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## RapidAI4EO: Advancing the State-of-the-Art in Continuous Land Monitoring

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New catalogues of nearly daily or even intraday temporal data will soon dominate the global archives. However, there has been little exploration of artificial intelligence (AI) techniques to leverage the high cadence that is already possible to achieve through the fusion of multiscale, multimodal sensors. Under the sponsorship of the European Union's Horizon 2020 programme, RapidAI4EO will establish the foundations for the next generation of Copernicus Land Monitoring Service (CLMS) products. Focus is on the CORINE Land Cover programme, which is the flagship of CLMS.

Specific objectives of the project are to: 1) explore and stimulate the development of new spatiotemporal monitoring applications based on the latest advances in AI and Deep Learning (DL); 2) demonstrate the fusion of Copernicus high resolution satellite imagery and third party very high resolution imagery; 3) provide intensified monitoring of Land Use and Land Cover, and Land Use change at a much higher level of detail and temporal cadence than it is possible today.

Our strategy is two-fold. The first aspect involves developing vastly improved DL architectures to model the phenomenology inherent in high cadence observations with focus on disentangling phenology from structural change. The second involves providing critical training data to drive advancement in the Copernicus community and ecosystem well beyond the lifetime of this project. To this end we will create the most complete and dense spatiotemporal training sets ever, combining Sentinel-2 with daily, harmonized, cloud-free, gap filled, multispectral 3m time series resulting from fusion of open satellite data with Planet imagery at as many as 500,000 patch locations over Europe. The daily time series will span the entire year 2018, to coincide with the latest release of CORINE. We plan to open source these datasets for the benefit of the entire remote sensing community.

This talk focuses on the description of the datasets whose inspirations comes from the recently released EuroSAT (Helbert et al, 2019) and BigEarthNet corpora (Sumbul et al, 2019). The new corpora will look at the intersection of CORINE 2018 with all the countries in the EU, balancing relative country surface with relative LULC distribution and most notably adding the daily high resolution time series at all locations for the year 2018. Annotations will be based on the CORINE ontology. The higher spatial resolution will support modeling of more LC classes, while the added temporal dimension should enable disambiguation of land covers across diverse climate zones, as

well as an improved understanding of land use.

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