

Analysis of Compound Enhancement Algorithms (CEA) based on Adaptive Histogram Equalization (AHE) on Intra-oral Dental Radiographs Images

Siti Arpah Ahmad, Mohd Nasir Taib, NoorElaiza Abd Khalid, Rohana Ahmad
University Teknologi MARA, Shah Alam, Malaysia

Haslina Taib
School of Dental Sciences, Universiti Sains Malaysia, Helath Campus, Kubang
Kerian, Malaysia

ABSTRACT

Abnormalities are the main interest of dentists in examining the radiographs for determining any diseases that may appear at the apices of the teeth. However poor quality radiograph produces weak visual signal that may produce misleading interpretations. Hence the quality of radiograph influence dentists' decision that reflects the success or failure of any suggested treatments. Therefore this work intend to analyze the abnormality found in intra-oral dental radiographs by comparing the original images with images that had been enhanced using compound enhancement algorithms (CEM) namely Sharp Adaptive Histogram Equalization (SAHE) and Sharp Contrast adaptive histogram equalization (SCLAHE). Results show that SCLAHE enhanced images provide slight improvement, compared to the original images, in detecting widen periodontal ligament space abnormality.

Keywords: Image processing; Intra-oral dental radiograph; periapical lesion; AHE; CLAHE

1 INTRODUCTION

Radiographic diagnosis influence treatment planning and overall cost of dental health care (Steetman,1995). Radiograph images are often noisy and low in contrast and sometimes make it difficult to interpret (Baksi, 2010). High contrast in radiograph images is expensive in term of examination time and x-ray dose to patients (Yousuf, 2011). Besides, radiation also harms human body and bone (Kanwal, 2011). Hence, image processing techniques are an acceptable technique that can be used to assist dentists in improving the diagnosis (Mehdizadeh, 2009; Alves, 2006; Sund,

2006). Contrast enhancement is one of the techniques that are actively being researched to improve the dental radiographs. Even though contrast enhancements are usually built in the software accompanying the x-ray machines, the interactive trial and error adjustment of contrast and brightness is a time-consuming procedure (Sund, 2006). Thus a more automated and universal contrast enhancement is needed to overcome this problem. This work compares the performance of sharpening function combined with adaptive histogram equalization (SAHE) and sharpening combined with contrast limited adaptive histogram equalization (SCLAHE) with the original image. The

