MULTISCALE MOTION ESTIMATION BASED ON A POTTS-MARKOV, BAYESIAN, SEGMENTATION SCHEME

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Abstract

In a video scene, motion estimation (ME) can be studied on a dense field (optical flow) or on image structures or regions. Image structures can be deduced from the motion itself or formerly deduced by a segmentation. A scheme of ME, funded on a Bayesian segmentation using a Potts-Markov model, has lead to a "region-matching" ME scheme [1]. Bayesian segmentation has been operated, with the same model, in the wavelet domain and has shown an interesting gain in segmentation speed [2]. In the present work we have synthesized both approaches to demonstrate a new scheme of region-matching ME which uses the hierarchical property of the multiscale segmentation scheme. A bottom-top ME is built from the hierarchical segmentation in the wavelet domain. We show that a hierarchical, region-based, ME, can provide an interesting approach w.r.t. the necessity of ME robustness as well as its scalability and its progressivity, in an object (or region) -based compression scheme. This approach is compared with recent developments like the "structure from motion" (SfM) in [3], based on Bayesian inference and sequential Monte Carlo methods, and the "trace model" for object (face) detection and tracking in [4].

References:

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