NIVA

NEW IACS VISION IN ACTION

UC5a

11/05/2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 842009

Overall overview

Objectives of UC5a

Facilitate LPIS update by locating changes on non-agricultural elements (appeared or disappeared)

- Develop algorithms (machine- and/or deep learning)
- Basis for algorithms: Orthophoto and other relevant data

Depending on quality, data from the algorithms can be used as

- Fairly precise geo-located alerts
- Fairly precise suggestions for changes
- Automatic cut out

Short status on UC5a

ASP co-lead with IGN technical partner to build components to detect (under development):

- Buildings – new approach since Madrid with deep learning
- Tall vegetation

DAA lead with a technical partner to build components to detect (in progress):

- Flat elements e.g. water or roads -> types and number of elements still pending

Products of UC5a

UC5a is relatively independent of other UCs.

Expected end product

The paying agencies will get the algorithms and a description on how to run the algorithms on their data

- It is up to the paying agencies how to use the data (alerts, suggestions, or automatic update) following the final quality of the tool
- Each paying agency will run the algorithms on their data and decide how to use the data from the algorithms. So UC5b will have to get the updated eligible area from the paying agencies (and not UC5a directly).

Stakeholders and possible innovations

- Main stakeholder of LPIS are LPIS operators
- Questionnaire to PA's across Europe in Fall 2019
  - Some countries work with automatic change detection in LPIS
  - No one does automatic update

- Innovation: Try to do automatic update without manual check as an end goal

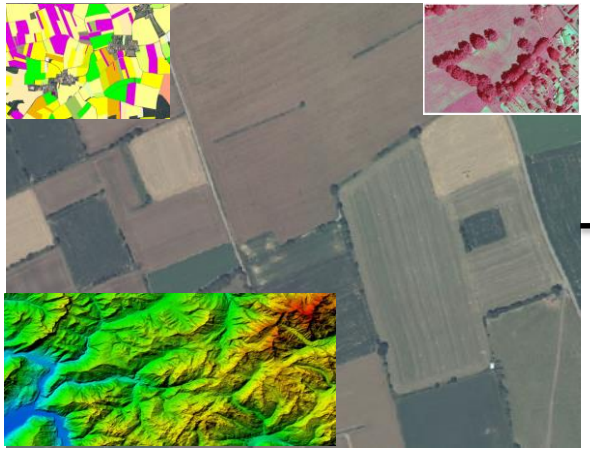
Timeline of test and consequences

- Milestone Month 18 is currently expected to be met, but insecurities regarding covid19 could mean delays and could thereby mean:
  - Few months to adjust and correct the algorithms after initial test (original month 12-test)
  - Algorithms for month 18-test, might not be as good with only three and not six months between first and second test

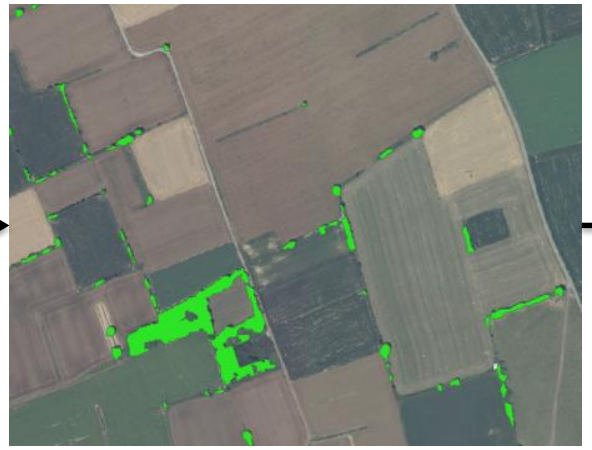
Change detection tool for vegetation

Schematic process explanation of vegetation tool

Objective => located by a punctual alert changes of tall vegetation corresponding to the land feature and/or EFA objects (trees, groves, hedges...)



1. Data preperation



2. Vegetation mask computation

3. Segmentation and post-processing

4. Punctual geolocated alerts

Vegetation prototype progresses

A specific training of the model has been done in the department of Isère (18) and ongoing analyses of the results to justify the usefulness of this approach.

Time computing:

- At least 2 weeks for the training phase
- 24 hours to generate alerts for one French department (around 5 000 sq km) with a server with GPU card

Next steps:

- move the model to another department (63)
- Testing productivity gains (pilot workshop)
- Complete the drafting of documentation
- Deploy the tool for internal use and tests with Spain

State of play : study areas

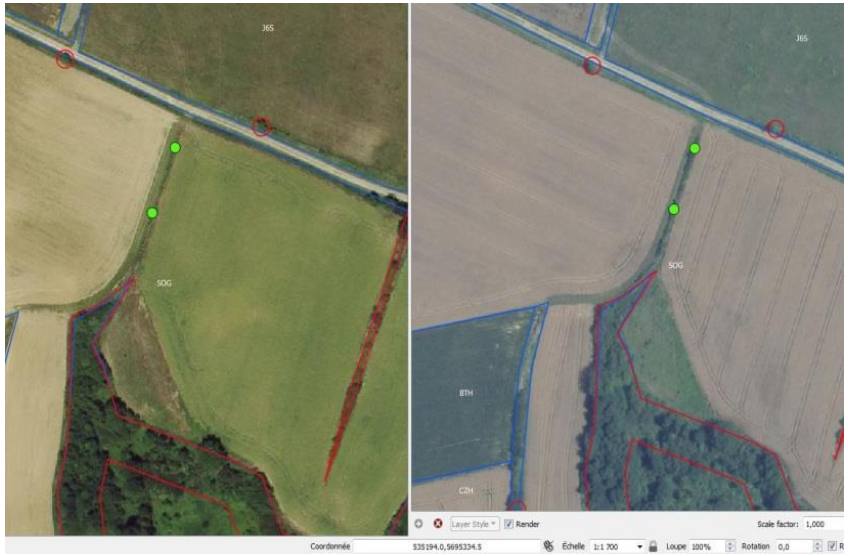
2 testing zone in France:

- Isère (completed)
- Puy-de-Dôme (ongoing)

1 testing zone in Denmark:

- Fyn island (ongoing)

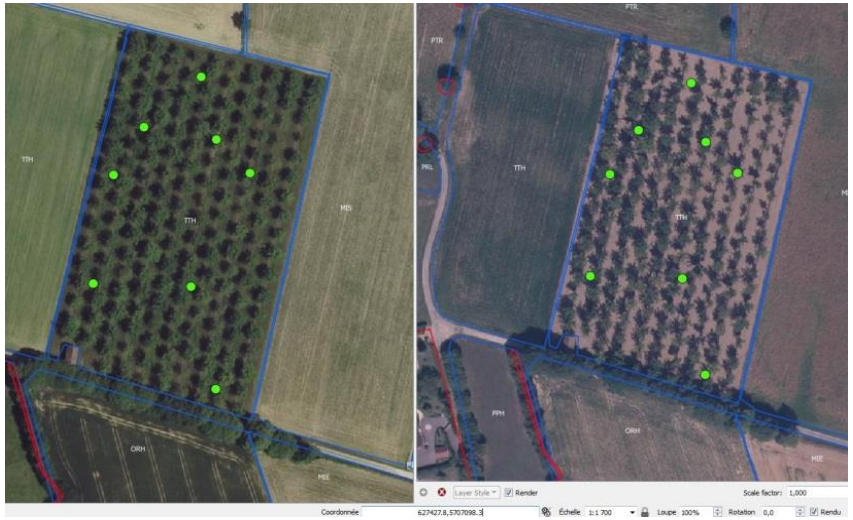
Some results of the prototype (appeared alerts)



A. Very sensitive hedge detection

B. Good detection on the parcel boundary

C. Fallow land and grasslands to be reinforced



D. Over-sensing on permanent crops

Change detection tool for buildings - a new approach with deep learning process

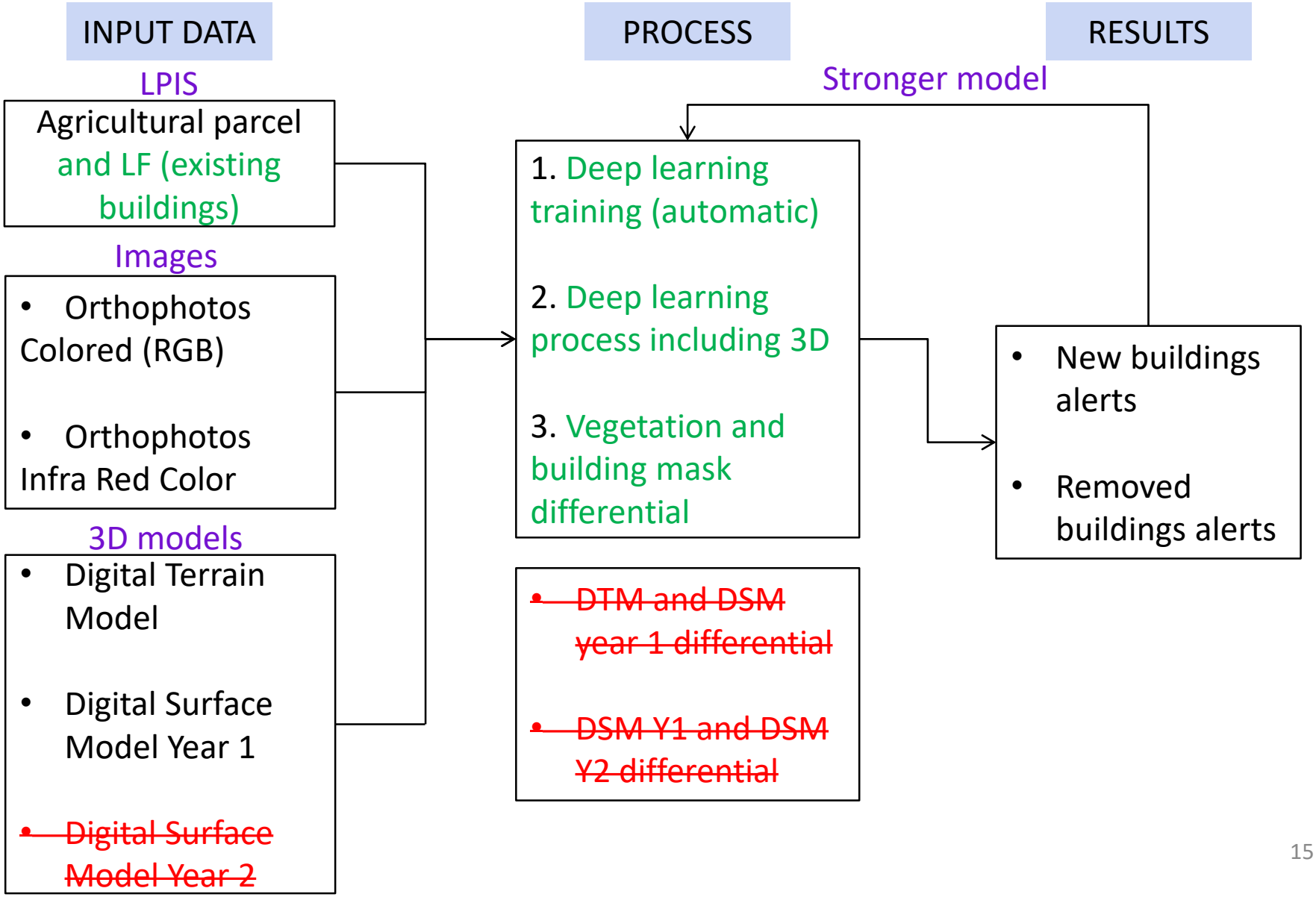
Building prototype evolutions

IGN's IT department initially used 3D model comparison to detect buildings evolutions but this method has the following drawbacks:

- Need to use orthophotos and 3D model for 2 years
- Components were not totally open source and disseminable
- Time computing was very long
- Mixed results on quality

The new approach is approximatively the same as for vegetation, using just one year for the 3D data with deep learning process. The first results are very good quality, calculated in a short time and the tool is EUPL compatible

New method with deep learning



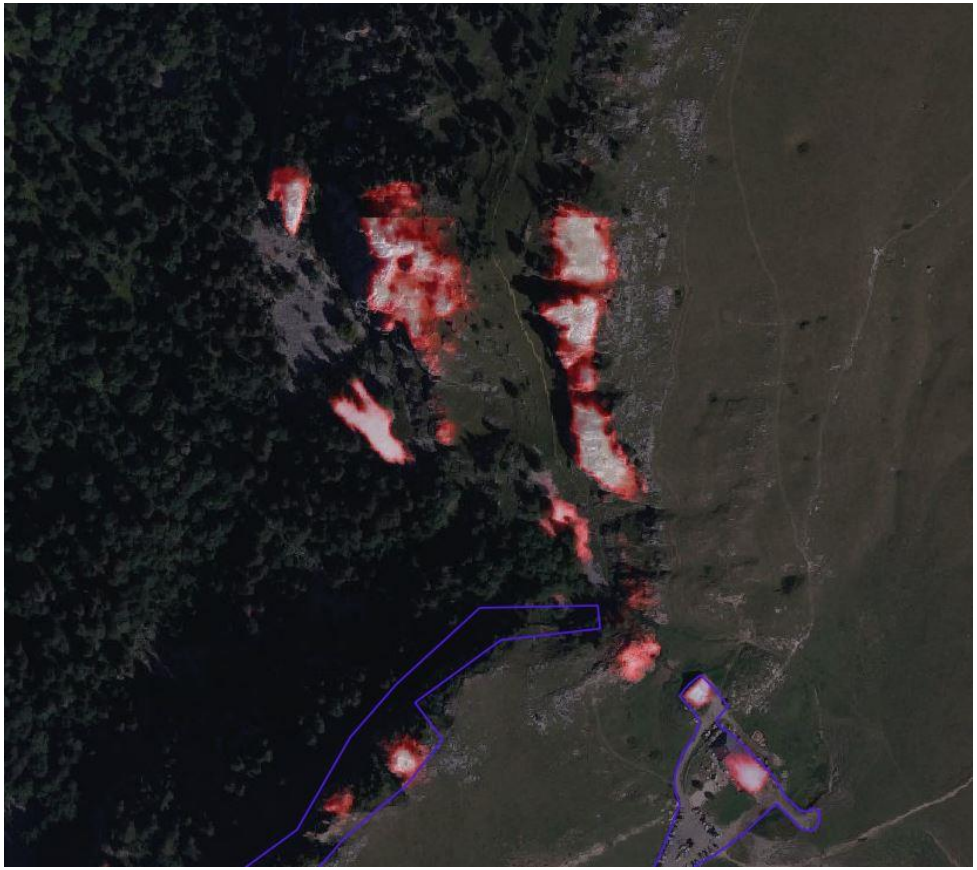
New method with deep learning good examples

A. Only building detected

B. Pylon detected (no lines)

C. Exhaustive detection including small buildings and excluding greenhouses or agricultural storage (strengthening the learning model)

New method examples with some limits



A. Over-sensing due to DTM bad quality in mountains but few buildings inside permanent grassland

B. Over-sensing on a hedge to be investigated (model to reinforce or 3D model quality ?)

This project has received funding from the european union's horizon 2020 research and innovation programme under grant agreement no. 842009