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**THE USE OF ARTIFICIAL INTELLIGENCE IN ANIMAL LAW
ENFORCEMENT AND ANIMAL WELFARE MONITORING**

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ABSTRACT

AI has emerged as a potent tool in animal law enforcement and animal welfare monitoring. From tracking vulnerable species to implementing anti-poaching legislations, AI can help protect the wellbeing of animals. Real time animal monitoring combined with AI – Powered data helps in enhancing animal welfare and lives. This paper examines the potential benefits of artificial intelligence for the animal kingdom in light of Prevention of Cruelty to Animals Act 1960. Further underscores the merits of embracing AI technologies in animal law enforcement and animal welfare monitoring. AI has been used in number of fields including pasture appraisal, determination of gender, vaccination delivery, animal identification and welfare of livestock monitoring. This paper the researchers try to understand how the AI can lend a helping hand in combating wildlife crimes. It further highlights different AI methods used for animal welfare. This doctrinal study focuses more on the goal of incorporating animal welfare into artificial intelligence and thus animal welfare is to safeguard and improve the living conditions of the animals. It will then help the veterinarians to detect early signs of discomfort and take prompt actions with the help of remote surveillance, tracking animal movements and locations as well as gathering information regarding their lifestyle habitat and health status has become a simple process.

Keywords: Artificial Intelligence, Animal welfare, wildlife cruelty.

INTRODUCTION

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The term Artificial Intelligence, abbreviated as AI, describes the creation of computer systems that can do jobs that have historically required human intelligence. It entails giving machines the capacity to make decisions, solve problems, comprehend language, and learn from mistake. By using digital models and algorithms, artificial intelligence aims to mimic human cognitive process. Artificial Intelligence (AI) technology is becoming more and more significant in today's society, rapidly altering the way we live. A number of sectors and industries, including healthcare, banking, marketing, education and entertainment, stand to benefit greatly from artificial intelligence. Human workers can concentrate on more sophisticated activities by delegating repetitious and time-consuming duties to AI powered robots. AI offers customized recommendations. Personalized recommendations have a significant impact on boosting user enthusiasm and commitment in business including e-commerce, digital marketing and media artificial intelligence (AI) algorithms are capable of spotting patterns and trends in vast volumes of data that humans might overlook, giving organizations information that might help them make better decisions.

Animals cohabitate with humans and play a crucial part in our ecology. The integration of AI into the field of animal welfare is one of the most exciting and morally relevant applications of the technology. AI is a tremendous weapon that could greatly further animal protection. Through the utilization of artificial intelligence systems, it is possible to keep an eye on animals in various settings, such as farm and natural habitats, and to quickly detect any indications of suffering or illness. Artificial intelligence also helps with precision animal production, which maximizes productivity by optimizing care techniques. Through the analysis of large data basis, it makes early disease diagnosis easier and allows veterinarians to intervene promptly. Animal behavior is also interpreted by AI, which offers insight into social interactions and emotional states of animals. AI helps with wildlife protections by tracking illicit activities like poaching and monitoring endangered species. Chatbots powered by AI raise public awareness of animal welfare issues and encourage ethical pet ownership.

CRUELTY FACED BY ANIMALS IN THE ABSENCE OF ARTIFICIAL INTELLIGENCE

Animals are brutally treated in many different contexts, from entertainment to industrial agriculture and beyond. Animals raised in factories are frequently housed in cramped quarters with no access to natural light or adequate care making for filthy and overcrowding

circumstances. Without anesthesia, they might go through gruesome processes including castration, debeaking and tail docking. Animals are also frequently raised in stressful, confined spaces or subjected to cruel trapping techniques before being slaughtered for their pelts. Such practices are widespread. Animals are used for human entertainment in rides like rodeos, aquariums, and circuses where they are coerced and terrorized into acting in ways that are not natural to them. The training techniques frequently include psychological trauma and physical torture which can reduce lifespan and cause health problems associated with stress.

Animal welfare is seriously threatened by the exploitation of wildlife. Many species are threatened with extinction due to poaching, habitat loss and the illegal wildlife trade. Animals captured in traps or snares frequently die horribly or suffer terrible injuries. Furthermore, animals employed in research facilities could experience grueling tests, isolation in sterile cages, and eventual extermination. The pain inflicted upon these sentient individuals raises ethical questions even though some of this study may help develop medicine. Disregarding their fundamental wants and rights, animals undergo anguish both physically and mentally in each of these situations.

ROLE OF ARTIFICIAL INTELLIGENCE IN ANIMAL WELFARE

Across a range of industries, AI is leading the change in transforming animal welfare by providing creative ways to track, safeguard and improve the welfare of animals. AI-driven technology is changing our understanding of and interactions with the animal kingdom in a variety of ways, from precision, cattle farming to habitat conservation. AI is revolutionizing animal welfare through the use of sophisticated algorithms and data analytics to change conventional methods and promote more humanitarian and proactive methods. AI-based technologies have been used to a variety of disciplines, including disease management, sustainable resource use, agricultural planning, and animal management. It has been effectively embraced by other industries and is now set to transform agriculture through the use of drones, robots and sophisticated monitoring systems. Rapidly expanding global population presents farmers with an increasing number of challenges as herd sizes increase and the number of workers in agriculture declines. Added to the fact that younger people are becoming less interested in careers in agriculture, this situation highlights how urgent it is to adopt cutting-edge approaches in order to feed the globe sustainably and prevent oncoming food crises. As a result, farmers are resorting to advanced methods intended to maximize the

distribution of resources such a land, water and energy. Augmenting the productivity of current farming practices becomes a vital endeavor as the need to accomplish more with fewer resources becomes more pressing. Farmers can effectively handle these issues and increase productivity while reducing their impact on the environment and ensuring food security for future generations by adopting innovative technologies and tactics.

By helping farmers manage disease, produce healthier products, monitor movement, and use resources more sustainably, AI is a clever monitoring system that is gradually making its way into industry's technological evolution. Without lowering output, AI assist farmers in overcoming a range of challenges. In addition to collecting and evaluating data to precisely predict consumer behaviour, such as purchasing patterns and new trends, it allows them to improve animal health and outcomes. Increased investment will enable farms to improve livestock quality through products like milks, automate processes and save significant expenditures. Artificial intelligence driven systems improve livestock productivity and administration. Utilising it helps farmers automate animal welfare and behaviour. Monitoring, anticipate disease outbreaks, and plan feeding schedules. Farmers may now better oversee and improve the wellbeing, capacity for reproduction and general health of their livestock.

In response to the growing desire for improved farm animal outputs, artificial intelligence has lately emerged as a tool that assist farmers in tracking, forecasting and optimising the growth of farm animals. Among the livestock industry's primary use of AI technology are the administrations of farms, monitoring farm animals, and controlling diseases, parasites and bio security. Pigs are being raised using precision farming, deep learning is being used to identify cow and pig behaviour, sensors and Internet of Things (IOT)³ are being utilised for the welfare of poultry and data modelling is being used for animal production. Drone technology has significantly benefitted farmers in the dairy industry. Farmers are clamouring for the deployment of drones to perform increasingly difficult tasks. Drones can assist in herding cows from pastures to barns and inspect fences and the herd as a whole. Modern dairy farms also employ drones to map, inspect, and take pastures in order to track progress. Even more impressively, the advanced algorithms driving the drones can discriminate between cows and

³Entire network of interconnected devices as well as the technology that enables communication between the devices themselves and with the cloud.

other similar animals, even recognising cows specifically. This has been a huge benefit to dairy business, because, it automates the herding of cows, saving farmers both time and money. Drones can be used to detect and track illness in animals and to send out early alerts about any problems. Drone data can subsequently be examined to enhance herd management tactics. The use of robotics in the dairy industry is causing a radical change, especially with automated milking equipment and robots that clean barns. By boosting production, cutting labour expenses, and enhancing bio-security protocols, these advancements are completely transforming conventional farming methods. While automated barn cleaning improves cleanliness and lowers the risk of disease, robotic milking devices expedite the milking process, saving time and guaranteeing cow comfort. Furthermore, robots give farmers useful information on the health of their cows, enabling them to make educated decisions.

The potential of AI to monitor and eliminate graphic animal abuse videos from web platforms is one of the technology's most promising uses in animal protection. Unfortunately, social media and content-sharing websites have developed into places where footage of animal abuse may be shared, upsetting people greatly and encouraging bad habits in the process. AI systems are capable of effectively identifying and tagging content that depicts animal abuse. Through the analysis of real-time video information, artificial intelligence algorithms are able to identify distinct patterns, motions, and sounds that are suggestive of animal mistreatment. These systems have the ability to automatically remove content after it has been discovered. AI has become a potent diagnostic tool for animal illness, using thorough data analysis of clinical signs, test findings, and imaging. AI systems can precisely diagnose illness by seeing patterns, which significantly lowers diagnostic errors and boosts productivity in veterinary clinics. Additionally, early disease detection made possible by AI-based diagnostics permits rapid treatment and improved results for animals. AI technology has great potential to revolutionize animal disease diagnostics, helping both animals and veterinary practitioners through ongoing learning and development. Animal Disease Diagnosis Expert System (ADDES)⁴ is used to quickly and accurately identify animal diseases by utilising a Convolutional Neural Network (CNN)⁵ to improve diagnostic accuracy.

⁴Computer programme that uses an inference engine and knowledge base to precisely identify and categorise diseases in animals, simulating the judgement of a human expert veterinarian.

⁵Deep learning technique that is particularly well-suited for the analysis of visual data.

AI-powered feeding platforms make use of AI algorithms to precisely calculate and administer feed amounts that are suited to each animal's unique nutritional needs. These algorithms create personalised feeding schedules based on data analysis of the animal's weight, bodily condition, and growth rate. These feeding schedules not only encourage healthy development but also cut down on waste and lessen the chance of overfeeding or underfeeding. Feeding habits such as the amount of time spent nearing feeding troughs, the frequency of feedings, the amount of feed consumed, and other feeding behaviours helps in detection of changes in food patterns that may be a sign of health or nutrition difficulties. Insights and techniques for studying animal behaviour and welfare can be gained from using artificial intelligence to the recognition of emotions in animals. We can precisely assess and recognise the emotional stages of animals by applying cutting-edge image processing and machines learning methods. Their well-being and quality of life are enhanced as a result of this applications ability to help us comprehend their emotional experiences and requirements. In addition, it can be extremely helpful in monitoring the health of animals, spotting possible illness risks, and promptly implementing any necessary intervention steps. Artificial intelligence has transformed the management of livestock and poultry, greatly impacting the well-being and output of animals. In these situations, environmental factors like temperature, humidity, and air quality are quite important. Sensors and data analytics are used by AI-driven environmental monitoring systems to continuously evaluate. AI systems have the ability to automatically modify ventilation, heating, or cooling parameters to produce a more comfortable and helpful environment for animals when they deviate from the ideal range. This not only reduces stress-related problems and illness prevalence, but it also improves production outcomes for the animals.

ARTIFICIAL INTELLIGENCE IN COMBATING WILDLIFE CRIMES

Trafficking in wildlife ranks fourth among all illicit activities worldwide .AI might identify which check points are most likely to encounter trafficked at certain times, providing valuable information to front line officials who are unable to search every item of cargo passing via airports or international crossings. In order for AI systems to accomplish this, the need to continuously gather and evaluate data. Information gathered on the ground by law enforcement officials during their daily routine checks, intelligence reports, and border force seizures are some examples. By using AI technologies, we may be able to allocate resources

to combat wildlife trafficking at the most advantageous times and places. The control locations where wildlife trafficking is most likely to occur may be heavily manned, with personnel. Artificial intelligence systems have the capability to search the internet for images uploaded by users of animals involved in illicit commerce, flagging potentially illicit listings and accounts based on these images.

ARTIFICIAL INTELLIGENCE IN ANIMAL LAW ENFORCEMENT

The ability to identify and halt wildlife poaching is beneficial to environmentalists. Although there may not be much legislations specifically integrating Artificial intelligence into the regulation of animal welfare, several nations are gradually upgrading their animal welfare laws to take advantage of technological improvements. For example, The United States Animal Welfare Act, 1996⁶, and other comparable laws around the world set forth requirements for humane treatment in a variety of industries. These regulations establish the framework for leveraging cutting-edge technology to improve enforcement capacities, even though they don't specifically address AI. Additionally, extensive animal welfare laws in the United Kingdom and The European Union cover a variety of aspects of animal care and allow for the implementation of AI- powered enforcement tactics. Laws and regulations pertaining to wildlife conservation and animal abuse are also updated to reflect advancements in technology, however they do not specifically address artificial Intelligence. As technology develops further, laws will inevitably change to take advantage of artificial intelligence to protect animal welfare. This will guarantee a more compassionate and efficient enforcement strategy for animal rights around the globe. One of the India's most expensive regulations pertaining to animal care is the Prevention of Cruelty to Animals Act 1960⁷. The primary aim of the legislations is to stop animal abuse as well as the unnecessary suffering or agony that animals endure. Section 11 of the Act addresses various sorts of cruelty and atrocities inflicted upon tamed and untamed creatures.

The criminal laws against animal cruelty in India are covered by the Prevention of Cruelty to Animals Act, 1960. Artificial intelligence can assist tracking down the criminal people linked to animal-related offences and keeping a verified log of these offences. The precise location of the crime and the identity of the perpetrator can be determined with the use of artificial

⁶The United State Animal Welfare Act, 1996, Public Law 89-544, Acts of Parliament (United States).

⁷The Prevention of Cruelty to Animal Act, 1960, No. 59 of 1960, Acts of Parliament, 1960 (India).

intelligence, particularly in the form of machines. When a criminal abuses an animal, like a dog or a cat, while out on the street, they can quickly flee the scene and make it very difficult to track down the perpetrator. Artificial intelligence can help us avoid this road block. AI can assist in preserving an animal's physical well-being. Examples of this include robot veterinarians or equipment equipped with cutting-edge medical analysis for the animals. Equipments such as sophisticated surveillance systems can assist in documenting the ways in which an animal's behaviour is changing. That system can monitor the owner's ability to give their pet the necessary living conditions. The Prevention of Cruelty to Animals Act, 1960's Animal Birth Control Rules, 2023 establish the guidelines for using birth control on dogs and cats and the post- surgery medical care that follows surgery. The health status of the dog that underwent surgery can be overseen and monitored by artificial intelligence.

Smart collars help in reducing the number of abandoned cases which eventually helps in reducing the number of offences committed against any animal. Micro chipping helps in avoiding animal theft. The investing officer can document and routinely preserve the specifics of an animal offence with the aid of an innovative recording device. Animal farms can prevent needless maltreatment by their owners by implementing sophisticated surveillance systems. An important turning point in India's history of wildlife conservation is the Wildlife Conservation Act of 1972⁸. The Act was put into effect to guarantee the preservation of India's aquatic and terrestrial species as well as their ecosystems. Researchers studying wildlife are using AI to better understand wild animal species as a whole and develop conservation plans. The extinction of endangered animal species is predicted by artificial intelligence, which also monitors wildlife patterns

CHALLENGES AND POSSIBLE REMEDIES

While there are a number of advantageous to applying artificial intelligence to animal welfare and health, there are also drawbacks and difficulties. The biggest obstacle is acquiring datasets because of privacy issues, research constraints, and differences in animal species and environments. Such constraints on the data may result in additional bias. There are many obstacles is the way of compiling thorough and trustworthy data on animal welfare infractions in various settings. The variety of animal habitats, the difficulties in reaching remote locations, and the subjectivity of well-being indicator interpretation are all causes of

⁸Wildlife Conservation Act, 1972, No. 53, Acts of Parliament, 1972 (India).

concern. Variations in culture and law make things much more difficult. In order to overcome these challenges, a multimodal strategy combining technological solutions such as drones and sensors with stakeholder collaboration and community participation is required. In order to protect animal welfare, this integrated approach can improve data accuracy and make more effective actions possible. Comprehending and understanding animal behaviour effectively can be difficult, especially when the circumstances are different. The work is made more difficult by subjectivity in observation, restricted access, and variability in species-specific behaviours and environmental conditions. Better insights for welfare and conservation initiatives are made possible by this integrated approach. It is difficult to guarantee that AI systems used in animal law enforcement adhere to ethical and legal standards. It necessitates cooperation between technologists, legal specialists and animal welfare professionals as well as defined guidelines and strict control.

AI may not be widely adopted or used effectively in animal law enforcement due to a lack of funds and manpower, among other limited resources. This limitation highlights how crucial it is to prioritise funding for AI solutions designed specifically for this use case. It also emphasises the value of establishing collaborations between public and private sector entities in order to pool resources and insights. The full potential of AI to improve animal welfare and strengthen law enforcement capacities can be realised by resolving resource constraints. AI systems may be biased, which could lead to unjust results when it comes to animal welfare and law enforcement. A variety of factors, such as unbalanced training data or poor algorithmic design, may contribute to these biases. It is essential to use representative and diverse data sets when developing and implementing algorithms in order to reduce this risk. To find and fix any potential biases, AI systems must undergo routine audits and monitoring. Furthermore, fairness measures can be used to guarantee equal results in animal welfare enforcement initiatives by assisting in the design and evaluation of AI systems.

A major difficulty is bridging the knowledge gap between developers, law makers, law enforcement, and experts on animal welfare. Disparities in these stakeholders' communication styles, priorities, and areas of expertise frequently cause this split. Promoting interdisciplinary collaboration and communication channels is essential to addressing this dilemma. Events like conferences, workshops, and cooperative research initiatives can help to promote goal alignment and the exchange of knowledge. Furthermore, establishing forums

for continuous communication and cooperation can guarantee that AI solutions in animal welfare enforcement adequately take into account the requirements and viewpoints of all parties concerned. There may be differing views on the use of AI in animal law enforcement, which could result in opposition or distrust. Proactive education initiatives are essential to overcome this. Building trust and promoting adoption of these technologies can be achieved through open communication about the advantages and security measured of AI combined with community involvement.

CONCLUSION

Artificial intelligence has the ability to completely transform animal welfare by offering automated intervention, predictive analytics, precise monitoring, and ethical concerns to improve the welfare of animals. The ramifications of legal rules for animal protection can be readily obtained by utilising artificial intelligence (AI) components of machines and technology. Research has demonstrated that humans have benefitted from AI systems that are currently in place for tracking down lawbreakers. The pursuit of justice through these technological advancements shouldn't be restricted to people. When an animal becomes a victim of crime it should likewise have the same access to justice as humans. To ensure that our technical advancements are in line with our duties towards animal kingdom, we must continue to prioritise the ethical application of AI in animal care. The Prevention of Cruelty to Animals Act, 1960 is out of date and ineffective in protecting animals. Considerations of cruelty are not applicable to animals utilised in scientific study. Regulations governing the raising of farm animals are lacking. The law in India was enacted over fifty years ago, and it is in due need of revision to keep up with modern standards. The current law imposes a meagre maximum fine of fifty one hundred rupees, which is insufficient to prevent animal cruelty. As a result, the government needs to make sure that those who mistreat animals face severe penalties, including lengthy prison terms, hefty fines, psychological counselling, and a ban from ever again coming into touch with animals. Creating an endless number of regulations, guidelines, and circulars won't be sufficient to protect the animal kingdom from social miscreants. Proper actions must be taken to ensure that the laws have the intended consequences.

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