EUROPLANET 2024 Research Infrastructure

JRA4 ML - Machine Learning Solutions for Data Analysis and Exploitation in Planetary Science
Tasks and Responsibilities

Task 10.1 – Management and Coordination of the JRA
(M1 – M36, IWF-OEAW, KNOW)

Task 10.2 – Requirements for Machine Learning, Tool Validation and Communication
(M1 – M36, IWF-OEAW, KNOW, All)

Task 10.3 – Data Pre-Processing, ETL and Feature Engineering
(M3 – M36, UNI PASSAU, KNOW, All)

Task 10.4 – Time-based Signal Analysis and Automatic Classification
(M3 – M36, KNOW, IWF-OEAW, IAP-CAS)

Task 10.5 – General Classification Tools
(M3 – M36, KNOW, UNI PASSAU)

Task 10.6 – Virtual Access and Interfaces
(M12 – M36, IWF-OEAW, ACRI-ST, KNOW)
IAP CAS

- Detection of plasma boundary crossings at planetary magnetospheres and solar wind (magnetospheres, plasma environments and space weather)

- Search of specific plasma and radio wave emissions and classification according to their spectral, polarization and propagation properties (planetary and solar radio emissions)

IAPS-INAF

- Mineral identification via reflectance spectra (planetary surfaces/compositions/interiors)

  [possible applications foreseen in GMAP]

DLR

- Classification of surface composition on the surface of Mercury (planetary surfaces/compositions/interiors)

  [resulting data products can be used for geological mapping of Mercury (GMAP)]

AOP

- Meteor and Asteroid Astronomy, automatic detection and classification of meteor signal (small bodies, asteroids & comets)
Science Cases for ML (unfunded)

GMAP

- Automatic recognition and analysis of planetary surface features (planetary surfaces / compositions / interiors)

  [Collaboration in context of this science case, use of resulting ML tools to produce high-level data products]

IWF-OEAW

- Stellar light-curve analysis for the search and classification of exoplanets (Exoplanets)

- Detection and classification of CMEs and CIRs in in-situ solar wind data (magnetospheres, plasma environments and space weather)

LMSU

- Analysis and forecasting of space weather events and solar wind conditions (magnetospheres, plasma environments and space weather)
Deliverables

D10.1, D10.2, D10.7 — Annual Reports 1, 2 and 3 (M12, M24, M36)
Agendas and feedback from workshops etc., description of requirements, high-level data products, …

D10.3 — Tutorial on Machine Learning and Basic How To’s (initial release) (M25)
Theoretical background, (user-) interfaces and potential applications, practical examples and best practices

D10.4 — Demonstrator and Documentation of Data-Processing techniques (M36)

D10.5 — Demonstrator and Documentation of Time-based Signal Analysis and Automatic Classification Tool (M36)

D10.6 — Demonstrator and Documentation of General Classification Toolset (M36)
All demonstrators also include UIs as applicable.

D10.8 — Tutorial on Machine Learning and Basic How To’s (final release) (M36)
MS11 — *Requirements for ML tools documented (M4)*
Science cases analysed, all relevant requirements extracted & documented

MS51 — *ML Demonstrators implemented and tested (M24)*
Initial versions of tools for data preparation & ML analysis for every science case

MS86 — *ML Demonstrators fully validated and integrated (M36)*
Final versions of tools for data preparation & ML analysis for every science case
## Overview (Tasks, Deliverables, Milestones)

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**Legend:**
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