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TARGET SIGNATURE-CONSTRAINED MIXED PIXEL CLASSIFICATION (TSCMPC): LINEARLY CONSTRAINED DISCRIMINANT ANALYSIS (LCDA)

Fisher's Linear Discriminant Analysis (LDA) is a widely used technique for pattern classification and was discussed in Chapter 9. It uses Fisher's ratio, a ratio of between-class scatter matrix to within-class scatter matrix as an optimal criterion to derive a set of feature vectors by which high dimensional data can be projected onto a low-dimensional feature space in the sense of maximizing class separability. This chapter presents an approach derived from Fisher's LDA, referred to as linear constrained distance-based discriminant analysis (LCDA), that uses a similar criterion to Fisher's ratio for classification. It maximizes the ratio of inter-distance between classes to intra-distance within classes while imposing a constraint that all the class means must be aligned along predetermined directions. Interestingly, the LCDA classifier operates at the same operational form as does OSP in Chapter 8, but achieves better classification resulting from the use of target signature constraints. Because of that, LCDA can be viewed as a constrained version of OSP.