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New AI model helps protect biodiversity by listening to insects

The winning solution from Capgemini's internal competition uses AI-powered sound recognition to aid researchers in understanding and monitoring vital insect populations

Paris, September 18, 2023 – Data and AI experts from Capgemini, in collaboration with Naturalis Biodiversity Center and Amazon Web Services (AWS), have developed artificial intelligence (AI) models that help protect biodiversity by automating and improving the identification of insects through sound recognition. The millions of insect species worldwide are estimated to make up about 80% of all animals¹ on our planet and losing them could lead to collapse of the overall ecosystem, which includes humans.

Currently, identifying insect species by their sounds is a very challenging task that can be done by only a few experts. Over time, targeted AI solutions developed by Capgemini will enable scientists to analyze terabytes of information within just 24 hours, as they will no longer be limited by the boundaries of ability, time, and geography.

"As a global leader in data and AI, Capgemini has a responsibility to apply its expertise to real-world scenarios that can help create a more sustainable world and drive tangible benefits for our society," said Niraj Parihar, CEO of the Insights & Data Global Business Line at Capgemini and Member of the Group Executive Committee. "Through our Global Data Science Challenge, we empower our team members to solve real world challenges of vital importance to us all. Insects play a central role in our ecosystem but are incredibly hard for humans to monitor. Listening to and identifying insect species is critical to preserving them. I'm inspired to see how our colleagues have collaborated to apply the power of AI to conserve our natural ecosystem and help protect the future of our planet."

The unsung heroes of our global ecosystem

Insects play a critical role in the global ecosystem², for example as pollinators, indicators of an ecosystem's health, and food source for larger animals. However, the insect population is increasingly being impacted by changes in land use, pesticides, urban developments, and shifts in climate.

This is compounded by the fact that insects are incredibly hard to monitor and, given that there are millions of species, it cannot be done reliably by humans. Although image recognition works for some species, it cannot successfully detect species that are inconspicuous to the human eye. It is here that acoustic recognition plays an invaluable role. Together with traditional and camera-based monitoring, acoustic recognition will bring new insights that allow for identification of insect species that would otherwise go undetected, enabling scientists to monitor and conserve these vital populations.

¹ <https://www.si.edu/spotlight/buginfo/buqnos>

² <https://onlinelibrary.wiley.com/doi/10.1002/9781118945568.ch2#:~:text=Insects%20create%20the%20biological%20foundation,food%20source%20for%20other%20taxa>.



Elaine van Ommen Kloeke, Program Manager at Naturalis, said, "Insects play a key role in protecting biodiversity. If we lose insects, it would be a devastation felt not just by the species that directly rely on insects as a food source, but everyone in the ecosystem – including humans. It could lead to the loss of about 35 percent of the world's food crops³, which means that one out of every three bites of food we eat might be unavailable. The good news is that through collaboration, enabled by organizations such as Cappgemini and by technological advancements, we can address this global issue and protect an animal group that's so important for our global ecosystem. With this initiative, we aim to make this technology accessible to research communities worldwide to support with the identification of insects in any given environment."

Cappgemini's purpose-driven hackathon that enables real-world AI solutions

The winning AI solution was developed as part of Cappgemini's sixth Global Data Science Challenge for a sustainable future (GDSC), an annual company-wide initiative whereby every employee is given the opportunity to harness their data and AI expertise to solve a real-world issue.

Tanuja Randery, Managing Director at AWS, EMEA comments, "We're very proud to support Global Data Science Challenge with the use and access of AWS technologies and expertise. We've seen over the years how data and AI can contribute to building a better, more sustainable future, and it's fantastic to see that come to life through projects such as GDSC." Tanuja added, "Along with Cappgemini, we have a shared vision to make AI more accessible to developers, researchers and scientists across the world and empower them to progress positive change."

This year's challenge builds on the shared vision of Cappgemini and AWS to make a meaningful difference for people, society, and the planet using AI, machine learning, and other state-of-the-art data-science tools. In 2022, Cappgemini and AWS published a whitepaper titled '[Tech & The Living World](#)' that examined the role of technology in protecting biodiversity. For this year's GDSC challenge, teams from Cappgemini collaborated with Naturalis, the National Research Institute for Biodiversity based in the Netherlands for their expertise in the field, and with AWS for Sagemaker, their scalable machine learning platform, to tackle the issue of insect monitoring. The winning team developed an AI-based acoustic model that can identify different insect species with almost 92% accuracy⁴. Over [1,500](#) participants from more than 30 countries came together to participate in this year's GDSC to address this important issue.

To find out more about this year's Global Data Science Challenge [click here](#).

About Cappgemini

Cappgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided every day by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of nearly 350,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Cappgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering, and platforms. The Group reported in 2022 global revenues of €22 billion.

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³ <https://www.usda.gov/peoples-garden/pollinators>

⁴ Macro-averaged F1 score