18th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Operations in Space Debris Environment, Situational Awareness (7)

Author: Ms. Ines Alonso Gómez
CDTI (Centre for the development of Industrial Technology), Spain, ines.alonso@cdti.es

Dr. Noelia Sanchez Ortiz
Deimos Space S.L., Spain, noelia.sanchez@deimos-space.com
Dr. Daniel García Yárnoz
Centre for the Development of Industrial Technology (CDTI), Spain,
daniel.garciayarnoz@community.isunet.edu
Mr. Ignacio Grande Olalla
Deimos Space S.L., Spain, ignacio.grande@deimos-space.com
Mr. Daniel Lubian Arenillas
Deimos Space SL, Spain, daniel.lubian@deimos-space.com

MACHINE LEARNING APPLIED TO OPTIMISING THE TASKING OF THE SPANISH SST
OPTICAL SENSOR NETWORK

Abstract

In the frame of Spanish SST activities, and in particular with regards to the operations of the national network of SST sensors (S3TSN), the S3TOC (Spanish operational center for SST) is undertaking research activities aimed at optimising the use of national resources. One of these initiatives is focusing on an analysis of the sensors performances over three years of operations, with focus on the nine optical sensors contributing to the S3TSN network.

Data since July 2016 is being analysed, with Machine Learning techniques, in order to identify the most relevant patterns in regards to unsuccessful tasks that have not been accomplished by the sensors. The outcome of the study is being considered for new dynamic planning of activities under evaluation in the S3TOC.

Unsupervised machine learning algorithms are applied to a set of data formed by the original planning requests sent by the S3TOC sensor planner, the orbital information associated to those objects (maintained by the S3TOC cataloguer or based on third party information), and the Sensor Monitoring System (SMS) deployed at S3TOC. SMS retrieves the information from the sensors daily data, including information on any relevant technical unavailability and information on weather conditions.

Over the past three years of operations, more than 1200 planning requests with more than 150000 observation slots have been sent to the nine optical telescopes of the S3TSN. The study is intended to identify patterns for unsuccessful tasks, in a sensor-wise manner, and in particular evaluating which are the main aspects playing a role (faint objects, inaccurate orbital information, geometrical conditions, sky conditions, etc.) with the aim to identify the best recommendations for future tasking to minimise the impact of such conditions.

The paper summarises the analysed data, the main findings from the analysis, and the approach for incorporating those findings into new approaches for the tasking of the national SST sensor network. General recommendations for SST observations will also be derived.