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ABSTRACTS

A Deterministic Algorithm for Optical Flow Estimation

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Motion computation is a fundamental and difficult problem of Computer Vision which regards either the computation of 3-D motion in the image space or the computation of 2-D motion in the image plane. Here, we deal with the latter problem, which is also called optical flow.

We propose a new deterministic algorithm for estimating optical flow through regularization techniques so that the solution of the problem is defined as the minimum of an appropriate energy function. We also assume that the displacements are piecewise continuous and that the discontinuities are variable to be estimated. More precisely, we introduce a hierarchical three–step optimization strategy to minimize the constructed energy function, which is not convex. In the first step we find a suitable initial guess of the displacements field by a gradient–based GNC algorithm. In the second step we define the local energy of a displacement field as the energy function obtained by fixing all the field with the exception of a row or of a column. Then, through an application of the shortest path technique we minimize iteratively each local energy function restricted to a row or to a column until we arrive at a fixed point. In the last step we use again a GNC algorithm to recover a sub–pixel accuracy. The experimental results confirm the goodness of this technique.