

Public Abstract

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Title:Geometric Image Segmentation via Transform Invariant Rank Cuts

This research propose a novel image segmentation algorithm, named as Transform Invariant Rank Cuts (TIRC). Based on salient 3D geometric information of natural scenes. The segmentation algorithm unities an emerging robust statistics technique called Robust PCA and its recent application in Transform Invariant Low-Rank Texture (TILT) extraction. This proposed novel algorithms address two critical issues that have handicapped the applications of the TILT feature. First, we propose a simple yet efficient algorithm to detect low-rank texture regions in natural images. Second, TIRC is a principled graph-cut solution to partition the TILT features into groups; each group represents a unique 3D planar structure. Using a TILT adjacency graph, the algorithm assigns a TILT feature as a node. Two nodes are connected if they are spatially adjacent, with the cut cost function defined as the total coding length of encoding the two texture regions as low-rank matrices separately. Finally, the classical graph-cut algorithm can be applied to partition the graph into sub-graphs, each of which represents a unique surface texture and 3D orientation. The efficacy and visual quality of this geometric image segmentation algorithm is demonstrated on a large urban scene database.