

# GI\_Salzburg22

## Special Forum on Hybrid AI

GI\_Studio 6th July 2022 9:00 – 10:15 and 11:00 – 12:15

## Programme

Forum D20: "Hybrid AI Part 1: State of the Art", GI\_Studio, 6<sup>th</sup> July 2022, 9:00 – 10:15

Assoc. Prof. Stefan Lang, Head of Christian Doppler Laboratory **GEOHUM**, Paris-Lodron-University of Salzburg, Austria

*Why a session on Hybrid AI? Complementary research approaches in machine learning and the need for a common language to bridge between research domains and user domains*

Dr. Devendra Singh Dhama, Independent Research Group Leader and Post Doctoral Researcher, **hessian.AI** and **AIML Lab**, TU Darmstadt, Germany

*Hybrid AI: The Way Forward with Applications to Satellite Data*

Nicolas Longépé, Earth Observation Data Scientist

**ESA Φ-lab**, Frascati, Italy

*R&D on hybrid AI in remote sensing at the ESA Φ-lab (online)*

Dr. Omid Ghorbanzadeh, Postdoctoral Researcher in the AI4RS group at **IARAI** (Institute of Advanced Research in Artificial Intelligence), Vienna, Austria

*Multitemporal EO data analysis, coupling OBIA with DL models*

Forum D22: "Hybrid AI Part 2: Defining a Data Challenge"

GI\_Studio, 6<sup>th</sup> July 2022, 11:00 – 12:15

Dr. Yonghao Xu, Postdoctoral Researcher in the AI4RS group at **IARAI** (Institute of Advanced Research in Artificial Intelligence), Vienna, Austria

*Universal Adversarial Examples in Remote Sensing: Methodology and Benchmark (online)*

Yunya Gao, Getachew Workineh, Christian Doppler Laboratory **GEOHUM**, Paris-Lodron-University of Salzburg, Austria:

*Building extraction in the humanitarian context: constraints, challenges and opportunities for hybrid AI experiments from 10+ years of data collection*

*Open discussion on steps forward towards a data challenge on hybrid AI*



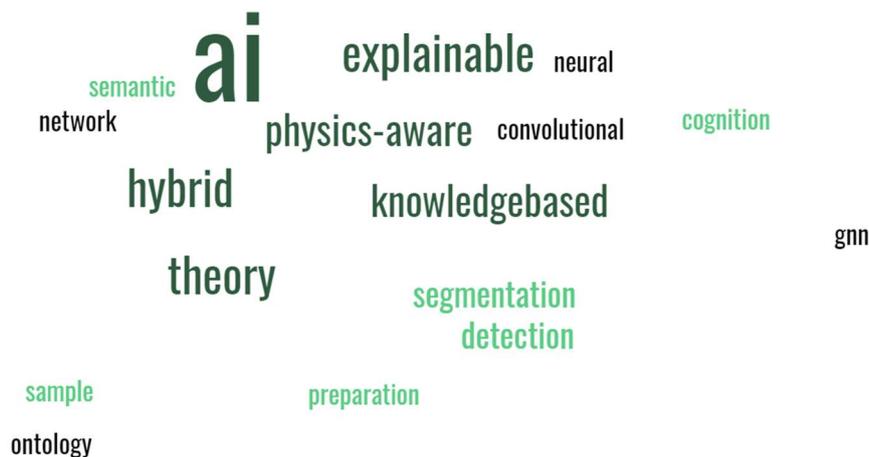
# Why Hybrid AI?

Convolutional neural networks (CNN) have become ubiquitous in remote sensing and close-range image segmentation and classification, but they need many training data, and the inner workings of deep learning approaches are often hidden from the user.

Rule-based classifiers and physical models and simulations on the other hand provide well-explainable results, but often lack adaptability. The synthesis of both data-driven and theory-driven approaches form a new generation of classifiers, sometimes called "Explainable Artificial Intelligence", "Physics-Aware AI" or "Hybrid AI".

## Wait! What exactly is Hybrid AI?

So what are "Explainable Artificial Intelligence", "Physics-Aware AI" and "Hybrid AI"? Or is Knowledge-based AI the better term? Many terms for the same thing? For similar things? Or related concepts? We need to clarify a bit what concepts are around, and how to make the best out of them for Earth observation applications.



What makes satellite or drone image analysis a special case? What specific challenges (timeliness, accuracy, reliability) do we encounter in humanitarian action or other specific domains? What role do classical spatial concepts play in today's automated image analysis? How can we infuse our prior knowledge of a scene, the observation conditions or the quality of the labels into a classifier to deal with poor samples or reduce the need of a multitude of samples? What are best practices? How can we structure our knowledge in a machine-readable and transferable way? Are ontologies the way to go? What are standards or best practices, like STAC, to describe samples? How far are these concepts from being widely used?

**In this Special Forum, we want to develop a common understanding and share both practical and theoretical experience to answer these questions.**



## From thinking to action. Let's challenge our colleagues and ourselves!

We aim to go one step further to draft a data challenge, in which we want to invite researchers from the wider scientific community to showcase their hybrid AI approach on a benchmarking dataset. What are interesting and challenging cases we should set up? How should we prepare the data to conduct and evaluate these challenges?

**The ideal outcome of this Forum is a deeper insight into hybrid AI, and the team building to design, promote, conduct, and evaluate a data challenge.**

The Forum is organised by the Christian Doppler Laboratory **GEOHUM**, headed by Prof. Stefan Lang ([stefan.lang@plus.ac.at](mailto:stefan.lang@plus.ac.at)).



GI\_Salzburg22, formerly AGIT and GI\_Forum, provides a platform for dialogue among geospatial minds, informing the GeoInformation Society, contributing to a more just, ethical and sustainable society. It is the annual meeting place for innovation, networking and continuing education from all areas of Geoinformatics. Interdisciplinary discussions, forward-looking ideas and a personal atmosphere accompany and shape the exchange of science and research, business and application. GI\_Salzburg22 will take place in Salzburg, Austria, 5.-7. July 2022, as a physical, on-site event.

