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AUTOMATIC SUBPIXEL DETECTION: UNSUPERVISED SUBPIXEL DETECTION

The subpixel detection studied in Chapters 3 and 4 requires either full or partial target knowledge. In the target abundance-constrained subpixel detection, a linear mixture model is required where the complete knowledge of the target signature matrix **M** must be given *a priori*. In the target signature-constrained subpixel detection, there is no need of a linear mixture model, but the desired target signature **d** must be provided in advance. In many practical applications, such prior knowledge may not be available. One way to remedy this situation is to obtain target information directly from the image data in an unsupervised manner. This chapter considers unsupervised subpixel detection where three unsupervised learning algorithms, unsupervised vector quantization (UVQ) algorithm, unsupervised target generation process (UTGP) and unsupervised NCLS (UNCLS) algorithm are presented. These algorithms extract necessary target information directly from the image data for unsupervised subpixel detection when no prior target information is available. Such generated unsupervised target information is referred to as *a posteriori* target information and can be also used to perform target classification as will be discussed in Chapter 13. One dilemma associated with these unsupervised algorithms is how much target information is sufficient for detection and classification. This is a challenging problem. On many occasions, it is closely related to the virtual dimensionailty, which will be discussed in Chapter 17.