

Purpose: The purpose of the present work is to demonstrate that a wavelet-based edge-detection algorithm can successfully extract edges of bony anatomy from radiation oncology images, and that these edges can be used to align these images.

Methods and Materials: Two data sets were used for this study. In the first set, the reference image was a digitally reconstructed radiograph of an AP pelvis field, and the test images were digitally reconstructed portal images of the field with known displacements. In the second set, the reference image was a portal image of a lateral upper neck field, and the test images were portal images of the same field with known displacements. In both sets of images, edges of bony landmarks were identified by convolving each row and column of the image with a Haar wavelet, then extracting local maxima/minima whose values lay above a specified threshold. Test images were then manually aligned with the reference image by aligning the edges.

Results: By proper selection of convolution and edge-extraction parameters, edges corresponding to specific bony landmarks on both sets of images can be extracted, allowing the images to be aligned correctly.

Conclusions: A wavelet-based technique for extracting edges of bony landmarks from radiation oncology images can be incorporated with various alignment techniques to effect automatic alignment of these images.

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