AbstractID: 8328 Title: Simpler and faster watershed medical image segmentation algorithm

Purpose: A watershed medical image segmentation method has a drawback of producing a region for each local minimum, resulting in oversegmentation. To alleviate this problem, a post merging process such as a hybrid graph merging algorithm is used, which impedes interactive segmentation with a graphical user interface. An effective watershed algorithm without a post merging process is proposed. **Method and Materials:** Our algorithm, as the preprocessing, includes the edge-preserving noise reduction and gradient-based boundary sharpening steps. Because the initial oversegmentation depends on the gradient image intensity variations, the noise reduction algorithm can reduce the problem appreciably. A well-known statistical edge-preserving noise reduction algorithm is implemented to preserve the boundaries of the image objects which have different physiological properties. Gradient-based boundary sharpening stage follows the novel edge-preserving noise reduction step. Boundary sharpening process combined with watershed segmentation results in an effective watershed algorithm without a post merging process. The combination of the standard gradient values with two cross operators makes the edges sharper and thinner. A threshold value is controlled interactively with a steppedup graphical user interface in the boundary sharpening process. **Results:** We applied the method to both CT and MR images. Interactive real time medical image segmentation was possible with a graphical user interface. Threshold values were manipulated interactively with a mouse to get an appropriate segmentation of the abdomen CT image. It was also confirmed that this method produced the same segmentations as those of hybrid-merging algorithm for the MR brain images. **Conclusions:** In the gradient-based watershed, computing time is negligible and storage requirement can be reduced appreciably because a post hybrid merging algorithm is not necessary. Moreover, interactive real time segmentation is possible with the steppedup graphical user interface.