

Fast algorithm for hybrid region-based active contours optimisation

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Abstract: Active contours are usually based on the optimisation of energy functionals that are built to attract the curve towards the objects' boundaries. This study describes a hybrid region-based active contours technique that uses global means to define the global fitting energy and local means and variances to define the local fitting energy. The optimisation of the functional is performed by applying a sweeping-principle algorithm, which avoids solving any partial differential equation and removes the need for any stability conditions. Furthermore, sweeping-principle algorithm is not based on the computation of derivatives, which allows using a binary level set function during the minimisation process instead of the signed distance function, consequently this removes the need for the distance regularisation term, avoiding its subtle side effects and speeding up the optimisation process. Successful and accurate segmentation results are obtained on synthetic and real images with a significant gain in the CPU execution time when compared with the minimisation via the commonly used gradient descent method.

Keywords : image segmentation