SPACE AND ARTIFICIAL INTELLIGENCE
Online Conference, September 4th, 2020
Organized by CLAIRE and ESA, in association with ECAI2020

Combination of AI, semi-physical models, and in-situ data for Earth Observation applications

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Starlab www.starlab.es is an SME specialized in complex data. Starlab aims at transforming science into services, bridging R&D developments to markets. The company is focusing on two field of application: Space and Neuroscience. Starlab Space is a downstream service provider based on hyperspectral signal analysis (SAR, optical) and AI techniques.
Starlab has developed an open platform for collaborative labeling high-resolution images for target detection applications www.targetdetection.com. In addition we introduce neural networks techniques to improve computational performance to traditional earth observation algorithms (land use land cover, burned area mapping, soil moisture).
Soil moisture is one of the key soil characteristics as it is closely related with crop vegetation development. Current available soil moisture products are generated and calibrated for global or regional scale applications and at spatial resolutions (~1km2) usually too coarse for monitoring common small farms.
We present an approach based on artificial intelligence and semi-physical synthetic-aperture radar backscatter models calibrated with in-situ surface soil moisture data from TAHMO and TWIGA networks stations installed in Ghana. Soil moisture was estimated with a neural network trained with synthetical data generated from the model simulations. Such approach allows for computationally affordable estimates over large areas while leveraging the current knowledge embedded in the semi-physical models.