



Synthesizing Realistic Wildlife Images for Conservation and Education

Utilizing Generative AI for Enhanced Wildlife Visualization

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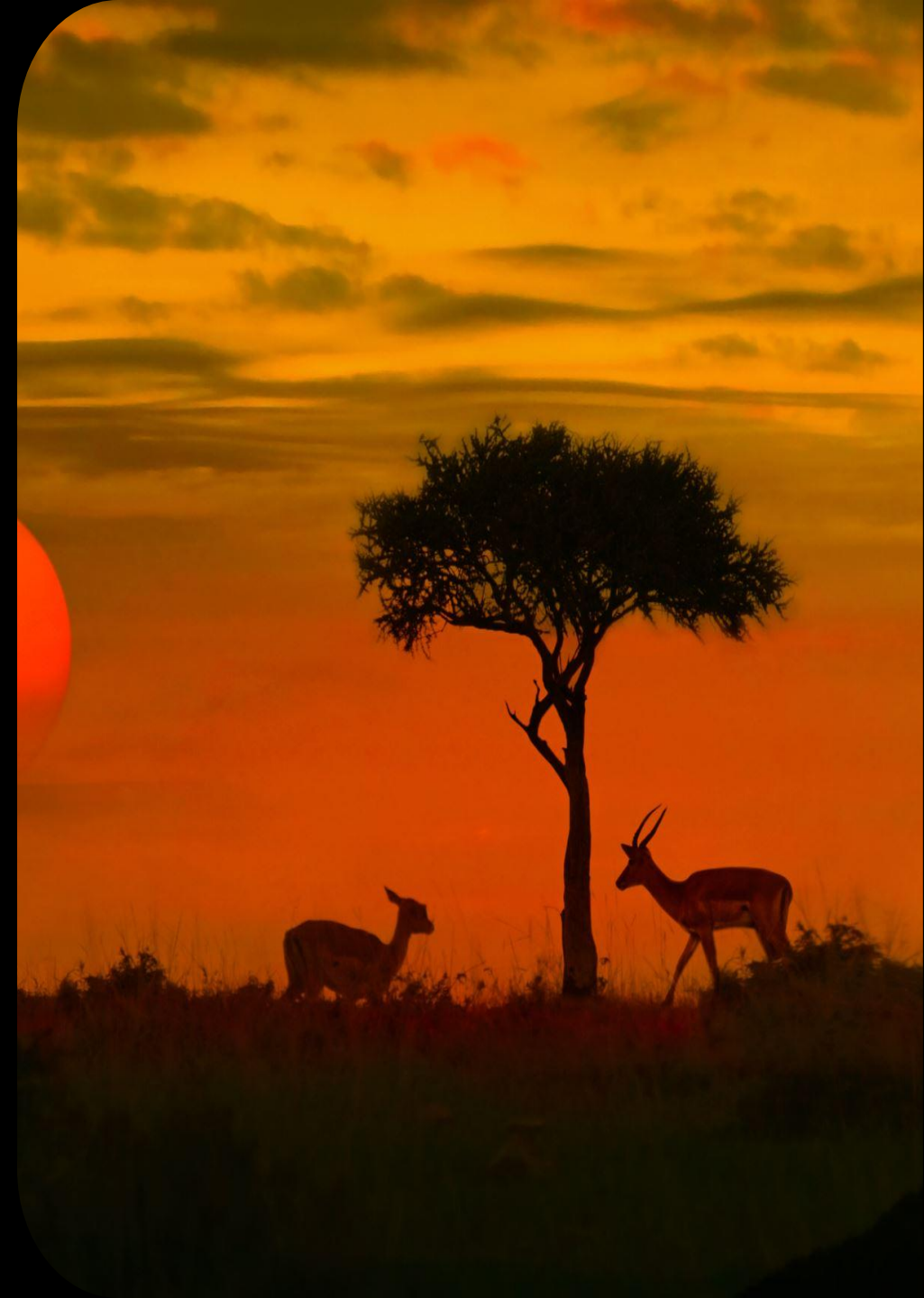
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Introduction

Overview

- African Manatee and African Golden Cat: Examples of unfamiliar endangered species
- Lack of data, especially images, hinders conservation efforts
- Data gap between IUCN Red List: Over 79,000 species listed, but only 4% covered in the Living Planet Report and actual visual data.
- Proposed solution: AI-generated wildlife imagery.



Importance of Realistic Wildlife Imagery



Scarcity of authentic visual data hinders conservation policies, research, and public engagement.



Need for effective conservation and educational initiatives.



Proposed solution: Synthesize realistic wildlife images from text descriptions.

Literature Review



Wildbook

Crowdsourcing and computer vision for conservation
Engages the public in conservation initiatives



SketchyGAN

Generates realistic images from human-drawn sketches using GANs
Facilitates visualization of wildlife through sketches



Generative Adversarial
Text to Image Synthesis

Generates realistic images from detailed textual descriptions using GANs
Enhances interaction between natural language and visual content

Proposed Approach

Generative AI for Wildlife Imagery

- Use pre-trained generative models with fine-tuning.
- Transfer learning techniques: Reduces computational resources and training time.
- Fine-tune the runwayml/stable-diffusion-v1-5 model using Dreambooth technique.
- Goal: Create a tool for synthesizing realistic wildlife imagery.



Data Collection and Preprocessing

Species Focus



AFRICAN MANATEE: :

VULNERABLE STATUS, THREATS.



AFRICAN GOLDEN CAT

VULNERABLE STATUS, HABITAT LOSS.



WHITE-BACKED VULTURE::

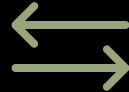
CRITICALLY ENDANGERED, ECOSYSTEM ROLE

Data Preprocessing

Image Handling



Images resized to 512 x 512 pixels using "Birne".



Model selection: Fine-tune runwayml/stable-diffusion-v1-5 using Dreambooth.



Pre-trained weights obtained from Hugging Face Model Hub.



Source: Bulk image resizing tool "Birne".

Model Selection & Fine-Tuning



Pre-trained model:
runwayml/stable-diffusion-v1-5.



Pre-trained model:
runwayml/stable-diffusion-v1-5.



Hyperparameters used for model
inference.



Source of pre-trained weights: Hugging
Face Model Hub.

Results - Real vs Generated Images

Image Comparison

African Golden Cat:

Real

vs.

Generated



Results - Real vs Generated Images

Image Comparison

White-backed Vulture:

Real

vs.

Generated



Results - Real vs Generated Images

Image Comparison

White-backed Vulture:

Real

vs.

Generated



Exploring Model Generalization

Generated Images of Untrained Species

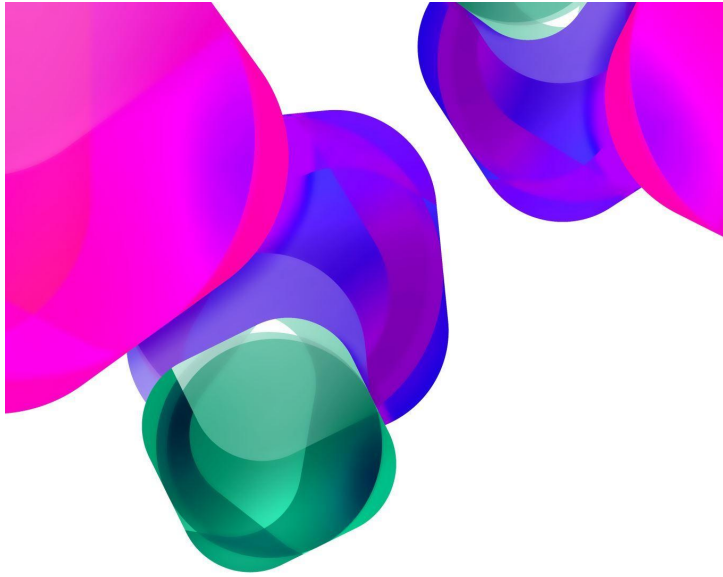
African Wild Dog:

Real

vs.

Generated





Discussion

Discussion

Results:

- Generated images show remarkable similarity to real counterparts.
- Model successfully captures key features and characteristics of each species.
- Ability to generalize to untrained species is noteworthy.
- **Limitations:** Occasional inconsistencies in anatomical details or environmental contexts.

Applications:

- Enhances conservation education and public engagement.
- Supports research efforts by visualizing historical or hypothetical scenarios.

Conclusion and Future Work



Feasibility of AI models:

- Successful use of fine-tuned generative AI models for creating realistic wildlife imagery.
- Effective in generating images for both trained and untrained species.

Implication for conservations:

- Enhances conservation education by providing diverse and realistic wildlife images.
- Supports research efforts, aiding in the documentation and study of elusive or critically endangered species.

Future Research:

- Expand model capabilities to cover a broader range of species.
- Explore integration with other conservation technologies.
- Address ethical considerations of AI-generated imagery in scientific contexts.