Artificial intelligence used to recognise primate behaviours in the wild

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Artificial intelligence can be used to identify the behaviours of monkeys in the wild. Credit: Kyoto University, Primate Research Institute

Scientists at the University of Oxford have developed new artificial intelligence (AI) models to recognize behaviors of chimpanzees in the wild.

The method will allow researchers and wildlife conservationists to significantly cut back on time and resources spent analyzing animal behavior in video footage, according to the new paper published today in

Science Advances.

The new computer model was trained using videos from two populations of wild chimpanzees in West Africa from Bossou in Guinea, and Cantanhez National Park in Guinea-Bissau, to capture several behaviors: nut-cracking, eating, and buttress drumming. The tool is the first of its kind to automatically recognize behavior in wild primates using both audio and video, and builds on previous work which developed an automatic method for tracking and identifying individuals using face recognition.

"Our models can be applied to thousands of hours of video recordings of chimpanzees in their natural habitat from camera traps or archival footage," says Max Bain, researcher and DPhil student at Oxford University's Department of Engineering Science. "We use methods from deep learning with networks that are able to ingest both the audio and the visual stream of information from a video, crucial in the wild where an animal behavior might be heard but not seen (e.g. cracking nuts behind a tree) or inaudible actions."

With the widespread deployment of camera trap databases and use of long-term video archives in field research, capturing the sheer volume of animal behaviors using human researchers is becoming increasingly difficult to scale.

"For species such as chimpanzees which have remarkable behavioral complexity, cross-site comparisons of video datasets using AI presents an exciting opportunity to capture subtle variation between groups and the evolution of behavior over time at a scale and depth not previously possible," says Daniel Schofield, researcher and DPhil student at Oxford University's Primate Models Lab, Institute of Human Sciences.

The method is novel by combining individual identification from

previous approaches with audio-visual behavior recognition to gain richer insight into the complexity of animals' lives.

"Our method is not restricted to chimpanzees, and can be trained to recognize any behavior," says Bain. "We hope that other teams and researchers can apply our cutting edge methods to other species."

Monitoring vast amounts of data from field research of wild species is a crucial component of conservation efforts tackling the biodiversity crisis. The use of behavior recognition using AI has potential to capture novel behavioral indicators that can more accurately measure the viability of threatened populations.

"Ultimately this can help us examine the social and ecological drivers of behavior, as well as monitor how these communities are responding to environmental pressures caused by climate change and habitat degradation from human activities," says Schofield.

"As a computer scientist, it is extremely satisfying to see these methods applied to solve real, challenging biodiversity problems," adds Arsha Nagrani, a co-author who is now at Google Research.

  More information: Max Bain et al, Automated audiovisual behavior recognition in wild primates, *Science Advances* (2021). DOI: 10.1126/sciadv.abi4883

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