Contribution ID: **32** Type: **talk**

State of Polaris, more visualization in using ML for space operations

Friday, 10 December 2021 11:20 (20 minutes)

Satellite constellations are growing at the fastest rate ever. Small teams of satellite operators now monitor the satellite health of dozens to hundreds of satellites as a part of missions like starlink, project Kuiper and OneWeb constellation. The Polaris project provides an open-source machine learning tool for easy analysis of telemetry to find dependencies between satellite parameters as well as a behaviour analysis tool (BETSI) to learn from any spacecraft behaviours and automatically detect anomalies.

This presentation gives an update to the community on the progress made to integrate a browser-based frontend for the information detected by Polaris, such as anomalies, and the possibility to explain the root cause by comparing the dependency graph generated by Polaris before and after any detected anomalies.

A ReactJS based frontend for visualizing the telemetry overlayed with the anomalies detected was developed thanks to the support of the Google Summer of Code 2021. The latent representation from the deep learning model can also be visualized along with the actual satellite health parameters to make it easy to understand what the model has detected as the changing parameters.

Currently the project is being redesigned to increase modularity and interfacing capabilities. Discussions are open on feature requests, useful ways to visualize output of machine leaning tools for spaceops.

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Session Classification: Talks