Automated Hyperspectral Target Detection and Change Detection from an Airborne Platform: Progress and Challenges

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Abstract

Over the past five years, the Air Force Research Laboratory and the Space Computer Corporation have supported the Civil Air Patrol in the development of the Airborne Real-time Cueing Hyperspectral Enhanced Reconnaissance (ARCHER) system, which combines a visible/near infrared hyperspectral imaging system, high-resolution panchromatic imaging sensor, a real-time on-board target detection processor and other supporting elements to aid in civilian search-and-rescue missions. The procurement and fielding of the ARCHER system provided useful practical experience in terms of moving hyperspectral remote sensing into an operational context, including areas where further advances are needed. It also provided a flying collection platform with which to experiment with and refine target detection and change detection algorithms, and to gain greater insight into detection performance. Many of the system and algorithm characteristics and refinements have been reported previously in the literature. This paper attempts to go one step further in providing several of the key lessons-learned from the CAP ARCHER experience, with a specific aim to illuminate the areas where further progress is needed and suggest approaches that may address these remaining shortfalls.

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