Traineeship Opportunity for "Young Graduate Trainees"

Reference	Field of specialisation	Duty Station	Closing Date
ESA/YG-ESTEC(2015)045, REV.1	**Symbolic Regression: Learning Models of Space Phenomena**	**ESTEC**	**28 February 2016**

Overview of the Division's mission

The Future Preparation and Strategic Studies Office ensures the overall coordination, coherence and performance of programme and corporate studies in support of the preparation of the Agency's future activities, in line with its long-term strategic objectives and priorities, as well as coordinate strategy development of trans-Directorate initiatives. In particular, this includes the General Studies Programme (GSP www.esa.int/gsp), implementing studies for the preparation of new missions, and the Advanced Concepts Team (ACT, www.esa.int/act), tasked to monitor, perform and foster research on advanced space systems, innovative concepts and working methods.

Within the European Space Agency, the ACT is engaging in collaborative research relations with university institutes and research centres, focusing on advanced research topics of potential strategic interest to the space sector and in experimenting with new forms of teamwork. In order to achieve this goal a multidisciplinary research environment is provided, in which young scientific and engineering post-doctoral and post-graduate researchers carry out work on emerging technologies and innovative concepts. Candidates are strongly encouraged to visit the website of the team to obtain more information about the team in preparation of their application and interview.

Overview of the field of activity proposed

The successful candidate will develop most of her/his activity in the field of machine learning, and in particular of symbolic regression. Symbolic regression is a technique that is able to reconstruct models from data by means of artificial evolution of the mathematical expressions that stand behind the data: it does so by means of genetic programming, a technique introduced in the 70s by John Koza.

The successful candidate will study the application of symbolic regression to space systems. Examples include:

- the development of an open source library implementing the differential version of Cartesian Genetic Programming (d-CGP),
- the study of d-CGP in conjunction to stellar clusters analysis, interplanetary trajectory optimization (shape based methods),
- the study of the introduction of a back-propagation algorithm equivalent in the realm of genetic programming to simplify the learning task.

Depending on the nature of the project, this might also involve interfacing with the academic community in these fields. The successful candidate will be a member of the Advanced Concepts Team (http://www.esa.int/gsp/ACT/index.html) and is therefore expected to contribute to the development and the assessment of new concepts and technologies for space applications in close interaction with ACT researchers who work on a broad range of disciplines including, informatics, artificial intelligence, climate modelling, energy systems, fundamental physics, biomimetics, computational management science and mission analysis. Based on her/his detailed background and interests and the opportunities and needs of the team, the successful candidate will be involved in a number of other ACT initiatives (including studies conducted via the Ariadna scheme, http://www.esa.int/gsp/ACT/ariadna/index.html and participate in reporting and communicating results of the team (internally and externally).

Educational and other requirements

Applicants should have just completed, or be in their final year of a University course at Masters Level (or equivalent) in a technical or scientific discipline, specifically in artificial intelligence, computer science, computational neuroscience or related fields. Applicants should have a good background and strong interest in the transfer of neuronal mechanisms into computational models and very good programming experience (e.g. C++, C, Python). The successful candidate is expected to be familiar with genetic programming, symbolic regression tasks, machine learning in general, Artificial Intelligence and have an interest in evolutionary computations, swarm intelligence and deep learning.

Applicants should show a genuine interest in applied academic research, together with sound analytical skills, avid curiosity and a natural aptitude to self-motivation and teamwork. Applicants should have good interpersonal and communication skills and should be able to work in a multi-cultural environment, both independently and as part of a team.

Applicants must be fluent in English and/or French, the working languages of the Agency. A good proficiency in English is required.

How can I apply?

Please fill in the online application form.
Please note that only one application may be submitted for the YGT Scheme.

The YGT Scheme is open to recently qualified young men and women
who are nationals of one of the following states:
Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the UK,
or Canada as a Cooperating State, Bulgaria, Latvia, Lithuania, Slovakia and Slovenia as European Cooperating States (ECS).