Bachelor / Master Thesis

Using AI/ML for event detection in space object catalogues

YOUR MISSION:

In Space Situational Awareness (SSA), space objects are observed, their orbits are determined, and the gained knowledge is saved in space object catalogues. Next to using the data contained in such a catalogue for direct analysis, i.e. determining the position of an object or performing conjunction analyses, they can be used to gain more knowledge on the single objects. As the data is saved as time series, it can be used to detect irregularities (so called events) or used to ascertain an object's mission. Classical statistical methods are used to derive characteristics of the time series. In the context of this work, methods from the machine learning domain shall be explored to improve on these tasks. Within this thesis, the following work shall be performed:

- Perform a literature research on methods currently used for event detection,
- Explore methods from the machine learning domain, suitable for:
    - Event/anomaly/outlier detection, and
    - Clustering of space objects based on their orbital behavior.
- Research suitable reference data documenting actual events of space objects
- Test these methods on the TLE catalogue.

The final task and scope will be laid out based on the Student's skills and interests.

YOUR PROFILE:

- Studying computer science, data science, or a related topic,
- Experience in applying machine learning to problems from an unfamiliar domain,
- Practical experience in using at least one popular machine learning framework,
- Basic knowledge of orbital mechanics and/or spaceflight are a plus,

YOUR BENEFITS:

- Team of motivated entrepreneurial colleagues and experts in the space domain
- Fair payment
- Free coffee, lunch routines and fun office events

ABOUT US:

OKAPI:Orbits is a young start-up developing an innovative AI-based platform for automated collision avoidance of satellites. We value entrepreneurial-minded, creative people, who are willing to take responsibilities to actively contribute to the development of OKAPI:Orbits and its products.

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