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Sen2Cube.at is a project funded under the Austrian Space Applications Programme (ASAP 14)
Sentinel-2 Semantic Data Cube Austria (Sen2Cube.at):

- The overarching goal is to build an **Austrian data & information cube**
- Sen2Cube.at will exemplarily show that it is possible to
  - Conduct **semantic content-based image and information retrieval (SCBIR)** through time in big EO databases and
  - **allow human users to query and analyse EO data on a higher semantic level** (i.e. based on at least basic land cover units and encoded ontologies).
"Conventional" queries of EO image archives

Conventional non-semantic queries of EO image archives (e.g., USGS Landsat, ESA Sentinel Data Hub). Search by:

- Metadata information.
  - Geographic area (AOI).
  - Acquisition time.
  - Sensor.
  - Summary quality indexes (e.g., image-wide cloud cover).
- "Thumbnail" image preview (RGB image QuickLook).

- No semantic querying
- No analysis capability
- No extraction of higher-level information products through time
Sen2Cube.at: a Semantic Content Based Image and Information Retrieval System through time

- is expected to cope with spatiotemporal semantic queries such as “retrieve all images in the database where a lake is not covered by clouds and larger than a certain area”.
- In addition, information retrieval (semantic analysis) within the system is possible, such as "retrieve all pixels in the AOI flooded as least once in the selected time span"
- Such an SCBIR system must rely on image understanding as a pre-condition. This makes the SCBIR problem at least as difficult (or ill-posed) as vision.

➔ No SCBIR (Semantic Content Based Image Retrieval) system in operating mode is available to date.
Key concept of Sen2Cube.at for spatiotemporal analytics of multi-source EO big data

EO images through time

EO image-derived information layers

Area-of-interest (AOI) in a target-time (TT) window.
Key concept of Sen2Cube.at for spatiotemporal analytics of multi-source EO big data

1. Optical satellite image and associated *fully automatic data-derived* information layers
   - The semantic enrichment used in Sen2Cube.at is based on a physical-model-based, spectral categorisation (SIAM) and additionally derived information.
   - These processes will be fully automated and free of any user parametrisation.

2. Data cube system storing images and image derived products for fast querying

3. Semantic content-based queries through time and space in user defined AOIs by a graphical inference engine

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Demo services...

......to be implemented in **one generic semantic data cube**
Demo 1: semantic queries for content-based image retrieval

- develop knowledge-based semantic queries
- search and select Sentinel-2 scenes based on their content

An inference engine for enhanced querying will be programmed as a Web interface in a client-server solution.
Demo 2: user-defined cloud-free mosaics and composites

- apply pre-defined semantic queries through time
- user-defined areas-of-interest and timeframes
- better selection of best-suited pixels on the fly using semantics

Source: Sentinel-2
Demo 3: location-based access

- historical data-derived trends where you are (or elsewhere)
  - location-based access
- example prototype developed in IQ4Sen
  - ZAMG project
  - implemented by SpaSe
Demo 3: location-based access

- **What was the status of Snow during 01.12.2016 and 05.04.2017** at 48.30 / 14.23?
- **What was the status of Vegetation during 01.12.2016 and 05.04.2017** at 47.90 / 15.26?
Demo 4: per-parcel statistics

- allow user-defined parcel calculations for spectral and semantic profiles through time
- particularly relevant for forestry and agricultural domains

- vegetation trends
- event detection
- when snow was last detected
- …

Source: Sentinel-2
Danke für Ihre Aufmerksamkeit

http://sen2cube.at/

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