An Automatic Graph-Based Approach for Artery/Vein Classification in Retinal Images

Abstract:

The classification of retinal vessels into artery/vein (A/V) is an important phase for automating the detection of vascular changes, and for the calculation of characteristic signs associated with several systemic diseases such as diabetes, hypertension, and other cardiovascular conditions. This paper presents an automatic approach for A/V classification based on the analysis of a graph extracted from the retinal vasculature. The proposed method classifies the entire vascular tree deciding on the type of each intersection point (graph nodes) and assigning one of two labels to each vessel segment (graph links). Final classification of a vessel segment as A/V is performed through the combination of the graph-based labeling results with a set of intensity features. The results of this proposed method are compared with manual labeling for three public databases. Accuracy values of 88.3%, 87.4%, and 89.8% are obtained for the images of the INSPIRE-AVR, DRIVE, and VICAVR databases, respectively. These results demonstrate that our method outperforms recent approaches for A/V classification.