

Artificial Intelligence for Space - Why? Where? and How?

8-9 October 2019

EPFL Lausanne, Room BC 420

The Swiss Space Center invites you to save the date for this workshop on Artificial Intelligence for Space. Two specialists from our industrial member Solenix will introduce this concept and provide concrete examples of areas where your company or research entity can benefit from it. The workshop will be organized in 4 sections:

- 1) Introduction to Artificial Intelligence (AI). What is intelligence? What is AI? What are the uses of AI? Artificial Intelligence being a very large field the focus will stay on common use cases within the space industry.
- 2) Introduction to Machine Learning (ML) as a domain of Artificial Intelligence. What ML can / cannot do? What the "learning" means in ML? Types of ML. Key concepts such as how to evaluate performance, generalization, when one needs a more complex / simpler solution. The ML workflow in ML projects.
- 3) Selected Machine Learning Techniques and their Applicability Depending on the time available for this part of the course: Linear Regression, Logistic Regression, Decision Trees, Random Forests, Deep Learning, Unsupervised Learning, and/or Text Mining.
- 4) Introduction to Automated Planning & Scheduling (P&S) as a domain of Artificial Intelligence for optimisation. What problems can be solved? What are the challenges? What techniques are used?

All parts are accompanied by examples either from the space industry or simpler so that the participants can easily grasp the concepts and relate to them for their own use.

If you have a project in this domain and you want to advertise it to the community, a specific section will be organised during the second day. You can contact the Swiss Space Center for more information.

This workshop is supported by the Software for Operations Working Group and the Earth Observation and Remote Sensing Working Group of the Swiss Space Center.

More information, a detailed agenda of the two days and the registration portal will be published early September.

About the trainers:

- **Jose Martinez-Heras** is a senior research engineer at Solenix working on-site at the European Space Operations Center. He is leading the Machine Learning efforts in Space Operations from the ESA side. His work on early anomaly detection, anomaly investigation and forecasting has led to safer operations on several ESA missions. Jose is experienced in artificial intelligence, machine learning and data analytics.
- **Nicola Policella** is a senior research engineer at Solenix with more than 15 years of experience working for the European Space Agency. He has been responsible for the design and development of advanced software solutions supporting the operations of several missions such as MarsExpress, SOHO, Integral or Alphasat. Nicola is a PhD-educated computer scientist specialised in Artificial Intelligence applied to planning and scheduling problems.

Agenda

Day 1 – Tuesday October 8th:

09h30 – 10h00	Reception (coffee)
10h00 – 10h15	Welcome & Introduction G. Bourban, SSC
10h15 – 12h00	Introduction to Artificial Intelligence (AI) Jose Martinez-Heras, Nicola Policella (Solenix)
12h00 – 13h00	Lunch
13h00 – 14h30	Introduction to Machine Learning (ML) Jose Martinez-Heras, Nicola Policella (Solenix)
14h30 – 15h00	Coffee Break
15h00 – 17h00	Machine Learning Techniques and their Applicability Jose Martinez-Heras, Nicola Policella (Solenix)
17h00 – 17h15	Wrap-up day 1

Day 2 – Wednesday October 9th:

08h30 – 12h00	Automated Planning & Scheduling (P&S) Jose Martinez-Heras, Nicola Policella (Solenix)
12h00 – 13h00	Lunch
13h00 – 13h30	The ESA Φ Lab and AI for Earth Observation Chris Stewart, Research Fellow, Φ -lab, ESA/ESRIN
13h30 – 16h00	Participants' presentation on internal developments linked to AI