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SPATIAL CONTEXT DRIVEN MANIFOLD LEARNING FOR HYPERSPECTRAL IMAGE CLASSIFICATION

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Abstract

Manifold learning techniques have demonstrated various levels of success in their ability to represent spectral signature characteristics in hyperspectral imagery. Such images consists of spectral features with very subtle differences and at times spatially induced disjoint classes whose neighborhood relations are difficult to capture using traditional graph based embedding techniques. Robust parameter estimation is a challenge in traditional kernel functions that compute neighborhood graphs e.g. finding optimal number of nearest neighbors. Achieving a corresponding high quality coordinate system to exploit spectral feature relationships remains an open research question. We address these challenges by proposing spatial context driven manifold learning methods. Empirically, the study reveals that use of spatial contextual information has a bearing on the structure of the graph Laplacian that in turn links image pixel observations to their manifold spaces. Further experimental results demonstrate an improvement in the classification performance compared to traditional manifold learning methods.