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[Review Article]:

Artificial Intelligence: Current and Future Role in Veterinary and Public Medicine

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Abstract

ARTIFICIAL INTELLIGENCE (AI) is revolutionizing many industries and medicine. This paper provides an overview of AI's current and future role in medicine. Currently, AI is used in many ways to improve healthcare including reducing costs, improving patient outcomes, increasing efficiency, early disease detection, diagnostics, medical imaging, drug discovery development, outbreak prediction and modeling, surveillance monitoring, and response, contact tracing applications such as proximity information, GPS data, vaccine distribution and predictive analytics. These applications can potentially improve diagnosis accuracy, identify patients at risk for certain diseases, and personalize treatment plans. For example, AI algorithms can analyze medical images to identify subtle abnormalities that human radiologists may miss. In the future, AI is expected to play a more important role in medicine. It has the potential to help physicians make more informed decisions by analyzing large amounts of data and providing personalized treatment recommendations. Additionally, AI-powered virtual assistants could help patients manage chronic conditions, such as diabetes and hypertension, by providing real-time feedback and guidance. However, there are also challenges to the widespread adoption of AI in medicine. One major concern is the potential for AI algorithms to perpetuate biases in healthcare, diagnosis, histopathology, and microbiota. Additionally, there is security and privacy of patient data. Despite these challenges, the potential benefits of AI in medicine are highly significant. Electrode implantation and microchips can be used as a treatment option for certain medical conditions. As AI technology continues to advance, we will see more applications in healthcare, leading to better patient outcomes and more efficient healthcare delivery.

Keywords: Meat Artificial intelligence, Definitions, Medicine Applications, Diagnosis, Microbiota, histopathology.

Definitions

Artificial intelligence (AI) is a term that refers to computer systems development to perform tasks that would require human intelligence, such as speech recognition, language translation, visual perception, and decision-making. AI includes the use of statistical models, algorithms, and techniques of machine learning to enable machines to learn from data and improve their performance over time. The Association for Computing Machinery (ACM) defines AI "the study of agents that receive precepts from the environment and perform actions" [1].

The European Commission defines AI as "a technologies set that enable machines to perceive, learn, reason, and assist in decision-making to solve problems in ways that are similar to human cognitive functions"[2].

AI applications in real life:

*Personal assistant*s: AI-powered virtual assistants like Alexa, Siri, and Google Assistant use natural language processing (NLP) to understand and respond to user's voice [3].

Recommendation systems: Online platforms as Amazon, Netflix, and Spotify are using AI algorithms to recommend movies, products, and music to users based on their past behavior and preferences [4].

Fraud detection: Banks and financial institutions use AI-based fraud detection systems to analyze

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customer transactions and identify suspicious activities [5].

Healthcare: AI is used in medical diagnosis, drug discovery, and personalized treatment planning. For example, IBM's Watson Health uses AI to analyze medical data and provide insights to healthcare providers [6].

Autonomous vehicles: Self-driving cars use AI to interpret sensor data and make decisions in real-time to navigate through traffic [7].

Manufacturing: AI is used in predictive maintenance, quality control, and supply chain optimization. For example, General Electric uses AI to predict when its turbines need maintenance [8].

Agriculture: AI is used to optimize crop yields and reduce resource wastage in precision farming. For example, John Deere uses AI to analyze data from sensors on its tractors to optimize planting and fertilization [9].

Role of AI in study disease spread and epidemiology:

In both humans and animals AI can play an important role in studying of disease spread and epidemiology by analyzing large amounts of data to identify patterns and predict outbreaks:

Diseases surveillance: AI can analyze data from multiple sources, including social media, news reports, and official health records, centres of surveillance for exotic disease data to identify expected outbreaks and track the spread of diseases in real-time. This can help public health officials respond more quickly and effectively to contain outbreaks [10].

Diagnosis and treatment: AI can analyze medical data, including genetic information and medical imaging, to help diagnose diseases and develop personalized treatment plans. This can improve the accuracy and efficiency of diagnosis and treatment, potentially reducing the spread of infectious diseases [11].

Vaccine development: AI can analyze large amounts of data on viruses/bacteria and their interactions with the immune system to help develop new vaccines. This can accelerate the development of vaccines and potentially reduce the spread of infectious diseases [12-14].

Animal diseases surveillance: AI can analyze data from various sources, including satellite imagery and animal movement data, centers of surveillance for exotic disease data to track the spread of animal diseases and predict outbreaks. This can help prevent the spread of diseases to humans and reduce economic losses in the livestock industry [15].

Examples of AI usage in disease surveillance in real-world situations:

There are some examples of how AI is being used in disease surveillance in real-world situations. AI has the potential to transform public health by enabling faster and more accurate disease surveillance and response:

Flu tracking: Google uses search queries to track the spread of flu in real-time. The system uses machine learning algorithms to analyze search data for flu-related terms and predict the number of flu cases in a given region. This can help public health officials respond more quickly to outbreaks [16].

Covid-19 tracking: There were more than 200,000 scientific articles related to Covid-19. Machine learning algorithms were used to analyze the data set to identify patterns and insights that can help in the fight against the disease. AI is being used to identify potential drug targets and predict the spread of Covid-19 [17].

Ebola outbreak prediction: The algorithm used data on the movement of people and animals, as well as other factors, to predict the likelihood of the disease spreading to new areas [18,19].

Dengue fever tracking: A system called Aedes AI was developed to track the spread of dengue fever. The system uses machine learning algorithms to analyze data on mosquito populations, weather patterns, and other factors to predict the likelihood of a dengue outbreak [20].

Cholera: AI was used to identify outbreaks of cholera [10].

Avian Influenza: AI has indeed been employed in the identification and tracking of outbreaks of Avian influenza H5N1, also known as bird flu. AI technologies and data analysis techniques have played a significant role in monitoring and responding to the disease [21, 22].

Newcastle disease (ND): It's important to note that while AI can provide valuable insights and support in the tracing and control of ND, it is typically used in combination with traditional surveillance methods and expert analysis [23, 24].

AI in animal production:

AI has the potential to revolutionize animal production by improving the efficiency and sustainability of production systems. Here are some examples of the role of AI in animal production:

Precision Livestock Farming (PLF): PLF is a management system that uses sensors and AI to monitor animal behaviour, health, and welfare in real-time. This can allow producers to detect and intervene in health issues earlier, resulting in improved animal welfare and productivity [25].

Feed management: AI can be used to optimize feed formulation and delivery by predicting animal nutrient requirements based on factors such as age,

weight, and genetics. This can reduce feed waste, improve animal growth rates, and reduce environmental impacts [26].

Diseases detection and prevention: AI is used to detect diseases in animals at from the early stage by analysing the collected data from sensors and cameras. This allows producers to take preventive measures and reduce the spread of disease, improving animal health and reducing treatment costs [27,28].

Genetics and breeding: AI can be used to identify animals with desirable genetic traits and create breeding programs to improve animal performance and health. This can lead to improved productivity and sustainability of animal production [29].

Environmental monitoring: AI can be used to monitor environmental factors such as temperature, humidity, and air quality to optimize animal housing conditions and reduce the environmental impact of animal production [30].

AI in pet animal medicine:

Analyze medical images, such as X-rays and MRI scans, to identify abnormalities including fractures, tumours, or other pathologies, and assist in diagnosis of conditions in pets. AI algorithms for automated detection of fractures in dogs and cats [31]. AI can analyze large amounts of data from electronic health records, laboratory results, and other sources to monitor the health of pet animals. This can be particularly valuable in managing chronic conditions or monitoring the health of pitbulls with a history of specific health concerns [32]. Deep learning models for automated use applied in detection of lung tumours in dogs [33].

AI can analyze genomic data to identify genetic markers associated with certain diseases or traits and predispositions to specific health conditions. AI driven identification of genetic markers associated with hip dysplasia [34], identify genetic variants associated with dilated cardiomyopathy in dogs. Machine learning models for early detection of acute kidney injury in dogs [35], treatment of canine lymphoma [36]. AI-based prediction of heart disease in cats using electronic health records [37], also optimization of insulin therapy for diabetic cats [38]. AI-powered telemedicine platforms can enable remote consultations between veterinarians and pet owners through sharing information, images, and videos of their pets AI-powered telemedicine platforms for remote consultations in veterinary medicine [39]. Remote monitoring of vital signs in dogs and cats using wearable devices and AI analysis [40]. AI can be used to analyze vocalizations of pets, such as barks or meows, to identify certain patterns or medical conditions as coughing sounds helping to diagnose respiratory issues in [41].

AI technology applications in animal husbandry:

AI-based systems are used to monitor and analyze various parameters related to livestock health, behaviour, and performance. Sensors and cameras are deployed to collect data on factors like body temperature, feeding patterns, movement, and vocalizations. Machine learning algorithms then process this data to identify patterns, detect anomalies, and provide insights to optimize livestock management practices [25].

AI-powered feeding systems use computer vision and machine learning algorithms to identify individual animals, monitor their feeding behaviour, and nutrition. This technology ensures that each animal receives the right amount and type of feed, leading to improved growth rates and feed efficiency [42]. AI can analyze datasets, including animal health records, sensor data, and environmental parameters, to identify early signs of diseases or abnormalities. That helps rapidly prevent the spread of diseases within livestock populations [43]. AI techniques are used to assess the reproductive status of animals. These technologies can detect oestrus, predict ovulation, and assist in artificial insemination, improving breeding efficiency and genetic selection [44].

AI in Veterinary Vaccine technology:

AI techniques (machine learning and computational modelling) are being employed in the vaccine development process. By analysing vast amounts of genomic and proteomic data, AI algorithms can identify potential vaccine targets, predict antigen-antibody interactions, and simulate the immune response to different vaccine candidates, thereby aiding in the design and optimization of vaccines [45]. AI can assist in the identification and optimization of adjuvants by analysing molecular structures, predicting immunogenicity, and simulating interactions between adjuvants and immune cells [46].

AI can aid in the assessment of vaccine safety and efficacy. Machine learning algorithms can analyze large-scale event data and electronic health records to identify potential vaccine-related adverse effects. Additionally, AI models can predict vaccine efficacy based on clinical trial data, genetic information, and immune response markers [47]. By comparing pathogen genomes to host genomes, AI models can identify unique pathogen-specific proteins that can serve as potential antigens for vaccine development [48]. Reverse vaccinology is an approach that uses AI and computational methods to predict potential vaccine targets from pathogen genomes. AI algorithms can scan the entire genome of a pathogen, identify genes encoding surface-exposed proteins, and predict their immunogenicity. This has been successful in identifying vaccine targets for various pathogens [49]. AI techniques including both machine learning and molecular

dynamics simulations, can be employed to predict the three-dimensional structure of proteins. These models can help identify antigenic regions on pathogen proteins and facilitate the design of vaccines that elicit an effective immune response [50]. Epitopes, which are specific regions on antigens recognized by the immune system. AI models can identify potential epitopes that can induce an immune response by analyzing protein sequences and structures, aids in selection of vaccine targets and design of peptide-based vaccines [51].

There have been several successful examples of vaccine targets identified using AI techniques in human. AI played a crucial role in identifying the spike protein of the SARS-CoV-2 virus as a key vaccine target. AI algorithms were used to analyze the viral genome and predict the structure and immunogenicity of the spike protein to develop Pfizer-BioNTech and Moderna mRNA vaccines, which target the spike protein to induce an immune response [52]. By analyzing viral genomes and protein structures, AI algorithms predicted the immunogenicity of specific Human Papillomavirus (HPV) proteins, leading to the development of successful vaccines like Gardasil and Cervarix [53], RTS,S/AS01 malaria vaccine, which includes the circum sporozoite protein [54].

Animal Health Monitoring:

Sensors can detect abnormal behaviour, signs of distress, or early signs of diseases, feeding behaviour and identify any deviations that might indicate health issues in dairy farming [55]. AI sensors can monitor vital signs and health parameters of animals, such as heart rate, respiration rate, and body temperature. In animal research facilities, AI sensors can detect signs of distress or pain in laboratory animals, ensuring their welfare [56]. AI algorithms can identify diseases outbreaks, track the spread of infections, and alert farmers or veterinarians. This enables timely intervention, reducing the impact of diseases on animal populations [57, 58].

AI Sensors in Monitoring and Control of Animal Environment:

AI can monitor and control animal environments with sensor technologies, researchers and animal welfare experts can gain valuable insights into animal behaviour, health, and well-being. AI sensors enable continuous monitoring of animal environments, providing real-time data on temperature, humidity, air quality, and lighting conditions. These sensors can detect and analyze changes in environmental parameters, helping to maintain optimal conditions for animals and poultry [59]. AI sensors can monitor temperature and humidity levels to prevent heat stress or respiratory problems in poultry farms [60.61].

Ethical principles and guidelines that guide the development and use of AI in healthcare:

Beneficence: The principle of beneficence requires that AI is used to benefit patients and society and to promote the greater good. i.e AI should be used to improve healthcare outcomes and to advance medical research in a responsible and ethical manner [62].

Non-maleficence: The principle of non-maleficence requires that AI development and applied without harms to patients or society. This means that AI should be designed and deployed to minimize the risk of harm and that appropriate safeguards are put in place to prevent unintended consequences [63].

Autonomy: The principle of autonomy requires that patients have the right to make their own healthcare decisions and to have control over their own healthcare data. Therefore, AI should be developed and used in a way that respects patient autonomy and that patients are fully informed about how their data is being used [64].

Transparency: The principle of transparency requires that AI developers and users are transparent about how AI is being used and how decisions are being made. AI algorithms should be explainable and that patients should be informed about how AI is being used in their care [65].

Role of AI in the development of diagnostic tools:

AI has revolutionized the field of medicine in many ways including improving diagnosis and treatment with a promising result in various medical applications. AI enables more accurate and efficient diagnoses. The following examples demonstrate how AI is being used to develop diagnostic tools for various diseases.

Cancer diagnosis: AI is being used to analyze mammograms and CT scans to detect and diagnose cancer at an early stage [66].

AI is making a difference in medical imaging: AI algorithms can analyze images, such as CT scans, MRIs, and X-rays, with high accuracy and speed. For instance, a recent study published in the journal Nature Medicine found that an AI algorithm could accurately detect breast cancer in mammograms with an accuracy rate of 94.5%, which is higher than that of human radiologists [67].

Cardiovascular disease diagnosis: AI is used to analyze echocardiograms and CT scans to detect and diagnose cardiovascular diseases such as heart failure and coronary artery disease [68].

Neurological disease diagnosis: AI is used to analyze MRI scans to detect and diagnose neurological diseases such as Alzheimer's disease and multiple sclerosis [69].

Infectious disease diagnosis: AI is being used to analyze medical images such as chest X-rays to

detect and diagnose infectious diseases such as COVID-19 [17].

AI and personalized medicine: Treatment plans were tried to individual patients based on their lifestyle, genetic makeup, and medical history. This approach has shown a valuable promise in cancer treatment plans based on a patient's genetic profile [70].

AI and monitor patients remotely: That allows doctors to track patients' vital signs and health metrics from afar. This approach is particularly useful for patients with chronic conditions or those who are recovering from surgery, as it enables doctors to monitor patients' progress and intervene if necessary. In a study found that an AI-powered remote monitoring system could reduce readmission rates for heart failure patients by 50% [71].

AI in histopathological analysis:

AI has made significant advancements in the field of histopathological analysis, revolutionizing the way pathologists interpret and diagnose tissue samples. Histopathology involves the microscopic examination of tissue specimens to identify and characterize diseases, such as cancer. Here, we can summarize what cited by many references about ways in which AI is being utilized in histopathological analysis [17, 72, 73].

Image recognition and classification: AI algorithms can analyze digital images of histopathology slides and accurately identify structures and patterns. Convolutional neural networks (CNNs) have been trained on large datasets of annotated histopathology images to recognize various tissue types, cell structures, and abnormalities. This enables automated classification of tissue samples, improving efficiency and reducing human error.

Tumor identification and grading: AI algorithms can assist in the detection and classification of tumors. By analyzing histopathology images, AI can identify cancerous regions, distinguish between different tumor types, and even predict tumor grades. This information is crucial for treatment planning and prognosis.

Image segmentation: AI algorithms can segment histopathology images, separating different tissue components, such as nuclei, cytoplasm, and stroma. This helps in quantifying various features and characteristics, such as tumor size, cell density, and spatial distribution. Automated segmentation can save time for pathologists and provide objective measurements for research and diagnosis.

Prediction of patient outcomes: By analyzing large datasets of histopathology images along with clinical data, AI models can predict patient outcomes, such as survival rates or response to specific treatments. These predictive models consider a range of features extracted from histopathology images, molecular data, and patient demographics, aiding in personalized medicine.

Quality control and standardization: AI can play a role in quality control by identifying potential errors or artifacts in histopathology slides. It can also help standardize the evaluation process by reducing inter-observer variability, as different pathologists may interpret slides differently. AI can provide consistency and objective analysis, leading to more reliable diagnoses.

Data management and retrieval: AI can assist in organizing, storing, and retrieving vast amounts of histopathological data from pathology reports and integrating it with imaging data, facilitating comprehensive analysis and data-driven decision-making.

AI and its role in studying microbiota in animal and chickens:

AI has a significant role in studying microbiota, which refers to the collection of microorganisms (such as bacteria, fungi, viruses, and archaea) present in a particular environment or within an organism. The study of microbiota, particularly the human gut microbiota, has gained immense interest due to its potential impact on health and disease [74, 76]. The study of microbiota, the microbial communities inhabiting animals and chickens, is essential for understanding their health, disease susceptibility, and overall well-being [77].

The S165 gene, which encodes a highly conserved region of the 16S rRNA molecule, is widely used as a target for analyzing microbial diversity and composition [78,79]. With advancements in AI technologies, researchers are leveraging AI applications to enhance the analysis of the S165 gene and gain deeper insights into animal and chicken microbiota [80]. AI algorithms can be employed to classify and identify microbial taxa based on the sequences of the S165 gene to rapidly and accurately identify the microorganisms present in animal and chicken microbiota samples [77]. Machine learning techniques, such as support vector machines or random forests, analyze the gene sequences and assign taxonomy at various levels, ranging from phylum to species [81].

AI-based approaches provide insights into the dynamics of microbiota communities, identify core microbial species, and detect changes in composition under different conditions or in response to interventions [75]. By integrating the gene sequence data with clinical or phenotypic information, AI models can identify specific microbial taxa or microbial signatures that are associated with disease conditions. This can help in developing diagnostic tools, monitoring disease progression, and identifying therapeutic targets to improve animal health [82].

AI techniques can integrate S165 gene data with other omics data, such as metagenomic or metabolomic data, to provide a comprehensive understanding of the microbiota-host interactions. AI facilitating the identification of complex relationships and patterns within the microbiota ecosystem [83].

Role of AI in revolutionize drug selection:

Artificial intelligence poised drug selection in medicine, by enabling more efficient and personalized drug development and selection processes. Precision medicine aims to tailor medical treatment to individual patients based on their data, including genomic data and electronic health records. This approach has shown promise in cancer treatment, where AI is being used to develop personalized treatment plans based on a patient's genetic profile [70].

AI is helps to speed up the drug development process by identifying potential drug candidates and predicting their efficacy and safety by analyze large

AI in the field of drug delivery systems:

AI can improve drug efficacy and reduce side effects. By identifying patient-specific factors that can affect drug absorption, distribution, metabolism, and excretion. One of the most promising applications of AI in drug delivery is in the development of nanomedicine, where the uses of nanoparticles to deliver drugs to specific sites in the body and predict how patients are likely to respond to nanoparticle-based drug delivery systems. This approach is used in cancer treatment [85].

AI is used to optimize drug dosing based on patient factors, such as age, weight, and kidney function. This approach has already shown promise in the treatment of infectious diseases [86]. Moreover, AI is being used to optimize drug delivery routes and timing based on patient-specific factors. By analyzing patient electronic health records and physiological data. This approach has already shown promise in the treatment of chronic pain, by developing personalized drug delivery systems that deliver pain medication directly to the affected area [87].

AI in designing models for experimental medicine:

AI can accelerate drug discovery and improve our understanding of disease mechanisms. By analyzing data from experiments and clinical trials, that can help researchers design more effective drugs and treatments. AI in model design is in the development of virtual drug screening platforms. AI can analyze data from chemical and biological data to identify drug candidates and their efficacy and safety. This approach has led to the discovery of new drugs, including an AI-designed drug that was approved by the US FDA in 2020 for the treatment of obsessive-compulsive disorder [84].

AI is help in the development of models predict the efficacy of drugs and treatments based on patient-specific factors. By analyzing patient data, including genomic data and electronic health records, AI identifies biomarkers that help predict patients' likely response to different medications and treatments. The applications have shown promising results in cancer treatment, where artificial intelligence is used to develop personalized treatment plans based on the patient's genetic profile [70].

AI is being used to develop models that can simulate disease mechanisms and predict the outcomes of clinical trials. By analyzing data from clinical trials and disease registries, AI algorithms can identify factors that can affect treatment outcomes and develop predictive models that can help researchers design more effective clinical trials. This approach has already shown promise in the treatment of Alzheimer's disease, where AI is being used to develop models that can predict the efficacy of new treatments [88].

AI has role in reduction of the use of experimental animals in medicine:

AI application helps researchers to simulate biological processes and predict the outcomes of experiments without the need for live animal models. By developing AI models based on large amounts of data from experiments and clinical trials, researchers can simulate the effects of drugs and treatments on human biology, which can help to reduce the number of animal experiments required in the drug development process. For example, AI-based models can be used to simulate the pharmacokinetics and pharmacodynamics of drugs in humans, which can help to predict how drugs will be absorbed, distributed, metabolized, and excreted in the human body without the need for animal experiments [89, 90]. AI algorithms can also be used to simulate disease mechanisms and predict the effects of drugs and treatments on disease progression and patient outcomes, which can help to reduce the number of animal experiments required in preclinical research [9, 91].

Role of AI in Neural implants and brain-computer interfaces (BCIs):

In recent years, experiments have been conducted in the field of neural implants and brain- BCIs that aim to help people with paralysis regain some movement [92]. The Brain Gate system is a notable example, has been used in clinical trials to allow individuals with paralysis to control robotic arms and perform complex tasks using their thoughts. This system depends on sensor implantation that records neural activity in the brain, which is then decoded and translated into commands for the robotic arm

[93]. The success of these implants can vary depending on the individual and the specific circumstances. Each case is unique, and the level of restored movement or functionality can differ [94,95].

Application of Neural implants and brain-computer interfaces (BCIs):

Neural implants can be used to restore sensory perception in individuals who have lost their sight or hearing. It was explored that the development of visual prosthetics that can stimulate the visual cortex, enabling blinds to perceive visual information. Similarly, cochlear implants were used to restore hearing in people with severe hearing loss or deafness. Here are a few examples as cited by Shih et al [94], and Kawala-Sterniuk et al [96].

Treating neurological disorders: Neural implants and BCIs have the potential to treat various neurological conditions such as epilepsy, Parkinson's disease, and chronic pain. Deep brain stimulation (DBS) is a technique that involves implanting electrodes in specific brain regions to deliver electrical impulses, which can help alleviate symptoms in conditions like Parkinson's disease or tremors.

Enhancing cognitive abilities: BCIs can be used to augment cognitive functions, such as memory or attention. The researchers used neural implants to improve memory by stimulating specific brain regions.

Controlling prosthetic limbs or robotic devices: Helping people with paralysis, as neural implants and BCIs can enable individuals to control prosthetic limbs or robotic devices using their thoughts.

Assisting in rehabilitation: Neural implants and BCIs can play a role in neurorehabilitation by providing precise feedback and facilitating motor relearning.

conclusion

AI has made a great significant contribution to all aspects of medicine and has the potential to transform healthcare. All current AI applications include image, speech recognition, natural language processing, and predictive analytics, which can improve diagnosis accuracy, identify patients at risk for certain diseases, and personalize treatment plans. In the future, AI is expected to play an even larger role in medicine, helping physicians make more informed decisions and empowering patients to manage their own health. AI can help to reduce the use of experimental animals in medicine, it cannot completely replace animal experiments.

However, there are also challenges to the widespread adoption of AI in medicine, such as the potential for perpetuating biases and concerns about data security and privacy. As such, it is important to carefully consider these challenges and work towards developing ethical and responsible AI systems. AI is important for healthcare providers, policymakers, and researchers to work together to harness the full potential of this technology while ensuring that it is used in a responsible and ethical manner. Electrode implantation and microchips can be used as a treatment option for certain medical conditions. As AI technology continues to evolve, it is likely that we will see more innovative applications in result evaluation of this technology.

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The authors declare that there is no conflict of interest.

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All authors M. M. A, A M.A and Kh M E-B are sharing the collected data, writing and revising the original draft. The authors approved the final manuscript.

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الذكاء الاصطناعي: الدور الحالي والمستقبلي في الطب البيطري والطب العام

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[3] قسم المراض الدواجن – المركز القومي للبحوث - مصر.

الملخص

يُحدث الذكاء الاصطناعي (AI) ثورة في العديد من الصناعات والطب. يقدم هذا المقال لمحة عامة عن دور الذكاء الاصطناعي الحالي والمستقبلي في الطب. حاليًا، يتم استخدام الذكاء الاصطناعي بعدة طرق لتحسين الرعاية الصحية بما في ذلك خفض التكاليف، وتحسين نتائج المرضى، وزيادة الكفاءة، والكشف المبكر عن الأمراض، والتشخيص، والتصوير الطبي، وتطوير اكتشاف الأدوية، والتنبؤ بتفشي المرض والنمذجة، والمشخصات والاستجابة، وتطبيقات تتبع الاتصال مثل مثل معلومات القرب وبيانات نظام تحديد المواقع العالمي (GPS) وتوزيع اللقاحات والتحليلات التنبؤية. يمكن لهذه التطبيقات تحسين دقة التشخيص، وتحديد المرضى المعرضين لخطر الإصابة بأمراض معينة، وتخصيص خطط العلاج. على سبيل المثال، يمكن لخوارزميات الذكاء الاصطناعي تحليل الصور الطبية لتحديد التشوهات الدقيقة التي قد يغفل عنها أخصائيو الأشعة البشرية. ومن المتوقع أن يلعب الذكاء الاصطناعي دورًا أكثر أهمية في الطب في المستقبل. لديه القدرة على مساعدة الأطباء على اتخاذ قرارات أكثر استنارة من خلال تحليل كميات كبيرة من البيانات وتقديم توصيات العلاج الشخصية. بالإضافة إلى ذلك، يمكن للمساعدين الافتراضيين الذين يعملون بالذكاء الاصطناعي أن يساعدوا المرضى على إدارة الحالات المزمنة، مثل مرض السكري وارتفاع ضغط الدم، من خلال تقديم ردود الفعل والتوجيه في الوقت الحقيقي. ومع ذلك، هناك أيضًا تحديات أمام اعتماد الذكاء الاصطناعي على نطاق واسع في الطب. أحد المخاوف الرئيسية هو إمكانية قيام خوارزميات الذكاء الاصطناعي بإدامة التحيزات في الرعاية الصحية، والتشخيص، وعلم الأنسجة المرضي، والميكروبات. بالإضافة إلى ذلك، هناك أمان وخصوصية لبيانات المرضى. على الرغم من هذه التحديات، فإن الفوائد المحتملة للذكاء الاصطناعي في الطب مهمة للغاية. يمكن استخدام زرع الأقطاب الكهربائية والرقائق الدقيقة كخيار علاجي لبعض الحالات الطبية. مع استمرار تقدم تكنولوجيا الذكاء الاصطناعي، سنرى المزيد من التطبيقات في مجال الرعاية الصحية، مما يؤدي إلى نتائج أفضل للمرضى وتقديم رعاية صحية أكثر كفاءة.

الكلمات الدالة: الذكاء الاصطناعي، التعريفات، التطبيقات الطبية، التشخيص، الكائنات الحية الدقيقة، التشريح المرضي.