Motion Tracking in Images based on Stochastic Filters and Optimization

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Abstract

Motion tracking in images is an Image Analysis problem that has evolved considerably in the last years. In fact, improvements have been made to try to overcome usual complex and ambiguous situations, due to, for example, cluttered backgrounds, occlusion occurrences, large geometric deformations, illumination variations or noisy data [1-3]. Therefore, through more enhanced computational solutions and imaging resources, the image based tracking is being progressively accurate and robust in numerous applications, such as surveillance, analysis of objects' deformation, medical diagnosis, traffic monitoring and biomechanical analysis [1-3].
Usually, to track features in images their temporal behavior is estimated by stochastic filters and in each image the predicted state of each feature is matched with the segmented features' data. Consequently, to successfully accomplish the tracking of features along images it should be employed: a stochastic filter; a matching strategy; a methodology to segment the features from each image; an efficient model to perform the management of the tracked features; and a stochastic approach to learn the dynamic model of the features from the tracked motion [1-4].
Therefore, in this work will be presented a computational framework designed to track features in images that uses a Kalman Filter to estimate the temporal behavior of the tracked features, optimization techniques in the matching step, a stochastic modeling in the segmentation task, a features management model, and hidden Markov models to learn the features dynamic model. Additionally, several experimental examples will be presented and discussed.

Acknowledgments

The second and third authors would like to acknowledge the support of the PhD grants with references SFRH/BD/12834/2003 and SFRH/BD/28817/2006 from the Portuguese Fundação para a Ciência e Tecnologia (FCT).

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