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CLOSED-LOOP GEOSPATIAL INTELLIGENCE WITH COMMERCIAL SATELLITE IMAGERY

Abstract

We demonstrate closed-loop geospatial intelligence Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) pipeline that provides data and data analyses using commercial satellite imagery. This capability is enabled by the Cloud-based Automated Satellite Tactical TCPED (CASTT) software platform that leverages the proliferation of earth-observing satellites and the maturation of the commercial satellite imagery market. We connect these data sources with emerging next-generation analysis algorithms for object detection/pattern of life monitoring and state-of-the-art tasking algorithms.

We implement an automated closed-loop pipeline that, based on high-level user-specified missions, continuously and autonomously tasks satellites for data collection, analyzes it, and then issues follow-up collection tasks to the satellites based on the analyses while disseminating data and analyses directly to end users. This results in lower latency and more relevant data and data products delivered straight to users and enables the effective monitoring of larger areas through the use of intelligent automation. In contrast, the current manually intensive satellite imagery intelligence process is time consuming, laborious, and slow. Automation and optimization results in more timely information, better use of highly constrained resources, and better intelligence.

We demonstrate this process using real data and real automated commercial connections with satellite operators for a sample mission concerning a port monitored for pattern of life in naval ship behavior. In the sample mission, the high-level mission is pattern of life monitoring for detected ships of different classes for the sample mission. CASTT connects to automated target recognition software to detect ships of different classes in collected imagery. It determines pattern-of-life from historical data which it compares to incoming data. If there is a departure from the typical pattern of life – for example, a missing aircraft carrier – it orders the appropriate follow-up tasking – e.g., tasks data collection for other ports.