AI Technology in Nursing Research

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Artificial Intelligence

Since the 1950s, scientists and engineers have designed computers to "think" by making decisions and finding patterns like humans do. In recent years, artificial intelligence has become increasingly powerful, propelling discovery across scientific fields and enabling researchers to delve into problems previously too complex to solve. Outside of science, artificial intelligence is built into devices all around us, and billions of people across the globe rely on it every day. Stories of artificial intelligence—from friendly humanoid robots to SkyNet—have been incorporated into some of the most iconic movies and books.

But where is the line between what AI can do and what is make-believe? How is that line blurring, and what is the future of artificial intelligence? At Caltech, scientists and scholars are working at the leading edge of AI research, expanding the boundaries of its capabilities and exploring its impacts on society. Discover what defines artificial intelligence, how it is developed and deployed, and what the field holds for the future.

What Is AI?

Artificial intelligence is transforming scientific research as well as everyday life, from communications to transportation to health care and more.

The field of artificial intelligence arose from the idea that machines might be able to think like humans do. It required an analysis of how our brains process information and use it to perform new tasks and adapt to novel situations. Continuing exploration of these concepts has fueled technological innovation and led to the development of AI applications that use data to identify patterns, carry out predictions, and make decisions. Often these applications are more efficient and precise than humans are—sometimes replacing people to perform repetitive or tedious tasks and calculations. Today, rapid advances in the field have opened new avenues for research and discovery but also raise ethical and safety questions.

Artificial Intelligence and Research

Artificial Intelligence (AI) is playing an increasing role in the research process. AI-based algorithms are being used to improve the efficiency of research and to provide new perspectives on explored topics. They are valuable not only in drawing connections between different pieces of information but also in proposing and testing new hypotheses.

What Do Nurses Need to Know About AI?

AI is computing hardware that can think for itself, and it is changing the delivery of patient care. Nurses who want to advance in their careers need to be open to learning about and understanding new technology. And, they should participate in the development and implementation of technology to ensure that it is going to help improve patient care while maintaining safety standards. With AI, nurses may be able to personalize patient care through the following:

- Monitoring population health.
- Pinpointing the best patient outcomes.
- Administering treatments optimized for each patient.
- Finding evidence that pertains to the individual patient.

How Is AI Being Used in Nursing Today?

A link between technology and healthcare has always existed. But the increasing sophistication of AI along with its efficiency are transforming healthcare. Currently, AI in healthcare covers these eight areas of nursing:

1. Decision-making - AI aids nurses in carrying out appropriate measures for patient care through the use of predictive analytics. Clinical decision support (CDS) is an application that typically is part of an electronic health record (EHR) system.

CDS provides nurses with additional knowledge so they make informed decisions, create alerts about medication interactions and determine treatment options.

2. Diagnosis - IBM's Watson for Health is using medical information from journals, case studies, and a database of symptoms and treatments to assist nurses with patient care.

3. Early detection - Diseases like cancer are caught in early stages. Mammograms result in a high rate of false positives. AI reviews and translates mammograms with a 99 percent accuracy which reduces the need for unnecessary biopsies.

4. End-of-life care - Robots with AI interact with the elderly to combat loneliness and social isolation. They are capable of serving, fetching, communicating and offering emotional comfort.

5. Healthy living - Health applications encourage healthier behaviour and management of health conditions.

6. Research - AI is being used in drug research to streamline discovery and repurposing operations.

7. Preparation - AI can produce naturalistic simulations to prepare nurses for all kinds of scenarios.

8. Treatment - Nurses can gather information from AI systems to form a comprehensive care plan for their patients.

Much of nursing is based on clinical trials, studies, protocols and time-tested methods. However, AI utilizes algorithms or predictive models to assess data about patient populations and breaks it down to provide accurate and personalized solutions for the delivery of care. Since healthcare is rich in data, AI is a natural fit for integrating into the nursing practice. Nurses can use AI to enrich the nursing practice by aiding nurses in making sound clinical judgements, educating them, and supplementing their experience.

AI Research Use Cases

A major advancement in artificial intelligence research recently came with a machine learning algorithm capable of inventing radical new proteins that can fight disease. Also, AI researchers are now developing algorithms that can search for scientific research papers and extract information from them to automatically correct scientific papers. Let's take a look at some more uses cases of AI in research.

1: Automated Data

Artificial intelligence is also used to optimize resources in research laboratories, automate the acquisition of data and facilitate the synthesis and analysis of complex datasets. For example, AI has recently been used to help manage the activities in large-scale, long-term studies by providing real-time guidance. An AI system may be able to monitor the health of each participant in a study and alert a scientist if a participant's status changes.

2: Optimize Equipment

AI is also being used to optimize laboratory techniques and equipment. AI-driven robots can automatically perform several tasks that were previously only carried out by humans, such as organizing and storing scientific equipment, preparing samples for analysis, and carrying out routine diagnostic tests. In addition, automated systems are also able to carry out tasks that are too dangerous or difficult for scientists or technicians to complete themselves. AI and robotics are also being used in the design of experiments— helping researchers determine which parameters should be changed, how the experiment should be designed, and what measurements should be made.

3: Healthcare

Many believe AI will soon be used to identify new drugs and drug combinations, diagnose diseases from medical images, and assist in surgeries. AI was used to predict an enzyme better than any other prediction before. A technique called deep learning was used. The system was able to predict the three-dimensional structure of an enzyme. The most important thing is that the 3D structure was more complex than those the algorithm was previously trained to deal with. Artificial intelligence has also been successfully used in cancer research to create better ways to detect, diagnose, and treat cancer patients.

Researchers reported that they used machine vision to analyze human behavior and physical characteristics in videos of people with autism and Asperger's Syndrome. They used AI algorithms based on deep learning with a dataset of 1,200 videos featuring 12-megapixel cameras, just like the ones on iPhone 13, and individuals making facial expressions or engaged in social interactions, such as smiling or nodding. The analysis revealed ten distinct facial states of autism,

while deep neural networks also accurately projected the severity of symptoms.

4: Computer Science

Researchers use AI-based algorithms to search databases of molecules and find effective molecules with desired properties. Such an algorithm may be able to search databases of millions of molecules in a fraction of the time it would take an expert scientist. Computer scientists also created a system that can be used to generate new educational games based on existing video games. The researchers used AI to develop new algorithms for recombining existing game elements into new types of games. They used machine learning to create the system, which uses a personalized learning algorithm to select elements from a large amount of video game content and then recombines them in an unpredictable way. The researchers suggest that this technique could be useful for exploring different genres of video games or creating new genres based on already existing ones.

The best AI tools for research papers and academic research

The influence of AI in scientific and academic research is an exciting development, opening the doors to more efficient, comprehensive, and rigorous exploration.

HeyGPT

I get more out of ChatGPT with HeyGPT. It can do things that ChatGPT cannot which makes it really valuable for researchers.

AI literature search and mapping

With AI as our research assistant, we can navigate the vast sea of scientific research with ease, uncovering citations and focusing on academic writing. It's a revolutionary way to take on literature reviews.

1. Elicit – https://elicit.org
2. Supersymmetry.ai: https://www.supersymmetry.ai
3. Semantic Scholar: https://www. semanticscholar.org
4. Connected Papers – https://www.connected papers.com/
5. Research rabbit – https://www.researchrabbit.ai/
6. Laser AI – https://laser.ai/
7. Litmaps – https://www.litmaps.com

8. Inciteful – https://inciteful.xyz/
9. Scite – https://scite.ai/
10. System – https://www.system.com

AI for academic research

These AI-powered tools can efficiently summarize PDFs, extract key information, and perform AI-powered searches, and much more. Some are even working towards adding your own data base of files to ask questions from.

1. Bit AI – https://bit.ai/
2. Consensus – https://consensus.app/
3. Exper AI – https://www.experai.com/
4. Hey Science (in development) – https://www.heyscience.ai/
5. Iris AI – https://iris.ai/
6. PapersGPT (currently in development) – https://jessezhang.org/llmdemo
7. Research Buddy – https://researchbuddy.app/
8. Mirror Think – https://mirrorthink.ai

AI for reading peer-reviewed papers

They not only facilitate efficient literature reviews by presenting key information, but also find overlooked insights.

With AI, deciphering complex citations and accelerating research has never been easier.

1. Open Read – https://www.openread.academy
2. Chat PDF – https://www.chatpdf.com
3. Explain Paper – https://www.explainpaper.com
4. Humata – https://www.humata.ai/
5. Lateral AI – https://www.lateral.io/
6. Paper Brain – https://www.paperbrain.study/
7. Scholarcy – https://www.scholarcy.com/
8. SciSpace Copilot – https://typeset.io/
9. Unriddle – https://www.unriddle.ai/
10. Sharly.ai – https://www.sharly.ai/

AI for scientific writing and research papers

Together, these AI tools are pioneering a new era of efficient, streamlined scientific writing.

1. Paper Wizard – https://paperwizard.ai/
2. Jenny.AI https://jenni.ai/ (20% off with code ANDY20)
3. Wisio – https://www.wisio.app

AI academic editing tools

In the realm of scientific writing and editing, artificial intelligence (AI) tools are making a world of

difference, offering precision and efficiency like never before.

1. Paper Pal – https://paperpal.com/
2. Writefull – https://www.writefull.com/
3. Trinka – https://www.trinka.ai/

AI tools for grant writing

In the challenging realm of science grant writing, two innovative AI tools are making waves: Granted AI and Grantable. These platforms are game-changers, leveraging the power of artificial intelligence to streamline and enhance the grant application process. Together, these tools are transforming the way we approach grant writing, using the power of AI to turn a complex, often arduous task into a more manageable, efficient, and successful endeavor.

1. Granted AI – https://grantedai.com/
2. Grantable – https://grantable.co/

Free AI research tools

The best free ones at time of writing are:

1. Elicit – https://elicit.org
2. Connected Papers
   – https://www.connectedpapers.com/
3. Research rabbit – https://www.researchrabbit.ai/
4. Litmaps – https://www.litmaps.com
5. Consensus – https://consensus.app/

The Future of Research

It has been asserted that AI affects the nature of humans, their intelligence, and the decision-making process. With the advent of AI, there is concern over how its creations could affect human beings, including encouraging biases in human thought processes. A common concern is that machines would become smarter than humans and thus gain control. Regardless, AI is proving a powerful tool for connecting information and drawing new hypotheses.

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