

Title           An adaptive image segmentation algorithm for x-ray quarantine inspection of selected fruits  
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### **Abstract**

Although X-ray scanners are commonly used in airports or customs for security inspection, practical application of X-ray imaging in quarantine inspection to prevent propagation of alien insect pests in imported fruits is still unavailable. The first step to identify insect infestation in fruits by X-ray imaging technique is the image segmentation procedure to locate the infestation site. Since the grey level of X-ray images significantly depends on the density and thickness of the test samples, the relative contrast of infestation site to the intact region internal of a typical fruit varies with its position. To accurately determine whether a fruit has sign of insect infestation, we have developed an adaptive image segmentation algorithm based on the local pixels intensities and unsupervised thresholding algorithm. This paper presents the detailed image processing procedure including the grid formation, local thresholding, background removal, and morphological filtering for the determination of infestation sites of a fruit in X-ray image. The real-time image processing procedure was tested with X-ray images of selected fruits such as apple, peach, and guava. We also performed extensive tests and analyses of X-ray images obtained with different image acquisition parameters.