PRESS NOTE

The new frontiers of AI for Earth observation: Leonardo, Telespazio, and e-GEOS sign an agreement with ESA Φ-lab

The goal of the agreement is to maximize the impact on the space sector of transformative technologies such as artificial intelligence, high-performance computing (HPC), quantum computing, big data and machine learning

The research fields include the study of neuromorphic networks, artificial intelligence architectures that "mimic" the human brain and its neural networks to increase the efficiency and speed of information processing

Roma, 11/07/2022 – The collaboration was signed by **Leonardo, Telespazio** (joint venture Leonardo 67%, Thales 33%), **e-GEOS** (joint venture Telespazio 80%, Italian Space Agency 20%) and **Φ-lab**, **the research center of the European Space Agency (ESA)** dedicated to the study of new technologies to accelerate Earth observation research and strengthening Europe's leadership in the space sector.

Within this agreement, Leonardo will utilize the **Leonardo Lab "Space Technologies"** research structure in Rome - in connection with the **Leonardo Labs network** - and **together with ESA Φ-lab**, for a joint study on optimizing the use of space data for Earth observation. After exploring areas of common interest, ESA Φ-lab and the Space Technologies Leonardo Lab, along with the Leonardo Labs network, will work together on projects seeking to boost the impact on the space sector of transformative technologies including artificial intelligence, high-performance computing (HPC), quantum computing, big data and machine learning.

Some of the areas of interest covered by the collaboration include studies on **neuromorphic nets**, new AI architectures that better "mimic" the human brain and its neural networks, going beyond traditional deep learning, therefore increasing information processing efficiency and speed. Because AI algorithms usually require many resources in terms of data, memory, energy and computation capabilities, **frugal learning** and **neural ordinary differential equations** will be explored in order to develop new AI methods able to use less data and computational resources. **Onboard/Edge AI** is an area which is rapidly emerging as a complement to cloud computing and the joint research will focus on the addition of AI processors to satellite payloads, as well as the associated requirement for low-power, high-performance computation. **Quantum computing** areas will be explored to evaluate how to apply this technology to classification, feature extraction, anomaly detection, data clustering on Earth observation images. Another central theme of the research concerns **explainable/trusted AI** which aims at addressing the need to increase trust in machine learning models through improving predictability, robustness and explainability.

ESA Φ-lab is committed to pushing the boundaries of Earth Observation and how it is conceived, designed and implemented," **adds Simonetta Cheli, ESA Director of Earth Observation Programmes and Head of ESRIN**. "*The ultimate goal is to boost the innovation element of EO and thereby strengthen Europe's world-leading competitiveness from both a scientific and commercial point of view. When we started interactions with what are now the Leonardo Labs, we immediately recognised synergies and complementarities that could greatly benefit this vision. We're very pleased to have now reinforced our relationship with these major industry partners on topics of collaboration that are at the core of what we see as the future of EO*."

"*The Leonardo Group has a consolidated relationship with ESA, further strengthened by the agreement signed with Φ-lab*". **Underlines Franco Ongaro, Chief Technology and Innovation Officer of Leonardo** "*The agreement with ESA allows us to pool our skills in areas such as AI, big data and quantum computing, combined with the computational capabilities of Leonardo's HPC infrastructure, davinci-1, to increase the application of innovative methodologies in Earth observation and in the wider space context. The agreement is an expression of the vision of the company which aims to strengthen the research activities carried out*

through the Leonardo Labs network - the company's network of laboratories aimed at the digital sphere - and the consolidation of the open innovation activities that both represent determined factors of growth and competitiveness."

"*The future of the Earth is increasingly linked to Space. Strengthening the ability to analyze, process and enhance the data from observation satellites is essential for environmental sustainability, for improving life on our planet and for its protection, as well as offering important opportunities in the Space Economy,"* **commented Luigi Pasquali, Leonardo's space activities coordinator and Chief Executive Officer of Telespazio.** *"The collaboration between Leonardo Lab Space Technologies and ESA Φ-lab will accelerate the development of new solutions in this area, leveraging on innovative infrastructures and specialists from the European Space Agency and Leonardo, Telespazio and e-GEOS. A multi-disciplinary team, with skills ranging from engineering and computer science applied to the management of complex systems such as satellites and fleets of drones, to mathematics and physics for the analysis of acquired data and the development of applications ".*

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