Artificial Intelligence and Wildlife Research

We are living through the consequences of all previous revolutions, and currently, we are in the Fourth Industrial Revolution, also known as Industry 4.0. In this era, new technologies are blurring the lines between the physical, digital, and biological spheres. With these advancements, big data has emerged in various fields, including ecology. However, according to an article titled “Perspectives in machine learning for wildlife conservation” by english-speaking researchers, which was published in 2021 in Nature communications, we don’t have enough resources to process and manage massive amounts of data effectively. My purpose is to show how artificial intelligence can be applied to the study of biodiversity for its preservation according to said article. I believe that technology can serve as a tool for collecting and processing data on ecology and animal behavior, using Machine Learning, particularly Deep Learning.

When we don’t have enough knowledge about biodiversity or sufficient data to make accurate predictions about ecology or animal behavior for preservation, we can use technology, such as sensors, to collect data.

They could improve the way we obtain information because, during field research, researchers can make mistakes. Field research is time-consuming, labor intensive, and expensive. Field research or workers face risks, such as aircraft and plane crashes, which are the primary cause of mortality for wildlife biologists. Researchers also have physical and cognitive limitations. For example, the number of individual animals that can be observed simultaneously, as well as the temporal resolution and complexity of the data that can be prone to error, leading to inaccurate predictions or extrapolations, also. Insufficient monitoring affects the evaluation of primate conservation efforts.

Using technology, we can reduce the lack of knowledge about biodiversity and the difficulty of processing data. Processing vast amounts of data, including geographic ranges, population densities, and community diversity, poses significant challenges, often leading to misunderstandings regarding the consequences of biodiversity decline. However, sensor technology has revolutionized data collection methods, offering new possibilities for researchers. Non-invasive digital devices such as camera traps, consumer cameras, and acoustic sensors have become important tools. Moreover, the utilization of miniaturized tracking tags and sensor arrays equipped with accelerometers, audio loggers, and cameras enables detailed studies of animal movement and behavior.

Undoubtedly, the black box models of ML and DL are challenging to comprehend. However, computer scientists and environmental experts can collaborate to integrate ecological knowledge, including underlying biological processes, into ML models.

Admittedly, the universality of ML has been questioned. However, Deep Learning models, which are based on artificial neural networks, have demonstrated superiority over conventional Machine Learning models. Both ML and DL exhibit significantly lower errors compared to

traditional generalized regression models. Moreover, ML and DL boast high detection rates with fewer false positives.

On the other hand, it is well-known that ML consumes significant amounts of energy. Recently, it has been estimated that the AI models used for understanding natural language emit as much carbon as several cars over their entire lifetimes. This issue must be addressed.

Finally, I still believe that technology could serve as tools for collecting and processing ecology and animal behavior data. However, it is necessary to examine its carbon impact on Earth.