI tools to help radiologists improve patient care.

TOP 5: AI IN MEDICAL IMAGING

1. Recent developments in artificial intelligence (AI), combined with the availability of large datasets and increasing computer power have brought major performance breakthroughs in many fields, including image recognition.

2. The Canadian Institute for Advanced Research (CIFAR) has previously supported research that has greatly advanced AI, in particular an approach known as deep learning pioneered by CIFAR fellows Geoffrey Hinton (University of Toronto, Google), Yoshua Bengio (University of Montreal), and Yann LeCun (Facebook, New York University) that has led to the resurgence of AI as a key driver of innovation and investments in Canada.

3. If given a large amount of training data, deep learning techniques may provide image recognition accuracy matching or even exceeding human experts in some scenarios, with the potential to assist physicians in diagnostic imaging.

4. The integrated nature of the Canadian healthcare system makes it ideal for pooling anonymized medical data from several institutions or provinces. This is needed to improve and validate patient management with AI tools because data from single institutions may be insufficient to achieve high accuracy. This gives Canadian researchers and physicians a competitive advantage over those in other healthcare systems but is dependent on the Government establishing balanced regulations on the use of medical data for AI purposes.

5. There is a huge potential to improve healthcare by leveraging recent advances in AI – including key contributions by Canadian researchers – with electronic healthcare infrastructure and imaging repositories previously funded by Canada Health Infoway.

OUR VISION: PAN-CANADIAN AI RESEARCH NETWORK FOR MEDICAL IMAGING

A collaboration with interdisciplinary stakeholders that will develop best practices for patient consent, enforcement of confidentiality, data ownership, and the application of technology for specific applications in the clinical workflow.

Radiology is uniquely positioned to lead the introduction and implementation of AI tools in medicine, and to ensure that the fundamental research is harnessed for better patient outcomes.

The Government must lead on setting standards for the interoperability of AI systems, while addressing regulatory and legal issues that accompany the use of AI in medicine. Small investments made now will have significant benefits to the Canadian AI ecosystem and the ability of that ecosystem to improve patient care.

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