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USING ARTIFICIAL INTELLIGENCE TO ANALYZE CANCER IMAGES

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Abstract: Technology is playing an increasingly important role in medicine, especially in image analysis for cancer diagnosis. New computational tools make it possible to identify patterns in scans more quickly and accurately, helping in the early detection of the disease and in targeting more effective treatments. Traditional methods, such as manual analysis of biopsies, are still essential, but they can be time-consuming and subject to variations in interpretation. Automating this process helps to reduce errors and standardize results. Among the most promising applications are the segmentation of tumours, the prediction of disease progression and the personalization of treatments according to the individual characteristics of each patient. However, challenges such as the need for large databases to train these tools and the transparency of results still need to be overcome. In addition, the regulation of these new health technologies is essential to ensure their safety and accessibility. In the coming years, the trend is for these innovations to be integrated with other fronts of medicine, such as genetic analysis and telemedicine, making cancer diagnosis even more accurate and accessible. With the constant advance of these technologies, it is hoped that there will be a significant improvement in patients' quality of life and in the efficiency of cancer treatments.

Keywords: Artificial Intelligence, Oncological images; Image analysis; Diagnosis.

COMPREHENSIVE INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND ITS MANY INNOVATIVE APPLICATIONS IN THE MODERN MEDICAL FIELD

Artificial intelligence (AI) is an innovative technology that enables machines and computer systems to perform tasks that, until recently, were the exclusive preserve of human cognition. In the field of medicine, its impact has been significant, being applied to medical diagnoses, the discovery of new drugs, the management of large volumes of clinical data and the analysis of images with an ever-increasing level of precision. The introduction of AI in healthcare has brought significant advances, especially in reducing human error and optimizing essential processes. One of the greatest benefits of this technology is in the analysis of cancer images, where intelligent algorithms are able to identify patterns and anomalies more quickly and accurately than traditional methods. This not only improves the early detection of cancer, but also contributes to more targeted and effective treatments. With AI, doctors can make more informed decisions, increasing the chances of successful treatments and providing more personalized care for each patient. Despite its challenges, such as the need for large databases and transparency of results, the trend is for AI to continue to evolve and integrate with other areas of medicine, such as genetic analysis and telemedicine. In this way, its impact will go beyond diagnostic accuracy, making medical care more efficient and accessible. As technology advances, artificial intelligence promises to revolutionize the fight against cancer and other diseases, offering new opportunities to improve patients' quality of life. Its role in the future of medicine is undeniable, bringing not only innovation but also hope to millions of people.

DEFINITION AND FUNDAMENTAL CONCEPTS OF ARTIFICIAL INTELLIGENCE

Artificial intelligence, often referred to by the abbreviation AI, is a fascinating field that encompasses systems and machines endowed with the incredible ability to perform a variety of tasks that conventionally require human intelligence. These tasks include, but are not limited to, learning, complex decision-making, intricate pattern recognition and natural language processing. The algorithms that form the basis of AI are designed with exceptional meticulousness, allowing these machines to analyze vast sets of data. This process allows for the efficient identification of relevant information and the appropriate resolution of varied problems, thus expanding our capabilities and optimizations in various areas. Among the fundamental concepts underpinning this innovative technology are machine learning, deep learning, artificial neural networks and natural language processing. Each of these elements plays a critical role in the evolution and application of AI, enabling this technology to advance and integrate deeply into various domains of human knowledge, covering areas such as medicine, engineering, communication and many others. This transformation is reshaping the way we interact with technology and the world around us, bringing new opportunities and exciting challenges.

IMPORTANCE AND BENEFITS OF APPLYING ARTIFICIAL INTELLIGENCE IN THE MEDICAL FIELD

The application of artificial intelligence in the medical field has become increasingly essential, bringing significant advances in diagnosis and treatment. Its ability to speed up the identification of complex diseases, which previously required a lot of time and human effort, allows for a faster and more effective approach. In addition, AI makes it possible to personalize treatments, adjusting them to

the individual needs of each patient, improve accuracy in predicting disease risks and help implement preventive measures. In the context of oncological image analysis, AI plays a crucial role in the early detection of cancer, identifying specific characteristics of tumors, accurately segmenting affected tissues and monitoring the evolution of treatment over time. These advances are fundamental to increasing the effectiveness of therapies and ensuring better prognoses. In addition, the use of sophisticated algorithms improves the accuracy and consistency of diagnoses, benefiting both patients, who receive more assertive care, and healthcare professionals, who can focus on other critical areas of care. At the same time, artificial intelligence improves the operational efficiency of health services, significantly reducing costs and optimizing resources.

CANCER AND DIAGNOSTIC IMAGING

Diagnostic imaging plays an essential role in the identification and assessment of cancer and is an indispensable tool in modern clinical practice. Different types of cancer have specific characteristics, such as variations in the shape, size and location of tumours, making imaging analysis even more relevant for personalizing treatment for each patient. Early diagnosis is fundamental, as it is directly linked to increased chances of successful treatment and improved quality of life for patients. This is because early detection of cancer makes it possible to apply the most effective therapies available on the market. In addition, the early identification of lesions can allow for less invasive and more conservative interventions, providing safer and less aggressive approaches for the patient. The analysis of oncology images not only aids accurate diagnosis, but also allows for continuous and detailed monitoring of the progression of the disease, directly

impacting therapeutic strategies and influencing patient survival. The role of diagnostic imaging goes beyond initial detection and is essential for evaluating the response to treatment and monitoring the long-term evolution of cancer. This approach guarantees more effective medical interventions, adapting treatment as necessary and contributing to better results and a higher quality of life for patients affected by the disease.

THE MOST COMMON TYPES OF CANCER AND THEIR CHARACTERISTICS

The most common types of cancer, which affect thousands of people every year, include skin, breast, lung, colorectal and prostate cancer. Skin cancer, one of the most common, is directly related to excessive and unprotected exposure to the sun. Its main signs include patches, spots of different colors and shapes, as well as sores that don't heal properly. Breast cancer, which mostly affects women, usually manifests itself through palpable lumps, nipple discharge and visible changes in the skin of the breast. These changes may indicate a more serious problem and therefore require medical investigation. Lung cancer, which is strongly associated with smoking, can cause persistent coughing, shortness of breath in everyday activities and chest pain, directly impacting on patients' quality of life. Colorectal cancer, which affects the colon and rectum, presents symptoms such as bleeding in the stool and changes in bowel habits, such as diarrhea or constipation, signs that may indicate a more serious condition. Finally, prostate cancer, which is quite common among older men, can cause difficulty urinating, pain in the pelvic region and blood in the urine. When faced with these symptoms, it is essential to seek medical advice for an accurate diagnosis and appropriate treatment.

THE IMPORTANCE OF EARLY DIAGNOSIS IN CANCER TREATMENT

Early diagnosis of cancer is essential for successful treatment, as it is directly linked to the survival rate of patients affected by this serious disease. When identified in the early stages, the chances of effective treatment increase considerably, resulting in better prognoses and reducing the need for invasive and complex medical procedures, which can cause significant discomfort and unexpected complications. In addition, detecting cancer early can also reduce treatment costs, since advanced stages of the disease usually require more expensive, prolonged and complex therapies. This scenario imposes a huge emotional and financial impact on both patients and their families. In this context, artificial intelligence applied to the analysis of cancer images can play a key role in enabling the early detection of lesions and tumors. This technology enables early medical interventions, which can save lives and provide less aggressive approaches, directly benefiting patients' quality of life. At the same time, AI improves the efficiency of the healthcare system, making care more agile and accurate - a crucial factor in an environment where speed can make all the difference. The incorporation of this innovation into clinical practice represents a significant advance in cancer treatment, reinforcing the need for increasingly modern and effective strategies to combat the disease.

TRADITIONAL TECHNIQUES AND METHODS FOR ANALYZING CANCER IMAGES

Traditional techniques and methods for analyzing cancer images cover a wide range of procedures, from macroscopic to microscopic visualization, allowing a detailed study of cancer cells. These methods include the manual classification and quantification of the cha-

racteristics of cells affected by cancer, a meticulous process that involves identifying morphological patterns such as shape, size, color and texture. For this, advanced microscopes and specialized digital image processing tools are used, ensuring a careful and detailed analysis. In addition, histopathological and cytopathological analysis are consolidated and widely applied practices, as they enable an in-depth assessment of tissue and cell samples. These tests are essential for detecting signs of malignancy and other anomalies that may indicate the presence or evolution of cancer, contributing significantly to a more accurate diagnosis. Despite their effectiveness and relevance in clinical practice, these traditional methods present challenges, such as the time needed to carry out the analysis and the high workload involved. In addition, the interpretation of images depends heavily on the experience and skill of the specialist in charge, which can lead to variations in diagnoses and increase susceptibility to errors. This lack of standardization raises concerns about the accuracy and consistency of the results, which are fundamental to guaranteeing adequate and effective treatment for patients.

CHALLENGES AND LIMITATIONS OF MANUAL IMAGE ANALYSIS

Manual analysis of oncology images faces a number of challenges and limitations, ranging from subjectivity in interpretation to eyestrain for healthcare professionals when dealing with highly complex and detailed data. This subjectivity can lead to significant variations in diagnoses, increasing uncertainty in critical cases where accuracy is essential. In addition, the risk of human error is a worrying factor in this process. The large volume of data in oncology also imposes additional difficulties, making manual analysis a laborious and time-consuming process. This can lead to significant delays in diagnosis and,

consequently, in starting treatment, which directly affects patient prognosis. As the success of treatment depends largely on the speed of intervention, any delay can compromise the chances of recovery. The accuracy and consistency of diagnoses can vary between different specialists, making manual analysis less reliable than automated approaches. In this sense, techniques using artificial intelligence are gaining ground, as they make it possible to optimize this complex process and guarantee more standardized and accurate results. The adoption of these technologies not only improves the efficiency of diagnoses, but also represents new hope in the fight against cancer, providing better results and, above all, saving lives.

ARTIFICIAL INTELLIGENCE APPLICATIONS IN THE ANALYSIS AND INTERPRETATION OF CANCER IMAGES FOR ADVANCED DIAGNOSTICS

The application of artificial intelligence to the analysis of cancer images has proved extremely promising, with algorithms such as convolutional neural networks and deep learning models being widely used. These tools have excelled in detecting complex patterns in medical images, enabling earlier and more accurate diagnosis of cancer. Practical examples, such as the identification of tumors in MRI scans and the classification of cancer cells in microscopic analyses, clearly demonstrate the potential of AI in this field. With increasingly high accuracy rates, this technology promises to transform clinical practice, making diagnosis more efficient and contributing to better results in cancer treatments.

MOST COMMONLY USED ARTIFICIAL INTELLIGENCE ALGORITHMS AND MODELS

In the analysis of cancer images, some of the most widely used artificial intelligence algorithms and models include convolutional neural networks (CNN), which are especially effective in the classification and segmentation of tumors, allowing for more accurate identification of lesions. In addition to these, other techniques such as decision trees, support vector machines (SVM) and artificial neural networks (ANN) have also been successfully applied to detect relevant patterns and characteristics in medical images, making it easier to identify anomalies that might otherwise go unnoticed. Advanced supervised learning algorithms, such as Random Forest and Gradient Boosting, have proved highly effective in classifying images for medical diagnosis, allowing for a more detailed and informed analysis of the data collected. The combination of different artificial intelligence models has proved to be a promising approach, significantly increasing accuracy in the detection and characterization of cancerous lesions. This contributes directly to a more reliable diagnosis and more appropriate cancer treatment, based on concrete evidence. The integration of these AI techniques not only speeds up the diagnostic process, but also improves the interpretation of results, favoring better clinical outcomes for patients. In view of this, the application of these technologies in healthcare can transform the way oncology specialists carry out their assessments and make decisions, bringing clear benefits to both patients and medicine as a whole.

EXAMPLES OF SUCCESSFUL AI APPLICATIONS IN ONCOLOGY IMAGE ANALYSIS

One of the most notable and widely recognized examples of success in the application of Artificial Intelligence (AI) in the analysis of cancer images is the development of advanced *machine learning* algorithms, capable of identifying and classifying cancer patterns in biopsy images with significantly greater precision and efficiency than manual analyses carried out by experienced specialists. Another important advance in this field is the application of convolutional neural networks, which excel at detecting tumors in various types of imaging exams. Their high precision allows for earlier diagnosis, an essential factor in the fight against cancer. In addition, sophisticated AI systems are being used to integrate different sources of clinical and genetic data, enabling a more comprehensive approach to identifying cancer biomarkers. This integration is key to personalizing treatment, taking into account factors specific to each patient, such as genetic information, clinical history and other relevant variables. In this way, these technological innovations not only improve cancer diagnosis, but also contribute to more effective treatments tailored to patients' individual needs. This advance represents a significant step towards a more humanized, personalized and patient-centred approach, guaranteeing more precise and efficient care in the fight against the disease.

DEVELOPMENT AND TRAINING OF AI MODELS

For artificial intelligence (AI) models aimed at analyzing cancer images to be developed and trained effectively, it is essential to have large and diverse sets of high-quality data. These images need to cover different types and stages of cancer, allowing the models to identify complex patterns and variations in the visual characteristics of lesions. In addition, the careful preparation of this data plays a key role in the success of training the algorithms. This process includes essential steps such as detailed labeling and thorough cleaning of the information, ensuring that the models are trained with accurate and well-structured data. Validation methods are also indispensable, involving the strategic division of data between training and test sets, as well as rigorous evaluation of the models' performance. Indicators such as accuracy, sensitivity and specificity are fundamental metrics to guarantee not only the efficiency but also the reliability of algorithms in the analysis of cancer images. The continuous improvement of data collection and processing techniques, combined with a robust validation process, can result in significant advances in the early diagnosis and treatment of cancer. These advances contribute to better clinical outcomes, positively impacting the survival rate and well-being of patients affected by the disease.

ACQUISITION AND PREPARATION OF DATA FOR TRAINING

Acquiring and preparing data for training AI models in cancer image analysis is an essential and complex process, which requires meticulous attention at every stage. Initially, data must be collected from reliable sources, ensuring that the diversity of clinical cases is adequately represented. This is crucial, as a comprehensive sample allows models to generalize better when dealing with new data,

reducing the risk of bias and increasing the accuracy of predictions. In addition, data cleaning and pre-processing are crucial steps, as this is when inconsistencies, unwanted noise and outliers are eliminated, guaranteeing the integrity of the information used to train the models. This refinement ensures that the data is in an ideal format for analysis, making the modeling process more efficient. The correct labelling of images, together with the standardization of formats, is another essential phase, as it directly influences the quality and reliability of the data used. A well-structured and organized data set is the basis for developing AI models that are not only accurate, but also effective in the analysis of cancer images. Without these precautions, the efficiency of the models can be compromised, resulting in inaccurate diagnoses and possible errors that can affect fundamental clinical decisions. Therefore, investing time and resources in this initial phase is essential to guarantee reliable and useful results in medical practice, promoting better outcomes for patients and improving the effectiveness of treatments.

MODEL VALIDATION AND EVALUATION METHODS

In the validation and evaluation stage of artificial intelligence models applied to the analysis of cancer images, it is essential to use sophisticated and well-structured techniques. These include cross-validation, which makes it possible to estimate the performance of the models in identifying relevant characteristics in the images with greater precision and consistency. In addition, it is essential to strategically divide the data set into specific parts for training and testing, ensuring that each stage of the model works with representative information. Performance metrics, such as sensitivity, specificity and AUC-ROC, play a central role in assessing the effectiveness and efficiency of models in different clinical scenarios.

These metrics not only quantify the success of the model, but also directly influence the quality of diagnoses in medical practice. Another essential aspect is the external validation of the models, using varied and representative data sets. This ensures that the algorithms not only show good results under controlled conditions, but are also applicable to real situations where there is great variability in the data. In addition to accuracy, the evaluation of models should consider factors such as interpretability, robustness and effectiveness in detecting relevant patterns, ensuring quick and assertive diagnoses. These elements are fundamental for healthcare professionals to trust the artificial intelligence tools they use. Continuously improving the performance and reliability of AI models in oncology is essential if they are to make significant contributions to the fight against cancer, a complex and challenging disease that affects millions of people worldwide. The integration of technological innovation and scientific rigor must be a priority, guaranteeing advances that improve clinical results and patients' quality of life.

ETHICS AND REGULATION IN THE USE OF AI IN HEALTH

The application of artificial intelligence in healthcare raises complex ethical issues that require careful and in-depth analysis. Ensuring the privacy and confidentiality of sensitive patient data collected and processed by these technologies is a priority. In addition, transparency and explainability of the decisions made by the algorithms are fundamental so that patients understand how and why their information is being used. Another growing concern is to ensure that the benefits provided by artificial intelligence are equitably accessible to all, avoiding inequalities in access to this technology. At the same time, the ethical responsibility of healthcare professionals in the use of these emerging tools must

be a central theme in discussions about the future of AI in medicine. In the field of regulation, government agencies around the world have established specific guidelines for the use of artificial intelligence in medical diagnostics and other health applications. The aim of these regulations is to guarantee not only the safety, but also the effectiveness of the systems used to treat and diagnose diseases. These regulations include the need for comprehensive risk assessments, rigorous validations of algorithms and continuous monitoring to ensure their proper functioning. In addition, constant supervision throughout the process of implementing and using AI in the health sector is essential to avoid potential problems. Therefore, an open and continuous dialog between technology experts, healthcare professionals and regulatory bodies is indispensable if the integration of artificial intelligence in medicine is to bring real benefits and if all ethical issues are to be properly addressed.

ETHICAL PRINCIPLES IN THE APPLICATION OF AI IN HEALTH

The application of artificial intelligence in healthcare requires consideration of a wide range of ethical principles to ensure the safety and well-being of patients in all their diversity. This care ranges from the technical to the more human aspects of this practice. It is essential to guarantee transparency in the development and use of algorithms, especially those that influence critical medical decisions. Likewise, the privacy and protection of sensitive patient data must be preserved, ensuring that all information relating to their state of health and medical history is treated with the highest level of security and respect. Furthermore, it is essential that clinical decisions and AI-based diagnoses are fair, impartial and centered on the individual needs of each patient. For this to happen effectively, healthcare professionals from different specializations need to be trai-

ned to understand the workings, benefits and challenges of these technologies. This preparation is essential to guarantee the reliability, integrity and accuracy of the results obtained through artificial intelligence, which has the potential to radically transform medical care. The adoption of AI in healthcare must be carefully regulated and monitored, taking into account the ethical complexities involved. The focus must always be on equity, safety and patient benefit, placing ethics and commitment to collective health as priorities. For technological advances to be aligned with the well-being of each individual, it is essential to respect human dignity and promote an environment of care, responsibility and mutual respect. This commitment to ethics also requires a continuous dialog between developers, health professionals and society, ensuring that technological innovations serve everyone, without discrimination or prejudice. In this way, it is possible to ensure that artificial intelligence in medicine is used responsibly, taking into account the uniqueness of each patient and their specific needs.

SPECIFIC REGULATIONS AND GUIDELINES FOR THE USE OF AI IN DIAGNOSTICS

When using artificial intelligence for cancer diagnosis, it is essential to carefully consider the regulations, standards and guidelines that govern this practice, which has a direct and significant impact on the health of the population. In several countries, regulatory bodies, such as medical councils and specialized government agencies, establish rules to ensure the safe and effective use of AI in healthcare. These measures aim to ensure not only patient safety, but also clinical efficacy and the ethics involved in cancer diagnosis. Oncology image analysis, one of the most sensitive and innovative areas of modern medicine, requires compliance with specific guidelines that

accurately guide the development, rigorous validation and proper implementation of AI algorithms. Following these standards guarantees the accuracy, reliability and transparency of the results generated by these advanced technologies. Strict compliance with these regulations is fundamental to strengthening the confidence of healthcare professionals, patients and society in the application of artificial intelligence at all stages of cancer diagnosis. This is essential if AI is to be safely and effectively integrated into clinical practices, promoting advances that can transform the way diseases are detected and treated, saving lives and improving the quality of medical care.

FUTURE CHALLENGES AND OPPORTUNITIES

Faced with the future challenges of using artificial intelligence to analyze cancer images, it is essential to address the growing need to improve the accuracy and reliability of algorithms, as well as ensuring that the results obtained are interpretable and accessible to healthcare professionals. More than just generating accurate diagnoses, it is essential that this information is understandable to those directly involved in patient care. Furthermore, the integration of artificial intelligence with other emerging technologies, such as genomic analysis and the use of large databases, represents a promising opportunity to significantly advance the personalization of cancer treatments. The future applications of AI in this field are wide-ranging and constantly evolving, enabling more accurate predictions of treatment response, the identification of genetic mutations that can influence the course of the disease and even the discovery of new biomarkers that are essential for oncology. These advances are fundamental to the development of more effective therapies adapted to the individual needs of patients. With this,

artificial intelligence can contribute to more personalized and efficient care, bringing new perspectives to cancer treatment and optimizing care in the health system.

CURRENT LIMITATIONS AND POSSIBLE FUTURE ADVANCES

Currently, the application of artificial intelligence in the analysis of cancer images faces some important limitations. These include the need for large sets of labeled data in order to train models effectively, as well as the lack of standardization and quality in the medical images available. This scenario represents a major challenge for both researchers and health professionals. In addition, interpreting the results generated by AI algorithms still requires rigorous validation by medical experts, a process that can be laborious and time-consuming. This contributes to the slower adoption of these technologies in clinical practice. However, new advances promise to significantly improve the effectiveness and efficiency of AI models used in medical image analysis. Among them, the development of semi-supervised learning techniques has emerged as a promising solution, allowing models to learn from smaller data sets and reducing dependence on large bases of labeled images. This approach would make the systems more adaptable to clinical reality. Another expectation is the implementation of AI systems capable of automatically recognizing and correcting imperfections and artifacts in images, further increasing the reliability and accuracy of analyses. This automation would not only make the work of healthcare professionals easier, but would also ensure that the images analyzed are of high quality before a diagnosis is made. Other promising prospects include the integration of genomic data into image analysis and the combination of different imaging modalities. These strategies are key to more accurate and comprehensive diagnoses,

transforming the practice of personalized medicine in oncology. Innovations in this field have enormous potential not only to improve diagnostic methods, but also to optimize treatments. This enables a more personalized approach for patients, while at the same time reducing the workload of healthcare professionals, allowing for more focused and efficient care. In this way, artificial intelligence can contribute to a more agile healthcare system centered on patients' individual needs.

POTENTIAL INNOVATIVE APPLICATIONS OF AI IN ONCOLOGY

The innovative applications of artificial intelligence (AI) in oncology are vast and extremely promising, bringing possibilities that could transform medicine in ways that were previously unimaginable. AI has the potential to identify complex patterns in cancer images with great precision, which is fundamental for the early detection of cancer. This advance significantly increases the chances of successful treatment, directly impacting patient survival. In addition, AI can contribute to the planning of personalized treatments, adapted to the specific needs of each patient. By taking into account individual factors, such as tumor characteristics and genetic aspects, the technology enables more effective therapeutic strategies. Another important benefit is the detailed monitoring of the progression of the disease over time, allowing for faster and more targeted interventions whenever necessary. Artificial intelligence also excels in the advanced analysis of images from microscopy and tomography, providing a deeper understanding of cancer cells. This approach is essential for the development of more effective and innovative therapies in the fight against cancer. As technology continues to advance and AI algorithms improve, new applications are constantly emerging, offering revolutionary prospects for the diagnosis and treatment of

the disease. These innovations not only transform the way cancer is identified and treated, but also usher in a new era in medicine, where prevention and treatment become increasingly effective, bringing renewed hope to millions of people around the world.

CONCLUSION AND FINAL CONSIDERATIONS

In conclusion, artificial intelligence has proved to be a powerful and innovative tool in the analysis of cancer images, an increasingly essential field for modern medicine. Advances in this area have been fundamental to improving the diagnosis and treatment of cancer, contributing to public health and ensuring more effective and humanized care for patients facing this difficult reality. The implementation of sophisticated algorithms enables not only a more accurate interpretation of images, but also a faster and more efficient approach. This significantly speeds up the workflow in healthcare facilities around the world, enabling early detection of anomalies, a crucial factor in increasing success rates in cancer treatment. In addition, artificial intelligence makes it possible to personalize thera-

peutic plans in detail, taking into account the particularities of each patient. As each case of cancer presents unique challenges, individualized approaches are essential to guarantee the best results throughout treatment and follow-up. The benefits of artificial intelligence in oncology are likely to expand in the coming years, driven by technological advances and new scientific discoveries. As experts and researchers continue to develop innovations in this area, new possibilities for diagnosis and treatment are emerging, significantly transforming the patient experience and the methods used in hospitals and clinics around the world. In this way, the impact of artificial intelligence on cancer image analysis is extremely promising, with revolutionary potential to redefine the way cancer is diagnosed, treated and monitored globally. This revolution not only improves the accuracy of diagnoses, but also contributes to the quality of life of patients and their families, promoting a healthier future. Bringing together innovation, compassion and humanization, artificial intelligence has the potential to profoundly transform cancer care, making it more accessible, efficient and centred on patients' well-being.

REFERENCES

- ARAÚJO, Amanda de. Um estudo sobre a utilização de inteligência artificial na detecção de câncer de pele. 2024. Trabalho de Conclusão de Curso (Bacharelado em Engenharia de Computação) – Instituto Federal Goiano, Trindade, 2024. Disponível em: <https://repositorio.ifgoiano.edu.br/handle/prefix/5013>. Acesso em: 12 fev. 2025.
- SANTIAGO, Hellen Thatiane Macena Rodrigues et al. O uso da inteligência artificial no rastreio e diagnóstico de diferentes tipos de câncer. *Revista Contemporânea*, v. 4, n. 7, 2024. Disponível em: <https://ojs.revistacontemporanea.com/ojs/index.php/home/article/view/4994>. Acesso em: 12 fev. 2025.
- JUCÁ, Jéssica Amaral Guimarães et al. O impacto da inteligência artificial na interpretação de exames de imagem e na prática clínica radiológica. *Revista Ibero-Americana de Humanidades, Ciências e Educação*, v. 10, n. 11, p. 72–86, nov. 2024. Disponível em: <https://periodicorease.pro.br/rease/article/view/16393>. Acesso em: 12 fev. 2025.
- RIBEIRO, Eduarda Coutinho. Relatório de Estágio e Monografia intitulada: O uso da inteligência artificial no processo de investigação e desenvolvimento em oncologia. 2021. Dissertação (Mestrado Integrado em Ciências Farmacêuticas) – Faculdade de Farmácia, Universidade de Coimbra, Coimbra, 2021. Disponível em: <https://estudogeral.uc.pt/bitstream/10316/98995/1/documento%20unico%20-%20Eduarda%20Ribeiro.pdf>. Acesso em: 12 fev. 2025.

GUEDES, Ana Luísa Alves de Carvalho; VARGAS, Ana Carolina Barbosa. Medicina do futuro: o uso da inteligência artificial em condutas de médicos pediatras – uma revisão integrativa. *Revista Científica UniEVANGÉLICA*, v. 18, n. 2, p. 45–60, 2024. Disponível em: <https://unievangelica.edu.br/revista-cientifica/artigo/medicina-do-futuro-ia-pediatria>. Acesso em: 12 fev. 2025.

LUCENA, Natália Vieira da Silva. Os impactos presentes e futuros do avanço da IA na medicina: uma revisão integrativa. *Revista Médica de Minas Gerais*, v. 34, supl. 6, p. S01-S108, 2024. Disponível em: <https://rmmg.org/exportar-pdf/4112/v34s6a02.pdf>. Acesso em: 12 fev. 2025.

REZENDE, Mariana Rodrigues; MAIMONE, Thais Siqueira. Uso de inteligência artificial para identificação de fatores influenciadores do câncer de mama a partir de dados clínicos. 2022. Trabalho de Conclusão de Curso (Bacharelado em Engenharia de Computação) – Universidade Presbiteriana Mackenzie, São Paulo, 2022. Disponível em: <https://dspace.mackenzie.br/items/b4606bcf-acdf-4eba-9c4a-0186b3934f1a>. Acesso em: 12 fev. 2025.

PINTO, Rebeca Szilagy et al. Avanços no diagnóstico e tratamento de doenças oculares: perspectivas atuais na oftalmologia. *Revista Ibero-Americana de Humanidades, Ciências e Educação*, v. 9, n. 7, p. 1215–1226, 2023. Disponível em: <https://periodicorease.pro.br/rease/article/view/10702>. Acesso em: 12 fev. 2025.

ALMEIDA, Maria Isabel Dias de. Tendências emergentes da Inteligência Artificial na saúde: análise bibliométrica de palavras-chave. 2022. Dissertação (Mestrado em Gestão de Serviços de Saúde) – Instituto Universitário de Lisboa, Lisboa, 2022. Disponível em: <https://repositorio.iscte-iul.pt/handle/10071/26620>. Acesso em: 12 fev. 2025.