Preprocessing with Contrast Enhancement Methods in Bone Age Assessment

Aye Aye Aung
ayeayeaungucsm86@gmail.com
University of Computer Studies, Mandalay, UCSM

Zin Mar Win
zinmarwin@ucsm.edu.mm
University of Computer Studies, Mandalay, UCSM

Bone age assessment (BAA) using radiological x-rays of the left-hand wrist is important in pediatric endocrinology to correctly assess growth and pubertal maturation. To identify the age, the most commonly used technique is bone age assessment. The bone age is the most commonly used criteria in age and growth disorder. There are two main methods for bone age estimation such as Tanner & Whitehouse (TW) method and Greulich & Pyle (GP) method. Tanner &Whitehouse (TW) method is a score assigning method while Greulich & Pyle (GP) is an atlas matching method. The objective of this research is to improve the accuracy of the automated bone age estimation. To improve the robustness and accuracy of this system, image preprocessing techniques are also necessary. Bone age assessment can affect the accuracy in segmentation because of poor contrast, noise, and various hand positions. Preprocessing steps of this system include background removal, radiological marker removal, image enhancement, and hand rotation methods. In this paper, we use the Contrast Limited Adaptive Histogram Equalization (CLAHE) method to enhance the contrast of the hand bone radiograph. This method enhances the hand radiograph in which the background and body have more brightness. The advantage ofCLAHEis to prevent the over-amplification of noise, it is able to increase contrast. In this paper, we tested contrast enhancement techniques such as Contrast Limited Adaptive Histogram Equalization (CLAHE), Histogram Equalization (HE) and Power Law Transform (PLT) techniques.