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Evaluation of Fractal Dimension effectiveness for damage detection in retinal background

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Abstract

This work investigates the characterization of bright lesions in retinal fundus images using texture analysis techniques. Exudates and drusen are evidences of retinal damage in diabetic retinopathy (DR) and age-related macular degeneration (AMD) respectively. An automatic detection of pathological tissues could make possible an early detection of these diseases. In this work, fractal analysis is explored in order to discriminate between pathological and healthy retinal texture. After a deep preprocessing step, in which a spatial and colour normalization are performed, the fractal dimension is extracted locally by computing the Hurst exponent (H) along different directions. The grayscale image is described by the increments of the fractional Brownian motion model and the H parameter is computed by linear regression in the frequency domain. The ability of fractal dimension to detect pathological tissues is demonstrated using a home-made system, based on fractal analysis and Support Vector Machine, able to achieve around a 70% and 83% of accuracy in E-OPHTHA and DIARETDB1 public databases respectively. In a second experiment, the fractal descriptor is

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