AN AUTOMATIC CONTRAST-DETAIL PHANTOM IMAGE QUALITY FIGURE EVALUATOR IN DIGITAL RADIOGRAPHY

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ABSTRACT. In radiology, it is significantly important to produce adequate diagnostic information while minimally affecting the patient with the lowest amount of dose. A contrast-detail phantom is generally used to study the quality of image and the amount of radiation dose for digital X-ray imaging systems. For evaluating the quality of a phantom image, the radiologists are required to indicate the location of the holes in each square in the phantom image. Then, the image quality figure (IQF) of the image can be calculated. However, evaluation by the human eye is subjective as well as time-consuming, and it differentiates from person to person. In this paper, an image processing method based IQF evaluator is proposed to automatically evaluate the quality of a phantom image. The experimental results tell us that the proposed IQF evaluator is more sensitive than the observation of radiologists. Moreover, a genetic algorithm is provided to compute the most suitable values of the parameters used in the IQF evaluator.

Keywords: Contrast-detail phantom, Image quality figure, CD curve

1. Introduction. X-rays are forms of radiant energy. Unlike light, X-rays can penetrate the body, which allows a radiologist to produce images of internal structures. The radiologist can then study the internal structure by viewing the produced images. X-ray examinations provide valuable information about one’s health and play an important role in helping his doctor make an accurate diagnosis. In some cases, X-rays are used in assisting in the placement of tubes or other devices in the body or with other therapeutic procedures [4,6,9].

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