Using AI and ML to support marine science research

An overview of iMagine

Peter Thijsse – MARIS (NL)

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iMagine The background

Marine environmental management and implementing ocean restoration initiatives require more knowledge and understanding

In Europe, we spent circa 1.4 Billion Euro a year in marine data acquisition (1.0 BE in-situ; 0.4 BE remote sensing)

Europe already has developed an impressive capability for aquatic environmental observation, data-handling and sharing, modelling and forecasting.

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Artificial intelligence
Machine learning

From DATA to KNOWLEDGE

Specific Objectives and indicators

O1

Objective 1. Deliver a scalable, shared IT platform for image analysis in marine and freshwater research

Operational iMagine platform with common AI development framework from TRL 7 to 9

O2

Objective 2. Advance existing image analytical services to increase research performance in aquatic sciences

Launch of 5 aquatic AI image services, running operationally at the iMagine platform

O3

Objective 3. Develop & prototype new image analytical services and datasets that can accelerate progress towards healthy oceans, seas, coastal and inland waters

Set of AIS-based imaging processing services of relevance to research for healthy oceans, seas, coastal and inland waters

O4

Objective 4. Capture and disseminate development and operational best practices to imaging data and image analysis service providers

Best Practices documentation, interaction with EOSC and AI4EU platforms. Training programme

O5

Objective 5. Deliver a portfolio of scientific image and image analytics services targeting researchers in marine and aquatic sciences

Portfolio: operational services, image repositories, Best Practices, iMagine framework and platform

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Enabling scalable AI/ML services

5 AI/ML technology development institutes (*LIP, CSIC, IISAS, KIT, UPV*)

12 research infrastructures supporting use cases

4 national cloud compute centres (*TUBITAK, CSIC, INCD, Walton*)

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Services with Virtual Access

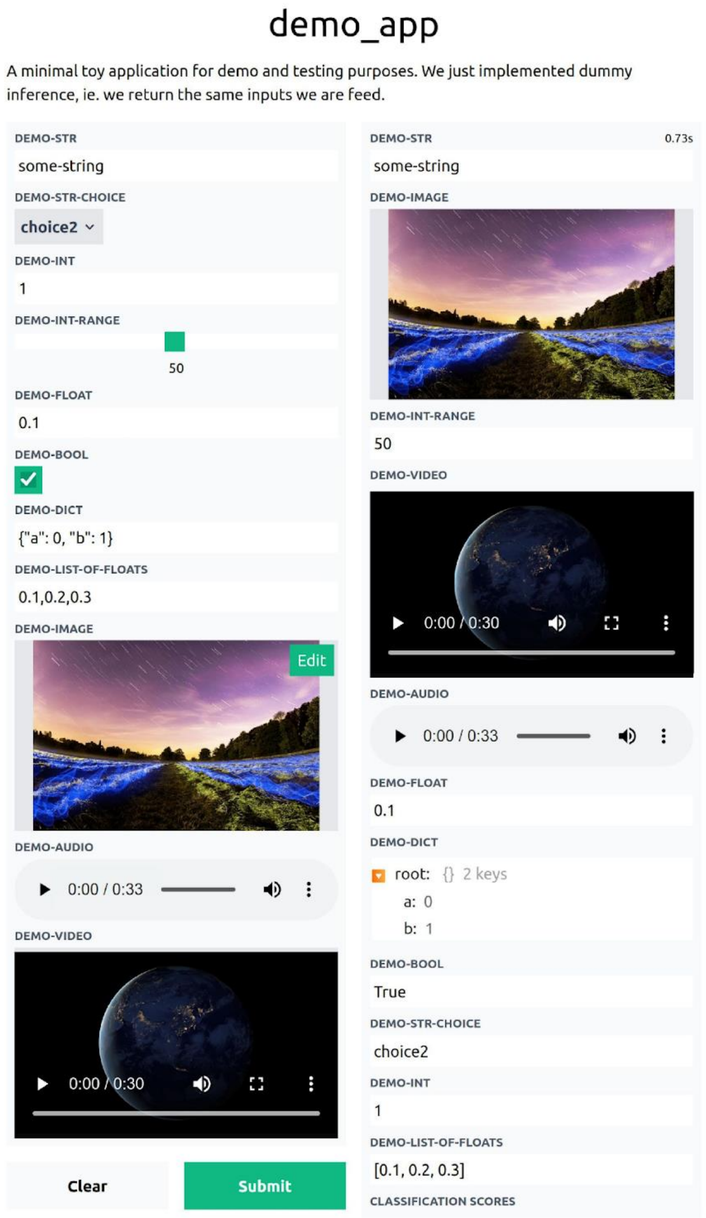
- Aquatic Litter Drones: Aquatic Litter monitoring system using drones
- Zooscan – EcoTaxa pipeline: Taxonomic identification of zooplankton using Zooscan
- Ecosystem monitoring at EMSO sites by video imagery
- Oil Spill Detection: Oil spill detection from satellite images
- Flowcam phytoplankton identification: Taxonomic identification of phytoplankton using Flowcam images

Validated application prototypes

- Underwater Noise Identification: Underwater noise identification from acoustic recordings using spectrograms
- Beach Monitoring: Posidonia oceanica berms and rip-currents detection from video monitoring systems
- Freshwater diatoms identification: Identification of freshwater diatoms using microscopic images

iMagine AI platform

- Based on DEEP Platform
  - Imaging use cases to exploit it to develop AI/ML/DL applications
  - Exploitation of resources from EGI Federated Cloud sites → onboarding of new providers
  - Transparent access to accelerators
  - Integration with training and inference APIs
- Evolution of DEEPaaS towards on-premises deployments (i.e. self-hosted) and automated deployment of imaging services
- Enhancements on DEEPaaS API as required by user communities
  - E.g. adoption of community standards for inference
  - Integration with friendly web user interfaces, with special focus on images



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