Adaptive homotopy for organ segmentation

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Abstract

Homotopic transformations can be designed in the framework of digital imaging thanks to the notion of simple point, leading in particular to discrete deformable models. However, such transformations are intrinsically limited to binary objects, and are then dedicated to mono-label segmentation. In this talk, we show how recent advances in the framework of digital topology lead to the definition of a multilabel version of the notion of simple point. We then illustrate how this allows for the development of new paradigms of topology-controled segmentation techniques that can (1) deal simultaneously with multiple labels and (2) adapt their behaviour to the level of detail where an image is processed. This leads to a multiscale, multilabel segmentation approach. Results are illustrated in the context of segmentation of brain tissues from cerebral MR images.

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