Artificial intelligence in the health context

Inteligência artificial no contexto de saúde

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ABSTRACT
Introduction: In human history, various discoveries have enabled the evolution and improvement of work and the means of communication, such as radio waves, which allow communication over great distances; the microscope, which can observe very small dimensions, such as bacteria; the telephone, which allows conversations with people on the other side of the world; television and the visualization of facts in real time; the computer, which has brought immense storage capacity, calculations and information in a few minutes; and the cell phone, where conversations take place more virtually than in person. The sum of all this technological apparatus, among others, forms Artificial Intelligence (AI), which analyzes a large amount of data and algorithms and provides a solution to any existing problem. Methodology: A narrative literature review was carried out, in which the methods and selection criteria for the studies included were not stipulated in advance. Searches were carried out on the electronic databases Google Scholar and Scientific Electronic Library Online - Scielo. Results and discussion: The results found demonstrate the great positive impact of artificial intelligence in the health sector, especially in medicine, as it makes it easier and quicker to diagnose patients. In the field of medicine, the treatment and diagnosis of diseases is a much-studied area and AI has achieved good and great results that help in the care of patients. AI has helped many professionals and students because computers analyze a large amount of data and algorithms already defined by professionals in the field and are able to solve medical problems. Computers can store and retrieve data on images, injuries, exams and so on, and with this information, based on algorithms, pass on a pre-established result. AI is being used to facilitate the early detection of diseases, improve the understanding and progression of the illness, as well as optimize treatments, drug dosages and even discover new procedures. Final considerations: The development of technologies and artificial intelligence has played a fundamental role in the health sector, especially in the field of medicine. Early diagnosis using AI can guarantee more appropriate treatment for people with different problems and clinical conditions, as well as reducing the chances of error. However, contact between the healthcare professional and the patient remains fundamental, because even if AI simulates human beings, communication is still the best form of personal contact, as it allows empathy and humanized care to be dispensed to the other.

Keywords: Artificial intelligence, Medicine, Health.

RESUMO

Introdução: Na história humana, diversas descobertas permitiram a evolução e aperfeiçoamento do trabalho e dos meios de comunicação, como as ondas de rádio, que permitem a comunicação a partir de grandes distâncias; o microscópio, que pode observar dimensões muito pequenas, como por exemplo as bactérias; o telefone, que permite conversar com pessoas do outro lado do mundo; a televisão e a visualização de fatos em tempo real; o computador que trouxe uma imensa capacidade de armazenamento, cálculos e informações em poucos minutos; e o celular, onde a conversa ocorre mais virtualmente do que presencialmente. A soma de todo esse aparato tecnológico, entre outros, forma a Inteligência Artificial (IA), que analisa um grande número de dados, algoritmos e traz a solução para qualquer problema existente. Metodologia: Realizou-se uma revisão da literatura, do tipo revisão narrativa, em que os métodos e critérios de seleção dos estudos incluídos não são previamente estipulados. Foram realizadas buscas nas bases eletrônicas Google Acadêmico e Scientific Electronic Library Online – Scielo. Resultados e discussão: Os resultados encontrados demonstram o grande impacto positivo da inteligência artificial no ramo da saúde, principalmente na medicina, por permitir facilitar e agilizar o diagnóstico dos pacientes. No campo da Medicina, o tratamento e o diagnóstico de doenças é um ramo bastante estudado e a IA tem alcançado bons e grandes resultados que auxiliam nos cuidados dos pacientes. IA vem auxiliando muitos profissionais e estudantes, pois o computador analisa uma grande quantidade de dados e algoritmos já definidos pelos profissionais da área e são capazes de solucionar problemas médicos. Os computadores podem armazenar e recuperar dados sobre imagens, lesões, exames entre outros e com essas informações baseadas em algoritmos repassar um resultado pré-estabelecido. A IA está sendo utilizada para facilitar a detecção precoce de doenças, melhorar a compreensão e a progressão da enfermidade, bem como otimizar tratamentos, dosagens de medicamentos e ainda descobrir novos procedimentos. Considerações finais: O desenvolvimento das tecnologias e da inteligência artificial tem desempenhado um papel fundamental na área da saúde, principalmente no campo da medicina. O diagnóstico precoce a partir da IA poderá garantir um tratamento mais adequado a pessoas com diferentes problemáticas e quadros clínicos, além de diminuir as possibilidades de erro. Contudo, o contato entre o profissional da saúde e o paciente segue sendo fundamental, pois, mesmo que a IA simule pessoas humanas, a comunicação ainda é a melhor forma de contato pessoal por permitir dispensar a empatia e o cuidado humanizado ao outro.

Palavras-chave: Inteligência artificial, Medicina, Saúde.

1 INTRODUCTION

In human history, several discoveries have allowed the evolution and improvement of work and means of communication, such as radio waves, which allow communication from great distances; the microscope, which can observe very small dimensions, such as bacteria; the telephone, which allows you to talk to people on the other side of the world; television and the visualization of facts in real time; the computer that brought an immense capacity for storage, calculations and information in a few minutes; and the cell phone, where the conversation takes place more virtually than in person. The sum of all this technological apparatus, among others, forms Artificial Intelligence (AI), which analyzes a large number of data, algorithms and brings the solution to any existing problem (LOBO, 2017).

The term Artificial Intelligence (AI) first appeared at the Dartmouth Summer Research Project on Artificial Intelligence workshop at Dartmouth College in Hanover, New Hampshire, and has often been

defined as "intelligence demonstrated by machines, in contrast to the natural intelligence exhibited by humans and animals" (NENSA; DEMIRCIOGLU; RISCHPLER, p. 1, 2019). AI is a branch of computer science that, using algorithms defined by experts, is able to recognize a problem, or a task to be performed, analyze data and make decisions, simulating human capacity (LOBO, 2018; SILVA; MAIRINK, 2019).

AI has been used in several application areas and sectors, showing increasing interest in society. AI has been observed in the infrastructure, engineering, security and health sectors. In health it has been used in the diagnosis of patients (SARLET; MOLINARO, 2017).

2 OBJECTIVE

Discuss the contributions of artificial intelligence in the health context from the literature search.

3 METHODOLOGY

A narrative review of the literature was carried out, in which the methods and selection criteria of the included studies are not previously stipulated. Searches were conducted in the electronic databases Google Scholar and Scientific Electronic Library Online - Scielo, using the descriptors: artificial intelligence, medicine and health. No language filters were used or temporality. Studies that were not open access and that did not refer to the objective of the study were excluded.

4 DEVELOPMENT

The results found demonstrate the great positive impact of artificial intelligence in the health field, especially in medicine, by facilitating and speeding up the diagnosis of patients. Some programs such as Machine Learning, deep learning and Big Data are used in various medical practices, providing support in data analysis, images, diagnoses and medical predictions, in addition to succeeding medical surgeries and operations using automated robots (BRAGA et al., 2018).

Hassabis et al. (2017) point out that AI is a premise construction of the human level, however a bit daunting as the spaces in search of solutions are not finalized. They argue and emphasize the usefulness of examining the human brain internally, the only existing proof of intelligence and providing several important aspects for higher-level intelligence. There are two benefits for AI development when examining biological intelligence. First, neuroscience provides many inspirations for new complementary or independent algorithms. Second, neuroscience provides validation of existing AI techniques.

Coppin (2010) reinforces that AI is an advanced form of neural network learning. AI has similarities with the functioning of the human brain. The network is organized in two layers normally, the first receives the information that will be classified, reorganized, modified and finally sent to the output neuron. It really is quite complex, many utilities and hardly any errors occur. Among the neural networks there is the form

of learning that will not be supervised and will not require classification, this is because in internet research, it brings several results and understands them without any classification for the user.

Thus, the AI domain uses symbolic, evolutionary, probabilistic and connectionist paradigms that are characterized by a collection of models, techniques and technologies. The symbolic paradigm, is identified in the domain, problem model, which uses formal representation language and implements deduction mechanisms for knowledge. The Connectionist has a simpler language, inspired by brain activity, artificial neurons are able to generalize and learn from examples. The evolutionary seeks solutions to problems, i.e. optimization, mutation, natural selection, recombination, heredity. Finally, the probabilistic uses conditional independence, in which induction calculates the conditional probability distribution of this distribution and uses very efficient algorithms (SICHMAN, 2021).

British mathematician Alan Turing (1950) was one of the founders of modern computer science and AI. It was he who defined intelligent computer behavior, where it achieves performance in human-level cognitive tasks, after a while it came to be called the "Turing test". Since then, researchers have been exploring, studying, and extending intelligent techniques and powers in all fields, including medicine. Gunn first successfully explored the possibility of diagnosing acute abdominal pain with computational analysis and with that interest only increased in the medical profession (RAMESH et al., 2004).

In the field of Medicine, the treatment and diagnosis of diseases is a branch that has been studied a lot and AI has achieved good and great results that help in the care of patients. In 1985 a robot was used in medicine for the first time, the PUMA 560, which was developed to perform a brain biopsy and guided the needle to the site (GUARIZI; OLIVEIRA, 2014).

AI has been helping many professionals and students, as the computer analyzes a large amount of data and algorithms already defined by professionals in the field and are able to solve medical problems. Computers can store and retrieve data on images, injuries, exams, among others, and with this information based on algorithms, pass on a pre-established result. Currently the use of wearable devices has been used in medical practice, obtaining common information, which can generate automatic actions. More than 50 years ago Howard Bleish, already suggested a system that did the action of restoring the patient's hydroelectrolytic balance, providing support for clinical diagnosis (LOBO, 2017).

The American Association of Medical Schools states that by 2025 it will adopt the medical decision support program, reducing the possibility of errors (Lobo,2017). In 2009, Castaneda et al. (2015), found that 32% of medical errors in the US were the result of shorter physician-patient interaction time, i.e., inconclusive or erroneous diagnoses regarding the patient. Even in hospitals that have electronic medical records, medical errors were still 78.9%, that is, even if they have all the information, there are still errors occurring due to lack of data evaluation or tests that prove the patient's diagnostic hypothesis.

Basic propositional fuzzy logic (BL) is the science of thinking, reasoning and inference that recognizes and uses the real world, all in a matter of degree. Instead of saying that everything is black and white, fuzzy logic recognizes shades of grey, meaning that the reality of things lies in between. This logic was popularized by Lofti Zadeh, an engineer from California. The technique makes associations in continuous set, Boolean or conventional logic, example 0 for false and 1 for true and it is this logic that allows for ambiguity and is suitable for medical applications. The authors Schneider et al demonstrated that fuzzy logic is better in regression analysis in lung cancer diagnosis using tumor marker profiles, similarly with acute leukemia and pancreatic cancer. It has also been used for breast ultrasound scans and liver lesions. Other examples that fuzzy logic is used is in the administration of vasodilators in the perioperative period and also in the administration of anesthetics in operating rooms (MASON et al., 1999).

The evolution of AI in medicine is associated with skills beyond human ones, i.e. precision medicine. The small daily routine tasks of doctors would be delegated to AI, thus giving more time to activities of higher value for human attributes, such as creativity, meaning or empathy. An example of daily work is medical imaging, which involves several activities, such as exam planning, quantification and detection of pathologies, manual searches and information in medical records (NENSA; DEMIRCIOGLU; RISCHPLER, 2019).

Costa, Machado and Moraes (2014) state that serious games in the health area also offer greater opportunities for treatment, reducing risks, motivating health care, involving acquired skills and knowledge and enabling personalized feedback on the action taken. AI is also being used to record patients' vital signs and pass them on to doctors virtually, adjusting medications according to results. Cardiac patients have monitors that check blood pressure, heart rate and oxygen levels and inform doctors of their results in real time, increasing the quality of treatment (WEST, 2015).

AI is being used to facilitate early detection of diseases, improve understanding and progression of disease, as well as optimize treatments, drug dosages and discover new procedures. AI is becoming a tool that can enable the rapid and successful analysis of scans, facilitating the detection of diseases such as cancer, and improving the performance of radiology and ophthalmology in searches for abnormalities undetectable to the human eye (HOSNY et al., 2018; VIDAL-ALABALL et al., 2019).

Guarizi and Oliveira (2014) report that systems that are developed with AI have been used as a knowledge base to help humans specialize in types of pathologies and certain diagnoses. These systems have advanced degrees of decision-making in specific areas of medicine, being able to verify with better accuracy the medical conduct and the patient's condition without the need for additional information, with AI determining the diagnosis. This is because experts determine and facilitate the solution of problems in the field of application by making references and inferences from a human knowledge base.

In the area of mental health, AI has great potential for diagnosis and understanding of mental disorders, still little explored in these areas. According to Graham et al. (2019), the diagnosis of mental disorder can benefit from the use of AI, being possible to identify more objective and improved biomarkers. AI has the capacity to develop better pre-diagnostic screening tools and also to identify and formulate risk models for some predispositions to psychosocial diseases. For such evolution, it is necessary the adherence of the multiprofessional team and the use of specialized tools. appropriate computational approaches, such as Big Data. Other authors also add that AI has helped to identify disease outbreaks earlier than traditional approaches (LAKE et al., 2016).

The authors report that the use of AI can help in decision making in the face of a problem presented, in addition to reducing the workload of health professionals (SCHEWALBE; WAHL, 2020). These techniques are promising, but there are still ethical, regulatory and practical rules that need to be studied, not least because the expansion needs to be generalized, including low- and middle-income environments (WAHL et al., 2018).

For Cippitelli et al. (2016), the science of human movement, developed research related to neuromotor control and biomechanics, in the study of the authors, they highlight that the applicability of the system on the human skeleton, from videos and images, can help the elderly to minimize falls.

Not always seen in a good light, AI is mistaken for a tool that in the future will be able to annihilate the human species on the planet, since many routine tasks are performed in virtual environments, as well as online shopping, banking, hotel reservations, vehicle driving, facial recognition, voice interaction and virtual assistants, such as Amazon's Alexa, Microsoft's Cortana, IBM's Watson and Apple's Siri, among other examples (PASSOS; JUNIOR, 2022).

"Human beings remain human beings in all their paradoxical complexity, but connected in a different way from digital media" (MARTINO, 2014, p. 10). However, separating society from acquired knowledge is unthinkable, in fact inseparable. According to Guedes (2017), technology is the great accelerator of life, due to the countless impacts caused by it until the moment of history.

The fireplace, the lamp and the candle contributed to a more united life, forcing all family members to be together in the same room, while electricity, in turn, distanced people, allowing them to be in separate rooms (CARR, 2008) and finally, the development of artificial intelligence technologies and social networks, allowed people to be in separate rooms, kilometers away or even in another country, and maintain communication in real time and at high speed (CARDOZO; FERRARI; BOARINI, 2020).

5 FINAL CONSIDERATIONS

The development of technologies and artificial intelligence has played a key role in healthcare, especially in the field of medicine. Early diagnosis using AI can ensure more appropriate treatment for people with different problems and clinical conditions, as well as reducing the chances of error. However, the contact between the healthcare professional and the patient remains fundamental, because, even if AI simulates human people, communication is still the best way to achieve this form of personal contact because it allows empathy and humanized care to be dispensed to the other. Elements that cannot be offered by any machine.

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