Dynamic Double anomaly Detection through evolving clustering: Application to on-board space radiation faults

Adrien Dorise, Louise Travé-Massuyès, Audine Subias, Corinne Alonso

To cite this version:

Adrien Dorise, Louise Travé-Massuyès, Audine Subias, Corinne Alonso. Dynamic Double anomaly Detection through evolving clustering: Application to on-board space radiation faults. ANITI presentation, Mar 2022, Toulouse, France. 2022. hal-03622285

HAL Id: hal-03622285
https://laas.hal.science/hal-03622285
Submitted on 28 Mar 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Dynamic Double anomaly Detection through evolving clustering: Application to on-board space radiation faults
Adrien Dorise (PhD)
Supervisors: L. Travé-Massuyès, A. Subias, C.Alonso

Context

- Space radiation is a primary concern for space agency
- Today’s out of limit detection is becoming obsolete
- Machine learning is investigated as a new anomaly detection method
- A dynamic method for embedded systems called DyD² is proposed

CNES collaboration

- Space case study based on ANGELS project
- Experimental testing with laser and heavy ion

New algorithm: DyD²

1. Training
2. Change point detection
3. Updates
4. Outer features extraction
5. Inner feature extraction
6. 1st anomaly detection
7. Waiting period
8. 2nd anomaly detection

Results

- DyD² is showing same result as state-of-the-art algorithms
- DyD² is faster and takes less resources to perform on online data
- DyD² is adequate to equip modern satellite on space mission