ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

DET - Bringing change detection on board satellites for low-latency damage assessment

Funded By	Dipartimento DET
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Context of the research activity	The PhD scholarship is in the framework of a joint activity with the European Space Agency, and requires to spend 1 year in their headquarters in Noordwijk. The topic is change detection for satellite images, with specific focus on change detection methods to be run onboard the satellites (as opposed to running them at the ground segment).
Objectives	This activity proposes a co-funded doctoral program with the objective to develop deep learning methods for onboard change detection in order to overcome the challenges mentioned above. The goal is to design a change detection system suitable for edge-AI, centered around a deep learning architecture having complexity suitable for modern onboard data processing systems, and providing the basic functionalities needed to generate suitable geometric information about the acquired images, and compare them with previous scenes in order to calculate a change map. The activity will procure representative datasets, define the onboard change detection architecture, develop the required tools, train the system on the datasets and validate its performance also in comparison to change detection systems operated on the ground. Finally, it will demonstrate an implementation of the deep learning part of the system on a suitable low-power accelerator.
Skills and competencies for the development of the activity	Prospective students should have at least 6 months of experience in the design and implementation of neural networks. Specific experience on neural networks for satellite image processing will be considered a plus.