Role of Artificial Intelligence in Advancing Veterinary Medicine

Rana A. Jawad[1], Fatema Ali AL Kafhage[1], Tuqa Sabbar Rahi[2], Ihab G. AL-Shemmari[1], Afrah Kamil Zabeel[3], Zainab Ali Jabur[1] , Athra Abass Muteab[1]

[1] College of Veterinary Medicine, Kerbala University, Karbala, Iraq
[2] Animal Production Department, College of Agriculture, University of Kerbala, Karbala, Iraq
[3]Veterinary hospital in Kerbala, Karbala, Iraq

Corresponding author: tuqa.s@uokerbala.edu.iq

Received: 4/8/2025 **Accepted:**15/8/2025 **Published:** 15/9/2025

***Abstract*— Through improved diagnosis, real-time monitoring, and predictive modeling, artificial intelligence (AI) is revolutionizing contemporary veterinary services. In order to improve clinical decision-making, facilitate illness diagnosis and maximize animal health outcomes, this assessment focuses on the use of AI technology in veterinary settings. The veterinary field is set to experience a radical change in how it approaches treatment, monitoring, and research as machine learning and big data integration advance.**

***Keywords* — Artificial Intelligence, Veterinary Medicine, AI Technologies.**

INTRODUCTION

In the field of computer science known as artificial intelligence (AI), computer programs are made to carry out activities which resemble those of a person. By fusing the finest elements of technology and science, artificial intelligence (AI) creates intelligent devices, mostly programming for computers. The AI boom began in the early 2020s , notwithstanding the fact that the concept dates back to the 1950s. Because to unmatched advancements in technology, employee quality, or computing and machine learning (ML) modules, including deep learning (DL), we are currently experiencing the AI revolution [1]. AI has nearly permeated every aspect of human life today and is poised to revolutionize the healthcare industry [2].

The profession of medicine has always been ordinary and probably going to continue to be so, with treatment delivered that are in line with the best course of action for the typical patient. This presumption may be refuted by individual variations, which could lead to results that are both incorrect and false. Results might grow accurate the more the treatment process is computerized. Artificial intelligence (AI) has grown in importance in the realm of life sciences, especially in the fields of healthcare and medical research, in the last few years. By optimizing predicting indications and attaining higher diagnostic accuracy, artificial intelligence has been extensively embraced and used in veterinary science to enhance the care of animal. To help get the right determination, provide the right treatment, and enhance experts' capabilities, machine learning interacts with imaging, pathology slides, and individuals' electronic health records [3].

AI Technologies in Veterinary Practice

Machine Learning and Pattern Recognition

Big data sets are analyzed by machine learning (ML) algorithms to find patterns and trends, which makes it possible to identify illnesses and anomalies early. Support vector machines (SVMs) and neural network models, for instance, are remarkably accurate at classifying animal radiography photographs [4]. For instance, algorithms using AI greatly outperformed manual diagnoses in the diagnosis of canine hip malformation, achieving 91% sensitivity in interpreting X-ray images [5].

Computer Vision and Medical Imaging

AI-powered image evaluation systems may accurately detect organ abnormalities, breaks, and cancers, cutting down on time and diagnostic errors. Both animal scans such as MRI and CT can be processed very well by deep learning models such as convolutional neural networks, also called CNNs [6].

Natural Language Processing (NLP)

Through extracting pertinent knowledge and spotting trends connected to the course of the illness or the results of treatment, natural language processing (NLP) assists veterinarians in processing clinical notes and electronic health records (EHRs).[7]

Applications of AI in Veterinary Medicine

Disease Diagnosis and Surveillance

AI aids in the diagnosis of complicated illnesses such as infections by parasites, avian influenza, and tuberculosis from cattle. Rapid management and epidemic forecasting are enhanced by algorithms trained on region epidemic information [8].

Reproductive Health Monitoring

Artificial intelligence (AI) systems in the livestock industry track physiologically and behavioral markers to forecast estrus and schedule breeding, improving the efficiency of reproduction [9].

Remote Monitoring and Wearables

AI-enabled devices with sensors track stress markers, degree of activity, and animals vitals in contemporaneous fashion. Regarding huge farms, this method is very helpful for assessing welfare and detecting diseases early [10].

AI in Veterinary Pathology and Parasitology

Through automated the examination of microscope images, artificial intelligence is improving the rapidity and precision of parasite detection in fecal samples [11]. Additionally, machine learning algorithms are able to distinguish among different types of parasites including Giardia, Cryptosporidium, and Eimeria. Furthermore, to increase the accuracy of diagnosis, AI-powered histopathology scanners are utilized to identify aberrant tissue patterns in illnesses such toxoplasmosis and hydatidosis [12].

Challenges and Ethical Considerations

AI has drawbacks in veterinarian contexts considering its benefits:

Data Availability: Veterinarian information are scarce and dispersed, in contrast to the healthcare of people.

Deployment Price: Use of agricultural or areas with inadequate resources might be restricted by high growth and integration expenses. Ethical Concerns: AI must protect the health of animals and guarantee algorithmic openness in decision-making [13].

The Future of AI in Veterinary Medicine

Integration with Genomics: Intelligence will help with disease-resistant reproduction and the selection of genes. Improved forecasting models for the spread of zoonotic diseases are known as prediction epidemiological.

Machine Learning-Assisted Surgery: Using real-time analytics to lower risk during surgery.

Development will be stimulated while responsible utilization of AI will be ensured by joint platforms that bring together engineers, statisticians, including veterinarian [14].

CONCLUSION

AI in veterinary medicine presents ground-breaking possibilities for preventative care, individualized therapy, and enhanced welfare for animals. AI is probably going to be a commonplace part of contemporary veterinary procedures all over the world as technologies get easier to obtain and more sophisticated.

RECOMMENDATIONS

1. Include AI Instruction in Veterinary Programs To ready future veterinarians for technology-driven practice, veterinarian colleges should include courses in artificial intelligence (AI), data mining, and electronic diagnosis in their undergraduate and graduate courses.
2. Make an Investment in Local Veterinary AI Facilities The creation of AI-based solutions tailored to regional animal health issues should be encouraged by governments and veterinary associations, particularly in underserved and rural areas.
3. Establish Uniform Protocols for Data Collection and Sharing For efficient AI training, interoperability, and system correctness, it is imperative that clinics and universities establish uniform veterinary data standards.
4. Encourage interdisciplinary cooperation to create morally sound, precise, and therapeutically applicable AI solutions, promote collaborations between veterinarians, computer scientists, engineers, and legislators.
5. Assure Transparency and Ethical Governance Put in place regulatory frameworks that cover algorithmic bias, data protection, informed consent, and accountability in diagnosis aided by AI.
6. Prior to widespread adoption, support pilot projects and the Fiel Validation Fund and keep an eye on pilot studies to assess AI technologies in actual clinical and agricultural settings
7. Encourage Acceptance for Public Awareness To increase confidence and adoption rates and inform stakeholders, including veterinary professionals and animal owners, about the advantages, drawbacks, and safety of artificial intelligence (AI) technologies.
8. Promote Veterinary AI Technologies with Open Access Encourage the creation of publicly available AI models and datasets to promote veterinary research, innovation, and international knowledge exchange.

REFERENCES

1) Parija, S. C., & Poddar, A. (2024). Artificial intelligence in parasitic disease control: A paradigm shift in health care. *Tropical Parasitology*, *14*(1), 2–7.
2) Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., et al. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology, 2*(4).
3) Mintz, Y., & Brodie, R. (2019). Introduction to artificial intelligence in medicine. *Minimally Invasive Therapy & Allied Technologies*, *28*(2), 73–81.
4) Lin, J., et al. (2023). Deep learning in diagnostic veterinary imaging. *AI in Animal Health*, *11*(1), 20–34.
5) Patel, R., & Gomez, J. (2021). AI-enhanced X-ray diagnostics in dogs. *Canine Radiology Journal, 7*(1), 23–30.

6) Zhang, H. M., & Dong, B. (2020). A review on deep learning in medical image reconstruction. *Journal of the Operations Research Society of China, 8*(2), 311–340.

7) Ribeiro, F., et al. (2022). NLP for extracting clinical insights from veterinary EHRs. *Computational Veterinary Medicine, 9*(3).

8) Al-Fatlawi, A. A., et al. (2021). AI in veterinary epidemiology: Iraqi livestock disease forecasting. *Veterinary Informatics Journal, 12*(3), 45–52.

9) Singh, H., & Singh, A. (2023). ChatGPT: Systematic review, applications, and agenda for multidisciplinary research. *Journal of Chinese Economic and Business Studies, 21*(2), 193–212.

10) Huang, L., & Lee, C. (2022). Wearable technology for animal health monitoring. *Sensors in Veterinary Practice, 5*(2), 88–99.

11) Rahman, M., et al. (2023). Automated detection of intestinal parasites using AI. *Veterinary Microanalysis, 14*(2), 91–99.

12) Karim, A., et al. (2021). Histopathological evaluation using AI in parasitic infections. *Pathology AI Journal, 10*(4), 67–74.

13) Bishop, T., Klee, R., & Morrison, G. (2022). Ethical AI integration in veterinary practice. *Veterinary Ethics Today, 8*(1), 30–38.

14) Food and Agriculture Organization of the United Nations. (2024). *Artificial intelligence in animal health: Guidelines and recommendations.* FAO.