Graph cut segmentation using a constrained statistical model with non-linear and sparse shape optimization.

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This paper proposes a novel segmentation method combining shape knowledge obtained from a constrained Statistical Model (SM) into the well known Markov Random Field (MRF) segmentation framework. The employed SM based on Probabilistic Principal Component Analysis (PPCA) allows to compute local information about the remaining variance i.e. uncertainty about the correct segmentation boundary. This knowledge about the local segmentation uncertainty is then used to construct a prior with a non-linear shape update mechanism, where a high cost is incurred in locations with little uncertainty and a low cost for shifting the segmentation boundary in locations with high uncertainty. Experimental results for segmenting the masseter muscle from CT data are presented showing the advantage of including the knowledge about local segmentation uncertainties into the segmentation framework.
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