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As part of the EU Common Agricultural Policy (CAP) reform of 2020, each EU member country is expected to suggest new farmland management protocols. Currently, farmers must manually declare each year their crop types into the Land-Parcel Identification Systems (LPIS), a geographic information system identifying the land use of agricultural parcels within each EU member country. Such a protocol remains tedious and error-prone. Automatic Earth observation image analysis can help achieving such a task. Leveraging the recent availability of precise and frequent Sentinel acquisitions,

In this context ASP (French paying agencies) and IGN (French National Institute for Forest and Geographic information)) are working together to automatise current French agricultural parcel monitoring by using sentinel 1 & 2 data. IGN is active, in both, improving current research state of art in crop monitoring, with the work of the LASTIG laboratory, and in the assessment, consolidation and deployment of current research results into large scale experimentations.

Concerning our current research, we propose modelling the crop type of parcels from a sequence of (radar and optical) satellite acquisitions, as well as LPIS entries of previous years, with a linear-chain Conditional Random Field. The novelty lies on the fusion of multi-modal images at the feature level and the integration of temporal knowledge extracted from existing land-cover databases.

We tested our model on two large-scale French study areas 1250km2, which are geographically distant and show different agronomic rules: the "Seine et Marne" (North of France) and the "Alpes de Haute-Provence" (South East). We use a granular nomenclature comprised of 25 categories. Our model demonstrates promising results for the task of automating the LPIS update: 89.0\% overall accuracy is reached in "Seine et Marne" (10 categories of the 25 present on the area) and 72.9\% in "Alpes de Haute-Provence" (14 categories). We show that the temporal modelling increases the accuracy by +2.6% and +4.6\%, respectively.

On the large scale experimentation side, we have planned in 2018 to adapt the iota2 processing chain for crop monitoring. Iota2 is a sentinel data processing chain develop by CESBIO laboratory and already used in sen2agri and sen4cap projects. We will test iota2 classification using a dedicated nomenclature for crop monitoring on 90 test sites of 30km2 each. We will use 2017 sentinel 1&2 data in order to be able to compare results to the current on the spot check. We will also test classification results with three different amount of data corresponding to three time of year: May, July, October. These three classifications are linked to the evaluation of three use case of sentinel data: pre-filling farmer aid application, helping and automating aid application control and testing a seamless claim aid payment system.