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Segmentation of Optic Nerve Head and Peripapillary Atrophy Region with Level Set Algorithm

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Detection of damages in the optic nerve head (ONH) and Peripapillary Atrophy (PPA) area in the early stage holds a crucial task in identification of glaucoma. Due to difficulty encountering inconsistent image contrasts and fuzzy edge features, automatic and precise detection of ONH and PPA boundaries is needed to increase reliability of glaucoma screening. To reach this goal, we propose automatic ways of segmenting and extracting ONH and PPA regions. In localizing the center of ONH, standard deviation filtering and averaging were performed onto the retinal images. For the regions of interests (ROI): channel selection, contrast adjustment, smoothing, and level set algorithm were used to segment the boundaries of ONH and PPA. The processes were applied onto ten randomly selected retinal images acquired from out-patients at Seoul National University. Comparing the results with manually segmented images by an ophthalmologist, the automatic way brought optimal results.

References

[1] Rafael C. Gonzales and et al., *Digital Image Processing Using MATLAB, Pearson Prentice Hall* (2004)