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

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

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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. Outer features extraction
4. Updates
5. 1st anomaly detection
6. Waiting period
7. Inner feature extraction
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