Birdwatching from afar: AI-enabled camera system to target specific behaviors

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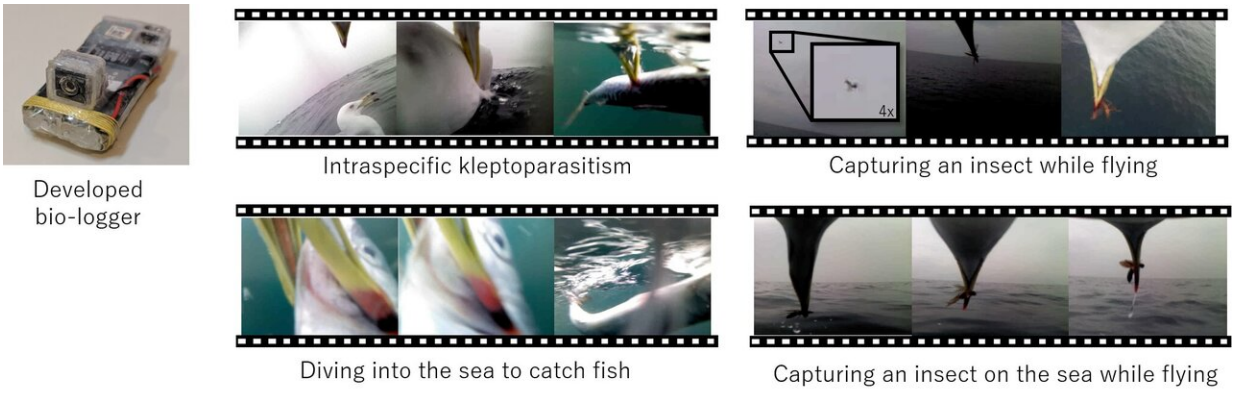

Bio-logger and screenshots of videos captured by AI. Credit: Osaka University

A research team from Osaka University has developed an innovative new animal-borne data-collection system that, guided by artificial intelligence (AI), has led to the witnessing of previously unreported foraging behaviors in seabirds.

Bio-logging is a technique involving the mounting of small lightweight video cameras and/or other data-gathering devices onto the bodies of wild animals. The systems then allow researchers to observe various aspects of that animal's life, such as its behaviors and social interactions, with minimal disturbance.

However, the considerable battery life required for these high-cost bio-logging systems has proven limiting so far. "Since bio-loggers attached to small animals have to be small and lightweight, they have short runtimes and it was therefore difficult to record interesting infrequent behaviors," explains study corresponding author Takuya Maekawa.

"We have developed a new AI-equipped bio-logging device that allows us to automatically detect and record the specific target behaviors of interest based on data from low-cost sensors such as accelerometers and geographic positioning systems (GPS)." The low-cost sensors then limit the use of the high-cost sensors, such as video cameras, to just the periods of time when they are most likely to capture the specific target behavior.

The use of these systems in combination with machine learning techniques can focus data collection with the expensive sensors directly onto interesting but infrequent behaviors, greatly increasing the likelihood that those behaviors will be detected.

The new AI-assisted video camera system was tested on black-tailed gulls and streaked shearwaters in their natural environment on islands off the coast of Japan. "The new method improved the detection of foraging behaviors in the black-tailed gulls 15-fold compared with the random sampling method," says lead author Joseph Korpela. "In the streaked shearwaters, we applied a GPS-based AI-equipped system to detect specific local flight activities of these birds. The GPS-based system had a precision of 0.59—far higher than the 0.07 of a periodic sampling method involving switching the camera on every 30 minutes."

There are many potential applications for the use of AI-equipped bio-loggers in the future, not least the further development of the systems themselves. "These systems have a huge range of possible applications including detection of poaching activity using anti-poaching tags," says

Maekawa. "We also anticipate that this work will be used to reveal the interactions between human society and wild animals that transmit epidemics such as coronavirus."

More information: Joseph Korpela et al. Machine learning enables improved runtime and precision for bio-loggers on seabirds, *Communications Biology* (2020). DOI: 10.1038/s42003-020-01356-8

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