

Field Notes

Tools and techniques for today's wildlife professional

Using the cloud to identify animals on the ground

As TWS member Derek E. Lee studies Tanzania's declining giraffe population, his fieldwork occurs in remote areas without cell service or internet, but increasingly, he's also making use of cutting-edge machine learning technology in the cloud.

An associate research professor at Penn State University and principal scientist at the [Wild Nature Institute](#), Lee uses photographs to survey Masai giraffes (*Giraffa camelopardalis tippelskirchi*) in and around Tarangire National Park to try to understand why giraffes have declined about 40 percent in recent decades. "A silent extinction of giraffes is happening right before our eyes," he said.

The technique allows him to identify every individual — some 3,100 — in the population, far more than traditional tagging could. Software identifies each giraffe's unique spot pattern, but researchers had to crop each photo one by one to show just the torso, where the most markings are visible. That could be 2,000 photos per survey. "It was very laborious and time-consuming," Lee said.

To eliminate the bottleneck, he turned to the cloud, using machine learning technology to convert photographs into data. He and a team from the cloud computing platform Microsoft Azure describe the technique in a [paper](#) in the journal *Ecological Informatics*.

The Microsoft team trained a program to recognize giraffe torsos using existing photos and to predict cropping squares on new images. With a human to verify or correct the results, a training algorithm improved the system over time. It proved 100 percent accurate in identifying giraffe torsos in high-quality photos, Lee said, and over 90 percent accurate when adding in poorer photos, even where vegetation partially blocked the giraffes. "It takes something that used to be weeks of processing down to hours," Lee said.

Scientists increasingly use photo recognition for other species, from salamanders to tortoises — even some species hard to distinguish by eye. "Animals that at first glance may appear to be very similar looking, if you look close enough, you often find some feature that is unique," he said.

Machine learning streamlines the process, Lee said, making it easier for biologists to use it as an alternative to tagging. That technique has risks for both researchers and wildlife and, in some cases, impacts animal behavior, survival and reproduction, he said. But photos "allow the animals to live their life completely unbothered by the study."

—Contributed by David Frey ■



Credit: Mudflap DC via Flickr

▲ Masai giraffes are experiencing "a silent extinction," researcher Derek Lee says.



Credit: Wild Nature Institute

▲ Machine learning allowed a computer program to recognize giraffe torsos in photographs and predict where the images should be cropped, helping researchers use the images to identify individuals.



Credit: Wild Nature Institute

▲ Derek Lee, Monica Bond and James Madeli, of the Wild Nature Institute, pose with students in their environmental education program in Mto wa Mbu, Tanzania.