EUROPEAN SPACE AGENCY

Internal Research Fellow in Artificial Intelligence (AI) ar Hybrid Computing for Earth Observation

Job Req ID: 12221
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Vacancy Type: Internal Research Fellow
Date Posted: 17 December 2021

Research Fellowship Opportunity in the Directorate of Earth Observation Programmes.

ESA is an equal opportunity employer, committed to achieving diversity within the workforc and creating an inclusive working environment. For this purpose, we welcome applications from all qualified candidates irrespective of gender, sexual orientation, ethnicity, beliefs, ag disability or other characteristics. Applications from women are encouraged.

This post is classified F2.

Location
ESRIN, Frascati, Italy

Our team and mission
Φ-lab, a division of ESA's Future Systems Department, aims to fully embrace New Space and be the catalyst for radical innovation in Earth observation (EO). In particular, our visic is to become a kind of "hub" connecting a growing ecosystem of Artificial Intelligence (AI) capabilities across Europe. The power of AI for EO is at present largely untapped, and ma challenges still need to be tackled at scientific, applications and capability levels to deliver maximum value from open EO data from satellites for our society and economy. See ESA lab Explore Office Research & Innovation (R&I) strategy, 2020 ((https://bit.ly/2VJRSrf).

In particular, there is growing interest in "hybrid" AI computing, where training is done in th "cloud" while inference is performed at the "edge" in dedicated embedded AI accelerator chips. Such capability provides the foundation for smart connected sensors operating at th ultimate edge, in space. One example of this growing trend of embedded smart sensors is Φ-sat-1, an enhancement of the Federated Satellite Systems (FSSCat) mission launched September 2020. It is one of the first experiments to demonstrate how AI (powered by a small Myriad chip) can be used for EO, in this case filtering out useless hyperspectral data due to cloud coverage. Such a technology demonstration experiment could stimulate new opportunities for upcoming ESA missions, including CubeSat missions but also possibly Copernicus missions (e.g. CHIME - Copernicus Hyperspectral Imaging Mission for the Environment). The ability to transmit small quantities of user-relevant insight in real time is crucial for the EO sector.

Candidates are encouraged to visit the ESA website: www.esa.int

Field(s) of activity/research for the traineeship
With the rise of hybrid AI computing and AI at the edge, a new set of challenges is coming

capabilities, (3) model training and benchmarking, (4) model reduction via pruning and/or knowledge distillation, (5) use of active learning techniques for continuous updating of the deployed machine-learning architecture.

This applied research opportunity would enable tackling some of the above research challenges, and you are thus invited to suggest research activities in the following areas:

- New machine learning schemes and principles (e.g. unsupervised, active, frugal, automated)
- Hybrid computing and edge implementation (e.g. embedded systems, pruning, distillation).

These research activities should be applied to an EO domain you are particularly intereste in and be in keeping with Φ-lab strategic research plans.

In addition to your main research activity, you will have the possibility to contribute to the general activities of the Φ-lab involving industry and research centres, and in general support Φ-lab activities in the community related to your expertise.

In particular, you will:

- Perform applied research in one of the above areas, bringing newly-developed AI technologies to upcoming smart space-borne EO sensors
- Contribute to development of an interactive environment for rapid prototyping and testi of new ideas
- Publish results in top-ranked, peer-reviewed publications
- Promote/share your results and tools through new digital tools, including social media and Jupyter Notebook
- Perform or participate in assessments on subjects of strategic interest to ESA.

Some benefits of working at the Φ-lab

You will boost your personal development through the following:

- You will be exposed to the unique, broad competences of ESA and have access to wel known leaders in Earth observation, AI, ICT, the space industry and academia
- You will be able to build a network of international connections that will help you throughout your future career
- You will become part of the ϕ-lab ESA community and its related networks.

Develop as researcher and/or industry innovation leader

- You will have the opportunity to lead changes in the growing AI4EO ecosystem, and promote and develop your ideas regarding EO, AI and a rapidly changing space sector
- You will be able to develop applied research in areas that interest you in an extremely innovative and stimulating environment
- You will have the opportunity to work on real applications that will impact European competitiveness (both scientific and industrial)
- You will have competitive conditions and be in the vicinity of the eternal city Rome, whe the past meets the future in a growing ecosystem of innovators.

Technical competencies

General interest in space and space research
Ability to gather and share relevant information

Behavioural competencies
Innovation & Creativity
Continuous Learning
Communication
Relationship Management
Self Motivation
Problem Solving
Cross-Cultural Sensitivity

Education
You should have recently completed, or be close to completion of, a PhD in data science, computer vision or similar engineering domains. Preference will be given to candidates awarded their doctorate within the past five years.

Additional requirements
You must also have:

- the ability to conduct pragmatic research leading to tangible results in-depth knowledge and interest in AI themes
- strong programming skills (Python)
- experience with machine/deep learning algorithms; a proven record (e.g. github) of using neural network frameworks (e.g. Torch, PyTorch, Tensorflow, Keras).

The working languages of the Agency are English and French. A good knowledge of one these is required. Knowledge of another Member State language would be an asset.

Other information
For behavioural competencies expected from ESA staff in general, please refer to the ESA Competency Framework.

The Agency may require applicants to undergo selection tests.

In addition to your CV and your motivation letter, please add your proposal of no more tha pages outlining your proposed research in the "additional documents" field of the "applicat information" section.
At the Agency we value diversity and we welcome people with disabilities. Whenever possible, we seek to accommodate individuals with disabilities by providing the necessary support at the workplace. The Human Resources Department can also provide assistanc during the recruitment process. If you would like to discuss this further please contact us at contact.human.resources@esa.int.

Please note that applications are only considered from nationals of one of the following States: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germa Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. Nationals from Latvia an Slovenia, as Associate Member States, or Canada as a Cooperating State, can apply as w as those from Bulgaria, Cyprus, Lithuania and Slovakia as European Cooperating States (ECS).

In accordance with the European Space Agency’s security procedures and as part of the selection process, successful candidates will be required to undergo basic screening befo appointment