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Srihas Manda

B.Tech., Electronics and
Communication Engineering
Gannavaram, Andhra Pradesh,
India

N Lakshmi Rani

Professor and Head, Department
of Veterinary Medicine, NTR
College of Veterinary Science,
Sri Venkateswara Veterinary
University, Tirupati,
Andhra Pradesh, India

Thangamani A

Assistant Professor, Department
of Veterinary Gynaecology and
Obstetrics, Veterinary College,
Karnataka Veterinary, Animal
and Fisheries Sciences
University, Bidar, Karnataka,
India

Corresponding Author

N Lakshmi Rani

Professor and Head
Department of Veterinary
Medicine, NTR College of
Veterinary Science,
Sri Venkateswara Veterinary
University, Tirupati,
Andhra Pradesh, India

Perspectives of artificial intelligence in veterinary practice: A mini review

Srihas Manda, N Lakshmi Rani and Thangamani A

Abstract

Artificial intelligence introduced to enhance effective and sustainable veterinary education and practice in many disciplines. With the development of several recent concepts promoting a global and multisectoral perspective in the field of health, AI should contribute to defract the different disciplines in animal health towards more transversal and integrative research. The present review described the hypothesis and perspective of artificial intelligence in veterinary profession with special references to pet animal practice.

Keywords: Artificial intelligence, animal health, digital statistics, machine learning and pet practice

Introduction

Artificial intelligence (AI) incorporates a large range of concepts and technologies used to solve problems of logical or algorithmic complexity. Introduced in the 1950s, many AI methods have been developed or extended recently with the improvement of computer performance. Artificial intelligence crosses many categories, including mechanistic modelling, software engineering, data science and digital statistics. Recent developments have been fuelled by the interfaces created between AI and other disciplines, such as bio-medicine, as well as massive data from different fields, particularly those associated with healthcare services^[1, 2]. AI was legitimately new to the animal health care sector. Researchers, scientists, and entrepreneurs have begun to introduce machine learning and AI into veterinary health. A key consideration in the successful adoption of AI technologies in veterinary medicine will be their safe introduction into clinical practice. They propose a 4-phase approach to follow when introducing an AI based solution in the hospital includes, conceptualization of the AI project, data acquisition and preparation, AI application and translation^[3].

There is an emergent demand for the development and use of wearable's, smart cameras and sensor devices in animal health for pet animals and on farms^[4]. These devices generate an enormous amount of data, which increases the potential for artificial intelligence (AI) using machine learning algorithms and real-time analysis (RTA). Perusal of literature revealed that very limited reports were published with special references to understanding of technologies (AI and machine learning) within the animal health industry^[5]. The present review explained the role of artificial intelligence in top 3 headlines as artificial intelligence in animal health, potential use of artificial intelligence in veterinary care and AI-based solutions for pet world alleviate efforts

Artificial intelligence in animal health

Artificial Intelligence is bringing changes to business models in many sectors, particularly regarding when human interaction or action is required, and what decisions are automated. Development on AI assistants for veterinarians that can instantly recognize species the moment a pet or animal walks in through the door and look up through a database^[6].

- 1. Imaging tool (augmented interpretation):** AI reliant imaging services help veterinary teams organize images for clinical interpretation, increasing practice efficiency significantly^[7]. AI imaging techniques compares your image to similar images in its database. The quality of the comparison is for humans to interpret, giving veterinary professionals the security they need that no machine is making diagnoses for them^[8].
- 2. AI as a diagnostic tool:** Veterinary practices have been using a version of artificial intelligence for decades now. Specifically larger veterinary practices have relied on proprietary systems that embed enhanced diagnostic tools in their practice management

software ^[9]. These programs suggest potential diagnoses, next step therapies, and diagnostic testing alternatives based on clinical signs and test findings. In human medicine, for example, diabetes prediction, traumatic brain injury prognostication, and early atrial fibrillation detection are already aided by AI in this way. Consider an AI-imbued stethoscope to help identify arrhythmias and other cardiac-sourced disorders, screens urine sediment for abnormalities using AI technology ^[9]. These devices are invaluable, saving time and increasing efficiency in the diagnosis and improve the practitioner skills. The Benefits of using AI in veterinary practice included, AI is inherently fast (time-intensive tasks and generates answers in seconds, which increasing operational efficiency), diagnose patients faster (i.e. treatment can be initiated earlier in the disease process), AI can be a lifesaver, Ultimately, AI promises to be a big boon to the veterinary healthcare unit ^[10].

Potential use of artificial intelligence in veterinary care

In the last few years, AI has brought great reforms to the veterinary industry by making, veterinary diagnostics easier, medical care accessible data collection for the pet industry.

a. Pet trackers and pet cameras: Pet trackers and pet cameras monitor virtually all of your pet’s daily activities such as, movement, eating and drinking behavior, sleep patterns, etc. This vast amount of information opens up many possibilities for machine learning ^[10]. Using video analytics software that is programmed to be on the lookout for unusual behavior, the camera sends you an alert to check for an injury or a foreign object causing discomfort. Similarly, a pet tracker detects that your cat has been sleeping several hours more each day than

normal. An algorithm in the tracker texts you that something may be amiss with your kitty and that you may want to call your vet ^[11].

- b. Pet telehealth:** Veterinary telehealth, the use of technology to deliver vet care, can benefit from the use of *chatbots*. A chatbot is software that simulates a natural human conversation (either written or spoken). Vet clinics can install chatbots on their websites to act as the first level of interaction with customers. In addition to assisting with communication, advanced bots could answer pet health questions and analyze symptoms ^[12]. A pet version of the “Ada Health app” could be uses a conversational interface to determine symptoms and provide medical information. If needed, the app then offers a remote consultation with a real doctor.
- c. Dog walking:** Dog walking companies like Rover and Wag could benefit from a natural language processing (NLP) system that delivers a weekly recap to their customers about their pet’s activities. Dog owners could receive a personalized email story detailing the walk routes, duration, encounters with other dogs and food and potty breaks ^[5, 6].
- d. Smart feeder:** Smart feeder could determine when pet food is running low and suggest a reorder, mentioning current coupons or special discounts. Smart feeders could also monitor a pet’s eating habits and highlight any irregularities ^[9, 10].

AI-based solutions for pet world alleviate efforts

Artificial Intelligence lessens the efforts of humans with the machines that ease the activities designed for animals and reduces supervision ^[13]. AI based solutions for veterinary care was represented in Table 1 and Figure 1.

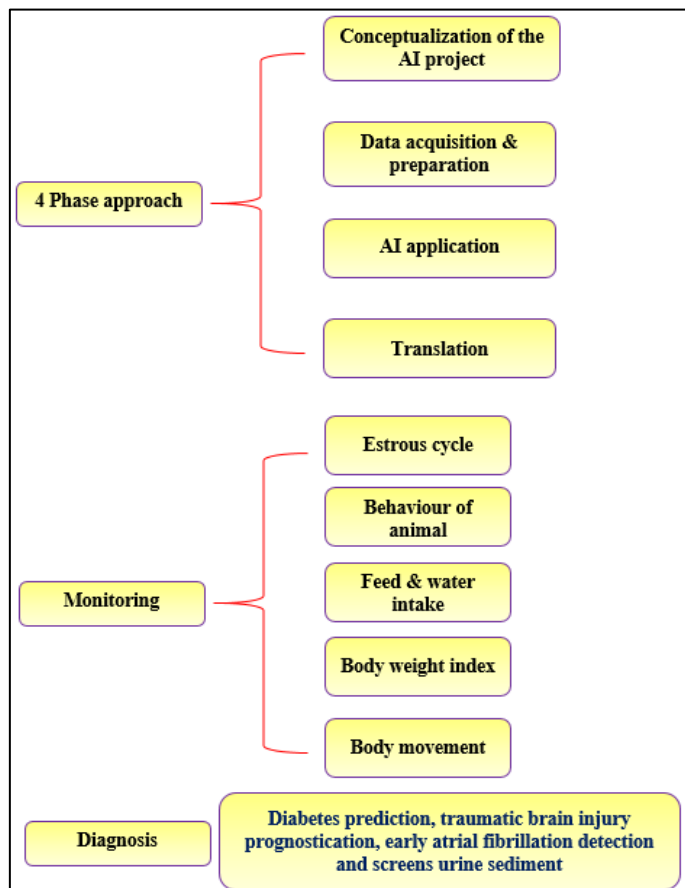


Fig 1: Approach and application of artificial intelligence in veterinary care

Table 1: AI based solutions for veterinary care

No	Elements	AI based solution
1	Communication barriers	To surpassing the language issues, using conversion to vibrations or pictures that pets can recognize.
2	Dynamics	Study of motion can give an estimation of the next set of action by animals, based on these assumptions humans can relate and respond better
3	Animal analogies	AI can help humans to understand animal behavior and assist in introducing new behavioral patterns to meet the needs of business or comfort animal owners
4	Observations	If animals can fall asleep when tired so do the humans the transporters who travel long distance at night are at high risk of meeting accidents. AI solutions can help humans from accidents,
5	Behavior change	Pet language is not our forte, we rely on assumptions that can lead to accidents involving animal attack and human loss. Every species has their mood swings like humans this can help create AI-based solutions to soothe the user
6	Sleep patterns	AI can help to identify the regular and disturbed sleep patterns in pets.
7	Training	Oral and visual interpretation of requirements can lead to improvement in training quality by reducing complexities in pets
9	Interweaving AI and solutions	AI based solutions can create, a set of instructions for an animal to sleep same technology can create a soothing effect on animals to get good sleep. It is what we want to design and how we extrapolate the utilization
10	Routine tasks and AI	AI can reduce the daily tasks executed by humans for animals e.g. keeping their food bowls in place, asking them to use washrooms for nature calls etc.
11	Automation	AI can control the activities by automating the commands given to animals on daily basis and check for the task completion.
12	Data analysis	AI can record the data relating to animals age, weight, life expectancy, health issues, growth, puberty, physical changes, reproduction period, hormonal changes with the technological developments
13	Research and development	Making animals trainable is a long process in itself, it can be shortened, with the identification of potential problems, the complications can be minimized by AI based research and development
14	Predictions	AI based techniques can sense faster and accurately which can help AI to notify the humans about the threats with regards to climatic changes
15	Elimination of miscommunication	AI can simplify the animals and human communication and eradicates the risks of miscommunication.

Conclusion

Since animals do understand expressions, body language, voice modulations and have memory for the experience they share with the humans; all these factors can aid the making of AI-based software and solutions that improvise pet care and save wild animals from being extinct. The importance of artificial intelligence is increasing to the extent that we now search for the contributors who can revolutionize the machine learning to facilitate the coverage of various fields and be of human assistance.

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