



SMART

SPACE-BASED MACHINE AUTOMATED RECOGNITION TECHNIQUE

INTELLIGENCE VALUE

SMART automates broad-area search of multi-source satellite imagery to detect, monitor, and characterize the progression of anthropogenic or natural processes, such as heavy construction or crop growth. By augmenting the manual imagery analysis process with global-scale image processing and machine learning, SMART will provide timely discovery and robust monitoring of man-made and natural change.

Manual exploitation methods do not scale with the volumes of data available from single individual sensors, and they fail altogether at the problem of simultaneously analyzing data from past, current, and future space-based systems. With the growing quantity and diversity of imagery collected, the Intelligence Community is seeking novel methodologies to improve the analysis process and efficiently distill the data into actionable intelligence.

SMART innovations in data fusion and automated reasoning techniques will enable large-scale monitoring of both man-made and natural change with unprecedented temporal resolution and area coverage, erasing strategic surprise. Harmonization ensures calibration, correction, and georegistration, which allows the creation of a virtual constellation, providing the necessary coverage and temporal resolution for many

intelligence problems. Subsequently, machine learning and reasoning activities across spatial, spectral, and temporal features deliver automated sense-making against the harmonized data, enabling global alerting for change of interest.

The SMART program will use detection and monitoring of heavy construction as an initial use case and investigate

as to the transferability of the approach to other forms of natural and anthropogenic change. The ability to accurately characterize the temporal stage of dynamic processes in an automated fashion will validate the mission utility of SMART's harmonized multi-source imagery and machine learning system.

PRIME PERFORMERS

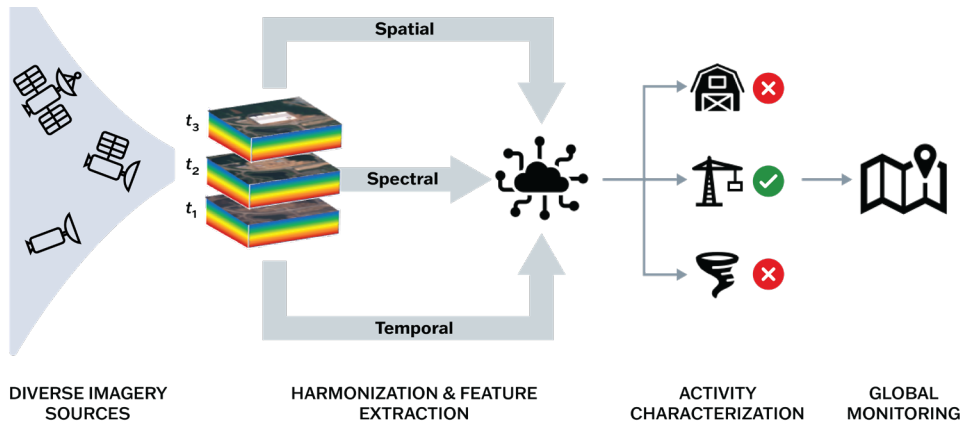
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- Kitware Inc.
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TESTING AND EVALUATION PARTNERS

- Johns Hopkins University Applied Physics Lab
- National Aeronautics and Space Administration Goddard Space Flight Center
- MITRE
- Savannah River National Laboratory
- United States Geological Survey

KEYWORDS

- Data Harmonization
- Broad Area Search
- Activity Recognition
- Time-series Analysis
- Machine Learning



SMART's approach to broad area search will harmonize multi-modal imagery sources and extract diverse features from that data, then apply machine learning models to characterize the underlying activity and provide that awareness at global scale.



PROGRAM MANAGER

Jack Cooper, Ph.D.

Phone: (301) 243-2033

jack.cooper@iarpa.gov



www.iarpa.gov



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