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Scalable Extraction of Small Woody Features (SWF) at the Pan-European Scale using Open Source Solutions

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Big Data and dedicated EO monitoring system
- High demand in monitoring specific landscape elements
  - urban areas, environment, ...
- Increase in Earth Observation (EO) image availability
  - Pan-European Very High Resolution (VHR) coverage
- Mapping of SWF included as part of Copernicus land monitoring service
Set up an automated approach capable to deal with:

- Extraction of small elements on VHR imagery
- Large amount of individual scenes (>25,000)
- Large amount of data (>100 TB)
- Diversity of landscapes
- Process the data in a timely manner

=> Collaboration between commercial company (SIRS) and research lab (IRISA)
1st Step

- Feature extraction through use of Differential Attribute Profiles (DAP): dichotomous morphological descriptors of image where each pixel is described through the analysis of its ancestors
- Construction of trees
- Spectral and textural information
2nd Step

Extraction of Features

- Using semi-supervised classification: Random forest
- Training datasets are extracted from existing Land Cover Products from Copernicus Services
Extraction of Small Woody Features (SWF)
- Copernicus pan-European component of the land monitoring service: High Resolution Layer 2015

Objectives:
- Identification of linear elements (hedgerows) and isolated patches
- Wall to wall mapping over 39 EU countries (approx. 6 million km²)
- High degree of homogeneity across Europe
- High level of accuracy
Results
Operational solution for specific object extraction

- Fully integrate, functional and open-source based algorithm
- Time efficient: 10 000x 10 000 pixel image processed in less than 2 minutes
- High accuracy
- Implemented as part of HR Layer SWF production chain
- Wall to wall mapping of EEA39 (approx. 6 millions km²)
- On-going integration as an open source component of the Orfeo Tool Box (OTB) software suite