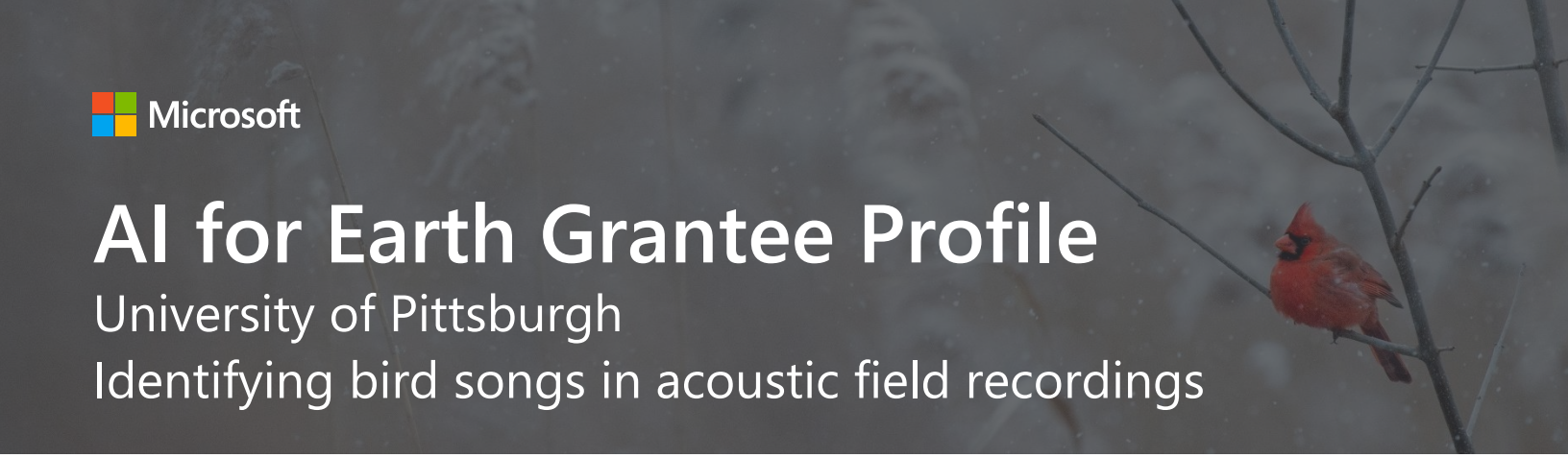

Microsoft

AI for Earth Grantee Profile

University of Pittsburgh

Identifying bird songs in acoustic field recordings

Summary

Indirect observation methods, such as microphones and camera traps, offer the opportunity for scientists to gather a lot more data on threatened species. With that capability comes the need for automated intelligent tools to efficiently process and analyze the massive amounts of data. Dr. Justin Kitzes is developing machine learning models to identify bird songs in acoustic field recordings to better measure bird populations and predict biodiversity loss.

Monitoring bird populations with AI

To protect threatened species, scientists need to observe where species are found and why—and this means collecting a lot of data. Until recently, scientists have had to directly observe populations in the field, but now with indirect observation methods—microphones, camera traps, and other autonomous sensors—scientists have a chance to collect a lot more of the data they need and then make sense of it with machine learning classification.

> When bird populations drop, we should be concerned for ourselves as well as the birds.

Dr. Justin Kitzes, an assistant professor with the University of Pittsburgh's Department of Biological Sciences, is looking to better measure and predict biodiversity loss in bird populations—and pioneering AI-assisted acoustic survey methods using microphones to do so. Bird populations in general can tell us how healthy our environment is. When bird populations drop, we should be concerned for ourselves as well as the birds.

Identifying bird songs in acoustic field recordings

Birds can be identified by their calls as well as by sight, but it takes an experienced observer to do so—and trained observers are limited by time and location. Automated recording devices can help, as they can be left in the field to record over long periods. However, the recordings still have to be processed to be useful. With the potential for many hours of data to review, that task is best handled by computer, if possible. Birds also have a wide variety of songs which they may change in many ways, and they even have different dialects based on

their environment and location. Thus, digital tools to identify complex bird songs from recordings would help with monitoring bird populations.

> “The data collection enabled by our work will ultimately help to form the foundation for effective conservation of birds and other vocal species on a changing planet.” – Dr. Justin Kitzes

With this project, Kitzes and his team aim to develop the first free, open-source models to identify bird songs in acoustic field recordings, with the goal of radically increasing global data collection on bird populations. His team will create a software package, OpenSoundscape, that can perform acoustic analysis on a laptop, cloud service, or supercomputer, along with a trained classifier library for around 600 bird species found in the United States. According to Kitzes, “The data collection enabled by our work will ultimately help to form the foundation for effective conservation of birds and other vocal species on a changing planet.”

About Dr. Justin Kitzes

Justin Kitzes is an Assistant Professor in the Department of Biological Sciences at the University of Pittsburgh. His research combines methods from spatial ecology, data science, and conservation biology in order to better

Justin Kitzes, assistant professor in the Department of Biological Sciences at the University of Pittsburgh in the United States. [Photo courtesy of Justin Kitzes]

measure and predict biodiversity loss on a changing planet. He has a specific interest in the development of hardware and software tools to support large-scale acoustic biodiversity surveys. Dr. Kitzes holds B.S. and M.S.

degrees in Earth Systems from Stanford University and a Ph.D. in Environmental Science, Policy and Management from the University of California, Berkeley.

Resources

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Microsoft and National Geographic Society announce AI for Earth Innovation grantees

Websites

AI for Earth