On the space between critical points

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Abstract

The vertices of the neighborhood graph of a digital picture P can be interpolated to form a 2-manifold M with critical points (maxima, minima, saddles), slopes and plateaus being the ones recognized by local binary patterns (LBPs). Neighborhood graph produces a cell decomposition of M : each 0-cell is a vertex in the neighborhood graph, each 1-cell is an edge in the neighborhood graph and, if P is well-composed, each 2-cell is a slope region in M in the sense that every pair of s in the region can be connected by a monotonically increasing or decreasing path. In our previous research, we produced superpixel hierarchies (combinatorial graph pyramids) that are multiresolution segmentations of the given picture. Critical points of P are preserved along the pyramid. Each level of the pyramid produces a slope complex which is a cell decomposition of M preserving critical points of P and such that each 2-cell is a slope region. Slope complexes in different levels of the pyramid are always homeomorphic. Our aim in this research is to explore the configuration at the top level of the pyramid which consists of a slope complex with vertices being only the critical points of P . We also study the number of slope regions on the top.

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