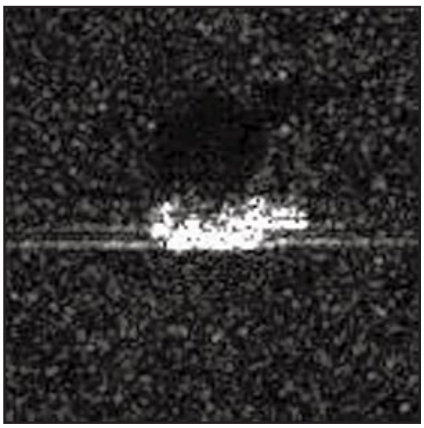
Data Management Environment Database Provides Low Cost Signature Data



Payoff

The Data Management Environment (DME) database dramatically reduces the cost and schedule to provide signature data to research and development automatic target recognition programs. Using the DME, a customer can receive all data from a particular collection for about $5,000 versus $300,000 using a flight test program and obtain the data in about two-weeks compared to five-months for a flight test program.

Accomplishment

Working with a team from industry and academia, engineers at the Sensors Directorate (SN) developed a database to provide low-cost signature data required in the development of automatic target recognition (ATR) software. The DME database is the repository of several high-cost signature data collections from various programs collated into products for dissemination to ATR programs.

Background

The development of ATR software capable of locating and identifying targets is very complex. A T-72 Tank can be easily identified from a photograph, however, it is much more difficult to identify a Synthetic Aperture Radar imagery of the same T-72 Tank. Training software to recognize a target is very difficult because the designer must characterize it at the pixel level from every direction and from multiple angles above the horizon. Additionally, various sensors see different characteristics of a target. For instance, the infrared sensor will define the target in terms of what is hotter and what is cooler, while radar defines the target as reflected energy. For research and development efforts, the sensor was mounted in a testbed aircraft where signature data was collected from various viewing angles with varying operating conditions. Depending on the amount of data and the many operating conditions of the vehicles in which to be collected, a data collection can cost hundreds of thousands of dollars. Prior to the development of DME, agencies had to plan new data collections every time data was required, since few, if any, data repositories existed to query for data of interest. Store-housing the data was physically impossible because of limitations in data storage and retrieval technology. The DME is a hybrid database capable of storing up to a terabyte of signature data, with all the information about the data residing in the form of database tables. Data from previous collections were imported into the DME database and is being leveraged for ongoing programs. The data is sorted according to data type, sensor type, wavelength of sensor, viewing angle, polarization, frequency of choice and target characteristics. This Air Force database is available to a wide community with the Army already contributing data and the Navy using the database for several of its programs.