



SURVEY ON ARTIFICIAL INTELLIGENCE

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Abstract:

In several sectors, including medicine, artificial intelligence (AI) is quickly transitioning from an experimental phase to an application phase. Major performance gains in the creation of AI applications have been made possible by the greater accessibility of massive datasets, rising computing power, and improvements in learning algorithms. Deep learning AI algorithms have produced fast improved performance in speech recognition, caption generation, and image recognition during the past five years. Particularly, radiology is a strong contender for early implementation of these methods. The application of AI in radiology is expected to transform radiologists' workflows and improve radiology's quality, value, and depth of contribution to patient care and public health over the course of the next ten years. The Canadian Association of Radiologists (CAR) is the organisation representing radiology at the national level and is dedicated to advancing the best practises in imaging that is patient-centered, lifelong learning, and research. An AI working group has been established by the CAR with the goal of discussing and deliberating on problems pertaining to patient care, policy, and practise that are connected to the introduction and use of AI in imaging. In this white paper, recommendations for the CAR are given as a result of discussions among the working group's AI members. The purpose of this white paper on artificial intelligence in radiology is to provide CAR members and policymakers with information on key terminology, member educational needs, research and development, partnerships, potential clinical applications, implementation, structure and governance, role of radiologists, and potential effects of AI on radiology in Canada.

We sum up the goals of this working group as follows in this white paper:

1. Terminology used in AI
2. The significance of critically evaluating AI literature in accordance with the principles of evidence-based medicine. Key issues and best practises related to educational needs of CAR members.
3. Development and research
4. Implementation and clinical applications
5. Organization and management
6. The radiologists' function and the prospective effects of AI on radiology in Canada

1. Objectives:

The CAR AI Working Group's mandates include the following tasks:

1. Conduct research and analysis on the potential effects of AI on various practise models in radiology in Canada.
2. Provide direction for the creation of CAR policy governing the application of AI in radiology.
3. Encourage and support the development of AI applications by imaging professionals working with various Canadian stakeholders.
4. Under the direction of radiology, offer advice and assistance to the membership and assist members in incorporating AI advancements into their practises in a way that benefits our patients and the healthcare system.
5. Take the initiative at the right time to work with various stakeholders to find workable solutions for integrating AI into everyday healthcare practise.
6. Oversee the creation and operation of certain working groups that may be established .
7. Provide guidance to the CAR Board of Directors regarding interactions with businesses that are involved in the AI industry.
8. Speak on behalf of the CAR regarding the application of AI to imaging in an effort to educate and support other CAR members.

In order to educate readers on the current state of the art of AI in radiology, give a conceptual framework for follow-up publications, and offer suggestions for important AI in radiology-related concerns, this white paper was created.

2. The Technology:

Learning about the potent algorithms that allow AI to decipher a variety of facts and carry out challenging jobs. Discover cutting-edge AI applications like machine learning and unsupervised learning that empower machines to learn for themselves, make predictions about the future, and outplay top gamers. The technologists who create AI systems are faced with a variety of possibilities on how to create these diverse, intelligent products, much like a carpenter choosing the best tool for the job. Although useful information, reliable software, and powerful technology are obviously necessary, understanding the issue you're trying to address comes first. To choose the AI strategy that is best for your task, you must have a well stated aim. The output of a recommendation based on a pretty fixed dataset and a set of logical rules created by human programmers may be all that is needed in some cases to solve the problem. Over the past 50 years, this style of AI, properly called as symbolic AI, has predominated. These systems only function to quickly offer answers to questions; they are not intended to learn or to modify their code in any other way. However, for other issues, one could require a system that can make predictions or swiftly modify its behaviour in response to varying or disorganised data flows. Machine learning, a branch of AI, infers results for this class of problem using mathematical models, probabilities, and statistics. Autonomous vehicles, computer vision, fastest-route mapping, ridesharing applications, the prevention of financial fraud, and email spam filters all use machine learning. The best strategy should be chosen once the issue is understood and a goal is set. The algorithm is everything.

3. Applications:

AI has a wide range of applications. Below is a discussion of a few of them:

Astronomy and AI

AI can be used to address societal issues. Understanding the operation and underlying principles of the cosmos can be aided by AI technologies and methodologies.

Healthcare and AI

In recent decades, the healthcare industries have made more use of AI-based systems and applications. While providing health care, it will also provide a substantial service. An AI-based system's algorithms are capable of providing superior diagnosis services than a human. Doctors can use it to comprehend patients' serious conditions and inform them when their condition is becoming urgent enough to require emergency medical attention.

AI in Video Games

The AI-based system is capable of taking part in game activities. The AI for a chess game can create an algorithm to find several alternatives to an opponent's specific move.

Finance and AI

Financial institutions and AI working together can provide better service while accomplishing financial objectives. Using algorithms for chatbots, trading, automation, and machine learning can be quite important.

AI for Data Security

Data security deployment is becoming a crucial component for industries all over the world. Business units are becoming more and more interested in using AI algorithms to identify defects in software and locate cyberattacks.

AI for Social Media

The social media platforms have a large number of user and product profiles. An enormous challenge for humanity is organising such a large data base. The data can be managed and organised by AI in accordance with current market trends and requirements.

AI in Transportation and Travel

The use of AI in the transportation and travel sectors is growing in popularity. The AI-based tools are capable of organising orders, recommending lodging and travel options, and helping users locate the optimal path. For more effective client interaction, the business units use AI-based chatbots.

AI in the Automotive Sector

Virtual assistants are used by several well-known sectors to assist people. The Tesla company's TeslaBot offers users a real-time assistant service. Numerous businesses are working to produce self-driving automobiles, which offer a safer and more secure ride than traditional drives.

Robotics and AI

The robotics can complete the assignment using their prior experience with the aid of AI. However, monotonous tasks are carried out by conventional general robots. However, the use of AI can improve these robots' capacity for thought. Another illustration of an AI service is the application of AI algorithms for humanoids. The humanoid robots Erica and Sophia can act and speak like real people.

Entertainment Using AI

The algorithms of machine learning and AI can offer the consumer superior service in the area of entertainment. These algorithms give

the recommended programmes depending on the customers' search fields in applications like Netflix and Amazon Prime.

Agricultural AI

For improved cultivation, conventional agricultural methods need a variety of resources, including cash, manpower, and time. However, the use of AI tools can improve the farmer's predictive analysis and crop monitoring system.

AI for online shopping

The AI-based solutions can offer a superior combination of products with size, colours, and brand in the e-commerce business units. The comments and analyses of the reviews help forecast if a product will be suitable for a specific user on the web.

AI in education

- (a) The use of AI algorithms in chatbot development can improve the quality of the students' teaching assistants.
- (b) In the future, it might function as an anytime-accessible personal tutor.

4 Conclusion

Both science and myth have influenced artificial intelligence and machine learning. It has been proposed for thousands of years that machines could think and carry out activities in the same way that humans do. The cognitive realities that AI and machine learning systems express are also nothing new. It might be more accurate to think of these technologies as the engineering application of potent and well-established cognitive principles. Accepting that there is a propensity to view all significant inventions as a Rorschach test on which we project worries and expectations about what makes a good or happy world is vital. However, the positive potential of AI and machine intelligence does not reside solely or even predominantly in its technology. It primarily resides in its users. We have no reason not to trust ourselves to use these technology well if we can generally rely on how our societies are now run. And if we can set aside our presentism and acknowledge the wisdom in old tales warning us against using strong technologies to play god, we'll probably be able to relieve ourselves of unwarranted worry about their usage.

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