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Barnard Feature Point Detector for Low-Contractperiapical Radiography Image

Authors : Chih-Yi Ho, Tzu-Fang Chang, Chih-Chia Huang, Chia-Yen Lee

Abstract : In dental clinics, the dentists use the periapical radiography image to assess the effectiveness of endodontic treatment of teeth with chronic apical periodontitis. Periapical radiography images are taken at different times to assess alveolar bone variation before and after the root canal treatment, and furthermore to judge whether the treatment was successful. Current clinical assessment of apical tissue recovery relies only on dentist personal experience. It is difficult to have the same standard and objective interpretations due to the dentist or radiologist personal background and knowledge. If periapical radiography images at the different time could be registered well, the endodontic treatment could be evaluated. In the image registration area, it is necessary to assign representative control points to the transformation model for good performances of registration results. However, detection of representative control points (feature points) on periapical radiography images is generally very difficult. Regardless of which traditional detection methods are practiced, sufficient feature points may not be detected due to the low-contrast characteristics of the x-ray image. Barnard detector is an algorithm for feature point detection based on grayscale value gradients, which can obtain sufficient feature points in the case of gray-scale contrast is not obvious. However, the Barnard detector would detect too many feature points, and they would be too clustered. This study uses the local extrema of clustering feature points and the suppression radius to overcome the problem, and compared different feature point detection methods. In the preliminary result, the feature points could be detected as representative control points by the proposed method.

Keywords : feature detection, Barnard detector, registration, periapical radiography image, endodontic treatment
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