



The Use Of AI In Physical Therapy

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ABSTRACT

Following the invention of the steam engine, human social and economic systems saw unprecedented growth and development. More recently, artificially intelligent machines have emerged, enabling human cognitive capacity to recognize previously hidden patterns within massive data sets. These changes are having an impact on every facet of society, including but not limited to our legal, moral, educational, health, and social systems. In comparison to the steam engine-driven mechanical revolution, these changes may have a greater lasting effect on human progress. Physicians will soon have to deal with massive information networks, which will necessitate the use of artificial intelligence (AI) in patient care. This paper aims to describe the potential impacts and range of applications of AI-based technologies on the field of physiotherapy, as well as the resulting changes that physiotherapy education will need to undergo in order to produce graduates qualified to work in a 21st-century healthcare system.

Keywords: education, physiotherapy, patient care, artificial intelligence, and machine learning

I. INTRODUCTION

The trajectory of human progress has been one of gradual increase over thousands of years. The material aspects of the lives of average people have changed very little over the course of successive The industrial revolution increased the amount of work that could be done by both human and animal labor by bringing with it a variety of technological innovations and ways to produce massive amounts of energy. The advent of machine power greatly expanded our ability to control the physical world around us and made it possible for material goods to be produced in large quantities, which improved living standards in all spheres of human endeavor and at all social strata. We are currently at a turning point in the 21st century, one that will see generations of improvements to human cognition after. Due to the industrial revolution, human social and economic development sharply increased starting about 200 years ago. At the same time, the population growth and productivity curves sharply veered in an almost vertical direction.

Human-machine intelligence (AI)

Artificial intelligence (AI) is the term used to characterize a machine's capacity to carry out operations that would typically require human intelligence, or "thinking" machines. According to its technical definition, it is the advancement of technology used to execute Technological progress, especially in the field of Artificial Intelligence (AI), has transformed a number of technological processes, many of which still need human intelligence. Through the use of computational, mathematical, logical, mechanical, and biological principles and tools, artificial intelligence (AI) is a multidisciplinary field of study that aims to comprehend, model, and replicate intelligence and cognitive processes. Lately, artificial intelligence has been a major force behind technological advancement.

AI's core technology, machine learning, makes it possible to train models through both supervised and unsupervised learning. It gives systems the ability to enhance their training and prediction capacities. AI technology is now present in many forms, such as hardware interfaces and software applications, which make

it easier to create systems that can learn from their own datasets. These qualities work together to improve the ability of AI-based algorithms to make decisions in unclear situations.

Furthermore, improvements in related hardware support the qualitative development of AI. AI-based systems are made more powerful and sensitive by faster networks, smaller gyroscopes, better and less expensive sensors, and the Global Positioning System (GPS). Thanks to these developments, artificial intelligence (AI) systems can now sense their physical surroundings, pinpoint their location on Earth, connect to other devices, and understand their spatial position.

All things considered, the amalgamation of AI with sophisticated hardware and software functionalities signifies a noteworthy progression in technology, endowing systems with heightened self-governance, efficacy, and environmental awareness.

II. MEDICAL SCIENCE AND ARTIFICIAL INTELLIGENCE (AI)

Expert systems that direct clinical decision-making procedures are becoming increasingly common in the modern era thanks to research conducted with artificial intelligence. In order to improve diagnosis and forecast patient outcomes, computer vision algorithms have the potential to analyze CT and MRI scans more accurately than humans can now. AI additionally helps health systems plan and administer more effectively. Striking a balance between the safe integration of AI applications in clinical operations and the constant advancement of technology becomes crucial as these applications continue to take shape in the medical field. It is critical to acknowledge and assess the benefits and drawbacks of the current medical AI systems. AI-based systems frequently improve clinical decision-making by utilizing pre-established algorithms and multiple information layers. Furthermore, because AI is so stable and efficient, it is especially well-suited for large-scale disease screenings where distinctive morphological alterations are evident. These kinds of applications are very valuable in easing the burden between the excessive demand for healthcare and the scarcity of medical resources.

However, there are issues with the growing use of digital health technologies to strengthen health systems, especially in low- and middle-income nations. The variety of clinical practice guidelines that are applicable to various populations and contexts adds to the complexity of medical practices worldwide. These difficulties might affect how AI is used in clinical settings, which could have an impact on things like safety, the effectiveness of healthcare services, and communication between patients and providers.

Before incorporating AI into clinical practice, it is imperative to thoroughly examine a number of ethical issues in order to address these important challenges. The design of systems that minimize risks and protect personal data, while providing better insights and improved treatments, is becoming increasingly understood. Healthcare systems can fully utilize AI technology while maintaining the highest standards of patient care and safety by carefully examining these ethical issues.

III. CLINICAL PRACTICE IN PHYSIOTHERAPY AND ARTIFICIAL INTELLIGENCE (AI)

Physiotherapy education has undergone substantial changes as a result of the impact of AI-based technologies in clinical practice, better equipping professionals for the demands of the healthcare system of the twenty-first century. In physiotherapy practice, clinicians use patient histories to make differential diagnoses. This process is similar to supervised learning in machine learning, where computers have access to labeled examples. Deep learning is a subset of supervised learning that uses layers of algorithms, or neural networks, to simulate how the brain processes information. It opens up new possibilities for treatment planning and diagnosis.

Another use of AI is predictive modeling, which makes use of current data to forecast future events or results and provides insightful information for both immediate and preventive patient care. Examples include estimating the course of depression treatment or the onset of diseases like diabetes mellitus. Cutting-edge tools like the "Stroke Recovery Predictor" help predict a patient's prognosis and direct their rehabilitation based on a range of patient parameters. Additionally, posture assessment is made easier by AI-based technologies like Open Pose, which improves patient assessment and treatment planning. By offering cognitive therapy and emotional support, integrating "ChatBot" systems into AI-based applications improves patient engagement and treatment adherence. These systems help to preserve emotional stability during the healing process, monitor patient routines, and gather data for psychological processing.

Clinicians must adjust to newly formed care teams in the changing healthcare environment where patients engage with providers from a variety of backgrounds, such as software developers and data scientists. In multidisciplinary teams, patients take on leadership roles in care delegation and actively participate in clinical decision-making. In order to manage this changing dynamic, clinicians must learn to transfer authority over patient care between themselves, other team members, and intelligent machines.

IV. ARTIFICIAL INTELLIGENCE (AI) AND EDUCATION IN PHYSIOTHERAPY

Teachers need to address some issues when thinking about the function and significance of studying the

implications of AI in clinical practice for physiotherapy. The need for adaptation in education is highlighted by issues like whether or not students need to understand algorithmic decisions and when to disregard them, or whether or not traditional skills like interpreting X-rays should still be taught when algorithms are becoming more and more adept at image recognition. It seems clear that patient-driven, interdisciplinary care teams using AI-enabled smart machines will be a feature of healthcare systems in the twenty-first century. This calls for significant changes in the way graduates are trained for clinical practice, with an emphasis on human-based elements that AI finds difficult to duplicate.

The teaching of physiotherapy needs to move away from a curriculum that emphasizes memorization and toward an approach that incorporates data literacy, technological literacy, and human literacy as three core literacies. In order to interact with intelligent machines, future physiotherapists will need to be technologically literate and comprehend terms from computer science and engineering. Lifelong learning is becoming more and more important as AI is implemented, and education is changing from being a time-limited degree program to a platform for ongoing professional development.

The growing automation of computation and reasoning tasks formerly done by humans means that clinicians need to develop human literacy in domains where machine learning algorithms fall short. Developing abilities in empathy, collaboration, ethics, creativity, and entrepreneurship is part of this. By incorporating these literacies into the curriculum, future therapists will be better equipped to work with AI in a way that capitalizes on their unique human strengths.

It is possible that future generations of educators and health professionals won't be prepared to handle the complexity of healthcare in the twenty-first century without this integration. Therefore, it is crucial to help students and practicing clinicians develop a flexible mindset so they can adjust to a rapidly changing healthcare environment where working with AI is essential.

V. CONCLUSION

In the twenty-first century, the application of artificial intelligence (AI) in physiotherapy has the potential to completely transform clinical practice and improve patient care. AI-based tools for diagnosis, treatment planning, and rehabilitation include computer vision, machine learning, and predictive modeling. These tools provide previously unheard-of capabilities. Physiotherapists can gain from enhanced patient outcomes, tailored treatment recommendations, and sophisticated analytics by utilizing AI.

The use of AI in physiotherapy is not without its difficulties, though. These include the requirement for continuous training and adjustment on the part of practitioners, moral issues pertaining to patient autonomy and data privacy, and the possibility of intelligent machines replacing some conventional skills. A multifaceted strategy that prioritizes interdisciplinary cooperation, ongoing professional development, and the development of human-centered skills in addition to technical proficiency is needed to address these issues.

In the end, the effectiveness of integrating AI into physical therapy relies on finding a middle ground between leveraging technology to support clinical judgment and maintaining the fundamentally human components of care, empathy, and intuition. Physiotherapists can usher in a new era of innovation and excellence in rehabilitation by embracing AI as a valuable tool in their therapeutic arsenal and using it to empower themselves to provide more effective, efficient, and compassionate care to their patients.

Artificial Intelligence has the potential to completely change the practice of physiotherapy by allowing for new opportunities to improve health outcomes and change lives through careful integration and responsible stewardship. Let us not waver in our resolve to use AI's transformative potential for the benefit of humanity as we set out on this voyage of exploration and discovery.

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