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Segmentation of x-ray image for welding defects detection using an improved Chan-Vese model

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Abstract: The welding defects detection in industries is becoming an important area and is attracting the attention of many researchers. Radiography is one of the most widely used techniques for inspecting weld defects. X-ray images are generally characterized by low contrast, poor quality and uneven illumination, so the extraction of weld defects could become a difficult task. Among the techniques most used in this field, it is the active contour and the main problem of this technique is the initial contour selection. To solve this problem and obtain reliable and efficient detection of welding defects, we propose in this work a new approach for welding defects detection from x-ray image based on an improved Chan-Vese model. This improved model is based on three stages. The first stage is the detection the region of interest. In the second stage, we apply the Fuzzy C-Mean (FCM) algorithm to select one of the clusters as the initial contour. In the third stage, we use the Chan-Vese model and the selected initial contour to segment the acquired images and obtain the boundaries of the weld defects. Experiments are carried out on different x-ray welding images of the GDxray database in order to extract the characteristics of the welding defects. The results obtained show the effectiveness of the proposed approach compared to conventional techniques.

Keywords : Chan-Vese model Fuzzy, C-means clustering, X-ray image, Welding defects