Wildlife Image Processing & Semantic Search System V2

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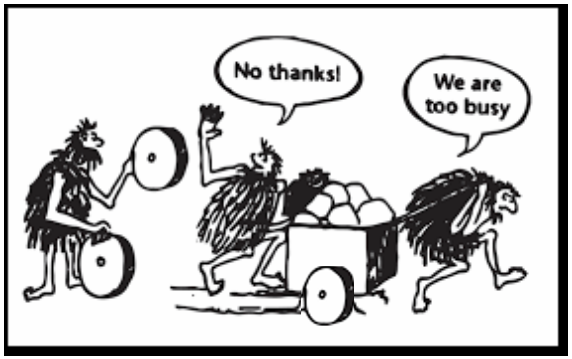
Why Continue?



Deploy

- Home
- Ingestion Pipeline
- Validation
- Species Detection

Analysis

- Analysis Explorer
- Exploration / Search

Tools

- One-Off Species Scraper
- Database & File Clean-up
- Geocode & Update Image Locati…
- Regenerate Image Embeddings
- Regenerate Text Embeddings

Appendix

- Project Overview
- Complete Wildlife Image Proces…
- References

View less

Sections

Home

Wildlife Image Processing & Semantic Search System

This project presents the development of a modular, AI-enhanced system for processing, classifying, and retrieving wildlife images and videos. It integrates traditional computer vision techniques with advanced semantic understanding powered by Large Language Models. The platform supports manual and AI-assisted annotation, stores visual metadata and embeddings, and enables intuitive natural language queries to discover relevant visual content. By enabling contextual insights and advanced search capabilities, the system transforms how wildlife media can be explored and utilized.

Brown Bear

Confidence: 0.738

mammalia, carnivora, ursidae, ursus, arctos, brown bear

American Bison

Confidence: 0.9952

mammalia, cetartiodactyla, bovidae, bison, bison, None, american bison

Owl

Confidence: 0.322

aves, strigiformes, owl

Agenda

- Back to the Future
- Project Goals
- Tag Responsibly
- Under the Hood
- AI Species Identification
- 88 MPH Achieved!
- Q&A

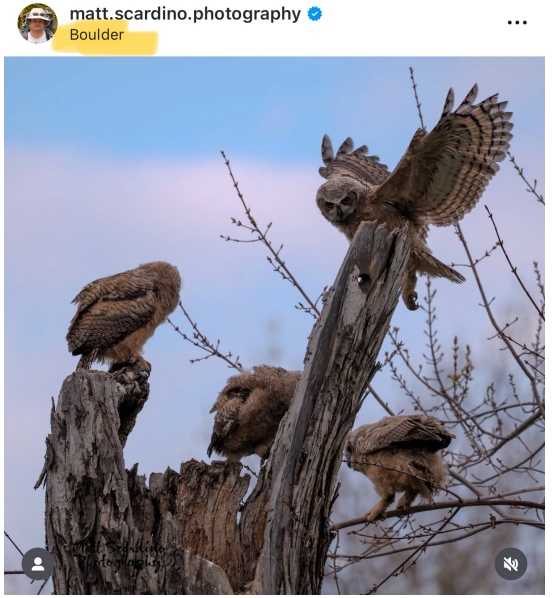
Project Goals

- Boost accuracy and improve species identification through multi-model AI (LangGraph, embeddings, SpeciesNet).
- Enhance images using OpenCV to improve quality before analysis.
- Lay the groundwork for training models using my own wildlife images.
- Make services and tools accessible to everyone.
- Protect what matters by addressing privacy concerns for wildlife and locations.

Tag Responsibly

Protecting Wildlife Through Mindful Labeling and Geotagging

- Generalize locations for sensitive areas — e.g., “Yellowstone, Boulder, etc.” instead of exact GPS coordinates.



Tag Responsibly

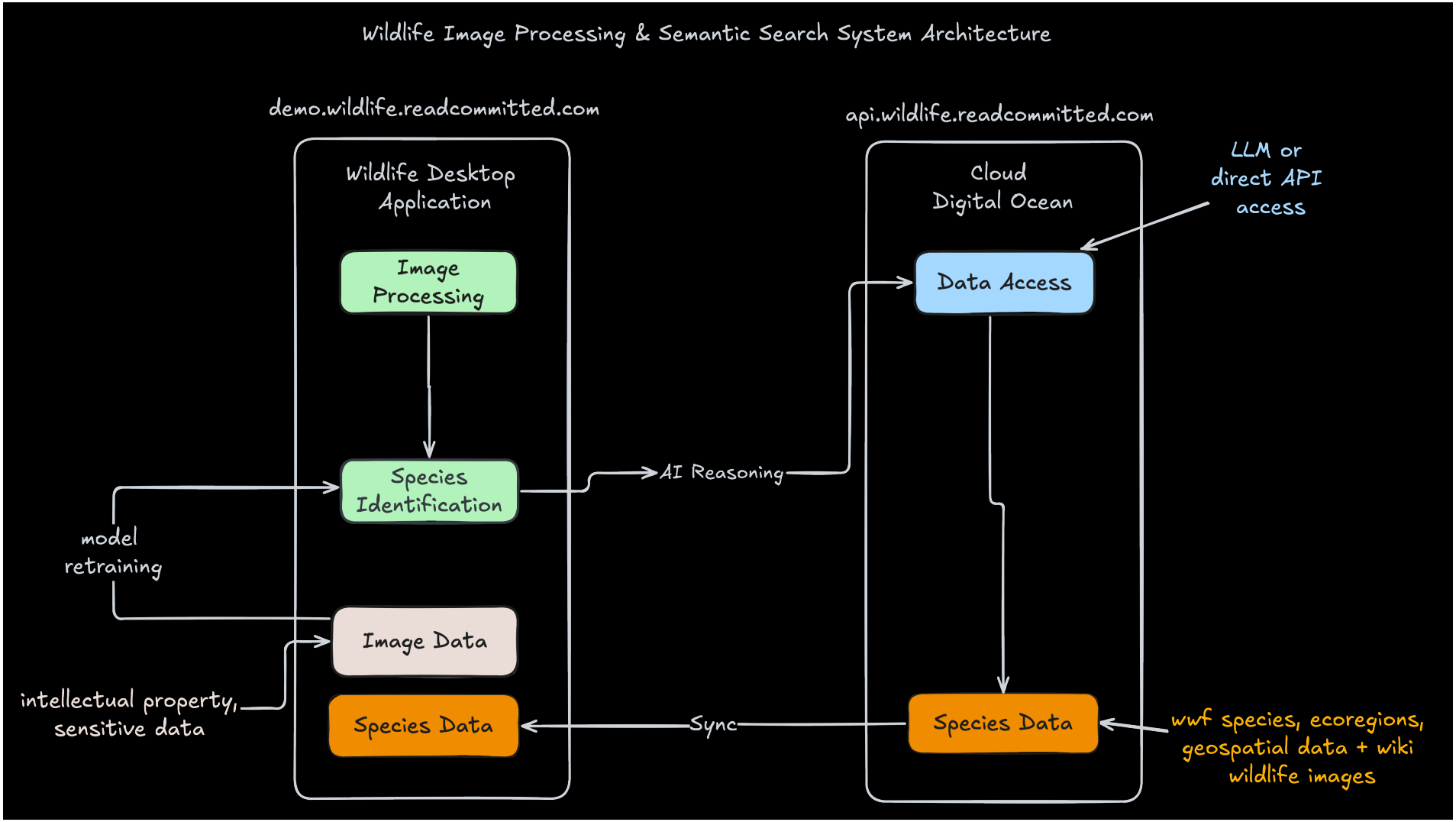
How it Fits in the New Architecture

- Desktop Application (Standalone Container for the Application). Protecting IP and wildlife from unnecessary exposure.

- Cloud (AI + Data Access for Species & Geospatial Data Model).

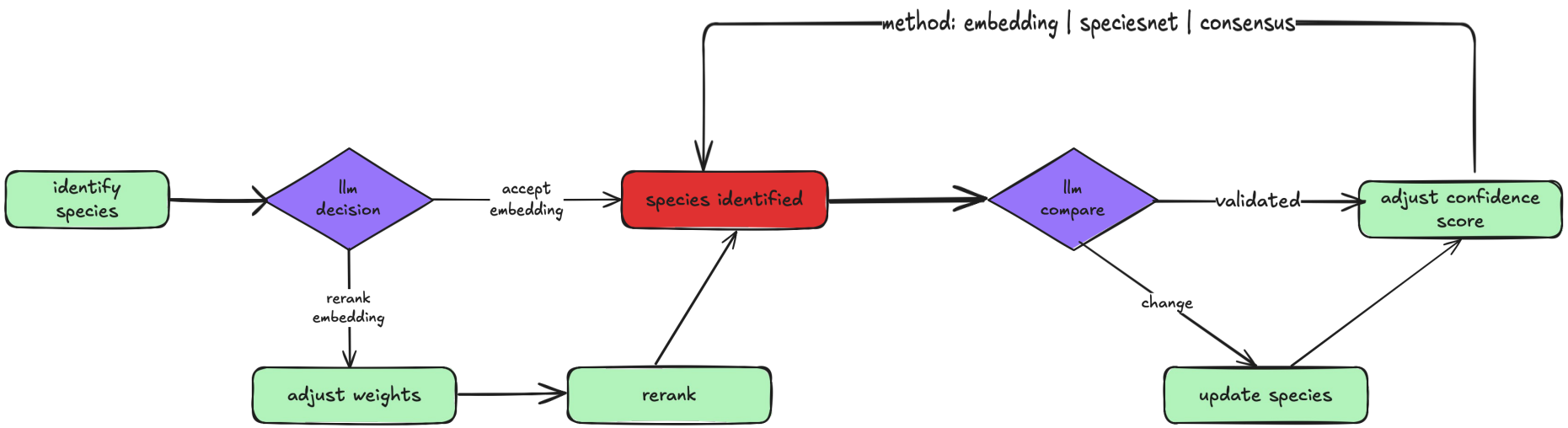
The Architecture

Under the hood


Wildlife Image Processing & Semantic Search System Architecture
demo.wildlife.readcommitted.com
Wildlife Desktop Application
Image Processing
Species Identification
Image Data
Species Data
api.wildlife.readcommitted.com
Cloud Digital Ocean
Data Access
Species Data
LLM or direct API access
AI Reasoning
model retraining
intellectual property, sensitive data
Sync
wwf species, ecoregions, geospatial data + wiki wildlife images

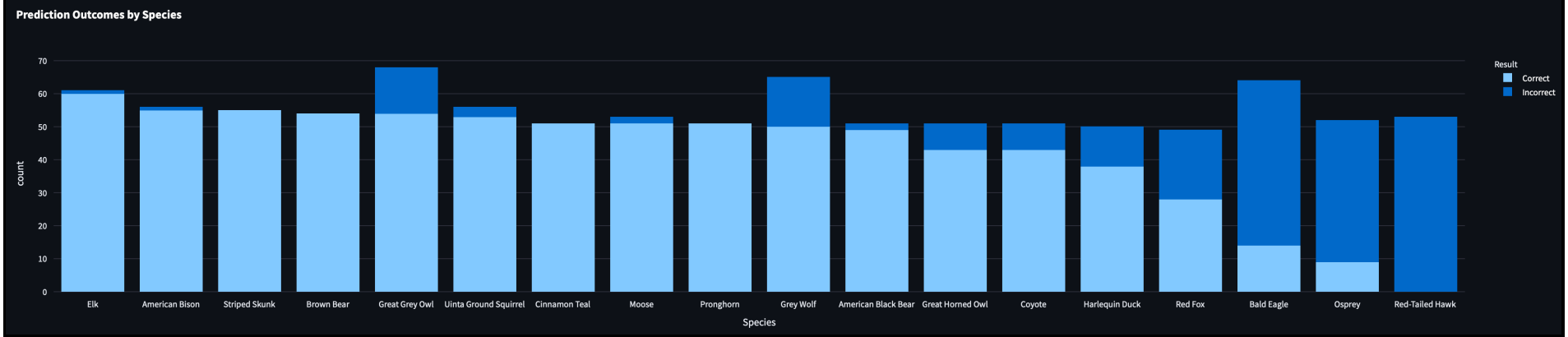
AI Species Identification

Multi-Model Species Identification and Arbitration



Clip Embedding Analysis

Accuracy: 758 / 991 = 76.49%



Multi-Model Analysis

Accuracy: 772 / 991 = 77.90%

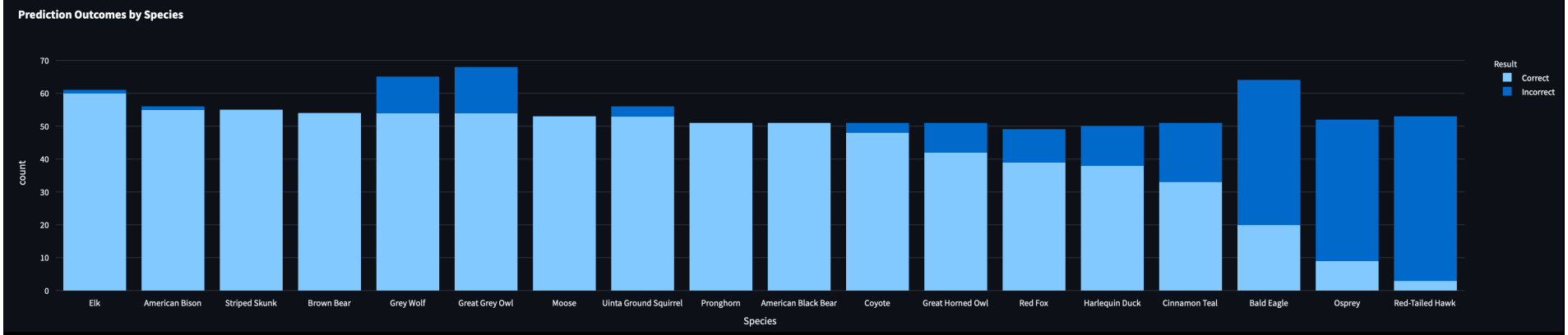


Photo: DeLorean Time Machine, 2025: https://www.deloreantimemachines.com/

>89% Accuracy

Custom-trained SpeciesNet Model on 450+ images

demo.wildlife.readcommitted.com

From Project Goals to Results

- Deployed to cloud, exposed APIs & LLM, containerized desktop application
- 30% -> 60% -> 80% accuracy (embeddings + SpeciesNet + LangChain)
- Built color palette for each species and Estimated relative size using camera properties
- Fine-tuned SpeciesNet on my photos Delivering > 89% accuracy
- IP stays local in within desktop application, Cloud holds only generalized, shareable insights

Q&A