ITU GeoAI Challenge 2024

Participation guidelines (version 10; 8 July 2024)

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1 Executive Summary

The ITU GeoAI Challenge rallies like-minded students and professionals from around the globe to solve real-world geospatial problems by applying artificial intelligence (AI) / machine learning (ML) to advance the United Nations Sustainable Development Goals (SDGs).

- **Problem statements** are provided by hosts. A host in general is a university, a company, or an organization. Problem statements can be found here: https://aiforgood.itu.int/about-ai-for-good/geoai-challenge/
- **Global reach**: The GeoAI Challenge, now in its third edition, builds on the experience of the AI/ML in 5G Challenge, conducted since 2020. The 2nd edition (2023) of the GeoAI Challenge had more than 1500 participants from over 60 countries.
- **Timeframe:** The GeoAI consists of the following stages:
    - Curation Phase: February - June 2024
    - Competition Phase: July - October 2024
    - Evaluation Phase [Challenge Finale] November - December 2024
- **Teams** comprising 1 to 4 members solve problem statements. Teams will be required to enable, create, train, and deploy ML models such that participants will acquire hands-on experience in AI/ML in areas relevant to advancing the SDGs.
- **Participation** is open to any individual from one of the 193 Member States of the ITU. No membership in ITU or any other organization is required.
- All participants must adhere to a **code of conduct**.
- **Motivation of participants**: Teams compete for prizes, global recognition and ITU certificates. They value the opportunities to learn, to publish their findings in per-reviewed journals (see below), to network with other colleagues, and to find employment opportunities and internships.
- **Compute platform:** ITU provides a state-of-the-art, free-of-charge compute platform to participants of the Challenge who do not have adequate access to compute in their respective institutions. The compute platform will provide participants with access to:
    - Free GPUs and CPUs
    - Jupyter and Colab notebooks
    - Python kernel
    - Pre-installed machine learning packages, e.g. PyTorch and Tensorflow
- **Mentoring**: Several activities accompany the Challenge such as webinars, roundtables, and hands-on sessions. The GeoAI Discovery Channel features related events (https://aiforgood.itu.int/eventcat/discovery-geoai/), all available for replay. The host will mentor the participants answering their questions on Zindi and/or fixing meetings with them.
- **Prizes and certificates:**
    - The best team for each of the problem statements will receive a cash prize of 500 CHF. The 2nd winner receives 300 CHF, the 3rd winner 200 CHF. Not every problem statement may necessarily have a winner if the quality of the solution does not satisfy the judging criteria. The Challenge Management Board may also decide to split the prize(s).

    - Various types of certificates will be issued to teams who submitted valid solutions.
- All events take place **online**.
- Participants are encouraged to submit **open-source solutions**. Besides the solution, participants MUST submit a report where they explain the models and procedures adopted. The report is subjected to evaluation as well as the solution. Good solutions not well documented will not be awarded.
- **IPRs (Intellectual Property Rights)** belong to the submitter of the solutions.
- **Publish**: The best peer-reviewed submissions have the possibility of being published in special issues of the peer-reviewed ITU Journal, which is free-of-charge for both readers and authors.
- **Sponsorship**: For sponsorship inquiries, please reach out to https://aiforgood.itu.int/sponsor/.

2 Participation

Participation is open to any individual from one of the 193 Member States of the ITU. No membership in ITU or any other organization is required.

"Participants" are individuals or teams that participate in the ITU GeoAI Challenge, providing solutions to problem statements of the Challenge.

Participants can form teams comprising 1-4 members. Experts will mentor participants on problems, providing guidance and good practices for participation in this Challenge.

3 Problem statements

3.1 Problem statements

Participants will be able to solve real-world problems, with access to real-world data. Teams will be required to enable, create, train and/or deploy ML models such that participants will acquire hands-on experience in AI/ML in areas relevant to solving the United Nations Sustainable Development Goals.

The host is the entity that defines and provides the problem statement including data. The host can be a university or a company (e.g. an equipment manufacturer, a geospatial company, a telecom operator, or others). Participants are required to pick one or more of the problem statements they are interested to work on.

3.2 Data privacy policy

Data will be handled in accordance with policies and regulations relevant to the entities and data concerned. Data may be pre-processed and provided using pre-published APIs, and may be secured using login/token. Data anonymization may be applied according to relevant policies and regulations. A non-disclosure agreement (NDA) may be included in the terms of participation. In cases where the Challenge involves local user data, the results may be presented in the form of a competition paper not including local user data. API access to data shall be monitored and licensed based on agreement. Some test data set may be private and will not be disclosed.

Some problem statements use "**restricted data**" which is available only under certain conditions set forth by the host.

3.3 Training and Testing Data

Training and validation data will be generally provided by the host or – in some specific cases– are easily derivable from the provided satellite images.. Detailed explanation will be provided by the host in the competition page.

Data will be hosted in the Zindi platform.

4 Phases and Governance Structure

4.1 Three Phases

The Challenge consist of three phases:

- Curation Phase: February – June 2024
- Competition Phase: July – October 2024
- Evaluation Phase [Challenge Finale]: November – December 2024

4.2 Governance Structure

4.2.1 Challenge Management Board

The Challenge Management Board (CMB) comprises representatives of the host with the expertise to advise on technical and governance aspects of the ITU GeoAI Challenge. The Challenge Management Board is active during the competition, the evaluation and the Challenge Finale.

The Challenge Management Board coordinates the different phases, working together to ensure the success of the Challenge.

4.2.2 Administrative support of the Challenge

The ITU Secretariat provides administrative support for the ITU GeoAI Challenge, in collaboration with the hosts, collaborators, participants and the Challenge Management Board

5 Phase 1: Curation Phase

The table below is the template that is used for the submission of problem statements for the ITU GeoAI Challenge.

Table 1: The template for a problem statement

Id	ITU-GeoAI-PS-TEMPLATE
Title	Please do not modify this particular table, this serves as a template
Description	NOTE 1 - include a brief overview followed by a description about the problem, its importance to geospatial analysis and the United Nations Sustainable Development Goals, highlight any specific research or industry problem under consideration.
Evaluation criteria	NOTE 3 - this should include the expected submission format e.g. video, comma separated value (CSV) file, etc. NOTE 4 - this should include any currently available benchmarks. e.g. accuracy.

Data source	NOTE 5 - e.g. description of private data which may be available only under certain conditions to certain participants, pointers to open data, pointers to simulated data.
Resources	NOTE 6 - e.g. notebooks, reference implementations, github repos, simulators, APIs, lab setups, tools, algorithms, add a link in clause 2.
Any controls or restrictions	NOTE 7 - e.g. this problem statement is open only to students or academia, data is under export control, employees of XYZ corporation cannot participate in this problem statement, any other rules applicable for this problem, specific IPR conditions, etc.
Specification/Paper reference	NOTE 8 - e.g. arxiv link, ITU link to specifications, etc.
Contact	NOTE 9- email id or social media contact of the person who can answer questions about this problem statement.

6 Phase 2: Competition Phase

6.1 Participant Registration

The participants registered for the ITU GeoAI Challenge will choose one or more problem statements, depending on their interests, and provide solutions to the problem statement(s).

Participants register in the Zindi platform.

Participants should start tackling the problem statement as soon as registrations open and submit solutions during the competition phase.

6.2 Guidance and Mentoring

Hosts of problem statements may provide baseline code/models as a starting point for participants. In some cases, Jupyter notebooks and Colab notebooks will be provided. During the competition phase, ITU in conjunction with hosts will hold webinars to describe the problem statement.

The hosts will present their problem statement as part of the ITU GeoAI Webinar series, a curated series of expert talks on GeoAI. The talks are recorded and available for replay (https://aiforgood.itu.int/eventcat/discovery-geoai). Besides that, the host will mentor the participants answering their questions on Zindi and/or fixing meetings with them.

6.3 ITU Challenge Compute Platform

ITU has put together a state-of-the-art compute platform hosted on its Geneva premises. The compute platform is provided free-of charge to registered participants of the Challenge who lack adequate compute resources. The resources will be provided on a need basis. The compute platform will provide participants with access to:

I. Free GPUs and CPUs

II. Jupyter and Colab Notebooks

III. Python Kernel

IV. Pre-installed machine learning packages, e.g. PyTorch and Tensorflow

To allow fair access to the ITU Challenge compute platform for all participants with needs, access will be time-limited. Participants must use the ITU Compute Platform only for the purposes of the Challenge.

Participants are asked to fill out the request form available on the website of the ITU GeoAI Challenge.

7 Phase 3: Evaluation Phase

7.1 Judgement criteria

The host lays out the evaluation criteria in the formulation of the problem statement. The solutions submitted will be judged on objective and/or subjective criteria according to the host choice. In general, the host could consider including the following points for evaluating solutions:

- Novelty & originality.
- Performance (evaluation based on performance measures such as accuracy, speed, scalability and quality).
- Resource needs (memory, CPU, size or others), evaluated with respect to the design criteria
- Status and maturity of technical implementation, reproducibility.
- Robustness under failure conditions
- Viability & impact on market (practicality of the solution and significance of its impact).
- Ease of integration (e.g. via standard APIs, containers etc.)
- Interoperability and mapping to international standards, as appropriate.
- Evaluation of the technical report by experts (humans)
- Documentation.
- Quality of demonstration and presentation at the Challenge Finale, if required.
- Classification accuracy (e.g. accuracy, precision, recall, F1 scores) calculated by validation samples
- Explainability: ease-of-explanation and transparency of your model
- Map visual evaluation by experts

For the exact metrics to be used, please see the problem statement.

7.2 Advancing to the Challenge Finale

The best teams of each of the problem statements will be invited to present their solutions in the Challenge Finale which will be organized for each of the problem statements. The awards will be handed out at the respective Challenge Finale.

Participants are required to submit an informative and complete report explaining the adopted models, methods and procedures. In addition they may be requested to provide the following additional information:

- A docker image which contains all dependencies and environments required for the algorithm to run, to insure reproducibility.
- ReadMe file containing the description of the algorithm.
- Minimum system configuration required to run the algorithm.
- Details of any data used to train the model (metadata).
- Test cases and results demonstrating the benefits of the solution.

7.2.1 Additional output for open source submissions:

- Final version of the code.

Wherever applicable, outcomes of the Challenge will be encouraged to be shared in an open forum as an open-source project.

7.2.2 Additional output for proprietary code (not open source) submissions

Participants are expected to provide the License statement.

7.3 Prizes

The following prizes will be awarded:

- **Prize per problem statement**: The winner of each problem statement will receive a cash prize of 500 CHF. The second and the third classified teams will receive 300 CHF and 200 CHF, respectively. Not every problem statement may necessarily have a winner if the quality of the solution does not satisfy the judging criteria. The Challenge Management Board may also decide to split the prize(s).
- The respective host of a problem statement may hand out additional prizes.

There may be additional prize categories as determined by the Challenge Management Board.

7.4 Certificates

ITU may issue various categories of certificates such as:

- Winners and participants of Challenge Finale
- Certificate of participation (for teams who submitted a valid solution but were not among the top teams)

Below are the cerificates of the winners of 2023 GeoAI Challenge on Crop Mapping.

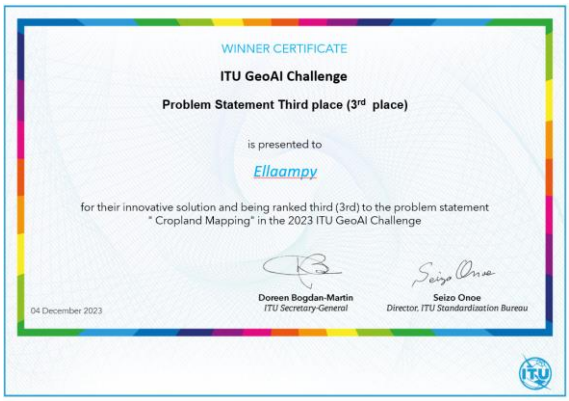

Figure 2: Winners of the ITU GeoAI Crop Mapping Challenge2023

8 Open source and IPR

8.1 Open Source

The Challenge encourages the submission of open-source implementations. Open-source implementations will enable a broad range of stakeholders to access the outcomes of the Challenge and continue collaborating with relevant Challenge participants.

However, solutions based on proprietary implementations may also be accepted based on conditions in the problem statement.

8.2 Quality of Submissions and intellectual property rights

Submissions must be original unpublished works that are not currently under review by another contest or journal and must be solely owned by the participant. In addition, submissions must not: (a) violate the intellectual property rights of third parties; (b) be illegal under applicable national laws and international law; and (c) depict or incite hatred, defame, abuse, harass, stalk, threaten a specific person or social group, incite violence or conflict or otherwise violate the legal rights of third parties (including those of privacy and publicity).

Participants will retain the intellectual property rights on the contents of their submissions. However, each participant grants ITU a limited, non-exclusive, global royalty-free right and license to use, reproduce, communicate, demonstrate, make available for public display, and distribute the contents of his/her submission for ITU's and the Challenge's informational and educational or awareness purposes, via digital or other means, including ITU's website. The participant hereby represents that he/she has the legal right to grant such license to ITU.

By entering the Challenge, each participant agrees to release and hold harmless ITU from and against all claims, expenses, and liability, including but not limited to negligence and damages of any kind to persons and property, infringement of trademark, copyright or other intellectual property rights arising out of or relating to their participation in the Challenge and the contents of their submissions.

9 Code of Conduct

All participants must adhere to the following code of conduct:

1. Participants will treat each other, other teams and participants with respect, professionalism, fairness, and sensitivity to our many differences and strengths.
2. All discussions will be courteous. Participants must not accept or engage in abusive behaviour in any form, whether it is verbal, physical, sexual, or implied.
3. We value giving credit when credit is due. Participants must only take credit for their own original work. Where required, participants shall add citations and give credits to others. Plagiarism will result in immediate disqualification from the Challenge.
4. Judges' decisions will be final.

10 Sponsorship

A sponsorship package at the Diamond, Gold, Silver and Supporter level is available. For sponsorship inquiries, please reach out to https://aiforgood.itu.int/sponsor/.

11 Benefits

11.1 Benefits for partners

The Challenge offers partners the following (see sponsorship package for details):

- Visibility throughout the year
- Find global talent
- Find innovative solutions to your GeoAI use cases.

11.2 Benefits for participants

- Shape the future: Opportunity to define, provide inputs and shape the technologies related to GeoAI.
- Create your network: Network with experts and peers.
- Be practical: Platform to gain hands-on experience related to GeoAI.
- Be known: Gain global recognition in the form of prizes, appreciation, and publications of the results in the ITU News Magazine and ITU Journal on Future and Evolving Technologies (ITU J-FET https://www.itu.int/en/journal/j-fet), subject to acceptance.
- Realize your dreams: Receive support to implement use cases and technology ideas using software and access to platforms, e.g. cloud credits and licenses.
- Employment and internship opportunities.
- Free (hosted) access to AI/ML platforms and GPUs.

11.3 Special Benefits for certain sponsor categories

- Brand visibility on ITU's AI for Good platform for the duration of 12 months, supported by 40 United Nations organizations; GeoAI webinar series, weekly newsletters; promotion campaigns (see sponsorship package for details)
- Program opportunities
- Media opportunities

AIIA (Artificial Intelligence Industry Association, China) and Jarvislabs.ai (India) are technical partners.

12 Contact

Email: GeoAI-Challenge@itu.int

Websites:

- AI for Good: https://aiforgood.itu.int/
- GeoAI Discovery channel: https://aiforgood.itu.int/about-ai-for-good/discovery/ -> past and future sessions: https://aiforgood.itu.int/eventcat/discovery-geoai/
- GeoAI Challenge: https://aiforgood.itu.int/about-ai-for-good/geoai-challenge/
- Registration page for GeoAI Challenge: from “GeoAI Challenge” website