DEEP: Hybrid approach for Deep Learning

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Hybrid DataCloud
https://deep-hybrid-datacloud.eu

The DEEP-Hybrid-DataCloud project researches on intensive computing techniques such as needed for deep learning. This requires access to specialized GPU hardware to explore very large datasets. DEEP applies a hybrid-cloud approach that enables such access. We understand the needs of our user communities and help them to combine their services in a way that encapsulates technical details the end user does not have to deal with.

DEEP Architecture components

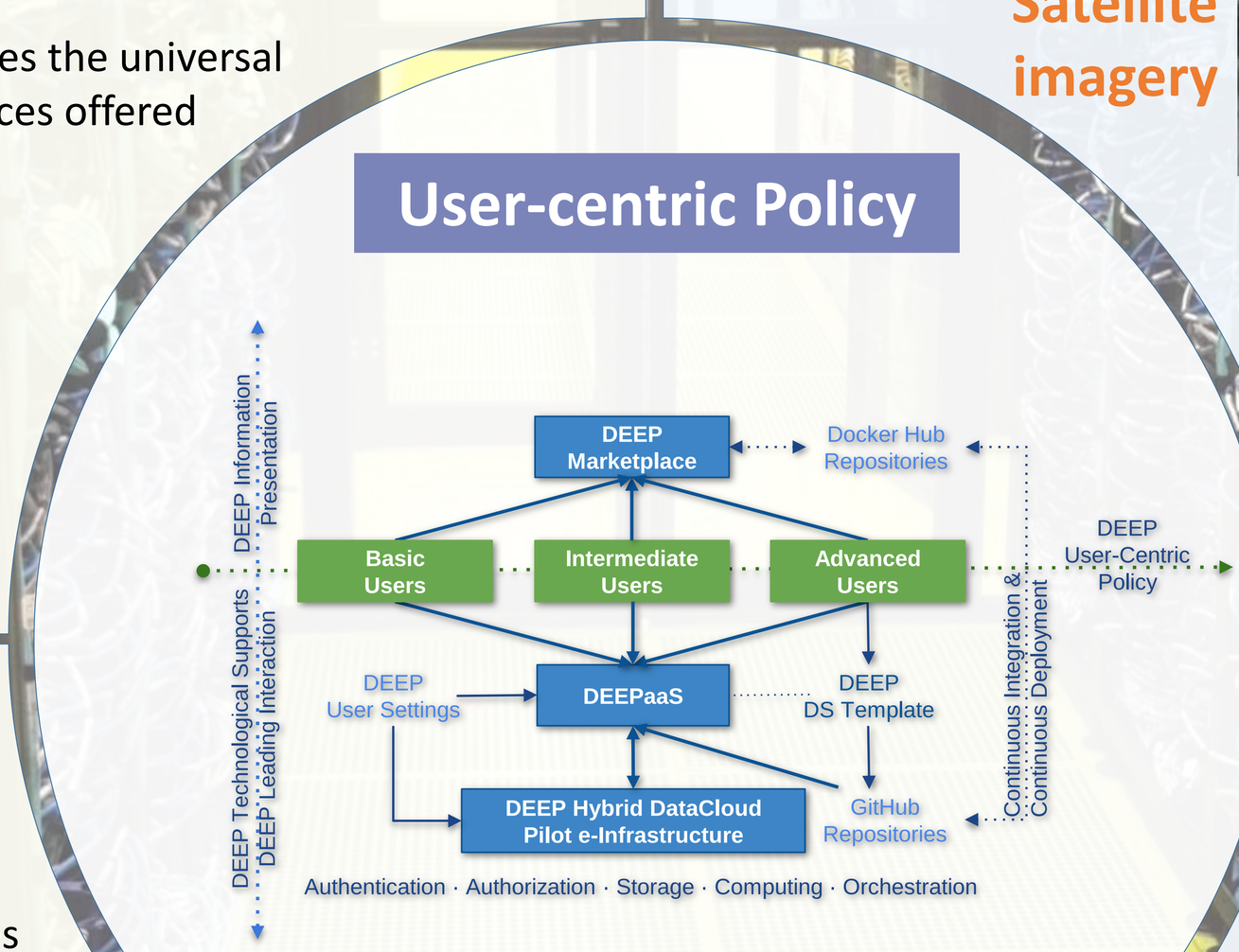
DEEPaaS API

DEEP as a Service API is a REST API focused on providing **Basic Users** with web access to machine learning models. **Advanced users** can integrate arbitrary machine learning models.

DEEP Marketplace

The Open Catalog provides the universal point of entry to all services offered by DEEP:

- Browse modules and learn from others
- Re-use and re-train existing modules
- Implement new



DEEP takes care of supporting users with different levels of experience by providing different integration paths

Deep Learning Use-cases

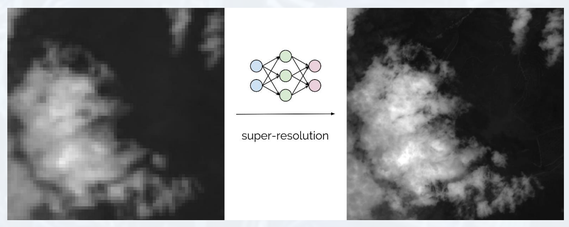
Exampled use-cases demonstrating usefulness and scalability of the approach

Image classification module

Generic model to train and test image classifiers (e.g. ResNet50, Xception). Several services are derived:

- Plants (Plantnet dataset)
- Conus marine snails
- Seeds
- Phytoplankton

Satellite imagery



An image super-resolution service for satellite imagery (Sentinel2, Landsat8, VIIRS, MODIS) to upscale low resolution bands to high resolution with Deep Learning (e.g. DSen2)

Pilot Testbed

Heterogeneous sets of resources are provided:

- Access to resources through orchestrator
- Alien4Cloud for a graphical composition of complex infrastructures
- HPC resources
- Supporting Nextcloud for remote synchronization

Massive Online Data Streams

A service is aimed at analyzing online data streams in order to generate alerts in real-time. The principle is proactive time-series prediction adopting artificial neural networks (e.g. LSTM, GRU).

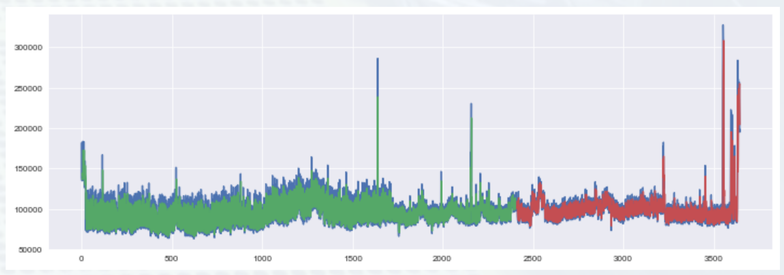
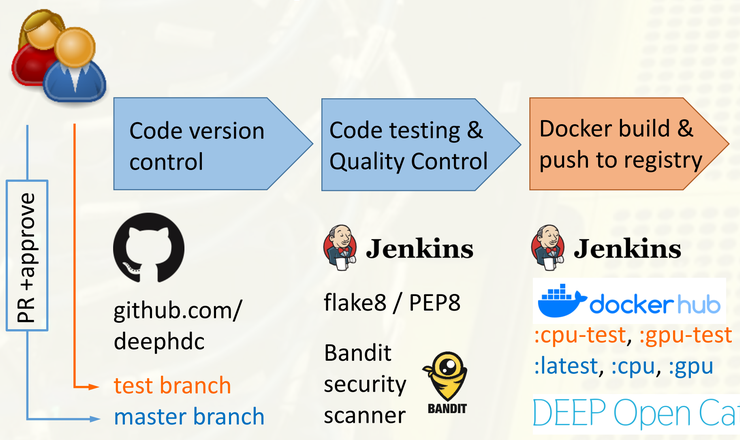


Fig.: dataset, prediction (train), prediction (test). 6 month monitoring dataset for network traffic

Jenkins CI/CD

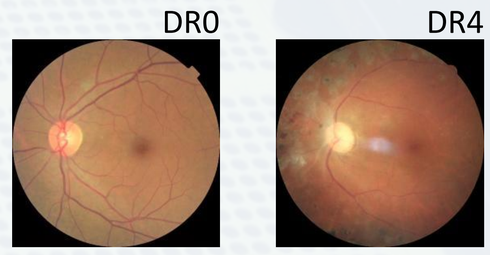


For user applications:

- Automatization of code testing
- Docker image building
- Delivery to the registry

Retinopathy

A deep learning approach (e.g. ResNet50, InceptionV3) for automated classification of retinopathy based on color fundus retinal photography images



Color fundus retinal photography images for a healthy (DR0) and the most pathological level (DR4)

European Commission

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