Contours corresponding to organ and tumor boundaries in CT images are computed by combining region growing, gradient edge detection, and prior shape constraints, without explicit anatomy knowledge. Region growing and contour-anatomic boundary matching are posed as maximum *a posteriori* problems, so that contours are obtained with minimum Bayes risk, or minimum average error. Beginning with a known sample of object-interior pixels on a single CT section, alternating steps of incremental region growth and optimal contour determination for that region produce a contour corresponding to the object boundary. Optimal contours correspond to maxima of an objective function summing contributions from the contour fit to the region perimeter, to local maxima in the gray level gradient, and to the shapes of prior contours of the object. The contour is a parametric (Fourier elliptic) curve where the parameters are the objective function's independent variables. Taken as random variables, the parameters' conformance to prior contours' probability densities constrain the computed shapes. As coefficients of truncated Fourier series, the parameters have shape-frequency information useful in optimization and testing. Region growing is conducted by a supervised classifier, re-calibrated for each section. The same classifier is used to find the like-textured pixels on neighboring sections to propagate the contours in 3-D. The method successfully contours test images with signal-to-noise ratios < 2.0. Up to 80% of the serial sections of some abdominal organs can be computed without requiring editing. Results on several soft tissues will be demonstrated.

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