

CONTRAST LIMITED ADAPTIVE HISTOGRAM EQUALISATION WITH EDGE ENHANCEMENT FOR MEDICAL X-RAY IMAGES

P. APARNA¹, ANAND JATTI² & SANJAY BHARADWAJ³

^{1,2}Department of Instrumentation Technology, R.V.C.E, Bangalore, India

³Department of Advanced Technologies, Skanray Technologies Pvt. Ltd., Mysore, India

ABSTRACT

Medical images are one of the most important and elementary images, as their usage is in a very sensitive field i.e., the medical field. The raw data got from medical acquisition devices may have a comparatively poor image quality and may be destroyed due to several types of noises. Detection and extraction of information from these poor quality images is very difficult. Thus such images have to undergo a process called image enhancement (IE). The various enhancement techniques aim to improve the visual aspects of an image. The study has been performed on X-Ray images obtained from SKAN-DR machine. For compliance with medical standards and to fulfill the requirements of digital medical images, the images have been enhanced. The aim of this study is to understand how to improve the image quality, enhance features and gain better characteristics of medical images for a right diagnosis.

The technique proposed in this paper begins with the application of a median filter, for removing noise on images followed by application of Contrast Limited Adaptive Histogram Equalization (CLAHE), basically to improve the poor contrast and then finally an unsharp mask filter is applied, which is the most commonly used type of sharpening. The proof of concept of the feasibility of this technique was performed through MATLAB software.

For testing purposes, X-Ray images of different sizes and various anatomy were used. Evaluation, by a clinician showed that the visibility of minute structures and details in the enhanced images were much better than the original images and the technique itself does not induce any artifacts or distortion.

KEYWORDS: X-Ray, Radiography, Enhancement, CLAHE, Unsharp Mask, Filter, SKAN-DR, MATLAB