Image analysis of ocular fundus for retinopathy characterization*

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Automated analysis of ocular fundus images is a common procedure in countries as England, including both nonemergency examination and retinal screening of patients with diabetes mellitus. This involves digital image capture and transmission of the images to a digital reading center for evaluation and treatment referral. In collaboration with the Optometry Department, University of California, Berkeley, we have tested computer vision algorithms to segment vessels and lesions in ground-truth data (DRIVE database) and hundreds of images of non-macular centric and nonuniform illumination views of the eye fundus from EyePACS program. Methods under investigation involve mathematical morphology (Figure 1) for image enhancement and pattern matching. Recently, we have focused in more efficient techniques to model the ocular fundus vasculature (Figure 2), using deformable contours. Preliminary results show accurate segmentation of vessels and high level of true-positive microaneurysms.

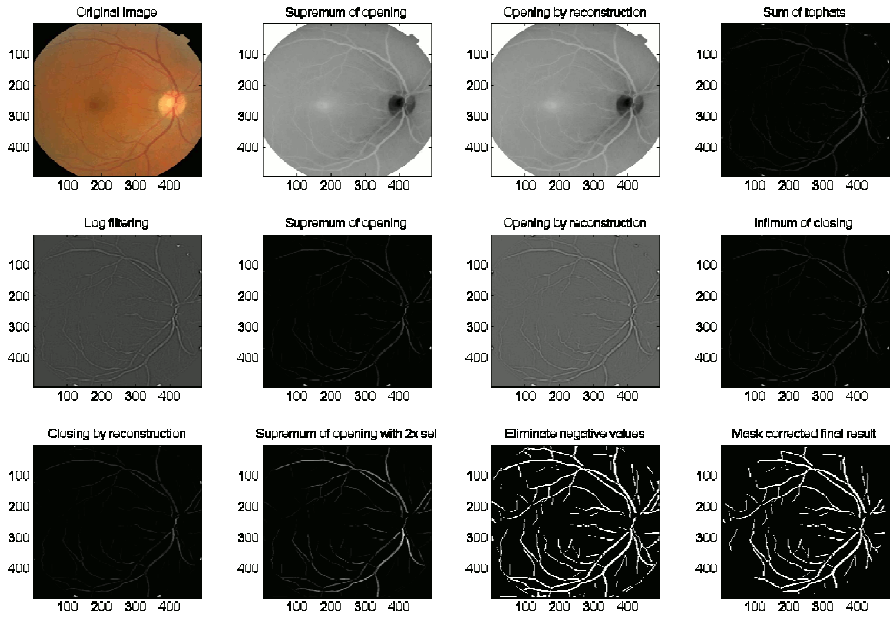

Figure 1. Vasculature segmentation using morphological methods only.

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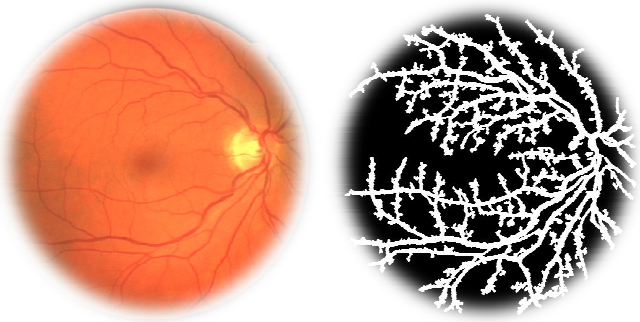

Figure 2. Vasculature segmention using fast marching methods.

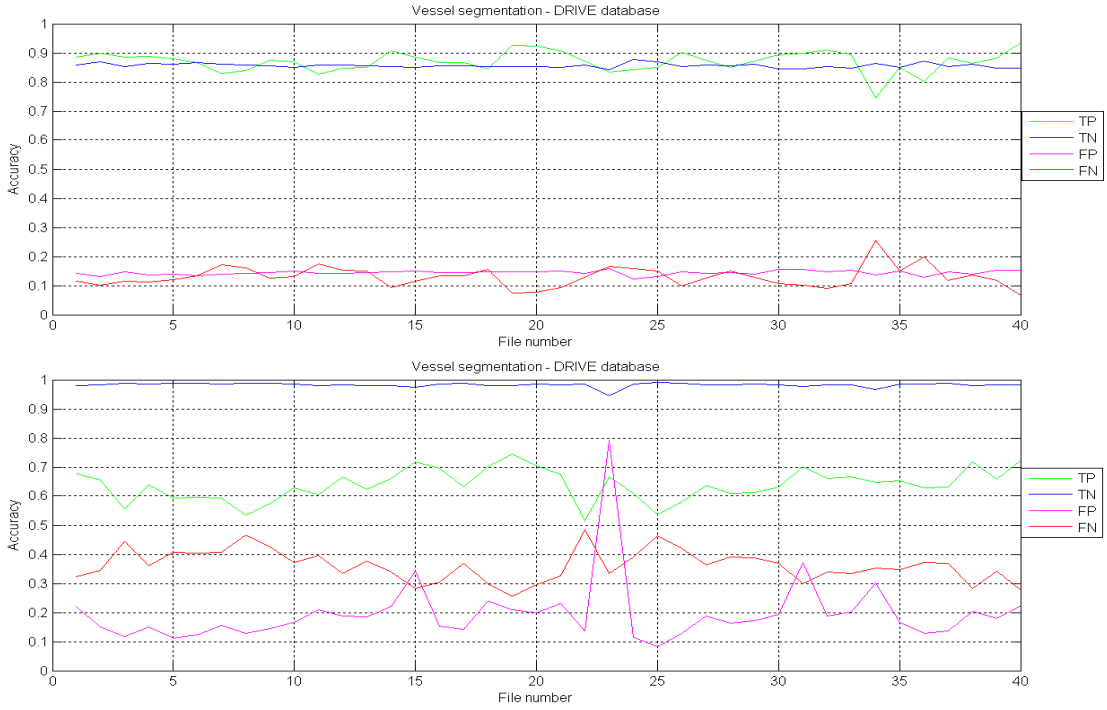

Figure 3. Vasculature segmentation accuracy using DRIVE database: (top) mathematical morphology and (bottom) fast marching.

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