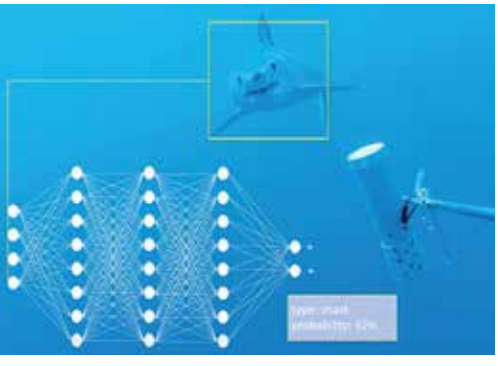
Using artificial intelligence to measure biodiversity

Urbanisation, resource overexploitation, pollution, habitat destruction and climate change are responsible for the sixth mass extinction of species - a global phenomenon that scientists are trying to quantify as much as possible.



Identification of a pelagic Mako shark using deep learning, New Caledonia.

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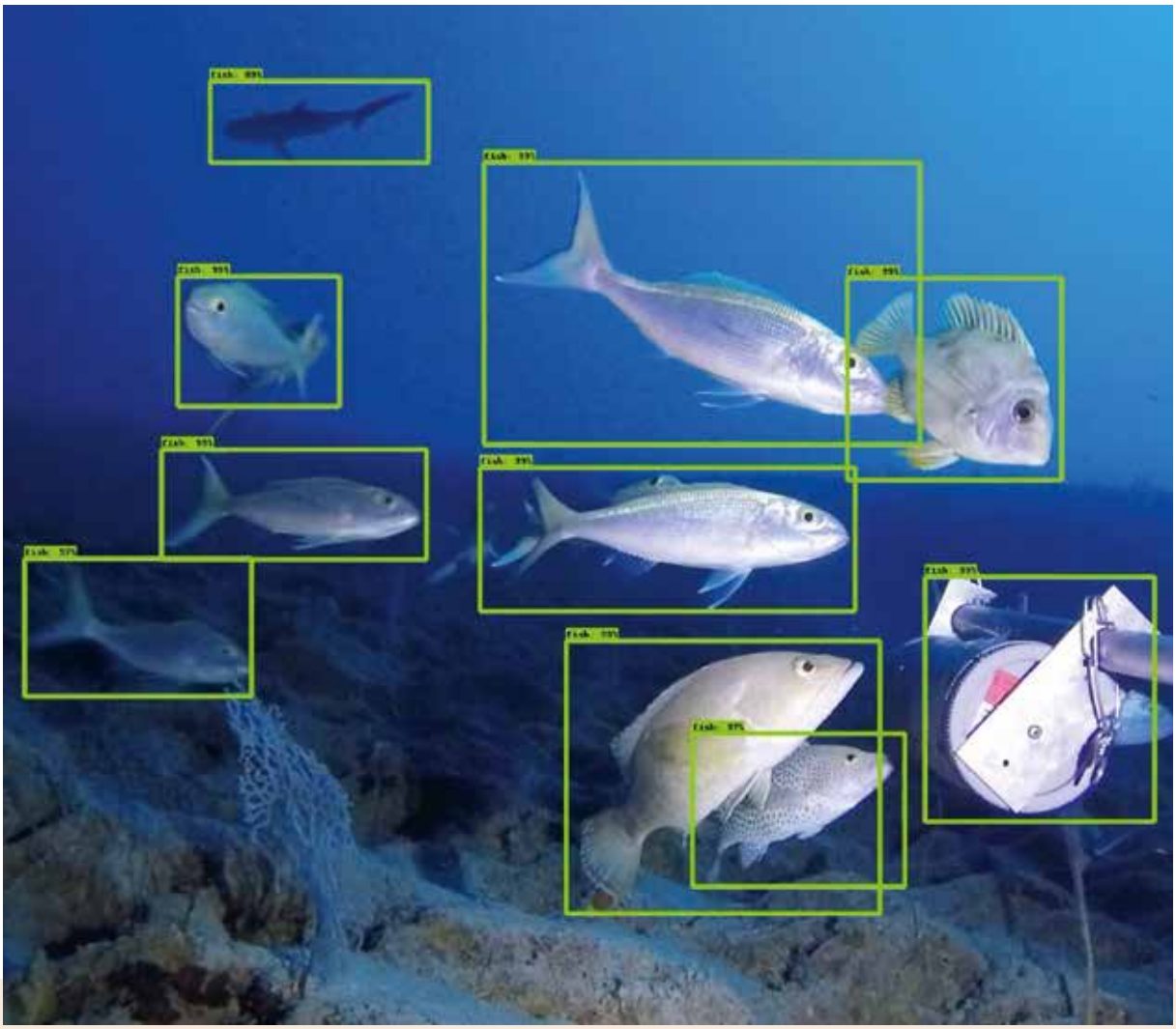
To measure global warming, we can use sensors, sea buoys and satellite images - in short, continuous recordings of physical parameters. But things become much more complicated when it comes to documenting the erosion of something as fluid and varied as biodiversity. In this respect, artificial intelligence (AI) is changing the game.

Data mining, for example, can be used to extract useful information from the diverse bestiary of global databases, be it counts, bioacoustic sound recordings or environmental DNA sequencing. AI can then highlight unsuspected links between species, reconstruct networks of interaction, highlight their sensitivity to environmental variations, or identify indicators - all results that would have been impossible to obtain using conventional methods.

Another very promising example is deep learning, which automatically analyses data from sensors, such as video recordings. This process can be used to detect animals or habitats in underwater photos or videos. However, AI does not perform well in all areas. It even has an essential flaw in that, to learn to recognise a species, it needs images of it. And not just one or two - on average, it needs 1,000! This is very difficult to provide, since from a biodiversity perspective, the majority of species are in fact rarely observed.

Despite these difficulties, the arrival of AI represents a scientific breakthrough whose impact is only just beginning to be felt. One of the challenges now is to store scientific data in dedicated, reliable warehouses.

••• New approaches to analysis, based on artificial intelligence, are helping gauge the erosion of biodiversity •••



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Fish detection using deep learning, New Caledonia.

"All managers of marine species, whether rare, endangered or of interest to the fishing industry, are on the lookout for innovative measurement and efficient monitoring techniques that do away with the need for human observers. For this purpose, IRD's algorithms have already proved highly effective (dugongs, turtles, sharks, snappers)."

Emmanuel Coutures, Sustainable Development Department, Southern Province of New Caledonia, France

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