

AI for Earth Grantee Profile

Imazon

Predicting deforestation in the Amazon

Summary

The vastness of the Amazon means that identifying and understanding trends there can be a daunting task. While images were available for processing, the initial process was highly manual and time consuming. And while image processing computer models was available, the sheer volume meant that the computing power required was significant. Using Microsoft Azure, image recognition became scalable to larger geographies in order to locate and predict fires and deforestation. This prediction allows governments and NGOs to better inform their budgets and allocate resources.

Using deforestation predictions to guide policy

The Amazon rainforest has long been regarded as the world's greatest repository of biodiversity, [home to more than 10 percent of all of Earth's plant and animal species](#) despite covering only 1 percent of the Earth's surface. Because of its vastness and environmental diversity, it also plays a significant role in mitigating the effects of global climate change. According to the Science Panel for the Amazon, the forest stores "more than 100 billion metric tons of carbon, roughly a decade's worth of global energy-related emissions." However, fires are destroying this important ecosystem while simultaneously emitting additional carbon into the environment, and deforestation puts the Amazon's importance at additional risk. Identifying risk areas and protecting the Amazon via informed public policy is crucial to preserving both the forest itself and ensuring the continued benefit it provides.

"We've tried to use the best from Azure to be able to scale this model. So instead of using one unique machine, we are now able to use a lot of machines in parallel."—Luis Braz, Microsoft Cloud Solution Architect

[Imazon's](#) Amazon monitoring program detects, quantifies, and monitors deforestation, forest degradation, logging, unofficial roads, and other forms of human impact in the Amazon. Mapping unofficial roads is an important tool in identifying deforestation risk; most deforestation originates within a 5-kilometer radius of

unofficial roads. Imazon was running this model at a smaller scale, and they were able to process their available images on that scale. But, as they work to be more granular and precise, the associated image processing requires much more computing power.



*Imazon workers monitoring deforestation
(Image courtesy Imazon)*

This is where Imazon engaged with the Microsoft AI for Earth team to explore opportunities for cloud computing and scalability. “There were a lot of issues around performance. It’s a big model and when the researchers developed the model, they didn’t think of the performance aspect. We’ve tried to use the best from Azure to be able to scale this model. So instead of using one unique machine, we are now able to use a lot of machines in parallel,” explains Microsoft Cloud Solution Architect Luis Braz.

The results of monitoring in the Amazon are combined with digital maps through geographic information systems (GIS) to identify environmental problems and improve regional planning. Lucia Rodrigues, Microsoft Philanthropies Lead, explains the process: “They are actually combining two models here, so one is statistical, which is the model that looks at many variables and tries to understand these variables’ dynamics. One of the variables that’s included in that model is the artificial intelligence piece, which comes from another model that’s processing the satellite images.”

PrevisIA brings an improved version of the risk model with updated data from roads and deforestation and statistics of different classes of territories most likely to be cleared of the forest. The AI model uses satellite imagery from the Planetary Computer, which provides images at 10-meter resolution every 10 days, to identify areas of the Brazilian Amazon that are at risk of deforestation, based on topography, land cover, and indicators of human settlement. “Imazon is already changing the model and trying to calibrate the model by making

“The great advance of this project was to democratize access to advanced information technology resources to facilitate the engagement of several users in the prevention and control of deforestation in the Amazon.”—Carlos Souza Jr., Associate Researcher, Imazon

some changes in the parameter. Every change has an impact in the performance of the model, so we are continuing to help them scale more and more," says Braz. All of this is only possible due to the capability of the Microsoft Azure cloud platform, which enables running these AI models to detect roads and generate statistics for forecasting deforestation.

The model runs when needed, not continuously, due to the massive processing power required. Because the objective of the reporting and tool is to provide information for governments and NGOs to be able to create policies that prevent deforestation, Imazon aligns their reporting to quarterly or semi-annual budget cycles. The goal is to use the reports to drive proactive policy change based on predictions, preventing deforestation and wildfire before it happens. The program also develops proposals for public policies and training in geotechnologies and strategically disseminates its results, contributing to the reduction of deforestation and forest degradation. Carlos Souza Jr., an associate researcher at Imazon, says, "The great advance of this project was to democratize access to advanced information technology resources to facilitate the engagement of several users in the prevention and control of deforestation in the Amazon."

About Imazon

Imazon (Institute of Man and Environment of the Amazon) is a Brazilian research organization whose work promotes conservation and sustainable development in the Amazon. The group promotes sustainable development models and produces a monthly [Deforestation Bulletin](#) to share independent transparent data on deforestation in the Amazon. They work with local communities, NGOs, and others to guide land use management practices.

Resources

Primary Contact

Imazon
imazon@imazon.org.br
+55 91 3182-4000

Websites

[Imazon](#)

Publications

Marcio Sales, Sytze de Bruin, Martin Herold, Phaedon Kyriakidis, Carlos Souza Jr. "A spatiotemporal geostatistical hurdle model approach for short-term deforestation prediction." *Spatial Statistics* Volume 21, Part A, August 2017, pages 304-318. <https://doi.org/10.1016/j.spasta.2017.06.003>

Documentation

Science Panel for the Amazon. "Science Panel for the Amazon: Statement to the UN Summit on Biodiversity." United Nations Sustainable Development Solutions Network. September 30, 2020.

<https://www.unsdsn.org/science-panel-for-the-amazon-statement-to-the-un-summit-on-biodiversity>