WILDLIFE MONITORING PROPOSAL

COMPUTER VISION

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Proposal for Wildlife Monitoring System Using Computer Vision and Machine Learning

Introduction :

Wildlife monitoring plays a crucial role in understanding ecosystems and conserving biodiversity. Traditional methods often rely on manual labor, which is time-consuming, costly, and prone to errors. This project leverages computer vision and machine learning to automate the process, providing accurate, efficient, and scalable monitoring solutions.

Objectives :

1. Develop an automated wildlife monitoring system using a custom image classifier.
2. Classify images of animals into predefined categories using advanced machine learning techniques.
3. Analyze and visualize the results for actionable insights.

Methodology :

1. **Data Collection**
    - Dataset: The project uses the Animals-10 dataset, which contains images of various animal species.
    - Classes: Dog, Horse, Elephant, Butterfly, Cat, Cow, Sheep, Spider, and Squirrel.
2. **Data Preprocessing**
    - Resizing images to a uniform size of 64x64 pixels.
    - Normalizing pixel values for faster convergence during model training.
    - Splitting the dataset into training and test sets.
3. **Model Development**
    - Implementing and evaluating multiple machine learning models:
        - Logistic Regression
        - Softmax Regression
        - Support Vector Machine (SVM)

- K-Nearest Neighbors (KNN)
- Feed-Forward Neural Network
- Convolutional Neural Network (CNN)

4. **Model Evaluation :**
    - Metrics: Accuracy, classification report, and confusion matrix.
    - Visualization: Heatmaps for confusion matrices to interpret model performance.
5. **Custom Image Processing :**
    - Techniques such as grayscale conversion, histogram equalization, and edge detection are applied for feature enhancement.

Tools and Technologies :

- Python (TensorFlow, NumPy, OpenCV, Matplotlib, Scikit-learn, Seaborn)
- Hardware: High-performance GPU for training deep learning models.

Expected Outcomes :

- An automated system capable of classifying animal images with high accuracy.
- Insights into the distribution of animal species in the dataset.
- A scalable framework that can be extended to other datasets and wildlife monitoring applications.

Timeline:

Task	Duration
Data Collection and Preprocessing	2 weeks
Model Implementation	4 weeks
Model Evaluation	2 weeks
Documentation and Testing	2 weeks

Budget

- Cloud GPU Resources: $300
- Dataset Acquisition: $0 (open-source)
- Development Tools: Free (open-source)