Machine Learning: An Animal Tracking Algorithm For Sanctuaries and Conservationists

(technical research project in Computer Science)

The Impacts of Social Media Platforms on Animal Conservation

(sociotechnical research project)

A Thesis Prospectus
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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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In a modern digital age, animal conservation faces numerous new opportunities and challenges. This portfolio addresses a general problem modern conservation efforts face: how to improve animal welfare and conservation by integrating new technologies while not forgetting to adhere to ethical, social, and regulatory frameworks. On one hand, traditional conservation methods are reliant on physical observation and invasive tagging which quickly proves inefficient due to the need for human monitoring and the price of tagging every captive animal. On the other, the rise of digital platforms has transformed public engagement with wildlife, offering powerful tools for education and fundraising while also introducing new risks such as misinformation, unethical animal portrayal, and unintended behavioral impacts. This portfolio looks at two distinct but related issues: a technical investigation into a machine learning-based animal tracking system and an STS research project examining the impacts of social media on animal conservation. Together, these projects aim to create more positive roles for digital tools and bring attention to the need for strong ethical guidelines in promoting animal conservation, encouraging solutions that respect both technological potential and the welfare of animals.

The technical research project focuses on developing an animal tracking and monitoring algorithm for sanctuaries, zoos, and conservationists. Recognizing that current techniques which are typically reliant on physical tagging or human observation fall short of providing continuous, reliable data, this project makes use of recent advances in machine learning and computer vision. Using a combination of existing real-time object detection algorithms and sustained tracking algorithms, the proposed system processes live camera feeds to accurately identify and monitor animal movements. The algorithm is designed to work effectively in the diverse conditions found in captive settings, including handling challenges such as objects blocking parts of a camera's field of view and variations in lighting. A real-time monitoring interface built on a Python

framework would be able to provide staff with immediate insights, enabling quicker response times to emergencies and improving overall animal care. This could provide significant improvements in data accuracy and monitoring efficiency, with promising implications for reducing invasive methods and enhancing the wellbeing of animals in captivity. Future work will focus on expanding species diversity, optimizing performance under low-light conditions, and integrating predictive behavioral analysis to be able to determine whether animals are behaving 'abnormally' which could indicate sickness or other issues.

The STS research project looks into the sociotechnical area of animal conservation in a digital age, with a particular focus on the role and regulations of social media platforms. The study explores how digital content, ranging from educational posts to viral videos, shapes public perceptions and practices related to wildlife conservation. Drawing on a comprehensive review of policy documents, social media analyses, and case studies, the project highlights the double edged nature of digital animal portrayal. While social media platforms have revolutionized outreach by engaging broad audiences and driving fundraising efforts for conservation causes, they have also blurred the lines between education and exploitation. The research identifies significant ethical concerns, including the potential for misinformation, increased animal harassment, and the promotion of the exotic pet trade. Furthermore, it is noted that existing regulatory frameworks often lag behind digital innovations, leaving critical gaps in the protection of animal welfare. By systematically assessing these issues, the research advocates for updated ethical guidelines and stronger policy enforcement to mitigate the risks associated with digital animal representation.

These two research projects together offer a comprehensive framework for addressing modern challenges in animal conservation. The technical research demonstrates that advanced machine

learning algorithms can revolutionize animal monitoring, significantly reducing the need for intrusive practices while enhancing responsiveness and care while the STS study highlights the need for improved ethical considerations and regulatory reforms in the digital spaces animal portrayal has shifted into. Together, these projects illuminate a path forward that emphasizes interdisciplinary collaboration as essential for sustainable progress. Future research should continue to refine technological tools and update policy frameworks, ensuring that the promise of digital innovation translates into practical benefits for animal welfare and conservation. This portfolio not only contributes to the academic discourse by bridging technical and socio-political insights but also serves as a call to action for researchers and practitioners committed to protecting wildlife in an increasingly digital world.