AutoAI-Pandemics

Democratizing Machine Learning

Introduction

Infectious diseases, transmitted directly or indirectly, are among the **main causes of epidemics, or even pandemics.**

Despite recent achievements, **there are several open challenges** in predicting epidemic outbreaks, detecting variants, contact tracing, discovering new drugs, and fighting misinformation.

Artificial Intelligence (AI) can provide tools to deal with these scenarios, demonstrating promising results in the **fight against the COVID-19 pandemic.**

Challenge

Despite its broad application, **designing robust and reliable ML solutions often requires expertise not commonly found among researchers in biology and health**, leading to serious inequalities.

For example, **accessibility inequality** (this creates a disparity in who can use powerful tools, often disadvantaging those working in smaller institutions or regions with few resources)

Knowledge inequality (the complexity of ML algorithms and the skills required constitute a barrier, limiting the potential for innovative research).

Democratization

In this context, **democratizing AI** implies granting ML **accessibility to individuals who are not experts**, for example, individuals without training in data science, mathematics, or computer science.

Our Proposal

A platform, called AutoAI-Pandemics, with the following solutions:

1 — Automated epidemiological analysis
2 — Automated bioinformatics analysis
3 — Fighting misinformation/disinformation

Our Proposal

OBJECTIVES

1. To democratize access to Machine Learning (ML) techniques, allowing non-specialists to use them without the need for knowledge of programming, artificial intelligence, and other disciplines.

2. Computational tools (AutoAI-Pandemics); (ii) data analyses and syntheses; (iii) data reconciliation or integration of public datasets

3. To significantly reduce the experience needed to use ML pipelines

Democratizing AI Knowledge in LAC

ENGAGEMENT WITH UNDERREPRESENTED COMMUNITIES

SPECIAL SHORT COURSES

PUBLIC AWARENESS CAMPAIGNS IN AI

COLLABORATION WITH INDUSTRY

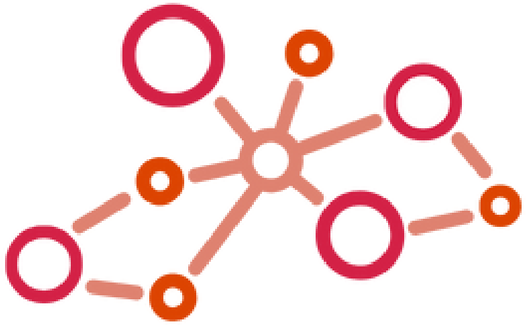
OPEN-SOURCE INITIATIVES

INTERNATIONAL COLLABORATION

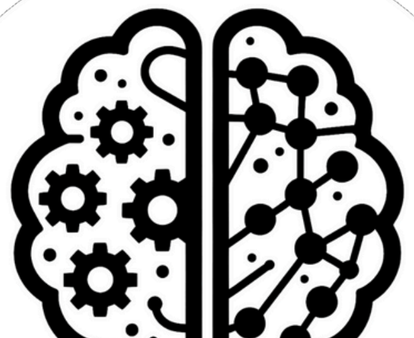
COMMUNITY-BASED DEVELOPMENT

Our Solutions

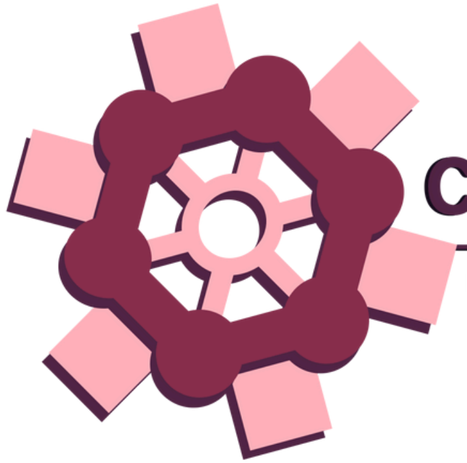
BioAutoML



BioPrediction



BioDeepFuse



ChemAutoML

Democratizing Cheminformatics

MathFeature

ITT- Is That True?

Main Contributions

Democratizing Access to Machine Learning:

- By making **AutoAI-Pandemics accessible to non-experts,** we address the significant accessibility and knowledge inequalities in the use of ML in biological research.

- Automating complex tasks such as **feature selection, algorithm recommendation, and hyperparameter tuning** reduces the time and expertise required to analyze biological sequences.

- This **increases scientific efficiency, accelerates discoveries, and can lead to significant advancements** in understanding and addressing critical biological and health issues.

Main Contributions

Promoting Inclusivity and Innovation:

- **AutoAI-Pandemics** can promote **broader inclusion of researchers from diverse backgrounds and resources**, strengthening global scientific and health efforts.
- This can lead to breakthroughs that directly **benefit society, the economy, and people's lives.**
- This signifies a shift from **exclusivity to accessibility,** making ML a shared resource for the collective improvement of science and society.

Our Impact

+21.000
Accesses to our solutions and articles

+10
Awards, Recognitions, and Grants

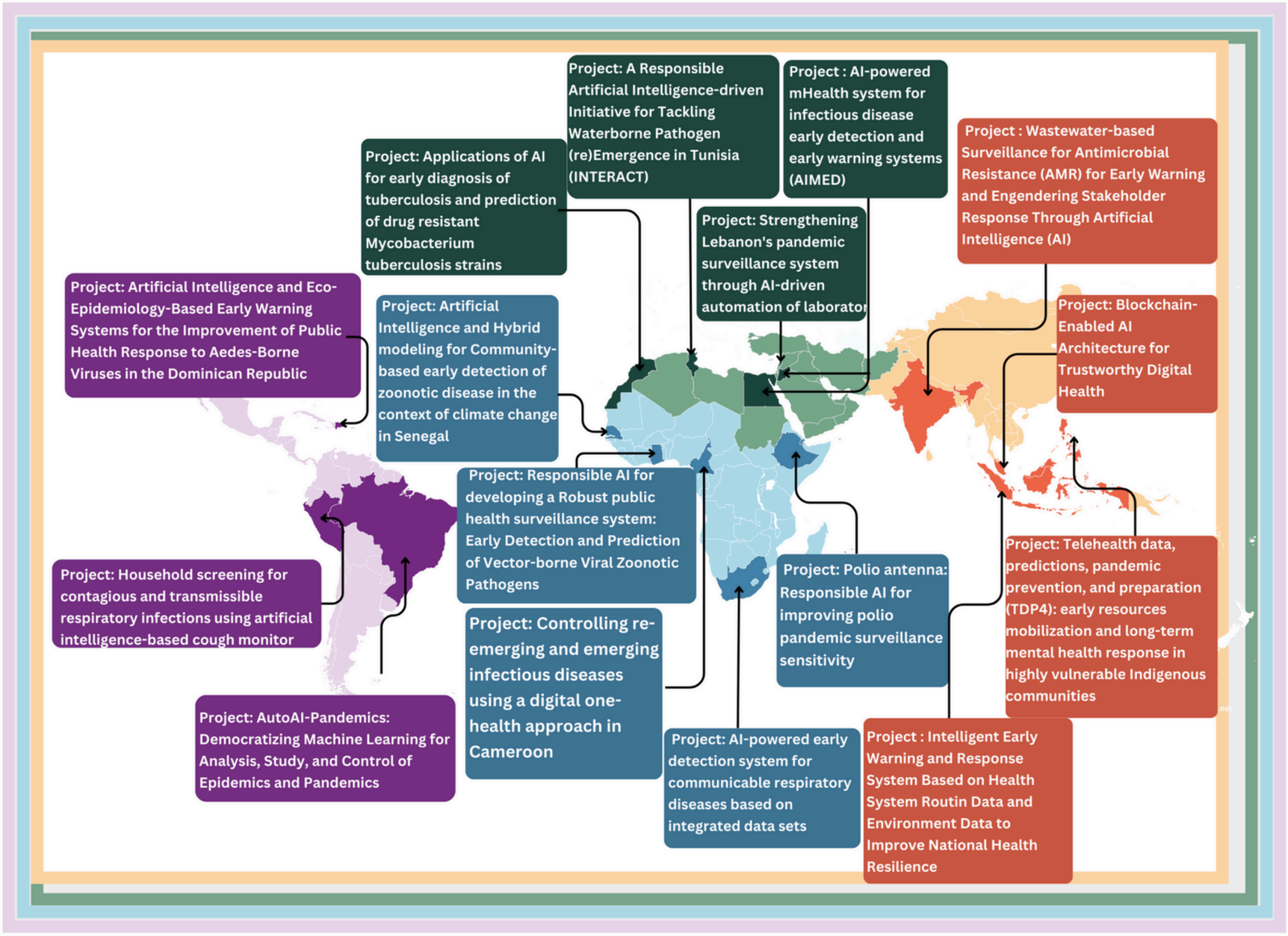
+148
citations in our articles

+123
Stars on GitHub

+50
news published in media

+100.000
People directly and indirectly impacted

Our Network


Project: A Responsible Artificial Intelligence-driven Initiative for Tackling Waterborne Pathogen (re)Emergence in Tunisia (INTERACT)
Project : AI-powered mHealth system for infectious disease early detection and early warning systems (AIMED)
Project : Wastewater-based Surveillance for Antimicrobial Resistance (AMR) for Early Warning and Engendering Stakeholder Response Through Artificial Intelligence (AI)
Project: Applications of AI for early diagnosis of tuberculosis and prediction of drug resistant Mycobacterium tuberculosis strains
Project: Strengthening Lebanon's pandemic surveillance system through AI-driven automation of laborator
Project: Artificial Intelligence and Eco-Epidemiology-Based Early Warning Systems for the Improvement of Public Health Response to Aedes-Borne Viruses in the Dominican Republic
Project: Artificial Intelligence and Hybrid modeling for Community-based early detection of zoonotic disease in the context of climate change in Senegal
Project: Blockchain-Enabled AI Architecture for Trustworthy Digital Health
Project: Responsible AI for developing a Robust public health surveillance system: Early Detection and Prediction of Vector-borne Viral Zoonotic Pathogens
Project: Household screening for contagious and transmissible respiratory infections using artificial intelligence-based cough monitor
Project: Polio antenna: Responsible AI for improving polio pandemic surveillance sensitivity
Project: Telehealth data, predictions, pandemic prevention, and preparation (TDP4): early resources mobilization and long-term mental health response in highly vulnerable Indigenous communities
Project: Controlling re-emerging and emerging infectious diseases using a digital one-health approach in Cameroon
Project: AutoAI-Pandemics: Democratizing Machine Learning for Analysis, Study, and Control of Epidemics and Pandemics
Project: AI-powered early detection system for communicable respiratory diseases based on integrated data sets
Project : Intelligent Early Warning and Response System Based on Health System Routin Data and Environment Data to Improve National Health Resilience

Main Recognitions

Google Latin America Research Awards (LARA): Our solution (BioAutoML) was selected by LARA-Google as one of the 24 most promising ideas in Latin America (24 awarded projects, from a pool of 700 entries);

AutoAI-Pandemics (Democratizing ML for Non-Experts, 2023), was selected as one of the most promising projects among a total of 221 proposals from 47 countries in a global competition organized by the AI4PEP, **securing funding of 362,500 Canadian dollars;**

Our solution, BioPrediction, was selected to participate in **Prototypes for Humanity 2023, during COP28-Dubai**, chosen from 3000 entries from over 100 countries, standing out among the 100 best.

Winning Team (Advisor), **1st place, "Breaking the Wall of Fake News", Falling Walls Lab Brazil 2023,** DWIH São Paulo, Falling Walls Foundation, DAAD, The German Center for Research and Innovation.

Our Team











Acknowledgments

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ICMC USP SÃO CARLOS

GLOBAL SOUTH AI4PEP NETWORK · SUD GLOBAL RESEAU AI4PEP

IDRC · CRDI
International Development Research Centre
Centre de recherches pour le développement international

Canada

UFZ HELMHOLTZ Centre for Environmental Research

Thank You