

OcéanIA IJCAI 2022 Challenge

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AI methods for determining ocean ecosystems from space: Combining genomic information, microscopic and satellite imagery

An IJCAI-ECAI 2022 Challenge

It is our distinct pleasure to invite you to the Challenge **AI methods for determining ocean ecosystems from space: Combining genomic information, microscopic and satellite imagery** to be held in conjunction with the **31st International Joint Conference on Artificial Intelligence and the 25th European Conference on Artificial Intelligence (IJCAI-ECAI-2022)** on July 23-29, 2022, in Messe Wien, Vienna, Austria.

Context

The ocean is the Earth's principal climate regulator and the main responsible for sequestering carbon dioxide (CO₂). This makes it our main defense against climate change, but climate change itself is destroying the healing capacity of the ocean. Algae and, in particular, plankton, play a fundamental role in this, as they are able to remove CO₂. Therefore, the mitigating capacity of an ecosystem can be established based on the presence of particular types of plankton. However, the health of the larger areas of the ocean can only be determined through large-scale measurements such as satellite imagery.

The challenge focuses on the remote identification via satellite imagery of high-potential ecosystems. This would allow large tracts of the ocean to be analyzed in a way that allows scientists and decision makers to understand how the ocean evolves over time and could be used to create policies for protecting high-value parts of the ocean. Alternatively, we propose to study the use of marker species, such as whales, which can be identified and their presence implies the existence of others.

This is an opportunity to attract the AI/ML community to this type of scientifically challenging and high-impact problem. For this we will make available to participants curated georeferenced datasets of plankton images, genomic data and satellite images and provide mentorship during the period of the challenge. It falls under the activities of Inria Project OcéanIA.

Goals

We propose to determine the variation of plankton species —i.e. ecosystems— inhabiting a given area of the ocean by cross-referencing genomic data, plankton microscope imaging and satellite images. This calls for the combined application of methods like:

- causal inference,
- explainable AI,
- computer vision neural networks: representation learning, self-supervision, out of distribution detection,
- ML methods for “small data contexts” like zero-shot/few-shot learning, and active learning, among others,
- associative rule learning, and
- domain adaptation and transfer learning, to mention a few.

Participation guide

The challenge will take place from **20 April 2022** to **29 July 2022**. Teams can join the challenge at any time, but we suggest you that you do it as early as possible.

The challenge is organized in two phases:

- **Phase I:** where participants work on a solution proposal and plan.
 - At the end of this phase, participants must submit a short paper (max. 2 pages excl. references) and (optionally) supplementary code.
 - Submitted proposals are evaluated, and selected ones are invited to take part of the phase II.
- **Phase II:** where participants work on their challenge solutions.
 - At the end of this phase, participants should submit a full paper (max. 6 pages excl. references) and make available the supplementary code under an OSI approved license (i.e. MIT, Apache, etc.).

Datasets available to challenge participants

- We have compiled a data access guide for challenge participants that describes data sets here: <https://github.com/Inria-Chile/awesome-ocean-ai-data>
- Note that is guide will probably be improved as the challenge unfolds.
- Feel free to contribute to the guide. See <https://github.com/Inria-Chile/awesome-ocean-ai-data/blob/main/CONTRIBUTING.md> for instructions.
- **Bring your own data:** we encourage participants to make available additional datasets. Share them under an open license and follow the contribution instructions above to add them to the guide.

Getting involved

- **Join the mailing list:** If you are interested to take part of the challenge, please let us know by filling up this form.
- **Join out discord server** to get support, collaborate and exchange with other participants.
- **Follow Inria Chile on Twitter** to for more news and updates.

Paper preparation instructions Papers must be written in English and in PDF format according to the IJCAI-ECAI'22 style. All submitted papers will be under a single-blinded peer review for their novelty, technical quality and impact. The submissions can contain author details. See below for submission link.

Source code instructions The challenge will help bring recent state-of-the-art AI/ML methods to tackle complex and high-impact problems that have a potential for global impact. Experts on this field have limited access and operational knowledge on how to use these advanced methods. Consequently, we will pay extra attention and involve participants in order to make their code contributions available in a form as usable as possible by non-AI/ML experts.

- During the unfolding of the challenge source code availability (open source or private) will be left to the decision of the participants.
- Derived and/or intermediate datasets that we consider of value will also be made freely available.
- Upon acceptance, participants code should be made available online under an open-source friendly license, in particular it should be an OSI approved license.
- We encourage participants to make their source code as easy to use as possible by providing installation scripts, instructions, etc.

Timeline of participation

- **Start of challenge (20 April 2022).**
 - Call for participation (this document), link <https://oceania.inria.cl/#ai-ocean-challenge-2022>, download as .pdf or as .txt.
 - Data access guide: <https://github.com/Inria-Chile/awesome-ocean-ai-data>.
- **Phase I. Solution proposal preparation (20 April – 7 June 2022).**
 - During this phase participants work on the conception of their solutions.
 - Participants are encouraged to interact via email or discord with organizers and other participants.
- **Submission of proposals (7 June 2022, UTC-12).** Proposal submissions must include:
 - **Short paper (max 2 pages excluding references)** with the proposed solution, potential impact, planning, etc., and

- **Code repo (optional)** link to code repository (i.e. GitHub, GitLab, etc.) with supplementary code. This code does not need to be public, but in that case organizers should have access granted to it.
- CMT submission site: <https://cmt3.research.microsoft.com/IJCAIOceanIAIChallenge2022>
- **Notification of proposal acceptance (14 June 2022).**
 - Challenge organizers will communicate which proposals will be accepted into Phase II.
- **Phase II. Construction of final solution (15 June – 15 July 2022).**
 - During this phase accepted participants will work towards the solution to be presented in the challenge session at IJCAI-ECAI'22.
- **Submission of final solutions (16 July 2022, UTC-12):** Final solution submissions must include:
 - **Full paper (max. 6 pages excluding references)** describing the solution, experiences, results, impacts and outlook, and
 - **Code repo:** link to code repository (i.e. GitHub, GitLab, etc.) where code is made publicly available under an OSI approved license.
 - CMT submission site: <https://cmt3.research.microsoft.com/IJCAIOceanIAIChallenge2022>
- **Challenge session and awards at IJCAI-ECAI'22 (July 22-29, 2022):** Participants will present their solutions in an in-person session in the conference. Only participants registered at IJCAI-ECAI'22 will be able to take part of the session.

Awards

We will provide small ocean-related gifts and cloud compute to the best contributions. Stay tuned for more details.

Publications and Post-proceedings

Dissemination is very important for the goals of the challenge. We will publish a non-archival proceedings booklet with the contributions and the main experiences gained during the challenge. Therefore, both the peer-review post volume and the challenge paper describing the results, experiences and lessons learned are interesting for us.

Organizers

- **Nayat Sánchez-Pi**, Inria Chile Research Center.
- **Luis Martí**, Inria Chile Research Center.

Scientific committee

- **José Manuel Molina**, Universidad Carlos III de Madrid,
- **Pablo Marquet**, Pontificia Universidad Católica de Chile.
- **Julien Salomon**, ANGE, Inria Paris,
- **Jacques Sainte-Marie**, ANGE, Inria Paris,
- **Olivier Bernard**, BIOCORE, Inria Sophia-Antipolis,
- **Michèle Sebag**, TAU, Inria Saclay,
- **Marc Schoenauer**, TAU, Inria Saclay,
- **Alejandro Maass**, Center of Mathematical Modeling (CMM), Universidad de Chile,
- **Pablo Marquet**, Pontificia Universidad Católica de Chile (PUC),
- **André Abreu**, Fondation TARA Océan,
- **Ana Cristina Garcia Bicharra**, Unirio - Federal University of Rio de Janeiro State,
- **Hernán Lira**, Inria Chile Research Center,
- **Hugo Carrillo Lincopi**, Inria Chile Research Center,
- **Leandro Fernandes**, Universidade Federal Fluminense,
- **Roberto Santana**, University of the Basque Country (UPV/EHU),
- **Colomban De Vargas**, GO-SEE CNRS Federation, and
- **Damien Eveillard**, ComBi, Université de Nantes.

Sponsorship

We are actively seeking support for different organizations. If you are interested to sponsor this challenge do not hesitate to contact us.

Diversity commitment

We will actively seek diversity in all aspects: schools of thought, theoretical backgrounds, nationalities, stages in the academic career, gender, etc. We will take an affirmative action to ensure that by disseminating the call for papers in diverse communities and offer a mentorship and assistance to help underrepresented and cross-disciplinary participants.