

Applications of Morphological Multiscale Analysis to Shape Representation

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Abstract: In the last years, a lot of attention has been devoted to the morphological multiscale analysis (MMA) provided by geometric partial differential equations. The MMA satisfy very interesting invariances like the morphological invariance (invariance under non-decreasing histogram modifications) or the invariance under geometric transformations like Euclidean, similarity or affine transformations. In this paper we explore the applications of the MMA to shape representation. The first application that we study is the extraction of characteristic points (corners) of a shape. We will show that, by using MMA, we can extract corners in the image with a high accuracy. The proposed method is robust and independent of the contrast of the corner. We will present the application of this technique to the problem of multiple camera calibration. The second application of MMA that we present in this paper is a new geometric invariant representation of shapes. The geometric invariance is based on a normalized surface and/or perimeter evolution of the shape under the action of a MMA. We analyze the cases of Euclidean invariant, similarity invariant, and affine invariant geometric representations. We also present some numerical results to evaluate the performance of the proposed models.

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Partial Differential Equations and Variational Methods in Image Analysis

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