SPACE AND ARTIFICIAL INTELLIGENCE
Online Conference, September 4th, 2020
Organized by CLAIRE and ESA, in association with ECAI2020

AIDA: Artificial Intelligence Data Analysis with application to the detection and prediction of space events

Names and affiliations of the authors: Giovanni Lapenta, KULeuven
Designated speaker: Giovanni Lapenta

Three trends are data revolutionising science in every field and in particular in space science: 1) the accumulation of large data sets, too large to analyse with traditional methods based on the human mind; 2) the transition towards python, a freely available language with a suite of available tools and functionalities with no competition; 3) the penetration of machine learning (ML) and artificial intelligence (AI) in every aspect of out life. AIDA is a consortium of several teams in Europe and America (see www.aida-space.eu) that collects these three trends into the development of a python-based tool to obtain, process and analyse space data using machine learning tools. This tool is AIDAPy, available to all from https://gitlab.com/aidaspace.
AIDAPy has already been used for some typical tasks of space science such as retrieving and analysing data from space missions. A key aspect of AIDA is the ability to treat in the same manner observation and simulation data: virtual satellite crossings in simulation can be used together with real crossings to train and study machine learning tools. ML needs data sets to train the neural networks and sometimes data fro observation is of limited availability. Simulations can provide more controlled data where the availability of the larger picture can facilitate labelling and discovering events to train the ML tool. Real data can then be analysed in the same manner using the tools trained on synthetic data. We provide examples of these activities to do two typical tasks: 1) analysing satellite (virtual or real) time series to identify the origin of solar wind plasmas; 2) detecting reconnection events in simulated or real data.
AIDAPy comes with a training and outreach component to facilitate the use by interested researchers. Information is available online at Aida-space.eu under the training and school sections. AIDAPy further provides several exercises based on Juypter notebooks to learn the main features of the tools. Full information on the work done so fare by the AIDA consortium is available at its web site: www.Aida-space.eu.