7

SENSITIVITY OF SUBPIXEL DETECTION

In Chapter 3, we considered the target abundance-constrained subpixel detection (TACSD) and evaluated three techniques, OSP, SCLS and NCLS. A major limitation of these techniques is the requirement of complete target knowledge. In Chapter 4, we studied the target signature-constrained subpixel detection (TSCSD) and also evaluated two techniques, CEM and TCIMF. However, their performance is sensitive to the target knowledge used in their filter design and is also closely related to the intrinsic dimensionality (ID) of $\mathbf{R}_{L\times L}$ which is generally unknown and needs to estimate. Unfortunately, the accuracy of the ID estimation is determined by noise level. Similarly, the anomaly detection developed in Chapter 6 also requires the computation of $\mathbf{R}_{L\times L}^{-1}$ with their performance also affected by noise sensitivity. So, this chapter is devoted to a thorough investigation of two issues related to detection performance. One is the sensitivity of target knowledge. Another is the noise sensitivity to computation of $\mathbf{R}_{L\times L}^{-1}$ required for TSCSD. Because the noise variances are determined by eigenvalues, the performance of TSCSD will be evaluated based on the number of eigenvectors used to calculate $\mathbf{R}_{L\times L}^{-1}$. As will be demonstrated, this number plays a significant role in detection performance.