

# International Journal of **Biological and Natural Sciences**

## **APPLICATIONS OF ARTIFICIAL INTELLIGENCE (AI) IN THE CONSERVATION OF AMAZON BIODIVERSITY**

---

*Mariana Vedovato Zuffi*

Eseba: School of Basic Education at UFU  
Uberlândia-MG  
<http://lattes.cnpq.br/4070864876001069>

*Giovana Cunha Sales Veríssimo*

Eseba: School of Basic Education at UFU  
Uberlândia-MG  
<http://lattes.cnpq.br/2437476443293080>

*Taynara Altair Ribeiro Bernardes*

Uberlândia-MG  
<http://lattes.cnpq.br/6854109141883727>

*Ariane de Souza Siqueira*

Uberlândia-MG  
<http://lattes.cnpq.br/2776300653391044>

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



**ABSTRACT:** Biodiversity deals with the diversity of life in all existing ecosystems, performing important functions, and its loss can affect the maintenance of ecosystems and all forms of life. The Amazon is considered the center of biodiversity, having a quarter of the terrestrial species on the planet. In the year 2019, the number of fires increased significantly in the Amazon ecosystem, being the third year with the greatest focus recorded, some compromising actions for the loss of this ecosystem have also been deforestation and illegal hunting. The advancement of technologies has greatly facilitated information and problem solving, in this sense the hypothesis is that technologies such as Artificial Intelligence can help identify abnormalities in the Amazon and thus propose actions for its conservation. The present work had as data collection researches in the bibliography and digital media. For the development of the work, weekly meetings were held virtually where our doubts and advances were shared, at each meeting we evaluated the progress of the project and discussed the texts we were researching. To better represent the Amazonian biodiversity, four models were made, one for the Amazon ecosystem, one for fires, one for deforestation and finally one of planet Earth. Using digital technologies, different applications were listed, ranging from the identification of abnormalities to actions for the conservation of the Amazonian ecosystem.

**KEYWORDS:** Amazon, Biodiversity, Conservation, Intelligence.

## **INTRODUCTION AND JUSTIFICATION**

Biodiversity is a natural heritage of the Earth that performs important functions, and its loss can affect the maintenance of ecosystems and all forms of life. The advancement of digital technologies has facilitated communication,

obtaining information and solving problems, thus emerging technologies such as Artificial Intelligence (AI) are propagating strongly. The Amazon is considered a repository of biodiversity for all mankind, being important in sustaining various ecosystems, it is home to endemic species, endangered species and many species that are unknown. The region of this ecosystem is home to 40% of the world's tropical forest and 25% of terrestrial biodiversity, including aquatic species. In this sense, digital technologies such as Artificial Intelligence (AI) can be used with a focus on the preservation and protection of Amazonian biodiversity.

For the development of this research, the following specific objectives were established:

- Conduct research in the scientific literature on Amazonian biodiversity.
- Investigate, using digital media, such as Artificial Intelligence (AI) has been used to identify abnormalities, as well as the actions that are being taken for their conservation
- Make four models representing the Amazonian biodiversity.

## **LITERATURE REVIEW**

Biodiversity is about the diversity of life in all existing ecosystems, whether in the deepest ocean or on top of the highest mountains. The concept of biodiversity does not only refer to the number of existing organisms in a given location, but also to the genetic variety and ecological functions performed by different species.

The Amazon is one of the few remaining forest areas and is home to about a quarter of the planet's terrestrial species. This biodiversity is important for the whole world. ("The fundamental importance of Amazonian biodiversity to the world...") All species in this incredibly biodiverse system represent solutions to a set of biological challenges; can

have transformative potential and generate benefits for all humanity. (LOVEJOY, 2019).

The impacts of biodiversity loss not only affect natural ecosystems, but have also affected the world economy, reducing food security and facilitating greater contact with diseases. Climate change making it unpredictable and loss of livelihoods are also impacts related to biodiversity loss.

The Amazon, which has 60% of its area in Brazil, is the largest tropical forest in the world. (“What is the largest rainforest in the world?”) It is considered a great center of biodiversity, with many plants and animals that can only be found there. (SPRING, 2019). In this sense, there are technological means that help to identify fires in the Amazon, and thus propose actions for their conservation.

In this sense, the project is configured in an exploration of biodiversity, seeking to know the Amazonian ecosystem from the production of knowledge that will be able to subsidize society’s access to its importance.

## METHODOLOGY

The research had an exploratory character with a qualitative and quantitative approach. The procedures for data collection were based on research in the scientific literature on the Amazonian ecosystem.

Due to the moment of social isolation, in order to prepare and develop this work, our meetings took place weekly, virtually. We started our meetings in early April 2020.

For a better representation of the Amazon ecosystem, we created four models, one for the Amazon forest, one for fires, one for deforestation and finally one representing the planet Earth, emphasizing the location in the Amazon. The materials used to create the models were defined in collective meetings after experiments carried out individually. For the construction of the models we used the following materials: 3 cardboard boxes

for the base of the model; sticks; Inks in blue, yellow, white, orange, brown, black, red and green colors; Crepe paper in blue and filipino paper in blue; dishwashing pads; Plastic dolls and cars; Polystyrene; Cookie dough.

Different materials were used for the garments, first the three (Amazon forest, fires and deforestation) used cardboard boxes as a base.

Representing the Amazon rainforest, earthenware sponges were used to characterize the leaves, twigs as the base of the trees and moss-green paint to color the leaves, and blue crepe paper was used to represent the river.

In the model of the fires, showing the fire spreading through the forest, ornaments in red were reused, featuring burning leaves and sticks both standing and lying down, representing the trunks of the trees. Already at the base of the model, brown paint was used, indicating the post-burned forest and, in the blue paint, together with the brown, the river was also represented in the midst of the fires.

In the deforestation model, newspaper sheets and tape were used to make the tree stumps and roots. To color the base, the stumps, tree roots and pieces of cut branches imitating felled trunks, brown paint was used. In addition, we used small pieces of burnt charcoal mixed with paint again to simulate the burnings, and we included plastic dolls and a small truck to simulate the action of deforestation.

Finally, a model of planet Earth was made, highlighting the location of the Amazon rainforest. In this model, a styrofoam ball and biscuit dough were used in the following colors: blue highlighting the sea; green for the American continents and the Amazon rainforest, white for the continents of Antarctica and North Pole, and finally red, yellow, black and orange for the Asian, African, European and Oceania continents. Each continent was molded and placed in its real location and

added names for identification. Finally, a model of planet Earth was made, highlighting the location of the Amazon rainforest. In this model, a styrofoam ball and biscuit dough were used in the following colors: blue highlighting the sea; green for the American continents and the Amazon rainforest, white for the continents of Antarctica and North Pole, and finally red, yellow, black and orange for the Asian, African, European and Oceania continents. Each continent was molded and placed in its real location and added names for identification.

To investigate how artificial intelligence has been employed in the preservation of Amazonian biodiversity, we carried out a survey of scientific papers published in Brazilian news portals. After reading the articles, we list the main applications of AI in the Amazon ecosystem.

## RESULTS AND DISCUSSION

During the first two months of the research, we read different articles about the Amazon ecosystem and the causes of its loss. At each meeting, we shared different works in which the different causes were addressed. With the reading and collective discussion of the scientific works, we were able to learn about the ecosystem, its importance and the

recurring causes of its loss, based on this, we made four models to represent it. (Figure 1,2,3,4 and 5).

We read different articles that related Amazonian biodiversity to artificial intelligence (AI), which led us to group the use of AI in two applications: identification of abnormalities in the Amazon and actions to preserve the Amazon rainforest. The applications and projects were listed and inserted in the following table, which presents the main techniques developed for each type of AI application.

## CONCLUSIONS

Teamwork is complete! We achieved all the goals that were set. Due to the current moment we are living, we face many difficulties to get here because we had to learn how to work virtually, accessing applications, platforms and digital resources hitherto unknown to us.

When developing the research, we acquired many experiences, where each member of the group not only shared ideas but taught each other how to work as a team in the current situation we are in. From the development of the research, we hope that society will have access to the elaborated content and the other confections, providing a didactic resource for teaching.

## REFERENCES

LOVEJOY – Thomas – A importância da biodiversidade Amazônica para o mundo: uma entrevista com Thomas Lovejoy- Disponível em: <https://www.worldbank.org/pt/news/feature/2019/05/22/why-the-amazons-biodiversity-is-critical-for-the-globe> – acesso em: 23 jun. The Word Bank

SPRING – Jake – Porque os incêndios da Amazônia geraram uma crise no Brasil e no mundo? Disponível em: <https://exame.com/brasil/por-que-os-incendios-da-amazonia-geraram-uma-crise-no-brasil-e-no-mundo/> - Acesso em 25.05.2020.

LIMA – Karla – Estudantes criam do PA criam aplicativo que ajuda reflorestamento da Amazônia – Disponível em: <http://g1.globo.com/pa/santarem-regiao/noticia/2014/05/estudantes-do-pa-criam-aplicativo-que-ajuda-reflorestamento-da-amazonia.html> - Acesso em 14-04-2020

CAETANO – Rodrigo – Inteligência Artificial a favor da floresta – Disponível em: <https://www.istoedinheiro.com.br/inteligencia-artificial-a-favor-da-floresta/> - Acesso em 14-04-2020



**Figure 1.** Model of the Amazon Rainforest (Source: authors' archive)

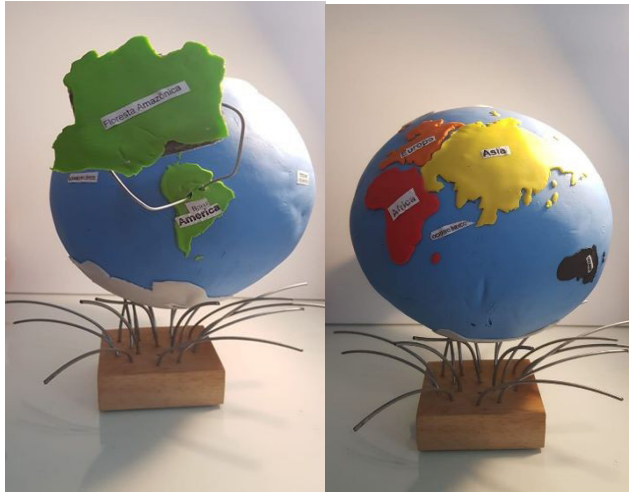


**Figure 2.** Model of the burnings (Source: authors' archive)



**Figure 3.** Deforestation model (Source: authors' archive)





**Figure 4 - 5.** Model of planet Earth (Source: authors' archive.)

<b>APPLICATION</b>
<b>Identification of anomalies in the Amazon (deforestation, fires, suspicious noises)</b>
<b>TECHNIQUES</b>
TensorFlow artificial intelligence platform, which uses old cell phones to detect chainsaw sounds or suspicious noises. With this, the devices positioned in the middle of the forest are able to alert the authorities that police the affected area(Used cell phones are strategically placed in trees to monitor noise in the woods).
Rainforest Connection foundation project, TensorFlow platform developed by Google.
<b>APLICAÇÃO</b>

<b>Actions for the preservation of the Amazon rainforest</b>
<b>TECHNIQUES</b>
The prototype of an application called GreenBaby allows users from all over the world to adopt trees that will be planted and cared for in the Extractive Reserve - (Resex Tapajós - Arapiuns). From the application it will be possible to contribute to the reforestation of the Amazon, preservation of native species and sustainable development. The user who adopts a tree will have to contribute an annual amount. Of the money raised, 60% will be destined for the residents of the Resex to maintain the trees and 40% for the project to invest in new technologies.
High school students, Sara Siufi, Larissa Miléo, Aléssia Pinheiro, Andressa Azevedo and Waykyru, under the coordination of the computer teacher, the master in electrical engineering Marialina Corrêa Nephew.

**Table 1.** Artificial Intelligence in the conservation of Amazon Biodiversity.

Source: G1 and Earth and Economy (2020).