Performance Comparison of Hyperspectral Target Detection Algorithms in Altitude Varying Scenes

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Many different hyperspectral target detection algorithms have been developed and tested under various assumptions, methods, and data sets. This work examines the spectral angle mapper (SAM), adaptive coherence estimator (ACE), and constrained energy maximization (CEM) algorithms. Algorithm performance is examined over multiple images, targets, and backgrounds. Methods to examine algorithm performance are plentiful and several different metrics are used here. Quantitative metrics are used to make direct comparisons between algorithms. Further analysis using visual performance metrics is made to examine interesting trends in the data. Results show an increase in detection algorithm performance as image altitude increases and spatial information decreases. Theories to explain this phenomenon are introduced.

Keywords: target detection, matched filters, hyperspectral imagery, performance metrics

Adam Cisz received a Bachelor’s degree in Imaging Science from Rochester Institute of Technology in 2002 and is currently working towards his Master’s degree in Imaging Science. His research interests include remote sensing, hyperspectral imagery, target detection, and comparison metrics. His thesis focuses on expanding the understanding of existing target detection algorithms through testing over a wide range of images, targets, and backgrounds.